trotec

E340

Operating manual

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ENGLISH (translation)

SETTING NEW STANDARDS

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CONTENT

1 GENERAL INFORMATION

1.1 About this manual

Read this manual completely and carefully before commissioning.

This manual is an integral part of the machine and must therefore be kept in its immediate vicinity and be accessible at all times.

This manual describes the safe and proper handling of the machine. Observe the safety notes and instructions, as well as the local accident prevention regulations and general safety instructions for the area of application. Before beginning any work on the unit, fully read the manual and in particular the chapter entitled “Safety” and the respective safety notes. The contents must have been fully understood.

1.2 Explanation of symbols

Important technical safety information and instructions in this manual are indicated by symbols. These notices and instructions on workplace safety must be observed and followed. Avoid accidents, personal injury and property damage by acting with care.

DANGER

This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

This symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

WARNING LASER

This symbol indicates hazardous situations due to the laser beam. Non-observance of the safety instructions may result in serious injury.

WARNING DANGEROUS ELECTRICAL VOLTAGE

This symbol indicates hazardous situations due to electrical voltage. Non-observance of the safety instructions may result in serious injury or death. Caution must be exercised, especially during maintenance and repair work.

NOTICE

This symbol indicates potential risks of damage to the supported product (or to property).

In addition, non-observance may result in damage, malfunction or failure of the machine.

DISPOSAL

This symbol indicates notices regarding the disposal of the product or accessories according to good professional practice .

1.3 Liability and warranty

Warranty periods specified in the manufacturer's warranty conditions are binding for the purchaser. If no warranty periods are specified, Trotec Laser GmbH's general conditions of sale, delivery, and payment shall apply.

The information, illustrations, tables, specifications and diagrams contained in this document have been carefully prepared according to the currently valid status. No liability whatsoever is accepted for errors, omissions, and damages and consequential damages resulting therefrom.

Strict compliance with the safety procedures described in this manual and extreme caution when using the equipment are essential in avoiding and reducing the possibility of personal injury or damage to the equipment. The manufacturer will assume no liability for any damage or malfunction caused by failure to comply with this manual.

Failure to observe the instructions for operation, maintenance, and upkeep described by the manufacturer in this operating manual excludes any liability on the part of the manufacturer in the event of a defect.

No liability whatsoever is accepted for damage caused by the use of non-original parts and accessories.

Trotec Laser GmbH shall not be liable for any personal injury or property damage of a direct, indirect or special nature, consequential damages, loss of business profits, business interruption or loss of business information resulting from the use of the equipment described in this operating manual.

The user is strictly prohibited from carrying out any changes, conversions, translations into another computer language, decompiling, disassembling, reverse engineering and from making copies (with the exception of any necessary backup copies).

In terms of technical progress, Trotec Laser GmbH reserves the right to update the information, illustrations, tables, specifications, and diagrams contained in this document at any time without prior notice.

1.4 Scope of delivery (standard configuration)

- Laser machine
- Cleaning set for lenses
- Lens holder with 2" lens
- 2 nozzles
- Allen key set

The actual scope of delivery may differ from the information provided here due to additional options or the latest technical modifications.

The accessory box contains the following:

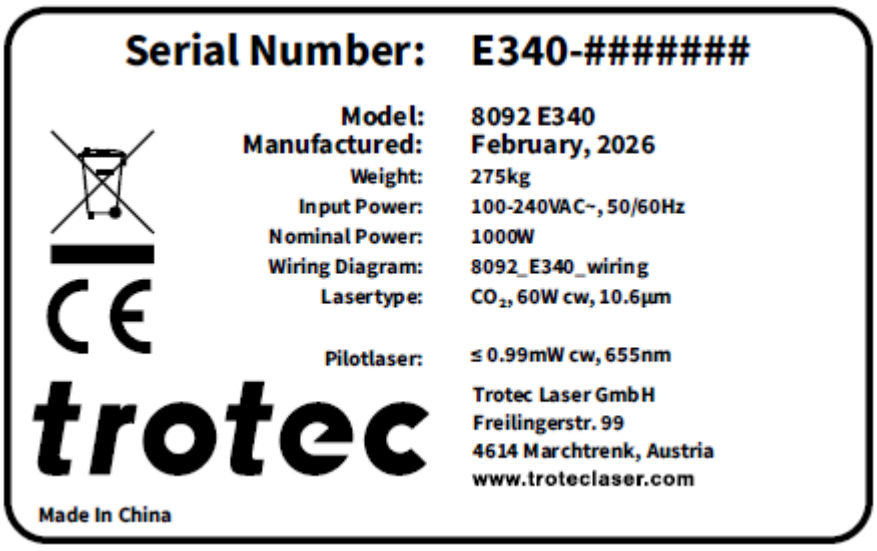
- Key
- Cleaning sticks (50 pcs.)
- CAT-5e LAN cable (5 m)
- Focus tool
- Auxiliary tool for lenses
- Screwdriver
- Replacement sealing rings for lenses
- Bellows
- Utility knife
- Cable ties
- Ruler
- Replacement toothed belt

1.5 Type plate

The data plate with the CE mark is located on the back of the unit.

Transfer the serial number, model and year of manufacture to your manual and always refer to this information in case of inquiries, problems with the unit, or spare parts orders.

Serial number:	
Model:	
Year of manufacture:	



2 SAFETY

TO AVOID POSSIBLE HARM READ AND FOLLOW THESE INSTRUCTIONS.

The machine is built at the time of it's development and production according to applicable, established technical rules and is considered to be safe to operate.

Dangers can be caused by the machine if the machine:

- is operated by unqualified personnel,
- staff have not been trained,
- the machine is used improperly or not as intended,
- or if the machine is used for other intended purposes.

This chapter provides an overview of all the important safety aspects that are required for optimal protection of people, as well as safe and trouble-free operation of the machine. Other chapters of this manual contain specific safety instructions for averting and avoiding danger.

2.1 General safety notes

2.1.1 Intended use

The machine is used for cutting, engraving and marking materials with a laser machine using the software supplied.

The machine may only be operated in conjunction with a suitable and effective exhaust system. The machine may only be used while it is being supervised. The rotary engraving attachment may only be operated with cylindrical objects.

The machine is intended exclusively for professional use. It is not permitted for consumers to use it.

2.1.2 Foreseeable misuse

- Do not use any materials other than those listed in the materials list of the operating manual. Using inappropriate materials can result in fires and toxic fumes.
- Only use the machine in the manner described in the operating manual.
- Operating the machine either without or with modified safety devices.
- Non-compliance with cleaning instructions; failure to notice signs of wear and tear damage.
- Carrying out cleaning work on the machine without disconnecting it from the power supply.
- Operating the machine despite visible faults.
- Repair work undertaken by the customer.

- Installation in potentially explosive atmospheres, e.g. in areas where there is a lot of wood dust, etc.
- Use of the machine outside the operational area.

2.1.3 Machine modification

It is strictly prohibited to alter, refit or modify the machine in any way without the express consent of the manufacturer.

Likewise, it is strictly prohibited to remove, bridge or bypass any safety devices. The operating conditions, and connection and setup values stated in the data sheet must be complied with at all times.

The machine may only be operated using parts and original accessories provided by the manufacturer. Using third-party accessories and spare parts affects machine safety.

2.1.4 Operating modes

Normal operation

For normal operation, the following conditions must be met:

- Intended use of the machine (see chapter "Intended use").
- Operation by trained operating personnel.
- Fully functioning and installed safety and protective devices.
- Machine in perfect condition.
- Processing of permissible materials according to the material lists.
- Maintenance and service are not included.

During normal operation it is not necessary to wear laser safety goggles.

Self-Service

Self-Service can be performed by the operator.

Other operating modes may be available; these are described in the Self-Service Manual.

Service operation

Service activities may only be carried out by authorized, trained service technicians. If cladding elements and side covers are removed and protective devices are bypassed, this can result in direct and indirect scattered radiation. Service operation is declared to be laser class 4 and appropriate precautionary measures must be taken (see section "Laser classes of this machine").

2.1.5 Applicable safety regulations

EU laws and directives

Trotec Laser GmbH issues an EU Declaration of Conformity for the laser machine in accordance with EC Machinery Directive 2006/42/EC.

With the CE labeling, Trotec Laser GmbH confirms compliance with the following EU directives:

- EC Machinery Directive 2006/42/EC
- Directive on Electromagnetic Compatibility 2014/30/EU

The CE labeling can be found on the type plate.

Applied harmonized standards

Please refer to the supplied EU Declaration of Conformity for the standards applied by Trotec Laser GmbH.

Observe applicable safety regulations

Instructions and directives in this manual may differ locally, regionally, and/or internationally. Please observe the country-specific guidelines that apply to you.

The operator is responsible for meeting all safety requirements since Trotec Laser GmbH has no influence on the correct use of the unit.

Adhere to official regulations for your operating site in accordance with the applicable local legal provisions (for accident prevention regulations or employee protection), e.g. DGUV regulation 11 for Germany.

Laser classes of this machine

A laser protection class characterizes the potential risk of accessible laser radiation.

The laser system complies with class 2 in accordance with EN 60825-1 “Safety of Laser Products”.

The built-in laser source is class 4 in accordance with EN 60825-1 and is labeled as such. During operation, laser class 4 is not accessible due to the safety features of the machine.

Laser classes

The operator is responsible for obtaining information about, and complying with, any national legal requirements and official regulations in respect of operating laser systems with an integrated class 4 laser source.

Definition of laser classes

Class 2 (US: class II)

The accessible laser radiation of Class 2 (US: Class II) laser systems does not pose any hazard for the skin. Diffuse reflections as well as any short-term irradiation of the eyes (exposure time max. 0.25 seconds) also pose no risk due to the low output power. However, it is possible to suppress the natural eyelid closure reflex and stare into the class-2 laser beam for a time long enough for the eyes to get injured.

Class 4 (US: class IV)

Class 4 (US: class IV) high powered lasers (visible or invisible) considered to present potential acute hazard to the eye and skin for both direct and scatter (diffused) conditions.

Also have potential hazard considerations for fire (ignition) and byproduct emissions from target or process materials. It is the responsibility of the operator of the machine to take appropriate measurements to eliminate any dangers such as fire or explosions through the laser beam.

2.2 Areas of responsibility

2.2.1 Responsibilities of the operator

The operator has the following responsibilities:

- It is the responsibility of the operator to know the national legal regulations and official requirements (e.g. reporting obligation) for operating class 4 laser systems / laser systems with an integrated class 4 laser source and to comply with these.
- Observe the safety notes and instructions, as well as the local accident prevention regulations and general safety instructions for the area of application.
- A CO_2 fire extinguisher must be located in the immediate vicinity of the laser machine since the laser beam can ignite flammable material.
- If the machine is used in the commercial sector, the operator is subject to the statutory obligations concerning workplace safety.
- The operator must ensure that the operating personnel have read and understood this manual, in particular the “Safety” chapter. The staff must furthermore be trained on an annual basis and informed about the dangers / laser safety measures.
- The operator is advised to prepare in-house operating procedures, taking into account the professional or occupational qualifications of the respective staff deployed, and to have receipt of such procedures or the manual, or participation in instruction/training sessions, confirmed in writing.
- The manual must be kept in the immediate vicinity of the machine and be accessible to persons working on the machine at all times.
- Responsibility for the various activities involved in operating the machine (e.g. installation, operation, maintenance and cleaning) must be clearly defined and adhered to so that no unclear responsibilities arise in terms of safety.
- The maintenance and servicing work specified in this manual must be carried out at regular intervals.*

- For all work relating to installation, commissioning, set-up, operation, changes to operating conditions or procedures, maintenance, inspection and repair, and any shutdown procedures specified in the manual as necessary must be observed.
- The operator is responsible for the safety-related condition of the machine. The machine may only be put into operation once all safety devices have been checked and all of the safety requirements have been met.*
- Flammable and highly reflective material must not be stored in the laser processing area or in the immediate vicinity of the machine.
- The operator must ensure cleanliness and accessibility on and around the machine through the use of appropriate instructions and controls.
- The machine may only be operated with a suitable and effective exhaust system.
- The operator must ensure adequate and glare-free lighting in the area of the operating stations. Avoid direct sunlight.

* See chapter "Maintenance"

2.3 Requirements for the operating and service personnel

The operator must be an adult. They must not be under the influence of intoxicating or reaction-inhibiting substances. They must be in good health to operate the machine.

Operators

An operator is a member of staff who works with the machine.

Work that operators may perform on the machine:

- Operation
- Inserting and removing items

  Operators who use the machine must be instructed by an authorized person (qualified personnel) about the tasks assigned to them and the dangers of improper conduct. Operators must be trained and instructed on the necessary safety equipment and protective measures.

Qualified personnel

Work that may be carried out on the machine by qualified personnel:

- Maintenance in accordance with the operating manual (see "Maintenance")
- Installation
- Connection
- Initial commissioning

  Qualified personnel are those who, based on their training, knowledge and experience, as well as their knowledge of the relevant standards and regulations, are able to assess the work assigned to them and to independently recognize potential hazards. They also have knowledge of the operating manual for the machine. Qualified personnel are, for example, mechanics, electricians, mechatronics engineers.

Self-Service

Self-Service can be performed by the operator.

There might also be other personnel-related requirements; these are described in the Self-Service Manual.

Trotec service personnel

Work that Trotec service personnel perform on the machine:

- Service and Repair Work

Unauthorized persons

Unauthorized persons must not be allowed near the machine.

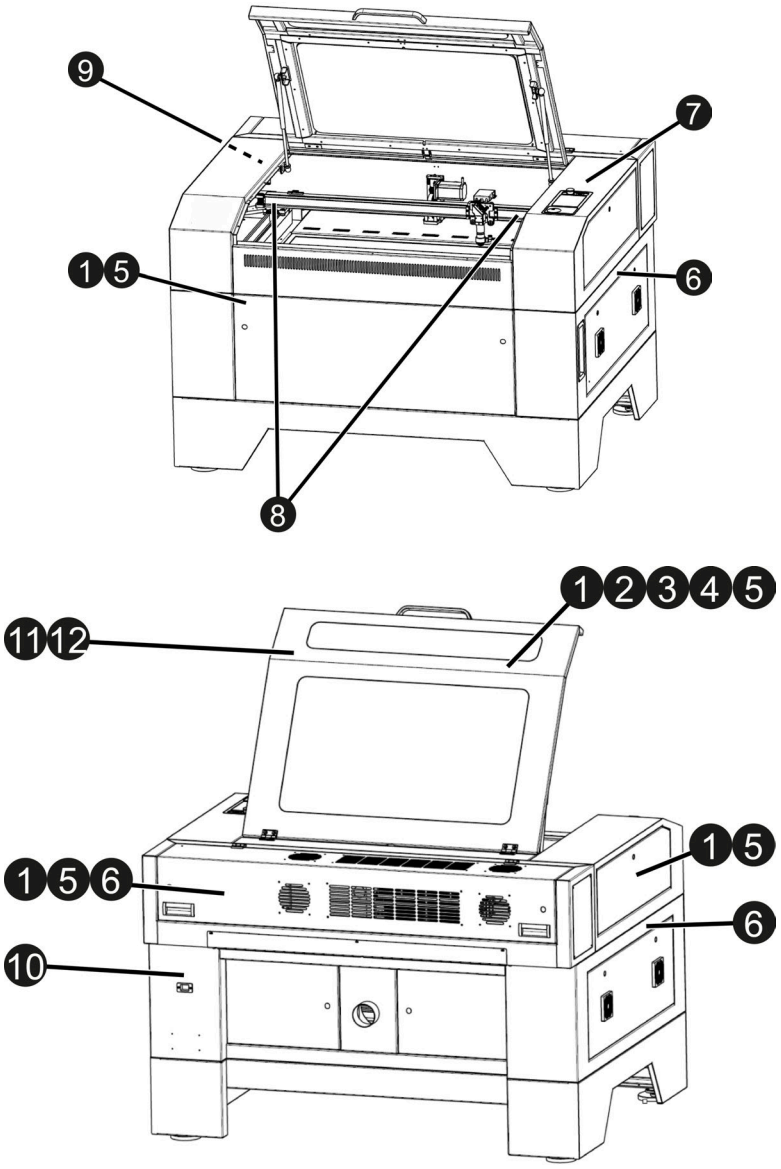
2.4 Warning and information labels

The warning and information stickers are affixed to the unit at those points which pose a potential source of danger before commissioning and during commissioning. Pay special attention to these labels.

Lost or damaged warning and safety stickers

If any warning and safety stickers are lost or damaged, the user is no longer able to recognize them or interpret them correctly. There is a risk of injury.

- If they are lost or damaged, they should be replaced immediately.
- Contact your responsible sales partner for details.



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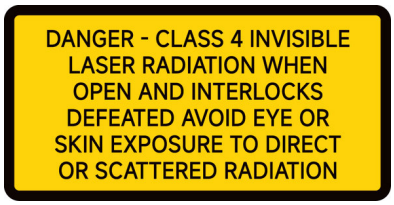

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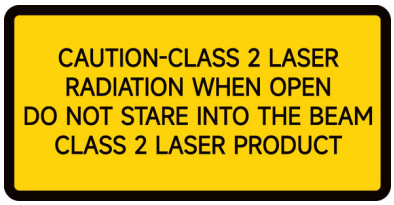

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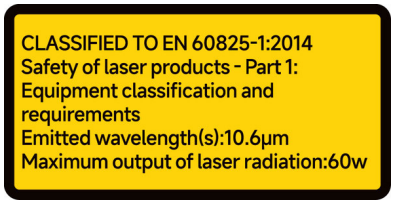

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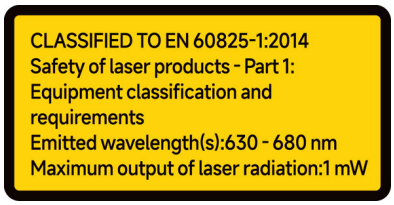

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11

12

Interior warning and information signs

Central earthing point in the lower right side flap:

Under the cover for the laser source

Right at the laser source

5

Under the cover for the laser source

Above the protective window

5 2 4

2.5 Safety devices

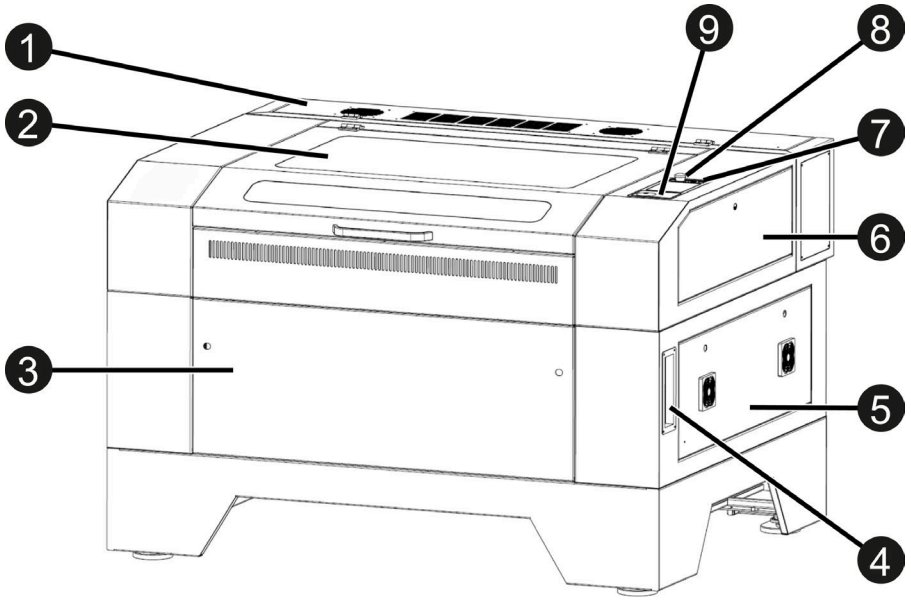
Danger due to laser beam

If the safety equipment and protective devices are not fully functional, this may result in personal injury and damage to equipment.

- Components that form part of the protective device must be original Trotec components and may only be replaced by original Trotec parts.
- Do not remove, tamper with, or put out of operation the interlock safety switch or protective covers on the system. These must remain fully functional at all times.

- Should damage to the safety equipment or protective devices be suspected or detected, the machine must be disconnected from the main power supply.
- Any damaged protective devices must be immediately replaced by a Trotec technician.

2.5.1 Overview of unit

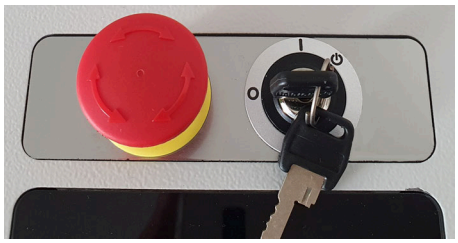


No.	Description	No.	Description
1	Cover for the laser source	6	Side cover upper right
2	Viewing lid	7	Key switch
3	Front lid	8	Emergency stop button
4	Main switch	9	Emission display
5	Side cover lower right		

2.5.2 Main switch

The main switch on the right side of the machine is used to disconnect or connect the machine from the main power supply.

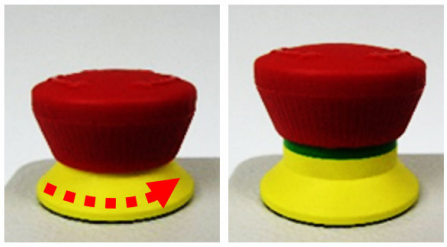
2.5.3 Key switch



Turning the key switch to the “0 position” de-energizes the motor, laser source, and electronics. It causes the machine to instantly stop and the laser source to switch off. Operation of the machine by unauthorized persons can be prevented by removing the key from the switch.

2.5.4 Emergency stop button

Pressing the emergency stop button instantly stops the machine and switches off the laser source. The laser beam is switched off and all movements are stopped.



Resetting the emergency stop button

1. Eliminate the hazard before resetting the emergency stop button.
2. Turn the emergency stop button counterclockwise to unlock it so that the green marking is visible.
3. Restart the laser system using the key switch.

2.5.5 Emission display

The laser system is equipped with an emission display on the keypad (see Keypad).

2.5.6 Shutter

If the safety circuit of the laser is opened, the safety shutter in the laser machine beam path shall close immediately. The laser beam is interrupted mechanically.

2.5.7 Interlock safety switches

The closed position of the viewing lid, the top left side cover, the front lid and the laser source cover on the rear of the machine is monitored using interlock safety switches. Commissioning of the machine is not possible if the safety guards are open or not in place. However, the pilot laser remains active.

2.5.8 Viewing lid

The viewing lid is matched to the laser type and protects against emissions of dangerous laser radiation.

Regularly check the viewing lid for damage (scratches, burns, etc.). Only operate the machine if the lid is in perfect condition (see "Maintenance schedules", page 70).

2.5.9 Covers

The front lid, the four side covers and the covers for the laser source and lenses serve both as laser protection and to prevent mechanical and electrical hazards. To ensure safe operation, all covers must always be fitted, closed and properly fastened.

2.5.10 In case of safety device malfunction

If malfunctions or damage to the safety or protective devices is suspected or detected, this may result in personal injury or damage to the machine. Therefore, the following measures must be followed:

1. Press the emergency stop button.
2. Disconnect the machine from the main power supply.
3. Contact our technical support team in your area.

2.6 Secondary (indirect) hazards

2.6.1 Fire hazard

There is a risk of fire due to gases and the processing of easily flammable materials. If laser radiation hits easily flammable material, e.g. paper, this may ignite and a fire can quickly start.

In addition, gases that form below the material to be processed may ignite, especially if requirements relating to the exhaust system are not met. Inadequate care and cleaning of the system increases the risk of flame formation.

To minimize the risk of fire, implement the following measures:

- Do not leave the machine unattended when in operation.
- Focus exactly on the workpiece surface.
- Use an adequate exhaust system to minimize or exclude the possibility of flames (see "Exhaust system requirements", page 27).
- Keep a CO_2fire extinguisher to hand and mount it in the immediate vicinity of the machine.

- Before switching on the laser, you should make absolutely sure that there is no easily flammable material in the laser beam path.
- Regularly check the ventilation slots inside the system for damage, dirt or blockages (e.g. as a result of cutting residue).

2.6.2 Gases, vapors and dust

Depending on the processed materials and selected parameters, it is possible for gases, vapors, aerosols or dusts to form during laser processing. Depending on the workpiece, these byproducts can be toxic. In individual cases, the reaction products may be electrically conductive dusts. If these get into electric systems, it may lead to short-circuiting that could result in personal injury and damage to property.

The operator must also ensure a suitable exhaust system is in place and that they comply with the relevant guidelines in order to avoid risk to humans or the environment. You can find information on this in the VDI 2262 1...3 guidelines, “Workplace air”.

The operating person must also ensure that gases, fumes or dust do not settle on the processing lens. Dirt on the processing lens can result in loss of performance, poor processing results and damage to the machine.

2.6.3 Hazards due to damaged optics

Damage of the lenses

Dirty lenses absorb laser radiation, which can destroy them. Broken or damaged lenses and thermal decomposition of lenses release particles that are hazardous to health.

- Clean the deflection mirror and lenses in the laser beam guidance area regularly.
- Take particular care when handling, attaching and cleaning.
- Always apply even pressure to the lens and do not apply pressure to one side only.
- Do not use tools or hard objects to clean the surface.
- Do not touch the lens surface with your fingers.
- Only use cleaning cloths once, never repeatedly.
- In the event of broken or damaged lenses or thermal decomposition of lenses, follow the appropriate protective measures (see "Protective measures for damaged optics").
- Disposal must be in accordance with local laws.
- Scratched lenses or lenses with a burn mark must not be used.

Scratched or damaged lens surface

Please note that scratches in the surface coating may produce small amounts of toxic emissions that are hazardous to health if inhaled or swallowed.

Thermal decomposition

Thermal decomposition produces smoke from selenium and zinc oxides. There is a risk of poisoning if inhaled or swallowed. Indicators of thermal decomposition of ZnSe (zinc selenide) are deposits in the form of white or red powder and an unpleasant odor.

Broken lenses

When optical components made of ZnSe (zinc selenide) are destroyed, toxic dust and vapors are produced, which must not be inhaled. The dust can also cause irritation to the eyes, skin and respiratory system. If a lens is destroyed during operation, extra care must be taken when removing and cleaning it.

2.6.4 Protective measures for damaged optics

Protective measures in the event of thermal decomposition and scratched or damaged lenses

- Wear a protective mask (e.g. FFP2) or respirator filter during disposal in order to prevent any inhalation or ingestion of thorium.
- Thoroughly wash hands after coming into contact with a scratched coating.

Protective measures in the event of a broken lens

- Switch off the machine if an unpleasant odor is detected.
- Hold your breath and immediately leave the operational area.
- Wait at least 30 minutes until the reaction has subsided.
- Wear appropriate protective clothing (respiratory protection, safety goggles, protective suit, and rubber or plastic gloves).
- Ensure there is ventilation.
- Pay attention to the formation of any odors when approaching and re-connecting the equipment.
- Remove all fragments of lens.
- Avoid disturbing any dust.

DISPOSAL

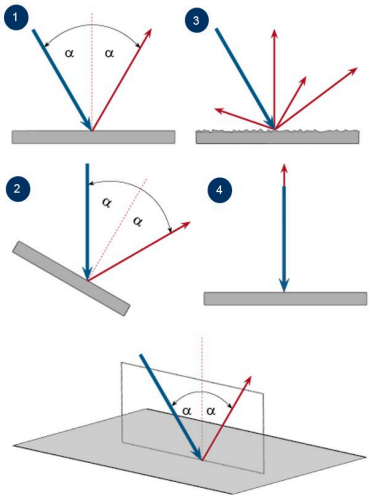
Remove the ZnSe dust and the lens dry. Together with any fragments, brooms, shovels or protective clothing, these must be disposed of as hazardous waste in airtight sealable containers or in sealed plastic bags.

Do not dispose of optical components in household waste and do not allow them to enter the sewage system or other water systems.

Disposal must be in accordance with local laws.

Reflection of laser radiation

The law of reflection applies to the reflection of laser radiation: **Angle of incidence = angle of reflection**



No.	Description
1	Directed reflection: Reflected laser beam on a smooth surface.
2	Directed reflection: Reflected laser beam on an inclined surface.
3	Diffuse reflection: Reflected laser beam on a rough surface.
4	Directed reflection: Horizontally reflected laser beam on a smooth surface.

2.7 In case of emergency

What to do in the event of malfunctions

- In the event of a fire: Fight the fire with a CO_2 fire extinguisher if it is safe to do so.
- After a deletion, involve Trotec Laser GmbH Technical Support must be involved before the system is put back into operation.
- In the event of unusual operating conditions, press the emergency stop button and switch off the machine.
- If necessary, disconnect the machine from the main power supply.
- Inform the laser safety officer and your supervisor.
- Repair work must only be carried out by Trotec Laser GmbH service technicians.

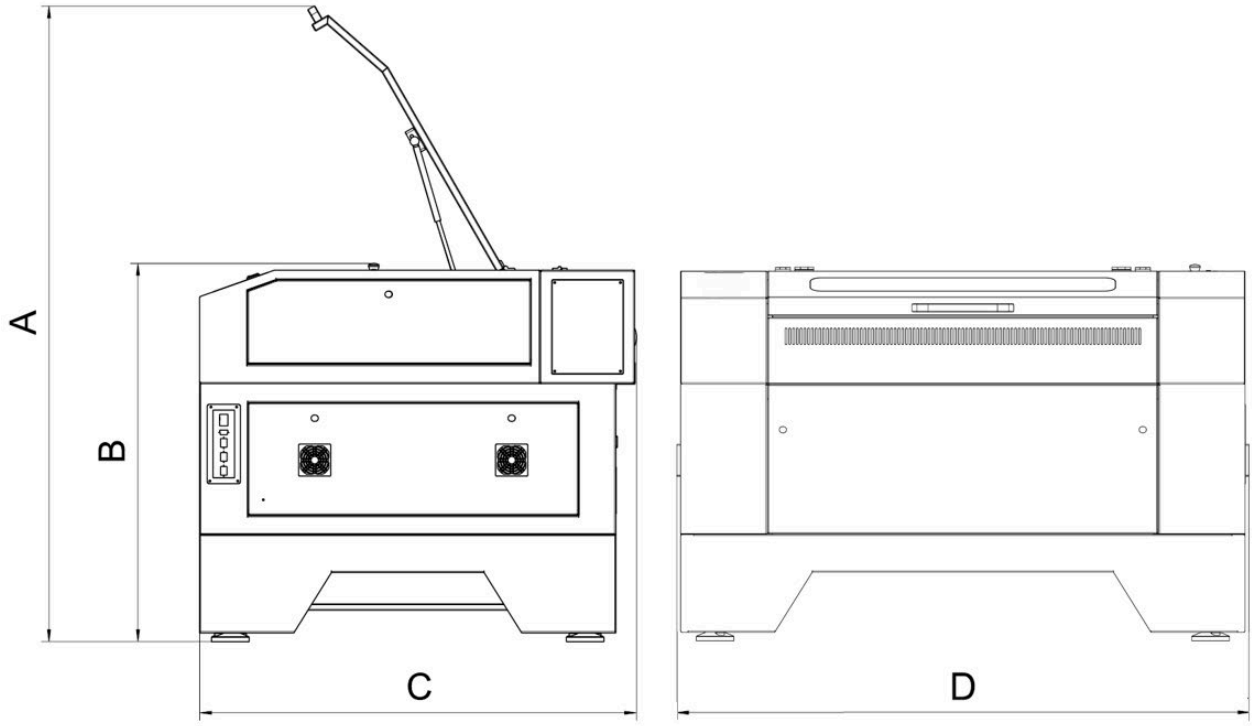
What to do in the event of an accident; first aid

- If eye damage occurs due to laser radiation, the casualty must be immediately seen by an ophthalmologist.
- The first aider must always ensure that they protect themselves.
- De-energize the unit and secure it against restarting:
  - Remove the key from the key switch.
  - Unplug the mains cable.
- Remove the injured person from the danger zone and provide first aid.
- Call an ambulance!

3 TECHNICAL DATA

→ **The technical data sheet can be found in the appendix of this manual.**

3.1 Dimensions and weight



	Description	Dimensions
A	Height when open	1682 mm
B	Height closed	1155 mm
C	Depth	1155 mm
D	Width	1520 mm
	Weight	approx. 275 kg

3.2 Noise emissions

The machine's noise emissions are below 80 dB. It can be operated without hearing protection.

3.3 Network connection

PC recommendations

Customer

- Operating system: Windows, Linux, or Mac (web-based access)
- Screen resolution: min. 1920 x 1080 (Full HD)
- Latest Chromium-based browser
- RAM: min. 16 GB

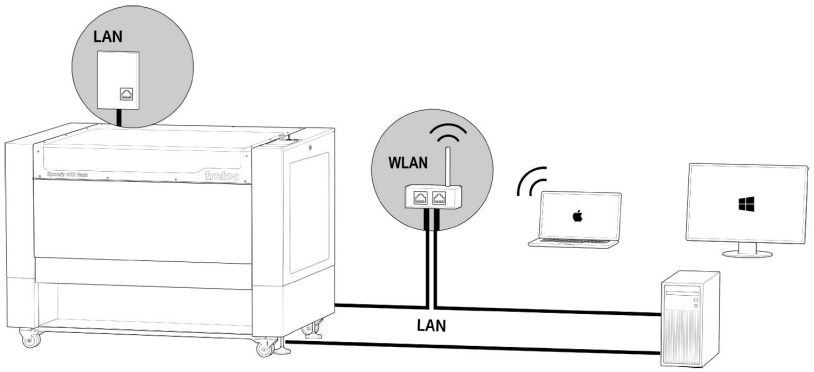
Network

- 100 Mbit Speed
- CAT5e or higher
- WiFi: 2.4 GHz or 5 GHz

3.4 Computer connection

Connect the machine to the local network connection or directly to the computer using a network cable (see chapter "Machine overview").

The network settings must be configured when the machine is started up for the first time.



Illustration, as an example

NOTICE

You can find information on the connections in the chapter entitled "Overview of unit".

3.5 Requirements for the electrical connections of the machine

NOTICE

- Ensure that the socket outlet can supply the correct voltage, frequency, and current for the laser system.
- Use separate circuits for the laser engraving machine and exhaust unit.
- Install the computer on the same circuit as the laser engraving machine to avoid electromagnetic interactions.

Damage from an insufficient or unsuitable power supply is not covered by the warranty.

Noisy or unstable current and voltage peaks can lead to faults as well as damage to the electronics of the laser system. It is preferable to connect the laser system to a dedicated electrical line.

Surge protection connectors are strongly recommended to protect the computer equipment.

If fluctuations in power supply, brownouts and/or blackouts occur frequently in your area, a stabilizer, UPS (uninterruptible power supply) or backup generator may be needed. When installing such units, ensure that they meet the electrical requirements of the laser system.

Laser power	60 W
Voltage	100-240 V
Fuse	16 A (built-in, resettable)
Power consumption AC	1000 W

* T = time delay (slow release)

3.6 Exhaust system requirements

WARNING

Risk of emission of toxic gases, vapors or dust

During material processing, toxic and harmful gases, vapors and dusts may be produced.

- Only operate the unit with a working exhaust system that is suitable for the materials to be laser-processed.
- Ask the manufacturer of the material about any potentially toxic effects of the material.

NOTICE

The laser may only be operated with properly installed and operating exhaust system. Damage to the system, caused by the use of not any exhaust system or improper extraction equipment, will not be covered by any liability.

Recommended exhaust systems

Information about compatible exhaust systems can be found on our website:

https://www.troteclaser.com/en-us/helpcenter/machines/exhaust-systems/compatible-exhaust-systems

We recommend consulting with a qualified Trotec technician.

NOTICE

Observe the instructions for operation and maintenance in the operation manual for the exhaust system.

Technical data for corresponding exhaust systems

The technical data for the corresponding exhaust systems can be found on our website:

https://www.troteclaser.com/en-us/helpcenter/downloads

Minimum requirements for the exhaust system for standard applications

Machine	Effective volume flow [m^3/h]	Pressure [Pa]
E340	400	4200

The exhaust connection on the side of the machine is used as the measuring point for volume flow and pressure. Losses in pressure due to the laser machine, table inserts, hoses and pipes or filters in the exhaust system must be determined and taken into account by the operator when selecting a suitable exhaust system. This is specifically relevant if the exhaust systems recommended by Trotec Laser GmbH are not used.

It must be ensured that devices use the appropriate filter stages so that pollutants and dust are effectively and reliably removed. Local guidelines regarding permissible limits must be observed.

A powerful exhaust system prevents a reduction in the service life of the lenses and mechanical components, the cutting quality and the laser power acting on the workpiece caused by fumes and dust remaining in the machine.

NOTICE

The extraction power available for the application is reduced by bends, small hose diameters and long hoses, among other things.

Therefore, please note the following:

- Prevent bends or kinks.
- Keep the hose lengths short.
- Use the largest possible hose diameter.

Dust-intensive applications or applications that generate large amounts of gases may require a more powerful exhaust system.

In such cases, you must consult your sales partner.

3.7 Materials

WARNING

Non-approved materials:

- Leather and vinyl with chrome (VI)
- Carbon fibers (carbon)
- Polyvinyl chlorides (PVC)
- Polyvinyl butyral (PVB)
- Polytetrafluorethylenes (PTFE/Teflon)
- Beryllium oxide
- Lead
- Melamine
- Materials containing halogens (fluorine, chlorine, bromine, iodine and astatine), halogenated epoxy resin or phenolic resins.

Care should be taken with the following materials (see "Notice", page 30):

- Manganese
- Chrome
- Nickel
- Cobalt
- Copper
- and when processing materials with the label “flame-retardant”, as they often contain bromine.

Carry out a processing test with the corresponding configuration.

WARNING

Serious injury or material damage.

The use of any unauthorized or non-approved materials in the above list may result in serious personal injury or damage to property and will void the warranty.

Only use approved and released materials.

WARNING

Danger from laser beam

Invisible laser radiation from reflective materials can cause personal injury and damage to property.

- Processing of materials according to the intended use of the machine.
- Take particular care with concave surfaces.
- Do not place any objects except the workpiece on the work surface or in the work area.

NOTICE

Please contact our experienced application specialists or a sales partner in your area if:

- You are unsure about processing a material.
- You have additions for further materials. In your opinion, a material was not referenced.

It is recommended to carry out a processing test using an appropriate configuration for materials that require care.

Trotec Laser GmbH accepts no liability for any effects resulting from the laser processing of any materials, especially in medical and pharmaceutical applications.

Unless written approval is given, Trotec Laser GmbH accepts no liability and the warranty will be void.

3.7.1 Materials list

Material	Cutting	Engraving	Marking
Metals			
Aluminum			
Anodized aluminum		✓	
Chrome, chromium-plated surfaces			
Precious metals			
Stainless steel			
coated metal (lacquered)		✓	
Brass			
Copper			
Titanium			

Material	Cutting	Engraving	Marking
Plastics			
Acrylonitrile butadiene styrene copolymer (ABS)	✓	✓	
Acrylic (PMMA), e.g. Plexiglas®, transparent	✓	✓	
Acrylic (PMMA), e.g. Plexiglas®, colored	✓	✓	
Rubber (stamp rubber)	✓	✓	
Polyamide (PA)	✓	✓	
Polybutylene terephthalate (PBT)	✓	✓	
Polycarbonate (PC), transparent	✓	✓	
Polycarbonate (PC), colored	✓	✓	
Polyethylene (PE)	✓	✓	
Polyester (PES)	✓	✓	
Polyethylene terephthalate (PET), transparent	✓	✓	
Polyethylene terephthalate (PET), colored	✓	✓	
Polyimide (PI)	✓	✓	
Polypropylene (PP)	✓	✓	
Polyphenylene sulfide (PPS)	✓	✓	
Polystyrene (PS), transparent	✓	✓	
Polystyrene (PS), colored	✓	✓	
Polyurethane (PUR)	✓	✓	
Foam material (PVC free)	✓	✓	

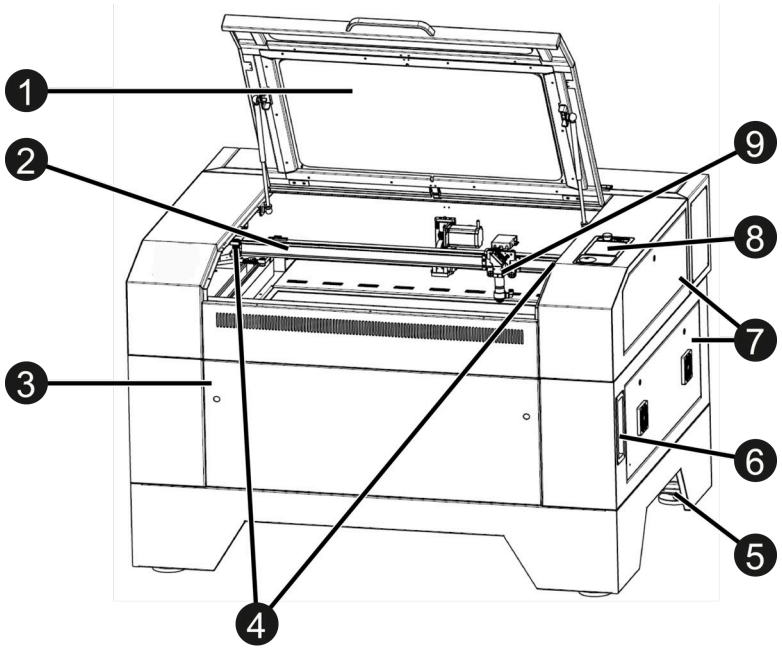
Material	Cutting	Engraving	Marking
Other materials			
Wood	✓	✓	
Mirrors		✓	
Stone		✓	
Paper (white)	✓		
Paper (colored)	✓		✓
Foodstuffs		✓	
Leather	✓	✓	
Fabrics	✓	✓	
Glass, transparent		✓	
Glass, colored		✓	
Ceramics		✓	✓
Cardboard	✓	✓	
Cork	✓	✓	
Marking agent (on metal or ceramic/glass) e. g. markSolid			✓

3.8 Service life of the machine

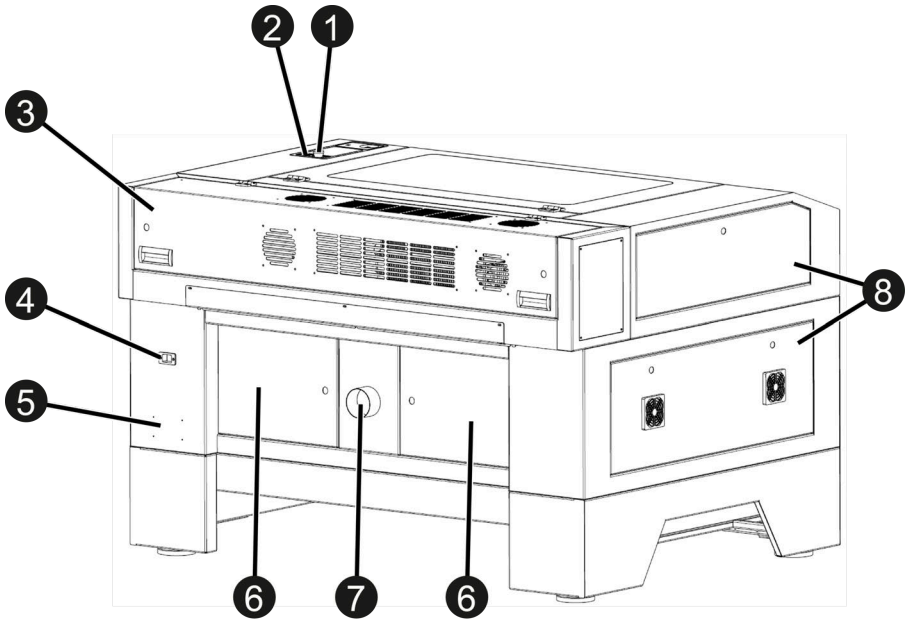
If used correctly, the machine is designed to have a service life of 10 years. It does, however, require regular maintenance. If the machine is to be operated for longer, a general overhaul must be carried out by the manufacturer.

4 MACHINE OVERVIEW

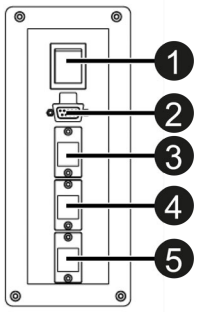
4.1 Overview of unit



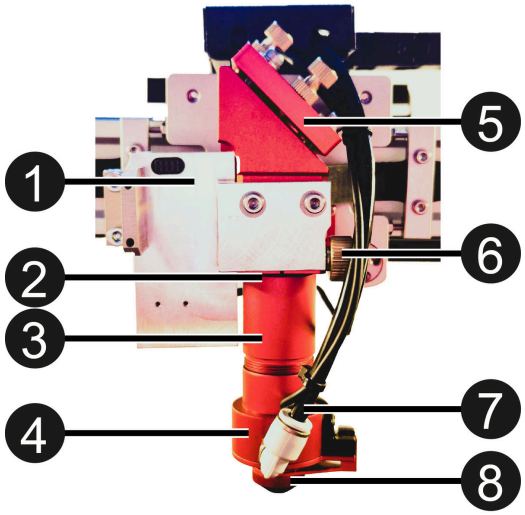
No.	Description	No.	Description
1	Viewing lid	6	I/O module
2	X-axis	7	Right-hand side cover
3	Front lid	8	Control panel
4	LED interior lighting	9	Work head
5	Adjustable feet/rollers		



No.	Description	No.	Description
1	Emergency stop button	5	Type plate
2	Key switch	6	Rear maintenance flap
3	Cover for the laser source	7	Connection for exhaust hose
4	Grid connection	8	Left-hand side cover



No.	Description	No.	Description
1	Main switch	4	Connection for exhaust system (EXT CTRL)
2	Connection for exhaust system (EXHAUST Legacy)	5	Local area network connection
3	USB connection		



No.	Description	No.	Description
1	VPC camera holder (optional)	5	Mirror #3
2	Sealing ring	6	Knurled thumbscrew
3	Lens tube	7	Hose for Air Assist
4	Nozzle holder	8	Nozzle

4.2 Front lid for cleaning

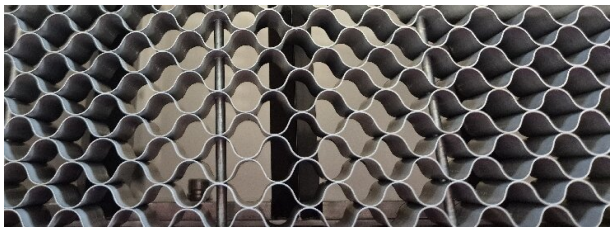
NOTICE

The front lid is secured using interlock safety switches.

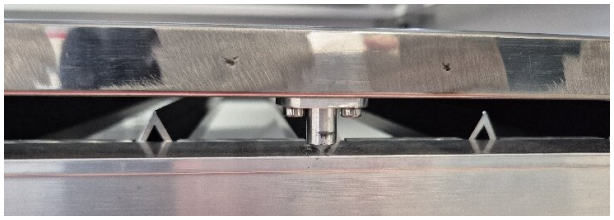
Close the front lid before commissioning the machine in order to enable operation.

The appliance is equipped with a front lid. The front lid can be opened with an Allen key. This allows the interior to be cleaned using a brush.

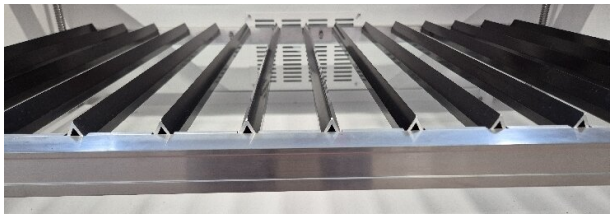
4.3 Tables



Honeycomb cutting table



Metal pins for centering the honeycomb cutting table on the aluminum lamella cutting table



Aluminum lamella cutting table

The processing table consists of an aluminum lamella cutting table and a honeycomb cutting table. Both tables are combined to form a single unit and are joined together with metal pins to ensure the perfect fit. If required, the tables can be separated and used individually. The number of slats to be inserted can be varied.

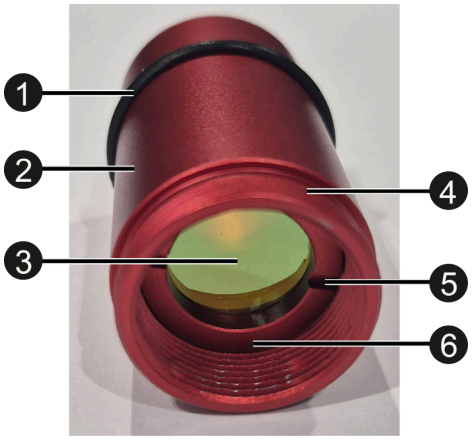
4.4 Lens

CAUTION

Only use the following lens

If a lens other than the approved lens is used, this may result in injury to people and the machine may be damaged.

- Only use the 2-inch lens permitted in the instructions.



No.	Description	No.	Description
1	Sealing ring	4	Thread for nozzle holder
2	Lens tube	5	Notch for original auxiliary tool
3	Lens	6	Clamping ring

4.5 Nozzles

Ø 3 mm

Short nozzle with small diameter

Generates a strong, targeted air flow directly onto the interface. Ideal for cutting wood since soot formation is prevented.

Ø 6 mm

Short nozzle with large diameter.

Provides a smoother, wider airflow that is not aimed directly at the interface. Ideal for cutting acrylic. It ensures that when engraving (e.g. wood) there is even distribution and extraction of particles and smoke, resulting in clean engravings without smoke marks.

5 TRANSPORT

5.1 Safety notes

WARNING

Risk of crushing due to falling parts during transportation

The machine is very heavy. Fatal injuries could occur.

- Unpack the machine from the transport packaging (wooden crate) before transporting it within the company premises.
- Follow the instructions in this manual for preparing the unit for internal transportation.
- Always use the lifting points provided for forklift transport when moving the machine within the company premises.
- Never stand under suspended loads.
- Wear suitable personal protective equipment (protective gloves, safety goggles, safety shoes, helmet, etc.)

WARNING

- Always exert utmost care and caution when moving the unit.
- Pay attention to the center of gravity during transport (risk of toppling).
- Observe handling icons (e.g. transport the machine only upright).
- Secure the units against lateral slipping or falling over.
- Transport the unit as gently as possible.
- Avoid vibrations.
- For ocean transport, the unit must be packaged tightly and protected against corrosion.
- Only transport outdoors in transport vehicles with a roof or other adequate weather protection.
- Secure the unit with belts and ropes and leave enough distance from other objects.
- Do not place or deposit any heavy objects on the unit or its components.

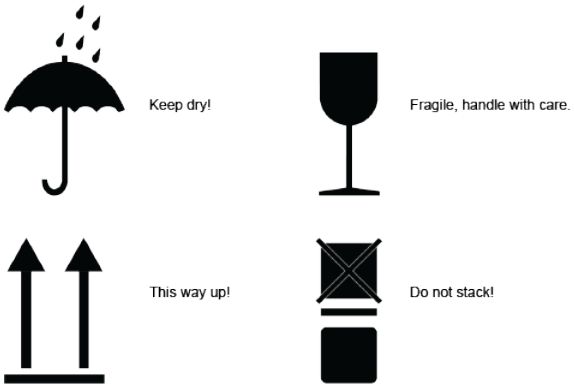
5.2 Delivery state

Unless otherwise agreed by contract, the unit is delivered in a wooden crate. This includes the laser machine and all accessories. Transport the machine only in the original packaging.

CAUTION

The transport crate can slip or fall over during transportation if not adequately secured.

Symbols for handling on the packaging:



5.3 Temperature and humidity

Transport conditions

Transport temperature (ambient temperature):	-10 °C to +40 °C (14 °F to 104 °F)
Relative humidity:	Max. 70%, not condensing

- Avoid high temperature fluctuations.

Storage conditions

Storage temperature (ambient temperature):	0 °C to +30 °C (32 °F to 86 °F)
Relative humidity:	Max. 60%, not condensing

- Avoid high temperature fluctuations.

5.4 Required tools for unloading and transport

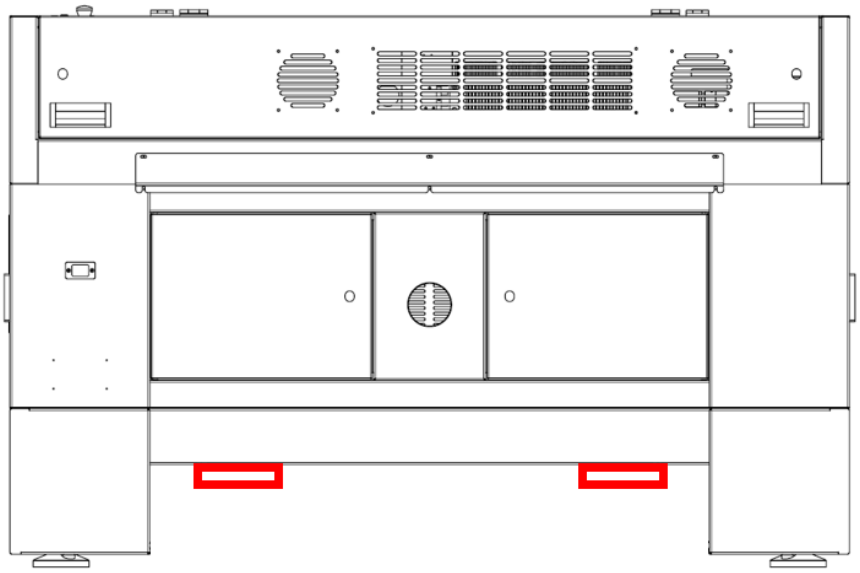
Auxiliary equipment required

- Unloading - Forklift truck
- Transportation - Forklift truck

The following requirements must be met before transporting the unit with a forklift truck:

- All connections are disconnected
- All moving parts are affixed to fixed and sufficiently stable frame parts

→ The machine can be transported using the lifting points.



Observe the following transportation conditions:

- Lift and transport the machine at the marked points under the instruction of a second person.

5.5 Place of storage

- Keep the machine sealed in its packaging until it is assembled or installed.
- The storage location must be dry, free of dust, caustic materials, vapors and combustible materials.
- Store the machine in a storage room or ensure it is adequately packed and protected from the weather.
- Avoid exposure of the machine to shocks or vibrations.
- Avoid extreme temperature fluctuations.
- Take particular care when packing away electronic components.
- When storing for a longer period, apply a coat of oil to all bare-metal machine parts.
- Regularly check the overall condition of all parts and of the packaging.

5.6 Transport inspection and reporting of defects

- Immediately after receipt inspect the delivery to ensure that it is complete and has not suffered any damage.
- Do not accept the delivery if there is externally visible transport damage, or only accept with reservation.
- Record the scope of the damage on the transport documents or delivery note.
- For all defects that are not discovered upon delivery, be sure to report them as soon as they are detected, since damage claims must be filed within a certain period, as mandated by law.

5.7 Unpacking the machine

WARNING

Risk of injury from the machine if it is not sufficiently stable during assembly

- Place the machine on a suitable industrial floor (smooth, stable) immediately after transporting it within the company premises.
- Push the machine to the installation location using the transport rollers. Observe the minimum clearance distances around the machine.
- Immediately place the machine on the machine feet and level it.

CAUTION

Emissions hazardous to health

Scratches on the coating of the lens can cause toxic emissions.

- The lens unit may only be handled by specialist personnel.
- Immediately check the lens unit for damage.
- Only unpack the lens unit after commissioning.

CAUTION

Risk of injury when unpacking the machine

Cut injuries may be caused by parts of the crate, or by crush and impact injuries if parts fall over.

- Dismantle parts of the crate individually and secure against tipping over.
- Wear suitable personal protective equipment (protective gloves, safety goggles, safety shoes, etc.)

NOTICE

At least 2 people are needed to unpack the machine.

The packaging materials must be disposed of in an environmentally friendly manner and in accordance with the applicable local disposal regulations.

The machine is supplied in a wooden crate containing the machine and other accessories. The following steps give you an overview of unpacking and assembling the laser system.

1. Lift the wooden crate to where the machine is being installed
2. Open all of the latches on the wooden lid by folding them open and rotating them 90°.
3. Remove the lid from the wooden crate.
4. Carefully remove the nailed cross strut from the wooden crate.
5. Remove the side walls of the wooden crate by loosening the metal connections.
6. Carefully remove the nailed wooden packages from the adjustable feet.
7. Carefully remove the foam material and other packaging materials.
8. Remove the accessory box and the other parts in the wooden crate.
9. Lift the laser machine from the bottom of the crate (see "transport on forklift truck").
10. Remove all sponges and cable ties from the inside of the machine.
11. Open the accessory box.

5.8 Relocation of the machine

CAUTION

Risk of injury

Only transport the machine components in their original packaging. Secure the transport crates adequately so that they do not slip or fall over during transportation.

Observe the applicable safety regulations from Chapters "Safety" and "Transport".

- When transporting over long distances, use transport crates that include transport locks.

Please observe the following steps:

1. Switch off the machine.
2. Disconnect all hoses and externally connected cables.
3. Remove exhaust system.

4. Reposition the machine (e.g. with the aid of auxiliary equipment if necessary) and on a level, clean floor.
5. Align the machine.
6. Commission the electrical system for the first time.
7. Carry out a function test.

6 SETUP AND INSTALLATION

6.1 For your safety

DANGER

Risk of injury due to pushing over the machine

The machine can fall over and injure people if it is pushed or set up incorrectly.

- Always push the machine very slowly and carefully.
- Always push the machine on the machine frame.
- Always place the machine on a level floor.
- Secure the rollers when the machine is switched off.

WARNING

Risk of accident and injury due to tampering

Tampering or improper use of safety equipment can lead to serious injuries or accidents.

- Never attempt to tamper with protective devices or protective circuits.
- Check the safety devices or protective circuits regularly to ensure they are properly functioning.
- The machine may only be operated if there are functional and fully installed protective devices or protective circuits in place.
- The machine may be operated once the danger zone is clear of people.

WARNING

Risk of accident and injury due to poor stability

Inadequate stability can result in serious injuries and accidents.

- Place the machine on a suitable industrial floor (smooth, stable) immediately after transporting it within the company premises.
- Push the machine to the installation location using the transport rollers. Observe the minimum clearance distances around the machine.
- Immediately place the machine on the machine feet and level it.
- Wear suitable personal protective equipment (protective gloves, safety goggles, safety shoes, etc.)

CAUTION

Risk of injury due to the lens material

The lenses are high-quality optical components and are made from ZnSe (zinc selenide). When optical components made of ZnSe (zinc selenide) are destroyed, toxic dust and vapors are produced, which must not be inhaled. The dust can also cause irritation to the eyes, skin and respiratory system.

- Only unpack the lens unit once it has been successfully installed.
- Only touch the lenses when wearing gloves and, if possible, only touch the metal lens holder.
- Do not use any tools when handling the lenses.

6.2 Temperature and humidity

Environmental conditions:

The machine is not designed for use in damp or potentially explosive environments or for use above 2,000 meters above sea level.

Ambient temperature:	+15 °C to +25 °C (59 °F to 77 °F)
Relative humidity:	45 % to 65 %. not condensing

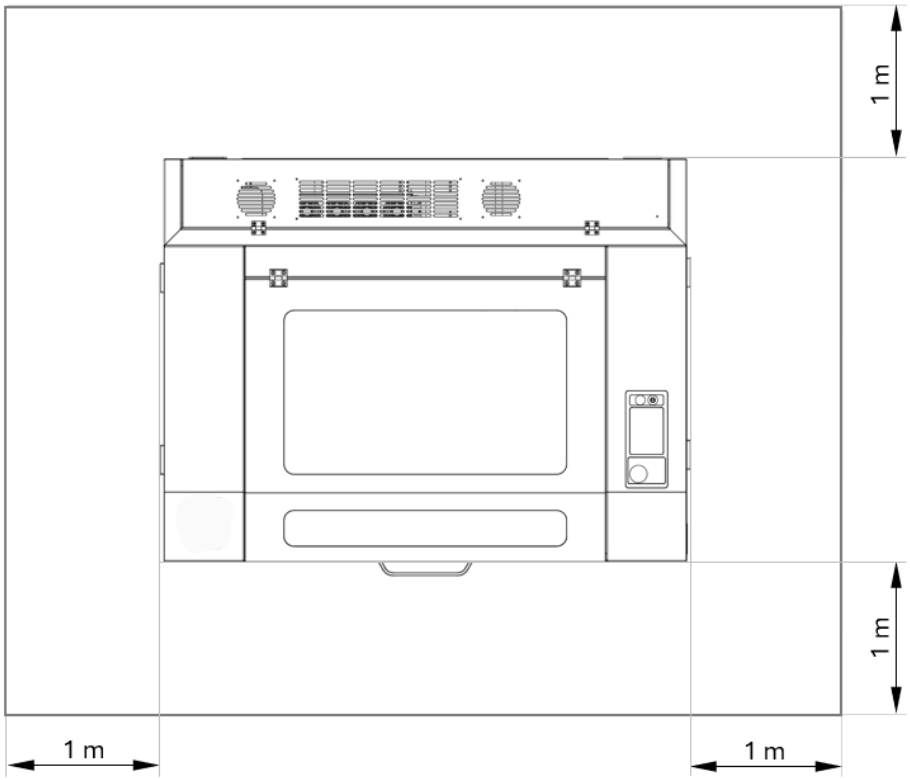
NOTICE

If necessary, an air conditioning unit must be used to ensure the appropriate temperature.

The following conditions must be met:

- Adequate glare-free lighting at the workstation.
- No direct sunlight.
- No contamination from dust (degree of contamination 2 in accordance with IEC60947-1), acids or corrosive gases.
- No interfering electrical installations, hoses and pipes.
- Fluctuation-free power supply.

6.3 Space requirements



Ensure shielding / sufficient distance from the wall and adjacent objects.

Illustration of the machine may differ.

6.4 Setup

NOTICE

Install the connections exactly in the order described, otherwise electrostatic charging can damage your computer and/or the electronics of the laser system.

Please observe the following steps:

1. Transport the system to the installation site by following the instructions in Chapter "Transport".
2. Make sure that all packaging material has been removed.
3. Remove any transport locks that may be present.
4. Fit the two connections for the exhaust system, which is located on the rear of the machine. The connections will have been removed for safety reasons and to transport the machine through doors.
5. The unit must be in an upright position.

6. Make sure that the viewing lid is not damaged.
7. Connect the individual electrical components.
8. Set up the network connection to the machine.

6.5 Equipment

- ✔ Tools are available (30 mm open-end wrench)

1. Unscrew all four feet until the distance between the castors and the floor is approx. 5 mm.
2. Align the machine horizontally at the level of the feet and check this using a spirit level.

6.6 Connections

6.6.1 Mains connection

Connect the end of the mains cable to a fused socket.

NOTICE

Damage to the machine in the event of incorrect voltage values

Only commission the appliance if the mains voltage matches the voltage intended for the machine to avoid damage to the exhaust system.

Ensure that the mains voltage matches the voltage intended for the exhaust system.

7 CONNECTION OF ADDITIONAL COMPONENTS

7.1 Exhaust system

NOTICE

Damage to the machine in the event of incorrect voltage values

Only commission the appliance if the mains voltage matches the voltage intended for the machine to avoid damage to the exhaust system.

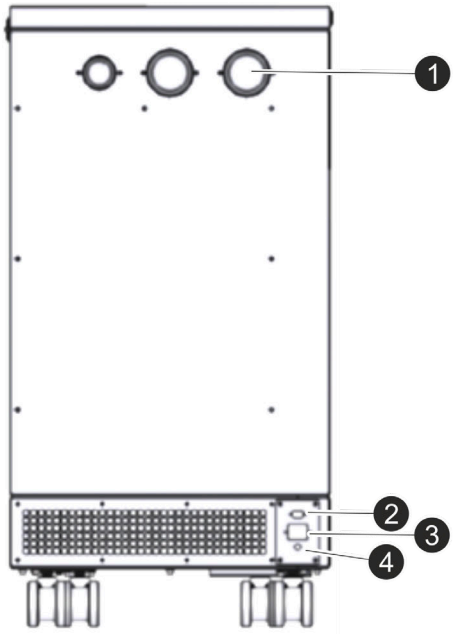
Ensure that the mains voltage matches the voltage intended for the exhaust system.

Connection

1. When using an original Trotec exhaust system, use the enclosed connection cable to connect it to the laser machine.
2. Insert the ends of the extraction hose into the connection sockets provided on the exhaust system and on the laser system. The position will depend on the exhaust system.
3. Connect the exhaust system to the mains socket.

NOTICE

Observe the operating and maintenance instructions in your exhaust system manual.



1 Exhaust connection
2 Connection cable to the laser machine:
Atmos Pure connection (EXT CTRL) is recommended (if available);
otherwise use the exhaust system connection (EXHAUST);
Atmos Pure 600: Both connections are possible
(see "Machine overview")
3 Mains connection
4 Safety switch

Illustration, as an example. The schematic representation may differ from the exhaust system used.

8 OPERATION

DANGER

Danger from laser beam

Invisible laser radiation from reflective materials can cause personal injury and damage to property.

- Only process the materials approved in Chapter "Materials"approved materials for use in the machine.
- CO_2 laser machine: No highly reflective materials, e.g. aluminum, chrome, precious metals, metal foils, stainless steel, brass, copper or titanium.
- No objects other than the workpieces in the machining area, e.g. on the work surface or work area.
- Pay attention to concave surfaces.

DANGER

Danger from toxic gases, fumes, vapors or dusts

Processing materials with a laser produces toxic gases, vapors and dust (fumes).

- The machine must be equipped with an extraction device that is designed to work on fumes.
- Stop the laser system immediately if the exhaust system malfunctions or does not have sufficient power.
- Ask the manufacturer of the material whether additional protective measures need to be taken when processing with lasers.
- Only process the materials approved in Chapter "Materials"approved materials for use in the machine. If you do not, it may result in serious personal injury or material damage. In this case, the warranty granted by Trotec Laser GmbH shall expire immediately.
- Consult Trotec Laser GmbH if you intend to process materials not included in the list. This prevents the release of chemical reaction products or damage to the machine.
- Non-approved materials:
  Leather and artificial leather with chromium (VI), carbon fibers (carbon), Polyvinyl chloride (PVC), polyvinyl butyrale (PVB), polytetrafluoroethylenes (PTFE /Teflon), beryllium oxide, lead, melamine as well as materials containing halogens (fluorine, chlorine, bromine, iodine and astatine), halogenated epoxy resin or phenolic resins.
- The following materials may only be processed with the utmost care:
  Manganese, chromium, nickel, cobalt, copper and materials with the suffix “flame-retardant” since they may contain bromine.

WARNING

Warning of laser radiation laser class 2

Class 2 lasers are harmless to the eye in the event of short-term exposure (up to 0.25 seconds) and may be operated without further protective measures.

If natural aversion responses or the blink reflex are suppressed, this may cause eye irritation.

- Do not suppress the blink reflex.
- Do not stare directly into the laser beam.
- Close your eyes and turn away.
- Never look at the laser beam directly and/or with optical instruments, such as lenses.

WARNING

Risk of injury due to improper operation or untrained personnel

If the machine is operated incorrectly or operating personnel have not been properly instructed, this can result in serious personal injury or damage to property.

- Only work on the machine if you have been instructed to do so.
- Observe all safety instructions in this operating manual.
- If you have any questions, please contact your in-house laser safety officer.

WARNING

Risk of injury due to fire in the machine

When incorrect parameters are used for processing, such as laser power, laser speed and frequency, a fire may occur.

- Ensure the machine is only operated if constantly supervised.

WARNING

Risk of injury from flammable materials

There is a risk of fire due to gases and the processing of easily flammable materials.

If laser radiation hits easily flammable material, e.g. paper, this may ignite and a fire can quickly start.

Gases that can form below the material to be processed may ignite.

- Do not operate the machine unattended.
- Keep a CO_2fire extinguisher to hand and mount it in the immediate vicinity of the machine.
- Before switching on, you should make sure that there is no easily flammable material in the path of the laser beam.
- Comply with the requirements of the exhaust system.
- Clean the appliance regularly and properly.
- Regularly check the ventilation slots inside the system for damage, dirt or blockages (e.g. as a result of cutting residue).

CAUTION

Risk of injury from hot parts

There is a risk of receiving burns from hot workpieces or components in the processing area.

- Allow the workpieces to cool down before removing them.
- Avoid contact with components close to the work head.
- Wear suitable personal protective equipment (protective gloves, etc.) during removal.

NOTICE

Unauthorized persons must not be allowed near the machine.

8.1 Before commissioning

Before commissioning, check the following points:

- For completeness and technically perfect condition of the machine and safety equipment, see chapter "Maintenance".
- Inspect the viewing lid for damage (scratches, burns, etc.)
- Order and cleanliness in the workstation.
- Cleanliness of optical components (free of dust and dirt).
- Activated exhaust system.
- Complete electrical installation.
- Correct input voltage of the electrical installation.
- Environmental conditions based on technical specification.
- For compliance with all regulations and laser safety measures, see chapter "Safety".
- Ensure compliance with all laser safety precautions as per chapter"Safety".

If any faults or functional deviations occur while checking the points listed, the machine is not considered to be safe to operate and must not be used until the fault has been rectified.

If you have any questions, please contact our experienced technical support team in your area.

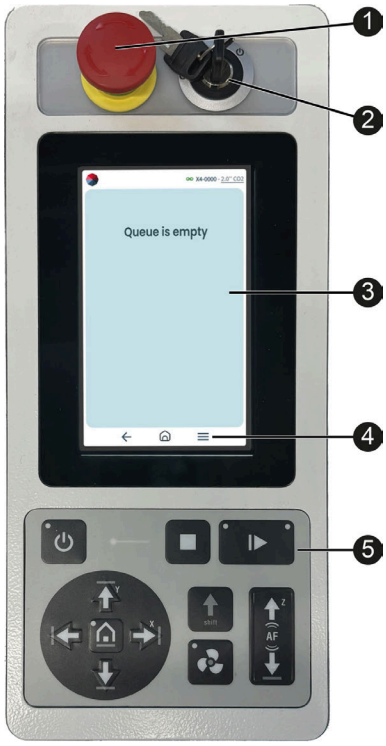
Checklist

Before initial commissioning, all points on the "checklist" must be fulfilled.

→ **The checklist can be found in the appendix to these instructions.**

8.2 Control panel

The control panel refers to the entire machine control unit.



[1] Emergency stop button

[2] Key switch

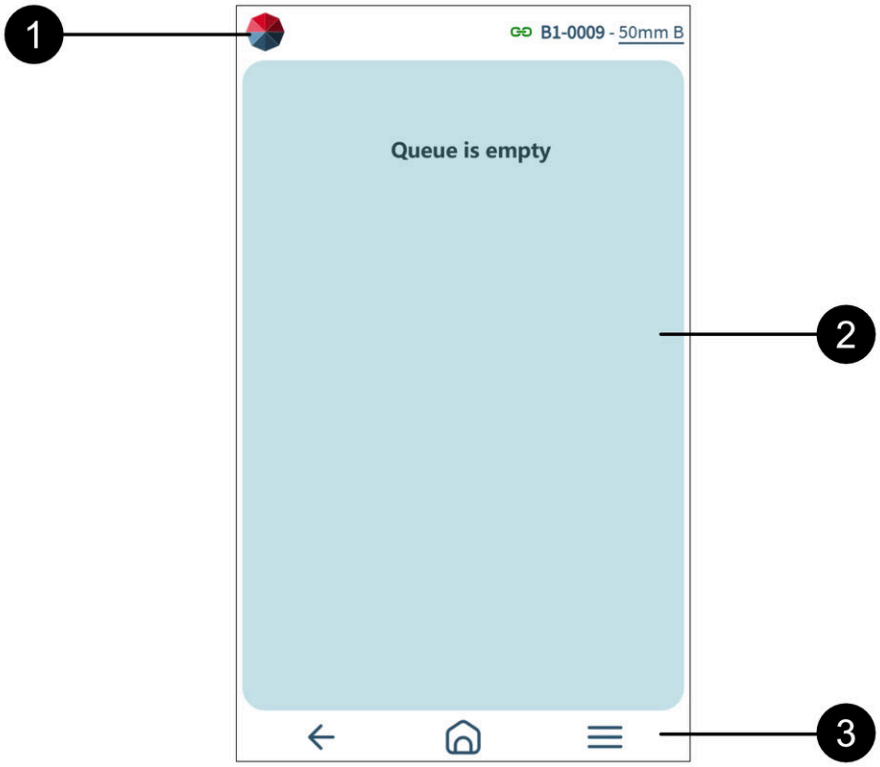
[3] Touch display

[4] Soft buttons

[5] Keypad with emission display

8.3 HMI/soft buttons on the touch display

Home screen (Produce)



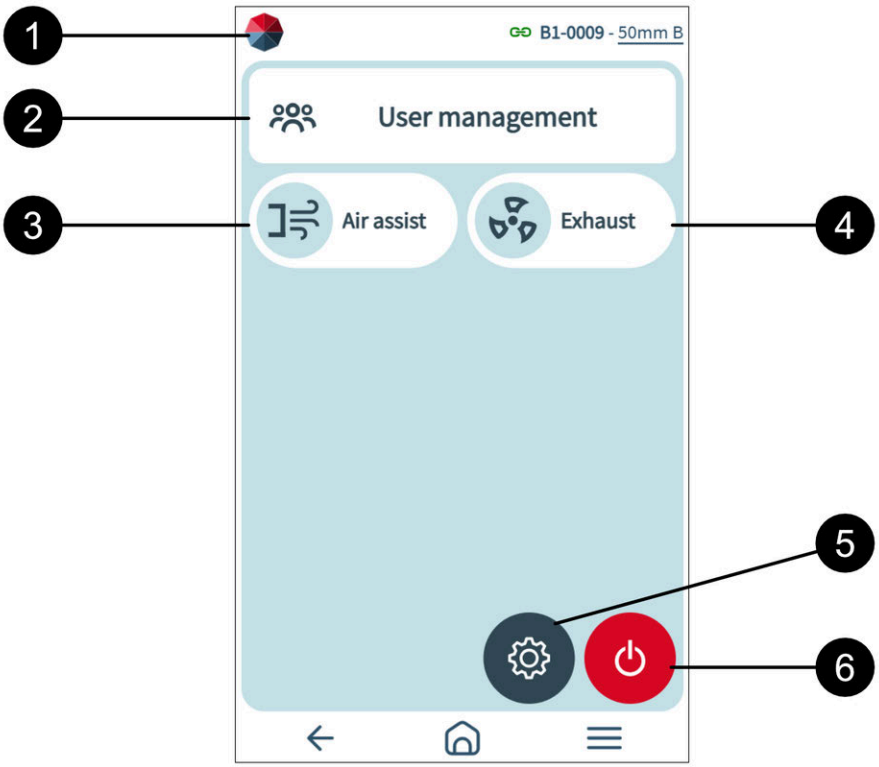
Touch display Home screen (Produce)

[1] Ruby icon (Restart/Shut Down Ruby Server)

[2] Job list

[3] Navigation bar (Back/Home/Menu)

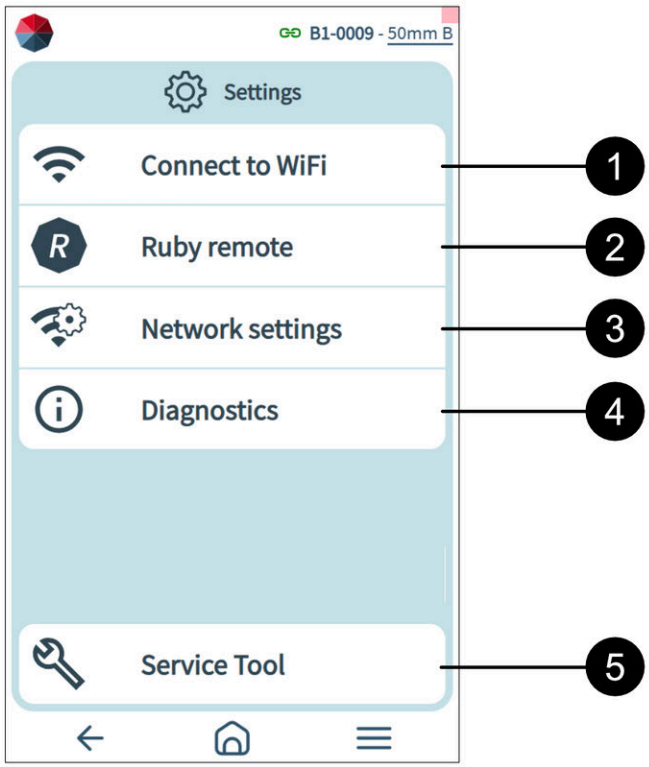
Menu



Touch display menu

[1]	Ruby icon (Restart/Shut Down Ruby Server)	**[4]**	Exhaust system (On/Off/Settings)
[2]	User management (language selection)	**[5]**	Settings
[3]	Air Assist (On/Off/Settings)	**[6]**	Standby

Settings



Touchscreen settings

[1] WiFi for Ruby

[2] Ruby access/Certificate download

[3] Network settings

[4] Software and status information

[5] Service Tool

8.4 Power On/Off

The following conditions must be met for correct commissioning:

- Unrestricted freedom of movement of mechanical parts
- Protective cover closed

CAUTION

Before switching on the unit, the user must ensure that there are no objects in the working area that could restrict or hinder any mechanical parts of the unit.

NOTICE

To avoid restricting or hindering the mechanics in their range of movement, there must be no objects of any kind in the processing area.

All protective covers must be fully functional and closed.

Switch on the laser:

1. Switch on the main power supply using the main switch on the right of the machine.

✔ The built-in Ruby server starts up. This process can take a few minutes.

NOTICE

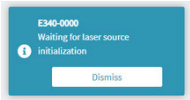
Only turn the key switch from position 0 to 1 when the red status indicator is no longer lit up. Otherwise, the additional EtherCAT devices, such as the exhaust system or rotary engraving attachment will not be recognized and configured.

2. Turn the key switch clockwise to the vertical position to activate the touch display.

   To start the machine, turn the key switch to the right and hold it against the force of the spring.

3. As soon as the machine starts, release the key switch.

✔ If necessary, the initializing process will start. An acoustic signal is heard when the initializing run of the axes is complete.



- ✔ Initialization of the laser source begins and a message appears on the touch display.
- ✔ As soon as the laser source is initialized, the message disappears and the machine is ready for operation.

NOTICE

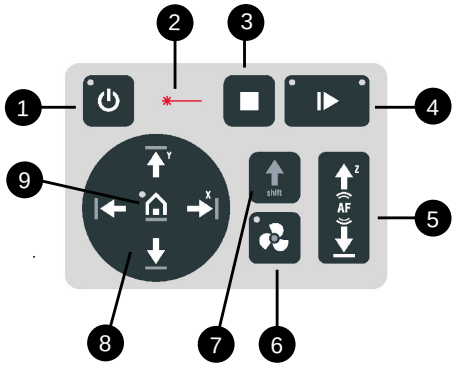
A reference is only made if the network connection has been disconnected, after an error, or if a maintenance session has been opened.

To switch off the machine:

1. Turn the key switch to the left.
   - Tap the Trotec logo => A dialog box opens.
   - Tap on “Shut down” in the dialog box.
   - Wait until the display color changes to blue.
2. Turn the key switch to the left.

3. Switch off the main power supply to the machine by pressing the main switch on the right side of the machine.

8.5 Keypad



The control panel refers to the entire machine control unit.
The keypad is part of the control panel.

❶ **Standby button.** LED is illuminated: Standby mode
❷ **Status/emission display.** LED lights up red: The machine processes data. Laser power can be emitted.
❸ **Stop button**
❹ **Start/Pause/Repeat button**

LED flashes green slowly (once per second).	All covers are closed. Machine is ready.
LED quickly flashes green (twice per second).	At least one cover is open.
LEDs light up blue and green.	Data transfer completed. Pause mode is active. Job can be started.
LED lights up green.	Job has been executed.

❺ **Processing table control key Z**

- Up button
- Down button
- Automatic focusing (AF ≙ autofocus)

❻ **Exhaust button.** LED is illuminated: Exhaust system is active
❼ **Shift button.** Second operating level
❽ **Laser head control key X/Y**

- Travel in X direction
- Travel in Y direction

❾ **Home button.** No function

Image	Button	Description
	**Status/emission display**	LED lights up red: The machine processes data. Laser power can be emitted.
	**Standby-button**	LED on: Standby mode • Press this button to switch to standby mode. • Press the standby button while the processing table is moving upward or downward (e.g. during automatic focusing). Standby mode only becomes active when it is in idle mode again.
	**Laser head control key X/Y**	• Press one of these buttons to manually move the laser head to the right, left, front or rear (travel in X/Y direction). • Press two of the four control buttons simultaneously in a diagonal direction to move the laser head diagonally (X+/Y+, X+/Y-, X-/Y-, X-/Y+). • Press the Shift button together with any control button to rapidly move the laser head to the corresponding end position. It is only possible for the machine to move when the viewing lid is closed.
	**Processing table control key Z**	• Press one of the buttons to manually move the processing table up or down (travel in Z-direction). • Press the Shift key together with the Up button. Automatic focusing activation begins and the processing table moves upward automatically. • If you press the Shift button together with the Down button, the processing table automatically moves down to the end position. Pressing the up button + down button simultaneously activates automatic focusing and the processing table moves upward automatically. You can stop the automatic process by pressing any button in the X, Y or Z direction. **Activation of automatic focusing:** The laser beam is automatically focused on the workpiece (depending on the selected lens). If there is no workpiece on the processing area, the focus remains on the table or the surface support. → For more information, see Chapter ""Focusing methods"" in these instructions. It is only possible for the machine to move when the viewing lid is closed.
	**Stop-button**	• Press this button to cancel a work process.

<table>
<tr><th>Image</th><th>Button</th><th>Description</th></tr>
<tr><td>  </td><td>Start/Pause/Repeat-button</td><td>Start:
Press this button to start a job. The job must be located on the sheet in the control software.
Pause:
Press this button to pause the current processing (LED on). Press the pause button again to resume processing (LED off).
Repeating the process:
Once you have finished processing, press this button again to repeat the process.</td></tr>
<tr><td>  </td><td>Status LEDs</td><td>Meaning of LEDs:<table><tr><th>LED</th><th>Description</th></tr><tr><td>Green, flashing slowly (1 Hz)</td><td>All covers closed. Machine is ready.</td></tr><tr><td>Green, flashing rapidly (2 Hz)</td><td>At least one cover is open.</td></tr><tr><td>Blue + green, permanent</td><td>Data is available. Pause mode is active.</td></tr><tr><td>Green, permanent</td><td>Job is running. Processing and receiving data.</td></tr></table></td></tr>
<tr><td>  </td><td>Shift-button</td><td>Second operating level, for further operation. Press the Shift button together with these buttons to activate the following functions:<table><tr><th>Button</th><th>Description</th></tr><tr><td>Shift + laser head X/Y</td><td>Laser head moves quickly to the respective end position (X or Y position).</td></tr></table></td></tr>
<tr><td>  </td><td>Exhaust-button</td><td>Press this button to switch the exhaust system on or off.
LED on: Exhaust system active (see Chapter "Exhaust system").
LED off: Exhaust system deactivated.
At the end of laser processing, the exhaust system switches off automatically after a few seconds or when a button is pressed.
Press this button to switch the exhaust system on or off.
LED on: Exhaust system active (see Chapter "Exhaust system").
LED off: Exhaust system deactivated.
Default setting: At the end of laser processing, the exhaust system switches off automatically after a few seconds or when a button is pressed.</td></tr>
</table>

8.6 Air Assist

NOTICE

The “Air Assist” function must be activated manually in the Ruby material settings, otherwise there is a risk that the lens could be damaged due to contamination.

To activate Air Assist, proceed as follows:

1. Open material settings in Ruby.
2. Enable Air Assist.

✔ “Air Assist” activation is complete.

Strength of air assist

- Cutting processes: stronger air assist
- Engraving: weaker air assist

8.7 USB connection

There is a USB port on the right-hand side of the machine.

8.8 Focusing methods

NOTICE

Please observe the maximum permissible weight (in accordance with the technical data sheet in the appendix), since exceeding this weight may result in damage to the machine.

NOTICE

If the laser head is damaged by colliding with the material or the processing table, this is excluded from the warranty.

NOTICE

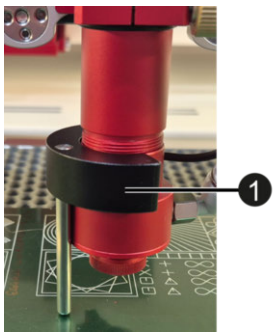
The system equipment may vary depending on the model.

Precise laser engraving depends on various factors. In addition to choosing the right lens, processing table and exhaust system for the laser machine, correct focusing also plays a decisive role.

Correct adjustment of the focus, i.e. the correct distance between the laser head of the Trotec laser system and the material to be processed, is crucial for a perfect application result.

Manual focusing method

- Focus tool



1. Use the X/Y position buttons on the control panel to move the work head over the workpiece.
2. Place the focus tool (1) on the work head.
3. Move the processing table upward using the control button Z on the processing table until the tip of the focus tool touches the surface of the material.

✔ The lens is now focused on the surface of the material.

Automatic focusing methods

- Tactile autofocus

1. Use the X/Y position buttons on the control panel to move the work head over the workpiece.
2. Press both buttons of control button Z on the processing table (up/down) simultaneously to activate the autofocus.

✔ The lens is now focused on the surface of the material.

8.9 Operation Ruby® Laser Software

Trotec laser machines use Ruby® Laser Software; for more info, see:
Ruby Help

NOTICE

The language can be selected at the top right.

First steps

First steps using Ruby® Laser Software:
Software installation and updates.
Link: First steps in Ruby

Online manual

Information about the Ruby® Laser Software screens, managing users, materials, and machine settings. The standard workflow in Ruby® Laser Software consists of the following four individual steps in sequence (**Manage, Design, Prepare, Produce**).

Link: Online handbook

1. Manage

- Everything you need to know about importing designs, jobs and much more. **Link:** Manage-Screen

2. Design

- Use the design screen in the Ruby® Laser Software to create your own design for the laser job. You have the option to choose between several tools in the toolbar. **Link:** Design-Screen

3. Prepare

- Prepare a design for laser processing. Finalize the created job and send it to the laser machine. You can customize several settings, such as the material or the processing rules. **Link:** Prepare-Screen

4. Produce

- From the file to the finished product. Overview of jobs that are currently in the queue for the laser machine. Details of the current order and the option to manage the queue. **Link:** Produce-Screen

Troubleshooting and contact

- To solve any problems and find possible solutions, see Trouble Shooting. **Link:** Trouble-Shooting
- See also the Help Center. **Link:** Help Center
- See also “Frequently Asked Questions” about Trotec Ruby. **Link:** FAQs-Ruby

8.10 Service Tool

Among other things, the Service Tool allows you to update the firmware and use various wizards (positioning of the table, Z-axis positioning, Zebra Job, etc.). The Service Tool can be accessed via the sandwich menu in Ruby or the corresponding soft button on the touchscreen of the control panel. The Service Tool includes tutorials (e.g., Getting Started Tutorial) and information pages on the individual wizards.

8.11 Options

8.11.1 Rotary engraving attachment

The rotary engraving attachment is used for engraving cylindrical workpieces.

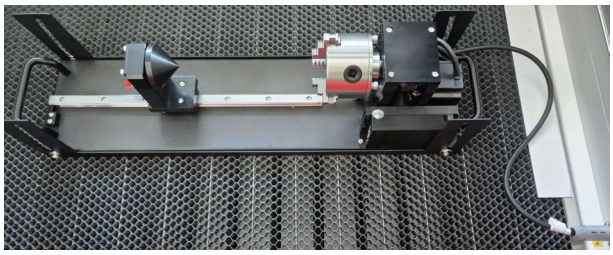
NOTICE

Material damage to electronics

Inserting or removing the rotary engraving attachment during operation can cause irreparable damage to the electronics.

- Switch off the machine before inserting or removing the round engraving device.

Device with cone:
Max. workpiece diameter: 100 mm
Max. workpiece length: 290 mm



Device with cone

Installation and commissioning

NOTICE

Do not connect the rotary engraving attachment during operation. This will damage the connections and the electronics.

Connector plug in the housing

The processing table must be mounted and positioned in the lowest position.

The laser machine must switched off (key switch in position 0).

1. Place the rotary engraving attachment on the processing table using the insert handles. The motor must be located on the right-hand side.
2. Align the rotary engraving attachment parallel to the x-axis using the pilot laser.
3. Use the connection cable to connect the rotary engraving attachment at the front right to the connector plug on the housing.

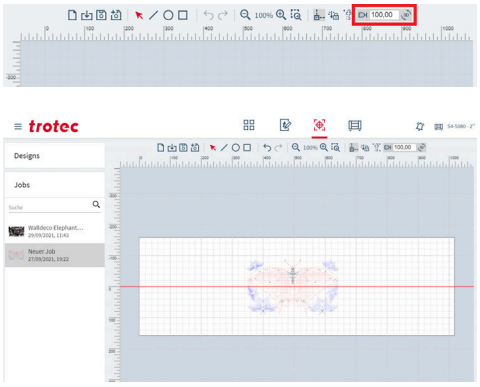
✔ The start button (green LED) and status indicator (red LED) remain lit up until the configuration of the rotary engraving attachment is complete. This is also signaled by means of an acoustic signal.

Mounting the workpiece in the rotary engraving attachment

1. Measure the diameter of the workpiece.
2. Loosen the quick-release clamping screw to clamp the workpiece between the cone and the drill chuck.
3. Now switch on the laser.
4. Position the work head over the workpiece at the point at which you want to carry out the engraving.
5. Focus the workpiece using the focus tool (see chapter "Focusing methods", page 62).

Rotary engraving process

1. Create a graphic using the graphics software.
2. Select the “Round engraving” option in the menu bar and enter the diameter of the object.
3. Select the job from the list and place it in the marking area.



4. Add the job to the processing list (queue).

5. Press the start button on the system to start the selected job (see Chapter "Control panel").

8.11.2 Trotec Vision Print&Cut

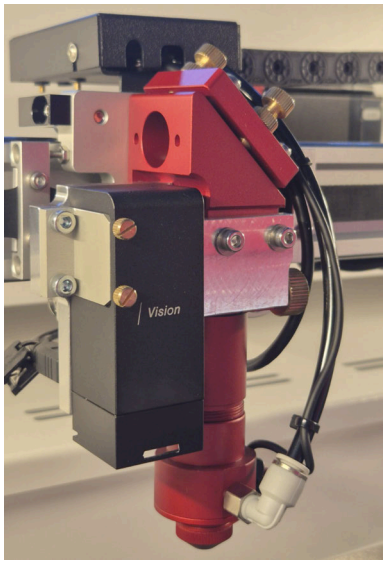
The Vision Print&Cut camera must be calibrated during assembly and before starting work. You can find more information about this on our website in the Ruby® Help section (online manual or video tutorials).

The “Vision Print&Cut” option is a camera positioned on the working head that reads the registration marks on the sheet material. This allows any distortions in the print to be detected and compensated for. The material is cut precisely, thereby avoiding costly incorrect cuts and shortening production times.

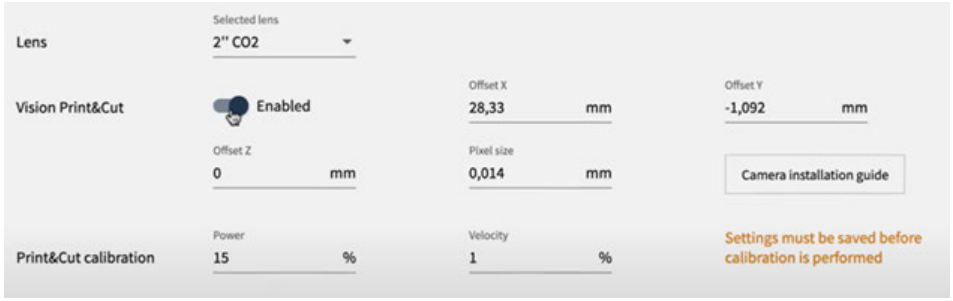
The “Vision Print&Cut” option must be activated in the “Settings” submenu in the control software. This adapts the acceleration and travel distance to the weight of the working head.

Installation

1. Slide the Trotec Vision-Print&Cut camera into the holder on the work head.
2. Secure the Trotec Vision-Print&Cut camera with the two knurled thumbscrews.



Vision Print&Cut camera



Activate Vision Print&Cut

9 MAINTENANCE

9.1 Safety notes

WARNING

Risk of injury from electrical shock

Working on active, live parts of the electrical equipment of a machine/system can result in electric shock and serious injury.

- All work on the electrical system must be carried out by qualified electricians.
- Work on live parts is not permitted.
- Ensure that there is no voltage before starting any work.
- The machine/system must be unplugged from the mains before starting maintenance/repair, servicing or cleaning work. The mains plug must be secured so that it cannot be plugged in again.

WARNING

Risk of injury due to maintenance work

Improper maintenance work (e.g. when handling cleaning agents) can lead to a fire or explosion.

- As the operator, only carry out cleaning or inspection activities.
- Do not use highly flammable materials or liquids in the processing area.
- Only carry out maintenance work if you have been instructed to do so.
- Pull out the mains plug. The energy source must be secured so that it cannot be switched on again.
- Only carry out work on electrical components if you are a trained electrician.

WARNING

Risk of becoming trapped during cleaning work

During cleaning work, employees can be injured if the machine starts up unexpectedly.

- Only carry out cleaning work when the main switch is switched off and secured so that it cannot be switched back on.
- Pull out the mains plug. The energy source must be secured so that it cannot be switched on again.

WARNING

Risk of fire and explosion during cleaning work

There is a risk of fire and explosion if incorrect cleaning agents are used. Cleaning agents and the vapors they emit can be highly flammable.

- Only carry out cleaning work if you are a trained specialist.
- Only carry out cleaning work when the main switch is switched off and secured so that it cannot be switched back on.
- Pull out the mains plug. The energy source must be secured so that it cannot be switched on again.
- Only clean the machine using a vacuum cleaner and a slightly damp, soft microfiber cloth.
- Only clean the lenses with the cleaning set that is supplied.

WARNING

Risk of injury due to fire in the machine

When incorrect parameters are used for processing, such as laser power, laser speed and frequency, a fire may occur.

- Ensure the machine is only operated if constantly supervised.

CAUTION

Risk of injury from machine parts.

Contact with sharp machine parts may occur during maintenance.

- Avoid contact with sharp edges.
- Use a suitable tool if necessary.
- Wear suitable personal protective equipment (protective gloves, safety shoes, etc.)

NOTICE

Ensuring machine safety

The safety devices (e.g. interlock safety switches, emergency stop) on the laser system can be damaged due to components ageing or corresponding operation (e.g. > 72,000 lid cycles / year) and must therefore be replaced by an authorized technician after 10 years at the latest, otherwise safety can no longer be guaranteed. Without appropriate measures, the operating license expires.

9.1.1 Service life of safety-relevant components

The safety-relevant components have a service life of ten years from the date of initial commissioning.

NOTICE

After ten years, an authorized technician must be contacted to check the safety-relevant components and replace them if necessary (e.g. emergency stop, interlock sensors, cover, etc.).

Otherwise, safety is no longer guaranteed due to component ageing and/or frequent operation.

The operating license expires if the safety-relevant components are not checked.

9.2 Maintenance schedules

	Before every shift	Daily	Weekly	Every 2 weeks	Monthly	Chapter
Laser system						
Inspecting the safety circuit	✓					"Daily inspection of the safety circuits", page 71
Inspecting the safety switch					✓	"Inspection of the safety switch", page 72
Lens		✓✓				"Cleaning the lens", page 77
Mirror #2, mirror #3 and protective window		✓✓				"Cleaning the lenses in the machining area", page 80
Mirror #1, beam combiner and protective window			✓✓			"Cleaning lenses at the laser source", page 82
Cooling system fan			✓✓			"Cleaning the cooling system", page 75
Laser tube cover and housing			✓			"Cleaning the laser source", page 74
Viewing lid: Clean and check for mechanical damage		✓				"Cleaning the machining area"
Entire engraving area General cleaning			✓			"Cleaning the machining area"

	Before every shift	Daily	Weekly	Every 2 weeks	Monthly	Chapter
Processing table and rulers		✓✓				"Cleaning the machining area"
x-/y-/z-axes				**CG**		"Movement system"
Exhaust system						
Compact filter unit					✓✓	
Hoses			✓✓			
Suction slots (machine interior) and exhaust system (rear)			✓✓			

✓✓ Check and clean as necessary.

✓ Clean as necessary.

CG Clean and grease.

NOTICE

In order to ensure the maximum availability and lifetime of the system, we recommend that you regularly check the filter, ventilation and exhaust slots and keep the surrounding area clean. A visual inspection of the lenses is likewise recommended before switching on the system.

9.3 Daily inspection of the safety circuits

Starting work:

Checking the safety switch:

1. After initializing, open top cover
   - The LED on the keyboard's Start button should be flashing quickly (2 Hz)
2. Close the lid
   - The LED on the keyboard's Start button should be flashing slowly (1 Hz)
3. After each time the mirror is cleaned and at least once a year, open the viewing lid, front lid, upper left side cover and the laser tube cover on the rear of the machine and check the safety switch (see "Inspection of the safety switch")

✔ Check completed

Checking the emergency stop button:

1. Press the emergency stop button
   - LEDs on the control panel switch off
   - Axes are freely movable

2. Release the emergency stop button
   - Machine must be restarted using the key switch

✔ Check completed

9.4 Inspection of the safety switch

Inspect the safety switch on the front lid:

1. Open the front lid after referencing
   - The LED on the keyboard's Start button should be flashing quickly (2 Hz)
2. Close the lid
   - The LED on the keyboard's Start button should be flashing slowly (1 Hz)

✔ Check completed

Check the safety switch on the upper left-hand side cover

1. After referencing, open the upper left-hand side cover
   - The LED on the keyboard's Start button should be flashing quickly (2 Hz)
2. Close the lid
   - The LED on the keyboard's Start button should be flashing slowly (1 Hz)

✔ Check completed

Check the safety switch on the cover of the laser source on the rear of the machine:

1. After referencing, open the cover of the laser source on the rear of the machine.
   - The LED on the keyboard's Start button should be flashing quickly (2 Hz)
2. Close the lid
   - The LED on the keyboard's Start button should be flashing slowly (1 Hz)

✔ Check completed

9.5 Cleaning the machine

WARNING

Risk of injury from electrical voltage

There is a risk of injury from electric shock if live parts are touched.

- Disconnect the mains plug from the power supply.

NOTICE

Cleaning may only be carried out by qualified personnel.

NOTICE

Lenses may become dirty during other maintenance tasks. They should always be inspected last and then cleaned if necessary.

9.5.1 Cleaning the machining area

Preparation

1. Switch off the unit and disconnect it from the mains.
2. Secure the appliance against unintentional commissioning.
3. Ensure the required tools are to hand.
   - Allen key set
   - Lint-free cleaning cloth
   - Recommendation: Vacuum cleaner, brush, broom

Cleaning the machining area

1. Move the processing table downward so that the ventilation slots are visible, but there is still enough space under the processing table for cleaning.
2. Switch off the unit and disconnect it from the mains.
3. Open the viewing lid, the front lid and the two rear maintenance flaps.
4. Thoroughly remove all loose dirt and deposits from the inside of the machine (e.g. with a brush or vacuum cleaner).
5. Clean the ventilation slots at the front and rear of the processing chamber (e.g. with a brush or vacuum cleaner).
6. Clean the tactile autofocus (e.g. with a brush).

NOTICE

Material damage

Do not use paper towels to clean the viewing lid. Paper towels can scratch the viewing lid.

7. Clean the viewing lid with a dry or slightly damp soft cotton cloth.
8. Close the viewing lid, the front lid and the two rear maintenance flaps.

9.5.2 Cleaning the laser source

WARNING

Risk of injury from electrical voltage

There is a risk of injury from electric shock if live parts are touched.

- Disconnect the mains plug from the power supply.

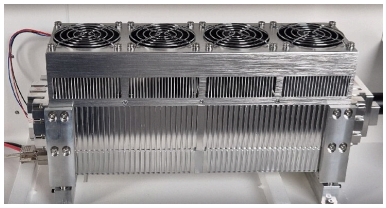
NOTICE

Cleaning may only be carried out by qualified personnel.

Preparation

1. Switch off the unit and disconnect it from the mains.
2. Secure the appliance against unintentional commissioning.
3. Ensure the required tools are to hand.
   - Allen key set
   - Lint-free cleaning cloth
   - Recommendation: Vacuum cleaner, brush, compressed air gun

Clean the laser source



Fan and ventilation grille of the laser source

1. Open the cover on the laser source.
2. Clean the cooling fins of the laser source using a brush and a vacuum cleaner or alternatively with a compressed air gun.

3. Clean the 4 fans on the laser source using a brush and a vacuum cleaner or alternatively with a compressed air gun.
4. Use a brush and a vacuum cleaner, or alternatively a compressed air gun to remove the dust from the machine.

9.5.3 Cleaning the cooling system

WARNING

Risk of injury from electrical voltage

There is a risk of injury from electric shock if live parts are touched.

- Disconnect the mains plug from the power supply.

NOTICE

Cleaning may only be carried out by qualified personnel.

NOTICE

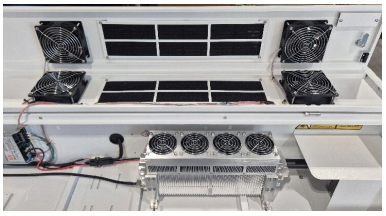
Take care not to blow the dust into machine parts.

Never use the compressed air gun on delicate parts.

1. Switch off the unit and disconnect it from the mains.
2. Secure the appliance against unintentional commissioning.
3. Ensure the required tools are to hand.
   - Allen key set
   - Lint-free cleaning cloth
   - Recommendation: Vacuum cleaner, compressed air gun

Cover for the laser source

Ventilation grille in the cover of the laser source (closed)



Ventilation grille in the cover of the laser source (open)

1. Unlock the cover of the laser source and fold it upward.

2. Carefully clean the ventilation grille and filter mat using a vacuum cleaner or compressed air gun.
3. Close the cover of the laser source and lock it.

Lower side flaps

Fan, right lower side cover

Fan, left lower side cover

1. Unlock the two lower side covers and fold them down.
2. Clean the ventilation grilles carefully using a vacuum cleaner or a compressed air gun.
3. Close the two lower side covers and lock them.

9.6 Cleaning the lenses

CAUTION

Emissions hazardous to health

Scratches in the coating of the lens can cause small amounts of toxic emissions. These emissions can be hazardous to health if they are inhaled or swallowed.

- The lens and mirrors may only be cleaned by qualified personnel.

The lens has a durable multi-coating and cannot be damaged by correct and careful cleaning. You should check the mirrors and the lens according to the interval specified at "Maintenance schedules". If you discover a layer of haze or dirt, it must be cleaned off.

WARNING

Risk of injury from electrical voltage

There is a risk of injury from electric shock if live parts are touched.

- Disconnect the mains plug from the power supply.

NOTICE

Lenses may only be cleaned by qualified personnel.

NOTICE

Make sure that you do not touch the surface of the lens with your finger since this will greatly reduce the service life of the lens.

Do not use tools to touch the lenses.

Never use a cleaning stick more than once. The surface of the lenses could become scratched.

NOTICE

Suitable cleaning fluid for lenses

- Isopropanol
- Ethanol

Do not use any cleaning fluid that contains acetone.

NOTICE

Lenses may become dirty during other maintenance tasks. They should always be inspected last and then cleaned if necessary.

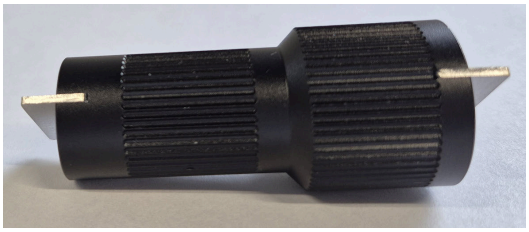
9.6.1 Cleaning the lens

Danger from damaged lenses see chapter "Hazards due to damaged optics"

Preparation

1. Move the table so that the table is approx. 10 cm below the work head.
2. Switch off the unit and disconnect it from the mains.
3. Secure the appliance against unintentional commissioning.
4. Prepare cleaning agents, cleaning sticks and tools for lenses.

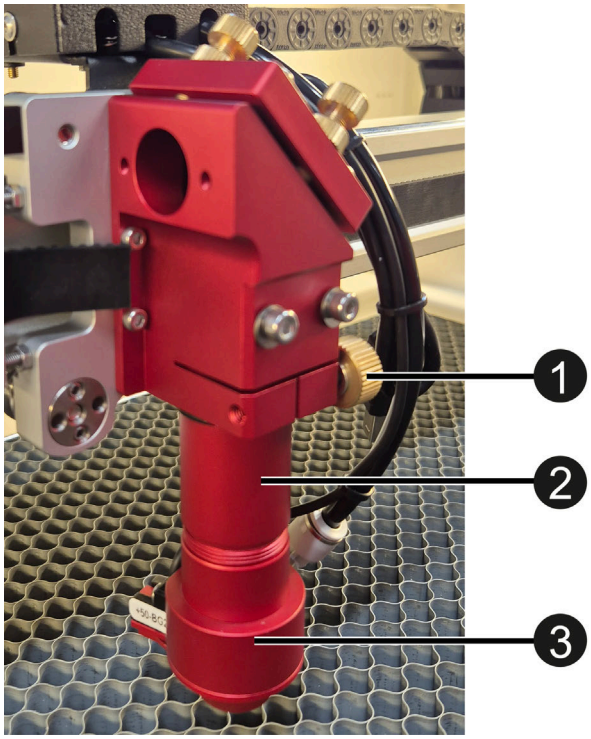
Cleaning sticks



Tool for lenses

5. Open the viewing lid.

Remove lens



No.	Description	No.	Description
1	Knurled thumbscrew	3	Nozzle holder
2	Lens tube		

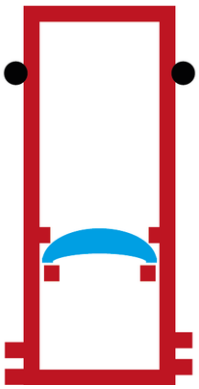
1. Secure the lens tube (2) with one hand.
2. Open the knurled thumbscrew (1) on the side with your free hand.
3. Carefully pull the lens tube (2) downward from the work head.
4. Carefully unscrew the lens tube from the nozzle holder (3).
5. Loosen the clamping ring in the lens tube by carefully inserting the narrow side of the tool for the lenses into the 2 notches of the clamping ring (see "Lens").
6. Turn the auxiliary tool counterclockwise until the clamping ring is completely unscrewed from the lens tube (2).
7. Remove the lens and place it on a soft, dust-free surface.

Cleaning the lens

1. Blow away loose particles and dust using bellows or compressed air (in accordance with ISO 8573:2010 Class 1).
2. Rinse the lens with cleaning fluid to remove any coarse dirt.
3. Check the surface of the lens for damage.
4. Apply cleaning fluid to one side of the lens and leave to act for approx. 1 minute.

5. Dry the lens by carefully absorbing the cleaning fluid with the cleaning stick and without applying pressure.
6. Repeat the cleaning process on the other side of the lens.
7. If the lens is still dirty, repeat the cleaning process.

Installing the lens



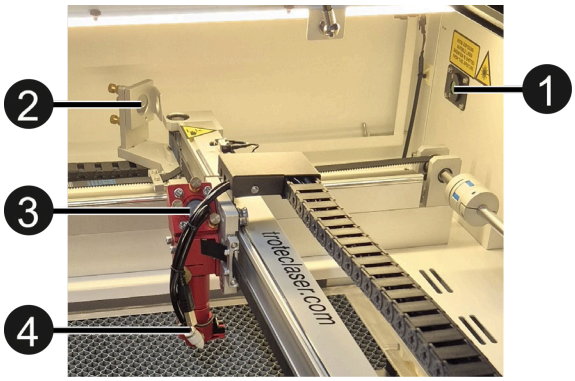
Lens in the installed state

NOTICE

Do not touch the cleaned surface of the lenses again!

1. Turn the lens tube over so that the side with the thread is facing upward.
2. Carefully grasp the lens by the sides and insert it into the lens tube (2). The outwardly curved side of the lens will be pointing downward.
3. Mount the lens in the lens tube (2) by carefully screwing in the clamping ring with the auxiliary tool.
4. Turn the lens tube (2) back into the installation position. The outwardly curved side of the lens must now point upward.
5. Carefully screw the lens tube (2) onto the nozzle holder (3).
6. Push the lens tube (2) upward into the work head until the rubber seal is flush with the work head and the lens tube (2) sits straight.
7. Hold the lens tube (2) firmly with one hand and tighten the knurled thumbscrew (1) with your free hand.

9.6.2 Cleaning the lenses in the machining area

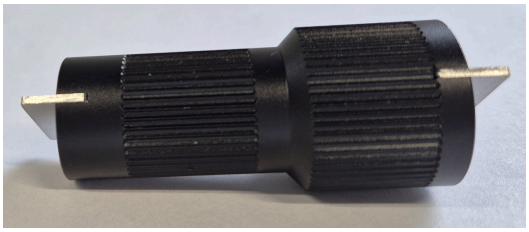


No.	Designation	No.	Designation
1	Protective window	3	Mirror #3
2	Mirror #2	4	Hose for Air Assist

Preparation

1. Move the table so that the table is approx. 10 cm below the work head.
2. Switch off the unit and disconnect it from the mains.
3. Secure the appliance against unintentional commissioning.
4. Prepare cleaning agents, cleaning sticks and tools for lenses.

Cleaning sticks



Tool for lenses

5. Open the viewing lid.

Cleaning the protective window

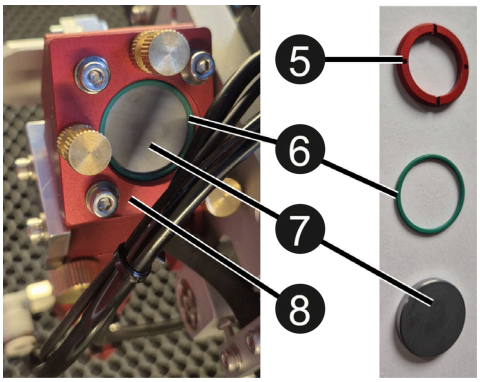
1. Blow away loose particles and dust using bellows or compressed air (in accordance with ISO 8573:2010 Class 1).
2. Check the surface of the protective window for any deposits.
3. Rinse the protective window with cleaning fluid to remove any coarse dirt.
4. Lightly moisten the tip of a cleaning stick with the cleaning fluid and wipe the surface of the lens without applying any pressure.

5. Dry the protective window by carefully absorbing the cleaning fluid with the cleaning rod without applying pressure.
6. If the protective window is still dirty, repeat the cleaning process.

Cleaning mirror #2

1. Blow away loose particles and dust using bellows or compressed air (in accordance with ISO 8573:2010 Class 1).
2. Check the surface of the mirror for any deposits.
3. If necessary, apply cleaning fluid to the mirror and leave it to work for approx. 1 minute.
4. Dry the mirror by carefully absorbing the cleaning fluid with the cleaning stick and ensuring no pressure is applied.
5. If the mirror is still dirty, repeat the cleaning process.

Cleaning mirror #3



No.	Designation	No.	Designation
5	Clamping ring	7	Mirror #3
6	Sealing ring	8	Bracket for mirror

Remove mirror #3

1. Detach the hose for Air Assist.
2. Loosen the clamping ring on the mirror mount by carefully inserting the wide side of the tool for the lenses into the 2 notches of the clamping ring.
3. Turn the auxiliary tool counterclockwise until the clamping ring is unscrewed from the mirror mount.
4. Remove the mirror and place it on a soft, dust-free surface.

Cleaning mirror #3

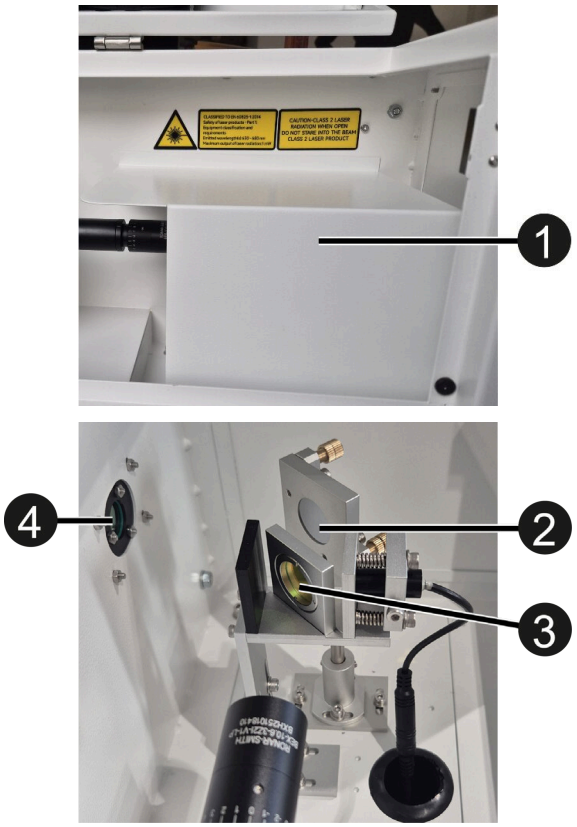
1. Blow away loose particles and dust using bellows or compressed air (in accordance with ISO 8573:2010 Class 1).
2. Check the surface of the mirror for any deposits.
3. If necessary, apply cleaning fluid to the mirror and leave it to work for approx. 1 minute.

4. Dry the mirror by carefully absorbing the cleaning fluid with the cleaning stick and ensuring no pressure is applied.
5. If the mirror is still dirty, repeat the cleaning process.

Install mirror #3

1. Hold the mirror carefully by the sides and place it in the mirror holder. The matte side should be facing upward.
2. Insert the sealing ring between the mirror and the clamping ring.
3. Screw in the clamping ring using the auxiliary tool for lenses.
4. Connect the hose for the Air Assist.

9.6.3 Cleaning lenses at the laser source



No.	Designation	No.	Designation
1	Covering the lenses	3	Beam combiner
2	Mirror #1	4	Protective window

Preparation

1. Switch off the unit and disconnect it from the mains.
2. Secure the appliance against unintentional commissioning.
3. Ensure that cleaning agents and cleaning sticks are to hand.

Cleaning sticks

4. Open the cover on the laser source.
5. Remove the cover on the lenses on the right-hand side of the laser source.

Cleaning mirror #1

1. Blow away loose particles and dust using bellows or compressed air (in accordance with ISO 8573:2010 Class 1).
2. Check the surface of the mirror for any deposits.
3. If necessary, apply cleaning fluid to the mirror and leave it to work for approx. 1 minute.
4. Dry the mirror by carefully absorbing the cleaning fluid with the cleaning stick and ensuring no pressure is applied.
5. If the mirror is still dirty, repeat the cleaning process.

Cleaning the beam combiner

1. Blow away loose particles and dust using bellows or compressed air (in accordance with ISO 8573:2010 Class 1).
2. Check the surface of the beam combiner for deposits.
3. Rinse the beam combiner with cleaning fluid to remove any coarse dirt.
4. Lightly moisten the tip of a cleaning stick with the cleaning fluid and wipe the surface of the lens without applying any pressure.
5. Dry the beam combiner by carefully absorbing the cleaning fluid with the cleaning rod without applying pressure.
6. Repeat the cleaning steps on the other side of the beam combiners.
7. If the beam combiner is still dirty, repeat the cleaning process.

Cleaning the protective window

1. Blow away loose particles and dust using bellows or compressed air (in accordance with ISO 8573:2010 Class 1).
2. Check the surface of the protective window for any deposits.
3. Rinse the protective window with cleaning fluid to remove any coarse dirt.
4. Lightly moisten the tip of a cleaning stick with the cleaning fluid and wipe the surface of the lens without applying any pressure.

5. Dry the protective window by carefully absorbing the cleaning fluid with the cleaning rod without applying pressure.
6. If the protective window is still dirty, repeat the cleaning process.

Completion

1. Fit the cover for the lenses on the right-hand side of the laser source.
2. Close the cover of the laser source.

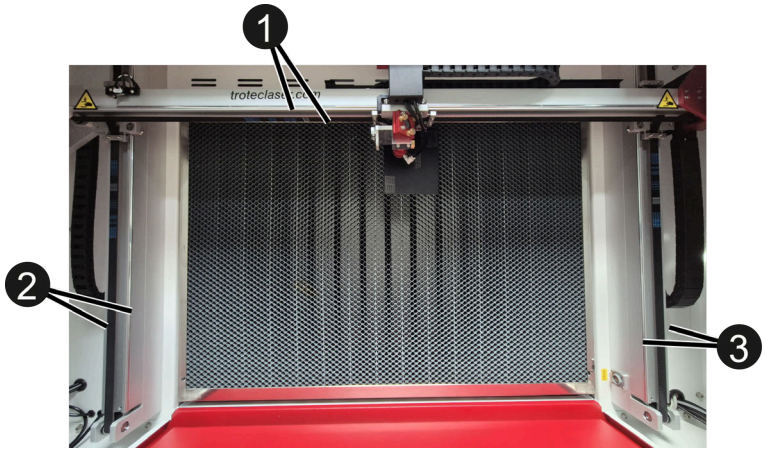
9.7 Movement system

WARNING

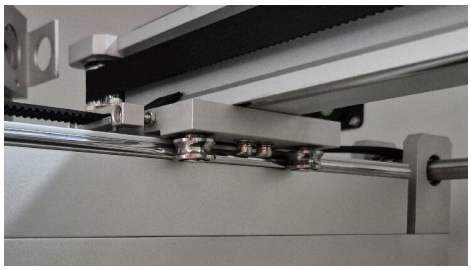
Risk of injury from electrical voltage

There is a risk of injury from electric shock if live parts are touched.

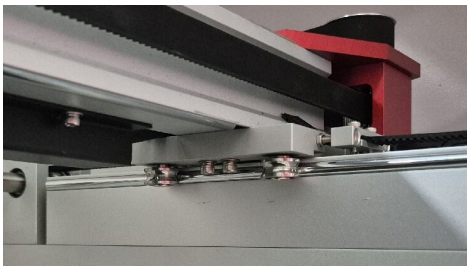
- Disconnect the mains plug from the power supply.



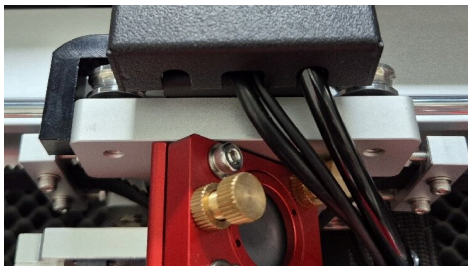
No.	Designation	No.	Designation
1	Rails X-axis	3	Rails Y-axis right
2	Rails Y-axis left		



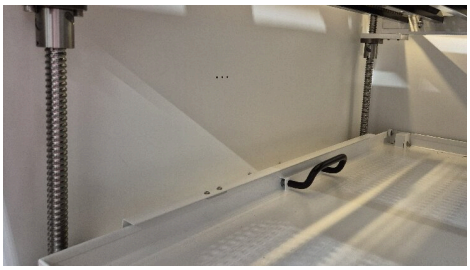
Detail of guide roller with bearing and rails, Y-axis (left)



Detail of guide roller with bearing and rails, Y-axis (right)



Detail of guide roller with bearing and rails, work head



Detail of spindles Z-axis

Preparation

1. Switch off the unit and disconnect it from the mains.
2. Secure the appliance against unintentional commissioning.
3. Prepare the cleaning material:

   Required:

   - Isopropanol
   - Lint-free cleaning cloth, cotton buds
4. Ensure that corrosion-protecting lubricant is to hand.
5. Open the front lid.

Cleaning

1. Apply isopropyl alcohol to a cleaning cloth and a cotton bud.
2. Clean the entire length of the top and bottom rail of the X-axis (1).
3. Clean the entire length of the inner and outer rails of the left Y-axis (2).
4. Clean the entire length of the inner and outer rails of the right-hand Y-axis (3).
5. Clean the contact surfaces of all bearings on the X and Y axes.
6. Clean the 4 spindles of the Z-axis.

Lubrication

1. Lubricate the upper and lower rails of the X-axis (1) by applying a thin layer of lubricant.
2. Lubricate the inner and outer rails of the left Y-axis (2) by applying a thin layer of lubricant.
3. Lubricate the inner and outer rails of the right-hand Y-axis (3) by applying a thin layer of lubricant.
4. Lubricate the 4 spindles of the Z-axis by applying a thin layer of lubricant.

Completion

1. Close and lock the front lid.

10 TROUBLESHOOTING

This chapter is to enable maintenance personnel to identify and rectify malfunctions based on error messages and symptoms.

WARNING

Risk of fire from incorrect parameter settings.

Laser operation with incorrect parameter settings such as power settings, speed or frequency can result in flame formation.

- Laser operation permitted only under supervision.

NOTICE

Material damage

A fault that cannot be rectified can damage the machine.

- Switch off the machine and contact customer service.

10.1 Error, cause and remedy

Problem	Possible cause	Problem Remedy
Engraving depth too shallow	• Inaccurate focusing • Dirty lenses	• Check focus (see chapter "Focusing methods", page 62) • Clean the lenses (see Chapter "Cleaning the lenses"
Blurred edges	• Inaccurate focusing	• Check focus
Wavy lines	• Loose lens	• Check lens and lens position
No visible markings	• Laser power too low • Speed too high • No focusing • Use of an incorrect focus tool	• Increase laser power • Reduce speed • Check focus (see chapter "Focusing methods", page 62) • Change focus tool. • When using autofocus: Check the settings in the software (lens, material thickness, table)
Details are engraved too thinly when stamp engraving	• Stamp shoulder too steep	• Change the shoulder or select a different one (flat/medium/steep)

Problem	Possible cause	Problem Remedy
Corners or angles are not marked or cut	• Insufficient laser power	• Increase the correction in the software (Ruby/Material Effect/Advanced/Increase Power Correction)
No initialization after starting	• Viewing lid not closed, front lid, side cover or cover for laser source	• Close all safety covers
The machine is unresponsive after starting	• Blown fuse • No current at power connection	• Check fuse • Check power connection
Connection to the machine is frequently interrupted	• Electromagnetic radiation • Unstable on-site network connection	• Restart the machine completely • Ensure that the machine and computer are connected to the same power circuit. The original cable length should not be exceeded. • Ensure a stable on-site network connection
Cutting edge and engraving lines are offset	• Speed too high • Resolution too low	• Reduce speed • Optimize Resolution
Other faults		• Call up the E Line Help Center or contact Technical Support (see chapter "Contact", page 87)

10.2 Contact

Technical Support

If you have any questions, please contact our experienced technical support team in your area.

Global service contact details and further information can be found on the help pages of our website under “Service”: **www.troteclaser.com**

E Line Help Center:

products.troteclaser.com/e-line-help

Locations / Sales

You can find the location search and detailed information about our locations on our website under “Contact”, “Location search”: **www.troteclaser.com**

11 DISASSEMBLY

WARNING

Risk of injury when disassembling the machine

There is danger of injury when disassembling the machine.

Always wear suitable protective clothing (e.g. safety goggles, safety shoes, safety gloves).

WARNING

Electric current.

The machine must be disconnected from the main power supply.

NOTICE

- Disassemble the unit into individual parts using suitable tools.
- Watch out for springs.
- Observe the “Disposal” chapter.

Process:

1. Remove all workpieces from the machine.
2. Switch off the machine using the key switch.
3. Switch off the main power supply using the main switch on the rear of the appliance.
4. Remove the exhaust system.
5. Disconnect all electrical supply lines and all other cables on the rear of the appliance.

12 DISPOSAL

DISPOSAL

Danger due to incorrect disposal of the lens

- Dispose of any lenses in airtight sealable containers or plastic bags and treat as hazardous waste.
- Do not dispose of optical components in household waste and do not allow them to enter the sewage system or other water systems.
- Observe any locally applicable laws pertaining to disposal.

13 ACRONYMS

Acronym	Description
AC	Air-cooled
AC	Alternating current
AIO-PC	All-in-one-PC
API	Application programming interface
BAT	Beam alignment tool
CAT	Category
CCL	Critical closed loop
CE	European Conformity
CO_2	Carbon dioxide
COM	Communication
CPU	Central processing unit
dB (A)	A-weighted decibel
DC	Direct current
DGUV	Deutsche Gesetzliche Unfallversicherung (German Statutory Accident Insurance)
DHCP	Dynamic host configuration protocol
DIN	Deutsches Institut für Normung (German Institute of Standardization)
DNS	Domain name system
I/O	Input/output
EC	European Community
EMC	Electromagnetic compatibility
EN	European standard
FES	Fire extinguishing system
GPU	Graphical processing unit
HD	High definition
HMI	Human-Machine Interface (HMI)
IEC	International Electrotechnical Commission
IP	Ingress protection
IP	Internet protocol
ISO	International Organization for Standardization
LAN	Local area network
LASER	Light amplification from stimulated emission of radiation
LC	Liquid-cooled

Acronym	Description
LED	Light emitting diode
MPC	Maximum permissible concentration
MPR	Maximum permissible radiation
NW	Nominal width
OEM	Original equipment manufacturer
OPC UA	Standard for data exchange as platform-independent, service-oriented architecture (open platform communications)
Pa	Pascal (printing unit)
PC	Personal computer
PCB	Printed circuit board
PIN	Personal identification number
RAM	Random access memory
RFID	Radio frequency identification
Rotary engrav-ing attachment	Rotary engraving attachment
SONAR	Sound navigation and ranging
T	Time delay (slow release)
TPU	Tensor processor
URL	Uniform resource locator
USB	Universal serial bus
UV	Ultraviolet
VDI	Verein deutscher Ingenieure (Association of German Engineers)
VDP	Vision Design & Position
W	Watts
WC	Water cooled
Wifi	Wireless network
WLAN	Wireless local area network
WTK	Water treatment kit
ZnSe	Zinc selenide

14 CHANGE HISTORY

Version	Change date	Description
1.0	2026-05	First edition
1.1	2026-07	Adapting the requirements for operating and maintenance personnel Adjustment of operating modes Changes due to the new control panel/HMI Various corrections and additions

E340

Laser engraving system

Mechanics

Working area	875 x 580 mm (34.4 x 22.8 inch)
Loading area	991 x 691 mm (39 x 27.2 inch)
Max. height of work piece	225 mm (8.9 inch)
Working table	Aluminium slat table with honeycomb table element on top. Slat Table can be used separately as well.
Max. processing speed	1.2 m/s (47.2 ips)
Max. acceleration	25 m/s^2 (984.3 ips^2)
Motor	Hybrid Servo Motors
Encoder	Incremental measuring system
Optical elements	Telescope, lens and mirrors
Lens	2.0 inch
Nozzles	Ø 3 mm, Ø 6 mm
Max. material load	40 kg (80 lbs), load over the whole working area
Interface	Ethernet

Standard Features

Lens	2.0 inch
Exhaust	Prepared for extraction of the working area
Software	Ruby®
Operating console	Touchpanel, keypad, safety-switch, system turnkey
Laser pointer	655 nm, <0.99 mWcw
Autofocus (tactile)	Automatic focusing via a mechanical contact switch on the laser head. Not suitable for soft materials.
Work area light	LED bar
Air Assist	Compressed air blowing
Other standard equipment	OptiMotion™, Smart Electronics

Options

Vision Print & Cut ready	Prepared for Print & Cut applications with Vision Print & Cut (VPC) system

Accessories

Rotary attachment	Available with conus
Vision Print & Cut	System for precise and accurate cutting of printed applications (Print & Cut)
Exhaust systems	Atmos Pure 600 via Ethercat, Vent-Set or other exhaust system via a standardized I/O interface

Laser

Laser system	Sealed-off RF CO_2 Laser, maintenance free, air cooled, wavelength 10.6 µm
Laser power	60 W

Dimensions & Weight

Width x Depth x Height	1520 x 1205 x 1115 mm (59.8 x 47.5 x 43.9 inch)
Weight	ca. 275 kg (606.3 lbs)

Safety & Environment

Laser class	CDRH laser class 2
Interlock	Double Interlock safety system
Ambient conditions	Mandatory ambient temperature +15 °C to +25 °C or 59 °F to 77°F Humidity 40 % bis max. 70 %, not condensing. Dust free environment (degree of pollution 2 according to IEC 60947-1)
Certificates	CE compliant, FDA listed

Exhaust Requirements

Exhaust working point	Min. 400 m^3/h at 4200 Pa (min. 235.4 cfm at 16.87 inH_2O)

Cooling

Air cooling	Active air flow cooling with fan

Electrical

Voltage & power consumption	1 ~ AC 110-230 V, 50/60 Hz, 1000 W (60 W)

Subject to change without notice.
Errors and omissions excepted.
Model identification: E340-8092
2026-05

EC-Declaration of Conformity

According to Machine Directive 2006/42/EC, Annex II 1. A

trotec

Manufacturer:

Trotec Laser GmbH
Freilinger Straße 99
4614 Marchtrenk
Austria

Authorized person to compile the technical files:

Trotec Laser GmbH
Freilinger Straße 99
4614 Marchtrenk
Austria

Description and Identification of the machine:

Product description	Laser cutting and engraving system
Model name	E340
Model identification	E340-8092
Serial number	E340-########
Machine group	8092
Function	System for laser cutting and laser engraving

This declaration of conformity is issued under the sole responsibility of the manufacturer. It is declared expressly that the machine fulfills all of the following applicable EC directives and regulations:

2006/42/EC	EC Machine Directive 2006/42/EC
2014/30/EU	Directive 2014/30/EU Electromagnetic Compatibility

Reference to the harmonized standards in accordance with article 7 (2):

ISO 11553-1:2020+A11:2020	Safety of machinery – Laser processing machines Part 1: General safety requirements
ISO 12100:2010	Safety of machinery – General principles for design - Risk assessment and risk reduction
ISO 13849-1:2023	Safety of machinery – Safety related parts of control systems Part 1: General principles for design
IEC 60204-1:2018	Safety of machinery – Electrical equipment of machines Part 1: General requirements
IEC 60825-1:2014+A11:2021+AC:2022-03	Safety of laser products - Part 1: Equipment classification and requirements
IEC 61000-3-2:2019+A1:2021+A2:2024	Electromagnetic compatibility - Part 3-2: Limits for harmonic current emissions
IEC 61000-3-3: 2013+A1:2019+A2:2021/AC:2022	Electromagnetic compatibility - Part 3-3: Limitation of voltage changes / fluctuations and flicker
IEC 61000-6-2:2019	Electromagnetic compatibility - Part 6-2: Immunity standard for industrial environments
IEC 61000-6-4:2019	Electromagnetic compatibility - Part 6-4: Emission standard for industrial environments

Further Reference to the harmonized standards in accordance with article 7 (2):

IEC 60825-4:2006+A1:2008+A2:2011	Safety of laser products - Part 4: Laser guards

trotec
Trotec Laser GmbH
Linzer Strasse 156, A-4600 Wels
Tel. 07242 / 239 - 0
www.troteclaser.com

Marchtrenk, 29 May 2026

City, Date

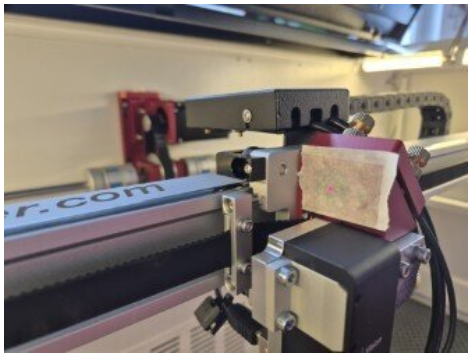
pp. Dr. Matthias Jörgl
Head of Research and Development

17 OPERATOR CHECKLIST AFTER INSTALLATION

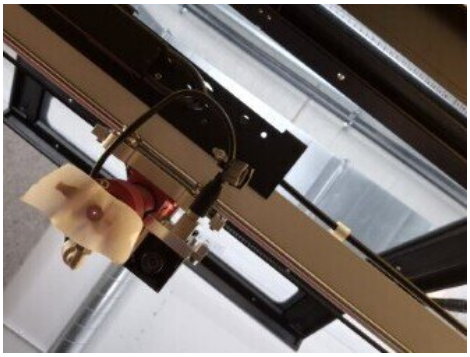
Preparations

1. Is a CO_2fire extinguisher to hand and mounted in the immediate vicinity of the machine?
2. Is an exhaust system connected and ready for operation?
   Does the exhaust system meet the minimum requirements (see "Exhaust system requirements")?
3. Is the desired material listed in the material list (see "Materials")?
4. Is the lens installed and free of damage?

Control of the laser beam



Adhesive tape on the work head



Adhesive tape on the nozzle

1. Move the work head to the front, right position.
2. Open the viewing lid.
3. Apply white paper tape to the level before the beam enters the work head.

✔ Check the position of the pilot laser on the adhesive tape:

- If the pilot laser is centered, continue with the next step.
- If the pilot laser is not centered, adjust the laser beam.

4. Change to the 6 mm nozzle.
5. Stick white paper tape to the bottom of the nozzle.

✔ Check the position of the pilot laser on the adhesive tape:

- If the pilot laser is centered, continue with the next step.
- If the pilot laser is not centered, adjust the laser beam.

6. Place a 10 mm thick piece of acrylic under the work head.
7. Close the viewing lid.
8. Focus on the material.
9. Deactivate air assist.
10. Activate the exhaust system.

11. Set a laser intensity of 30% and activate until the acrylic is almost completely penetrated by the laser.

✔ Check the course of the laser in the acrylic:

- If the laser runs vertically through the acrylic, continue with the next step.
- If the laser beam does not run vertically through the acrylic, adjust the laser beam.

✔ All checks have been completed. Your laser machine is ready for operation.