trotec

Speedy 100

Operating manual

8083

BA 8083_1.0_en-us (10/2024)
ENGLISH (translation)

SETTING NEW STANDARDS

(AT)

Trotec Laser GmbH

+43 7242 239-7070

service-at@troteclaser.com

(AU)

Trotec Laser Pty Ltd

+61 26413-5904

service@troteclaser.com.au

(BE)

Trotec Laser België
Trotec Laser Belgique

+31 850 70 51 55

support@troteclaser.nl

(CA)

Trotec Laser Canada

+1 800 663 1149-902

techsupport@troteclaser.ca

(CH)

Trotec Laser AG

+41 32387-1611

service-ch@troteclaser.com
suisse@troteclaser.com

(CN)

Trotec Laser GmbH

+86 189 500 735 62

china@troteclaser.com

(DE)

Trotec Laser Deutschland GmbH

+49 89 322 99 65-13

service-de@troteclaser.com

(ES)

Trotec Laser España

+34 93 102 50 50

soporte@troteclaser.com

(FR)

Trotec Laser France SAS

+33 1 72 62 20 94

techsupport.fr@troteclaser.com

(GB)

Trotec Laser UK

+44 0191 4188 110

service-uk@troteclaser.com

(JA)

Trotec Laser Japan Corporation

Tokyo: +81 42 313 0740

Osaka: +81 6 6180 2200

service-jp@troteclaser.com

(NL)

Trotec Laser B.V.

+31 850 70 51 55

support@troteclaser.nl

(PL)

Trodat Polska Sp. z o.o.

+48 22 339 35 39

serwis_pl@trodat.net

(US)

Trotec Laser Inc.

+1 866 226 8505, Option 2

support@troteclaser.com

(CN)

Trotec Laser (XIAMEN) CO., LTD.

#5 GuAn Road South, MaXiang Town
XiangAn District, XiaMen, China

Trotec Laser GmbH

Freilingerstrasse 99

4614 Marchtrenk, Austria

General contact details for technical support:

Tel.: +43 7242 239-7000

Email: techsupport@troteclaser.com

www.troteclaser.com

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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 notes 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.

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 notes regarding the professional disposal of the product or accessories.

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 apply.

The information, illustrations, tables, specifications and diagrams contained in this document have been carefully prepared according to the current state. 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 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
- Focus tool (as per the lens order)
- Cleaning set for lenses
- Lenses as per order
- Processing table as per order

- Exhaust connection cable (as per order)
- I/O plug
- Network cable
- 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:

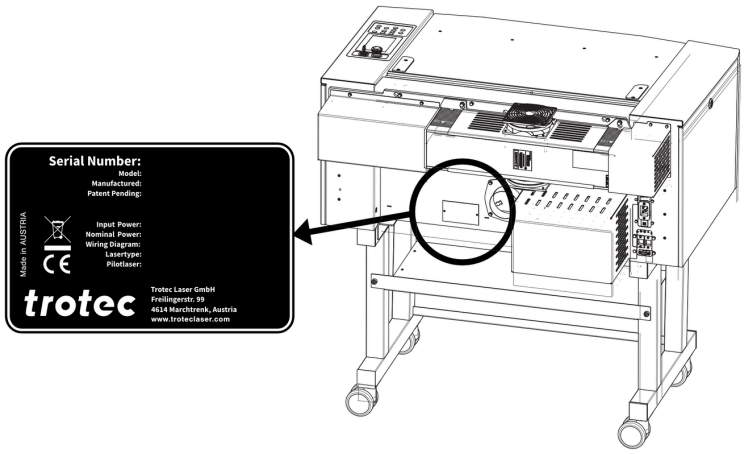
- Cleaning cloths (50 pieces)
- CAT-5e LAN cable (5 m)
- Focus tool(s)
- Speedy Series Quick Guide

1.5 Data 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 manu-facture:	



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,
- the personnel 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 important safety aspects that are necessary for optimum protection of persons and safe and trouble-free operation of the machine. Other chapters of this manual contain specific safety notes for the avoidance and prevention of hazards.

2.1 General safety notes

2.1.1 Intended use

The machine is used for cutting, engraving and marking materials with a laser system 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.

2.1.2 Improper use

Warning against incorrect use

- 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.

Common misuse

- 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

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.

Service operation

Service activities may only be carried out by authorized, trained service technicians. If side panels and lids 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

The following guidelines and regulations must be observed to avoid risks when operating Trotec laser systems:

Guidelines/Regulations

2006/42/EC	Machinery Directive
2014/30/EU	EMC Guideline

Applied harmonized standards

Please refer to the supplied EU Declaration of Conformity for the standards applied by Trotec Laser GmbH. The CE labeling can be found on the type plate.

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 according to EN 60825-1 “Safety of Laser Products”.

The built-in laser source is class 4 according to 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 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:

- Cleaning of the lens and mirrors

  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.

Trotec service personnel

Work that Trotec service personnel perform on the machine:

- Installation
- Connection
- Initial commissioning

Unauthorized persons

Unauthorized persons must not be allowed near the machine.

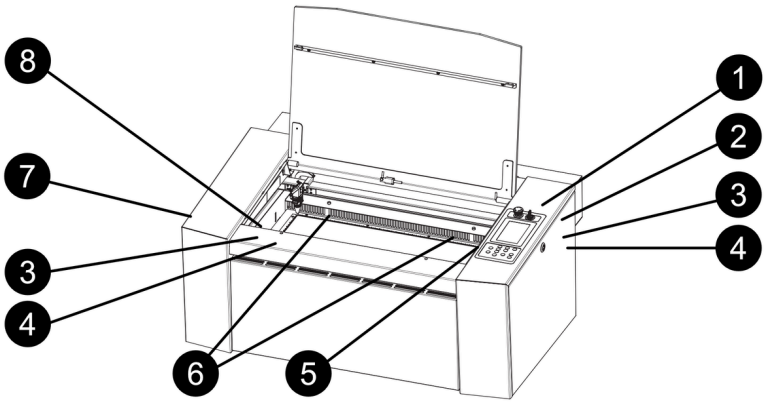
2.4 Warning and information labels

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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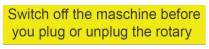

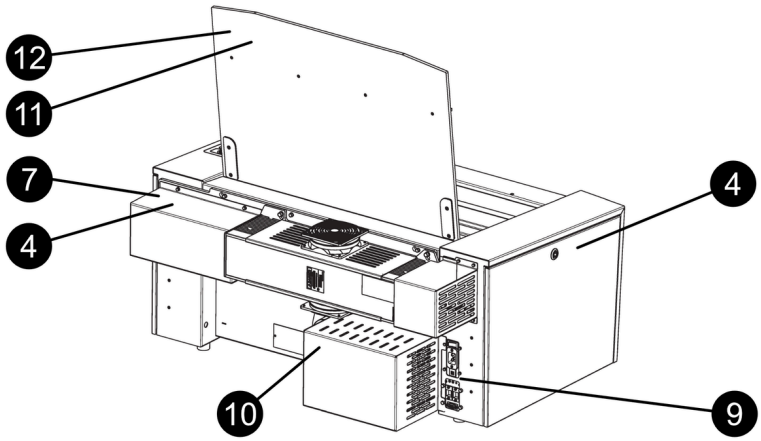

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Interior (right-hand side cover)

Interior (left-hand side cover)

2.5 Safety devices

Danger from laser beam

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

- Do not remove, tamper with, or put out of operation the reed contact 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 Main switch

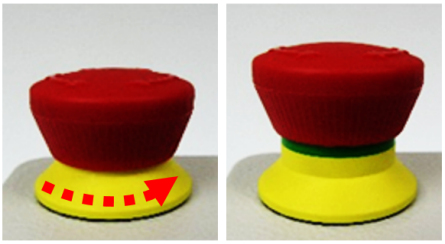
The main switch on the rear of the machine is used to disconnect or connect the machine from the main power supply.

2.5.2 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.

2.5.3 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.

2.5.4 Interlock safety switches

The closed position of the acrylic lid and the side lid on the right are monitored using interlock safety switches. It is not possible to start up the machine if the safety guards are open or not in place. However, the pilot laser remains active.

2.5.5 Acrylic top lid

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

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

2.5.6 Side cover

The side panels protect from laser light and must always be closed and properly attached.

2.5.7 In case of safety device malfunction

If 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 applied:

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.
- Use an adequate exhaust system to minimize or exclude the possibility of flames (see "Exhaust system requirements").
- 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 path of the beam.
- 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, fumes and dust

Depending on the processed materials and selected parameters, gases, vapors, aerosols or dusts can 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 to 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.

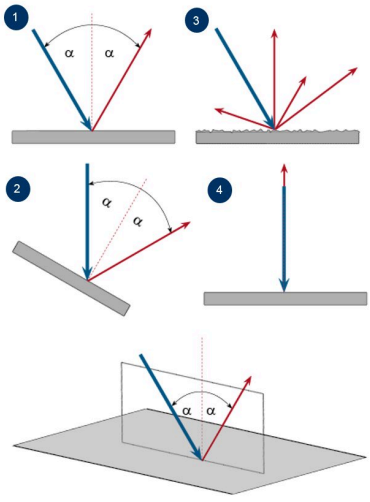
Danger from laser beam

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.
- Do not use highly reflective materials such as aluminum, chrome, precious metals, metal foils, stainless steel, brass, copper or titanium.
- Take particular care with concave and convex surfaces.
- Do not place any objects on the work surface or in the work area.

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 a malfunction

- 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.
- 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.

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

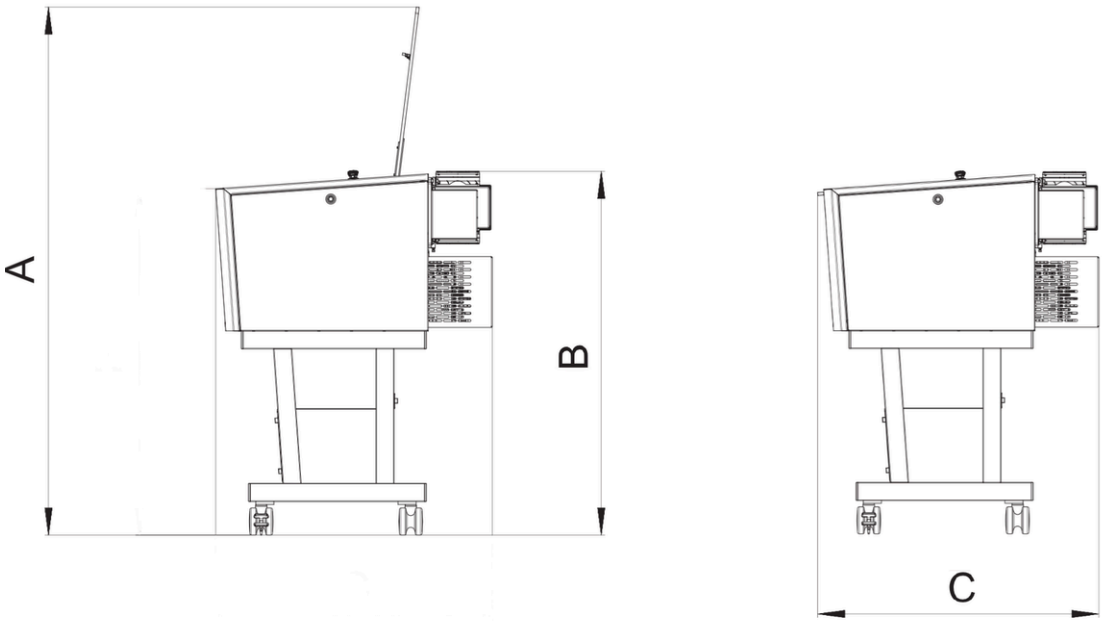
- If eye damage occurs due to laser radiation, the casualty must be immediately seen by an ophthalmologist.
- The first aider must always ensure that they protect themselves.
- De-energize the unit and secure it against restarting:
  - Remove the key from the key switch.
  - Unplug the mains cable.
-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

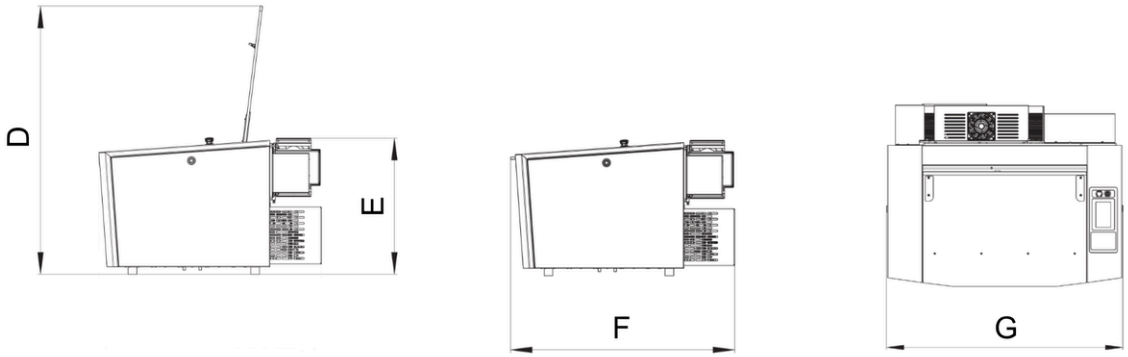
3.1 Dimensions and weight

Dimensions including trolley base



	Description	Dimensions
A	Front height with open lid	1,454 mm
B	Rear height with closed lid	1,002 mm
C	Depth with suction nozzle	779 mm
	Weight	122 kg

Dimensions without trolley base



	Description	Dimensions
D	Front height with open lid	917 mm
E	Front height with closed lid	465 mm
F	Depth with suction nozzle	779 mm
G	Width	1018 mm
	Weight	95 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 64-bit
- Screen resolution: min. 1920 x 1080 (Full HD)
- Most recent version of Google Chrome browser
- RAM: min. 4 GB
- Processor: Min. i7 or comparable

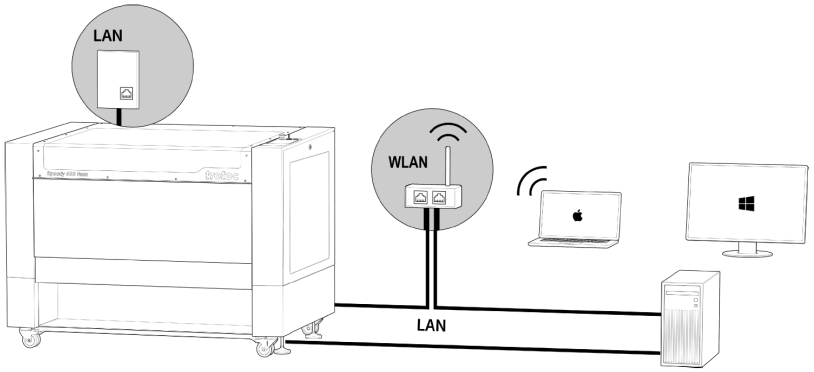
Network

- DHCP Active
- 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 "Unit overview".

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.
- Maximum pre-fuse: 16 A

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	30 W (CO_2)	50 W (CO_2)	80 W (CO_2)
Voltage	115-230 V~	115-230 V	115-230 V~
Fuse	16 A (T)*	16 A (T)*	16 A (T)*
Power consumption AC (air-cooled)	900 W	1100 W	1300 W

* T = time delay (slow release)

3.6 Exhaust system requirements

DANGER

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.

CAUTION

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.

The requirements for the exhaust system and recommended Trotec exhaust systems for standard applications depend on the processing table installed in the machine. We recommend consulting with a qualified Trotec technician.

Recommended exhaust systems

Exhaust system	Speedy 100
Atmos Pure 300	✓
Atmos Cube	✓

NOTICE

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

Technical data for the exhaust systems

Exhaust system	Hose connector ø [mm] (internal diameter)	Volume flow rate [m^3/h]	Pressure [Pa]
Atmos Pure 300	(3x) 80	352 (115V) 378 (230V)	6500 (115V) 8000 (230V)
Atmos Cube	80	320	5800 (115V) 8500 (230V)

Requirements for the exhaust system

Machine	Volume flow rate [m^3/h]	Pressure [Pa]
Speedy 100	Min. 200 Rubber: min. 300*	1000

The exhaust connection on the side of the machine is used as the measuring point for volume flow and pressure. Pressure losses through hoses or pipes or filters in the exhaust system must be determined and taken into account when selecting the exhaust system.

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 vapors and dust remaining in the machine.

To ensure proper ventilation while engraving rubber, an exhaust system with a suction capacity of at least 300 m^3/h is required.

The unit must be equipped with a fine dust filter (formation of rubber dust) and an activated carbon filter (neutralization of odors).

Good filtering of the exhaust air is also required when cutting plastics or engraving wood. If only Elox plates are engraved, the suction power can be reduced.

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. It may also be necessary to use separate exhaust systems for head extraction and table extraction.

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
- Materials containing halogens (fluorine, chlorine, bromine, iodine and astatine), epoxy resin or phenolic resins.

Care should be taken with the following materials:

- 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.

(See "Note", page 28)

WARNING

Serious injury or material damage.

The use of prohibited or unreleased materials can cause serious injury or material damage and will not be covered under warranty.

Only use approved and released materials.

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

CO_2

Material	Cutting	Engraving	Marking
Metals			
Anodized aluminum			✓
coated metal (lacquered)		✓	

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

Material	Cutting	Engraving	Marking
Plastics			
Polyurethane (PUR)	✓	✓	
Foam material (PVC free)	✓	✓	

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

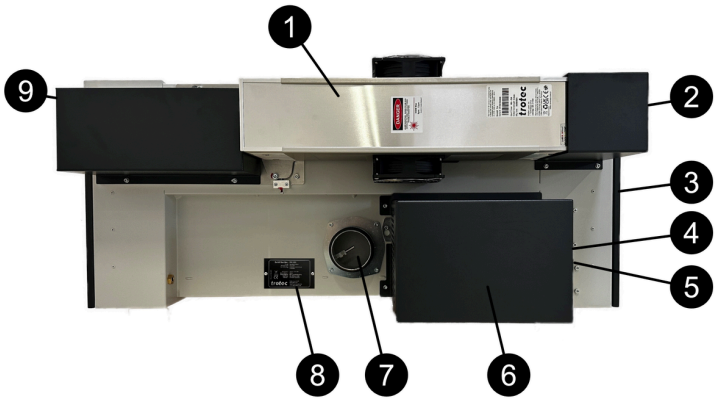
3.8 Service life of the machine

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.

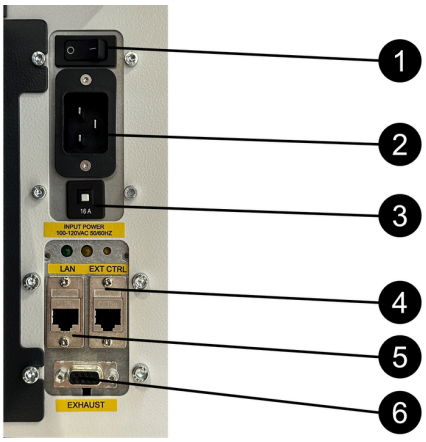
4 MACHINE OVERVIEW

4.1 Overview of unit

No.	Description	No.	Description
1	Acrylic cover	4	Control panel
2	Emergency stop button	5	Side cover right
3	Key switch	6	Side cover left



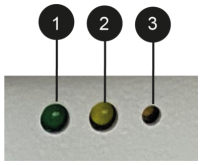
No.	Description	No.	Description
1	Laser source	6	Power supply units
2	Rear laser source cover	7	Connection for exhaust hose
3	Electronics	8	Data plate
4	On/off switch / mains connection	9	Front laser source cover
5	Connection for LAN and exhaust system		



No.	Description	No.	Description
1	On/off switch	4	Atmos Pure connection (EXT CTRL)
2	Grid connection	5	Local area network connection
3	Fuse	6	Connection for exhaust system (e.g. Atmos Cube or Mono/Duo) (EXHAUST)

4.2 Ruby Server Status LED

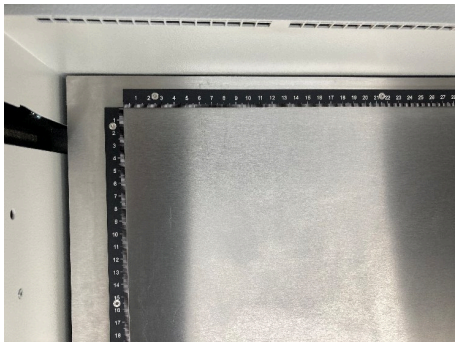
The Ruby server status LEDs are located on the rear of the system above the exhaust connection and network connection.



Description:

1. Green: Power
2. Yellow: Active
3. Reset button

4.3 Tables (multifunctional table concept)



Ferromagnetic engraving table

The ferromagnetic construction allows thin materials, such as paper or film, to be easily attached with magnets. A flat processing area is an essential criterion for optimum results in laser engraving and laser marking.

Honeycomb cutting tabletop

(optional)

The honeycomb cutting tabletop is especially suitable for applications that require minimal back reflection and optimal flatness, such as when cutting membrane keyboards.

Available in the following sizes: 12.7 mm nominal honeycomb size 6.4 mm nominal honeycomb size

4.4 Lens(es)

CAUTION

Only use the following lenses

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 permitted lenses as stated in the instructions.

CO_2	
	1.5” red
	2.0'' black (standard)
	2.5” silver

4.5 Nozzles

Ø 7 mm

Short nozzle with large diameter.

Ø 3 mm

Short nozzle with small diameter.

NOTICE

If the table is raised manually, this may result in a collision with the long nozzle.

- Carefully raise the table.

Optional:

Ø 3 mm

Long nozzle with small diameter.

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.

- To transport the machine, use the transport lugs or a forklift.
- Never stand under suspended loads.

⚠ WARNING

Warning: Risk of injury due to improper transport

Follow the safety notes in order to prevent the machine from being damaged or destroyed by improper transport. Improper transport may also result in injury to people.

- Always exert utmost care and caution when moving the unit.
- Only transport the machine (parts) in the original packaging.
- Pay attention to the center of gravity during transport (risk of toppling).
- Observe handling icons (e.g. only transport the machine in an upright position).
- 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 cardboard packaging. 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:

Keep dry!

Fragile, handle with care.

This way up!

Do not stack!

Pay attention to shockwatch:

5.3 Temperature and humidity

Transport conditions

Transport temperature (ambiente temperature):	-10 °C to +40 °C (14 °F to 104 °F)
Relative humidity:	Maximum 70%, non-condensing

- Avoid high temperature fluctuations.

Storage conditions

Storage temperature (ambiente temperature):	0 °C to +30 °C (32 °F to 86 °F)
Relative humidity:	Maximum 60%, non-condensing

- Avoid high temperature fluctuations.

5.4 Required tools for unloading and transport

Required tools:

- Unloading - Forklift
- Transport - Pallet truck

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

CAUTION

Emissions hazardous to health.

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

- The lens unit may only be handled by Trotec service personnel.

The lens unit may only be unpacked after installation.

CAUTION

Risk of crushing.

The laser engraving machine can tip over.

- The laser engraving machine must be lifted by two people.

NOTICE

Keep the original packaging case, in case of machine needs to be transported or relocate.

Dispose all waste according to the applicable waste disposal law.

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

1. Remove the cover and store the crate in a dry place.
2. Carefully remove the foam material that protects the viewing window of the cover.
3. Work with another person to lift the laser engraving machine out of the packaging. Position the laser engraver on a stable table, on the trolley base (optional) or on the Atmos Cube exhaust system, if available.
4. Remove the accessory box, which contains all the parts required to install the laser system.
5. 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.

NOTICE

The machine may only be installed by Trotec Laser GmbH Technical Support.

- If you wish to relocate the machine, contact Trotec Laser GmbH Technical Support.

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

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.

NOTICE

The setup has to be carried out by Technical Support.

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 - 65 °C, 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 (2 degrees 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 neighboring objects.

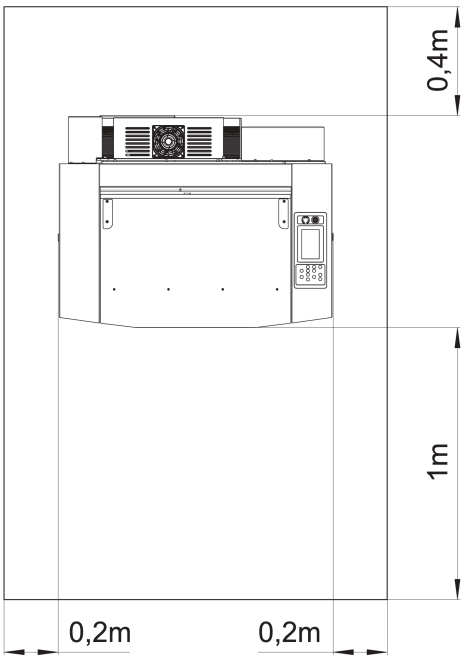


Illustration of the machine may differ.

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 located on the rear of the machine. These 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 acrylic cover is undamaged.
7. Now connect the individual electrical components.
8. Set up the network connection to the machine.

6.5 Connections

6.5.1 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.

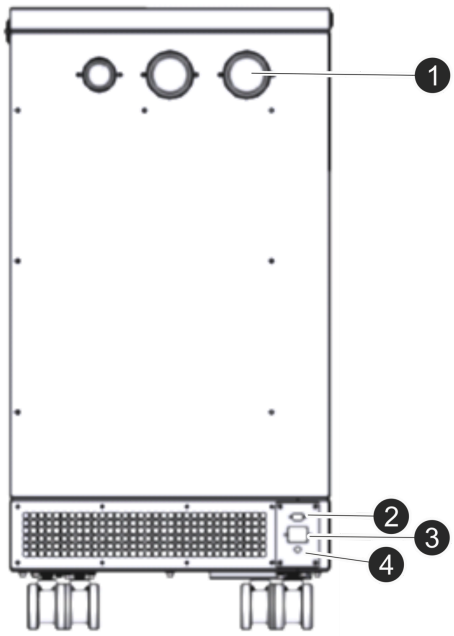
Ensure that the mains voltage matches the voltage intended for the exhaust system.

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 Suction nozzle
2 Connection cable to the laser machine:
Atmos Pure connection (EXT CTRL) is recommended (if available); otherwise use the exhaust system connection (EXHAUST)
(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" in the machine.
- Do not use highly reflective materials such as chrome, highly polished metals, aluminum, precious metals, metal foils, stainless steel, brass, copper or titanium.
- Do not leave objects in the processing area, e.g. on the work surface or in the working area.
- Pay attention to concave or convex 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.
- Ask the manufacturer of the material whether additional protective measures need to be taken when processing with lasers.
- Only process materials that have been approved in Chapter "Materials" of this operating manual. 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, as well as materials containing halogens (fluorine, chlorine, bromine, iodine and astatine), epoxy resin or phenolic resins
- The following materials may only be processed with the utmost care:
  Manganese, chromium, nickel, cobalt, copper, lead, and materials with the suffix “flame-retardant” since they may contain bromine

WARNING

Warning of laser radiation laser class 4

Exposure to laser radiation without protective measures can cause injuries.

This may result in burns and permanent damage to the skin and eyes.

- Avoid exposing the skin or eyes to direct radiation or scattered radiation.
- Wear suitable laser safety glasses.
- To comply with the relevant regulations, it is mandatory to appoint a laser safety officer trained in class 4 laser systems.

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 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).

WARNING

Fire hazard due to defective temperature sensor

If a temperature sensor is installed, its functionality should be tested when the machine is started up.

When the temperature sensor is ready for operation, an acoustic signal is emitted.

If there is no signal tone, the temperature sensor is defective. This poses a risk of fire.

- Do not leave the machine unattended.
- Contact Trotec Laser GmbH and have the temperature sensor checked to ensure it is functioning properly.

NOTICE

Unauthorized persons must not be allowed near the machine.

8.1 Before commissioning

Before commissioning, check the following points:

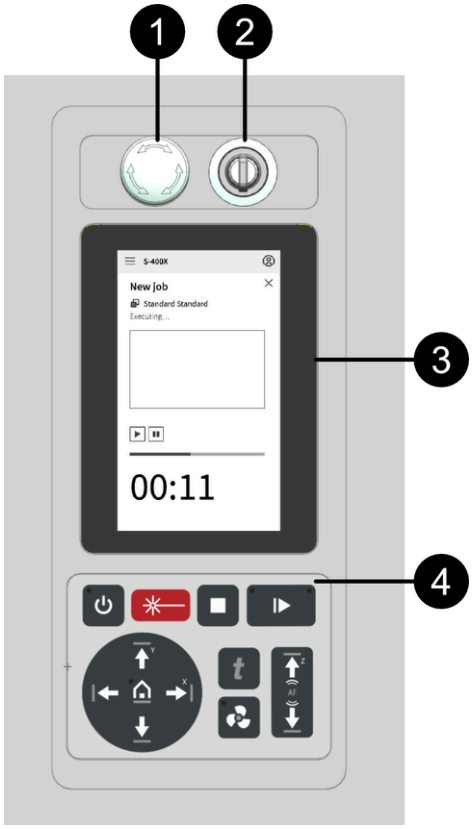
- For completeness and technically perfect condition of the machine and safety equipment, see chapter "Maintenance".
- Inspect the acrylic lid for damage (scratches, burns, etc.)
- Order and cleanliness in the workstation.
- Cleanliness of optical components (free of dust and dirt).
- Activated exhaust 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.

8.2 Control panel



[1] Emergency stop button
[2] Key switch
[3] Touch display
[4] Keypad

8.3 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.

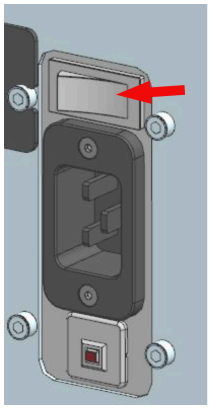
NOTICE

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.

Immediately after switching on, the unit starts the initializing process. When the initializing process has been correctly completed, an acoustic signal is heard and the unit is ready for operation. Operational readiness is also indicated by the (slow) green flashing of the status display.

Switch on the laser:



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

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

2. Turn the key switch to the right in the vertical position in order to activate the touch display.
3. To start the machine, turn the key switch to the right and hold it against the spring force.
4. As soon as the machine starts, release the key switch.

✔ The initialization process starts.

✔ A signal tone is heard when the initializing run of the axes is complete.

✔ The unit is ready for use once the Ruby server has fully started up.

NOTICE

Additionally the ready-to-use state is indicated through the slow flashing of the green status LEDs.

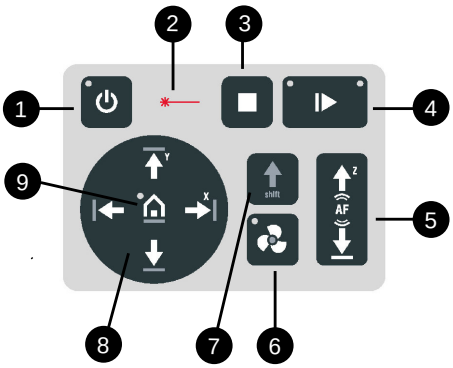
To switch off the machine:

1. Turn the key switch to the left.

✔ The touch display switches off, the axes are de-energized; the server remains active.

2. Switch off the main power supply to the machine by pressing the main switch on the rear of the machine.

8.4 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 **Laser beam status display.** LED is illuminated: The machine processes data.
❸ **Stop button**
❹ **Start/Pause/Repeat button**

LED slowly flashes green (every two seconds).	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

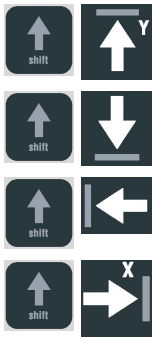
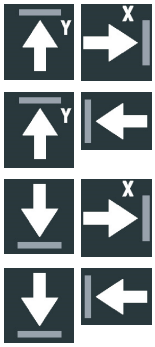
❾ **Home button.** No function

Image	Button	Description
	**Status indicator**	LED On: The machine is processing or receiving data.
	**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.

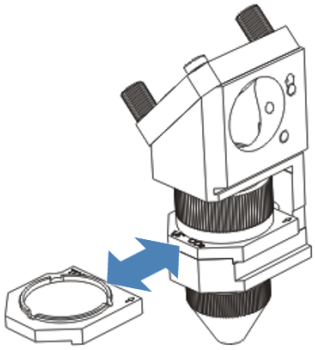
Image	Button	Description
	**Laser head control key X/Y**	• Press one of these buttons to manually move the laser head to the right, left, front or rear (travel in X/Y direction). • Press two of the four control buttons simultaneously in a diagonal direction to move the laser head diagonally (X+/Y+, X+/Y-, X-/Y-, X-/Y+). • Press the Shift button together with any control button to rapidly move the laser head to the corresponding end position.
	**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. Light barrier: Focusing on the material in the vicinity of the sensor. → For more information, see Chapter “"Focusing methods"” in these instructions.
	**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 the LEDs:<table><tr><th>LED</th><th>Description</th></tr><tr><td>Green, flashing slowly (0.5 Hz)</td><td>All covers are closed. Machine is ready.</td></tr><tr><td>Green, flashing fast (2 Hz)</td><td>Minimum one cover is open.</td></tr><tr><td>Blue + Green, permanent</td><td>Data available. Pause-mode 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 + exhaust system</td><td>Air assist on/off.</td></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><tr><td>Shift + Standby</td><td>Keypad locked/unlocked.</td></tr><tr><td>Shift + processing table Z, upward</td><td>The processing table moves upward automatically and activation of automatic focusing starts.</td></tr><tr><td>Shift + processing table Z, downward</td><td>The processing table automatically moves downward to the end 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.</td></tr>
</table>

8.5 Keyboard shortcuts

Image	Button	Description
	Shift-button + Exhaust-button	Air assist On/Off.
	Shift-button + Laser head control button X/Y	Laser head moves fast to corresponding end position (X- or Y-position).
	Shift-button + Standby-button	Keypad locked/unlocked.
	Shift-button + Working table control button Z (Up-button)	The activation of the automatic focusing startts and the Working table is moving automatically upwards.
	Shift-button + Working table control button Z (Down-button)	Working table is moving automatically downwards to the corresponding end position.
	Working table control button Z (Up-button + Down-button)	Automatic focusing activation begins and the processing table moves upward automatically. (See"Activating automatic focusing").
	Laser head control button X/Y	Laser head moves diagonal to the according direction.
	Shift button + Stop button	Laser interior lighting on/off.

8.6 Lense placement

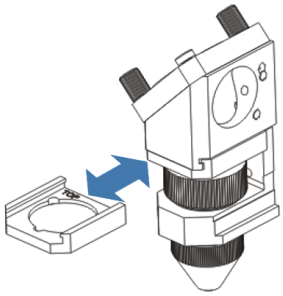


Illustration, as an example

1. Loosen the lens by turning the clamping ring.
2. Remove lens.
3. Check lens for damage.

   See chapter "Protective measures for damaged optics"

4. Clean both sides of the lens with a cleaning agent and cleaning cloth if necessary.



Illustration, as an example

5. Insert the lens with the marking facing upward, above or below the clamping ring depending on the lens type.
6. Fix the lens by turning the clamping ring.

The following lenses must be inserted below the clamping ring:

1.5''

NOTICE

All other lenses must be inserted above the clamping ring.

To do this, remove the clamping ring before inserting the lens, turn it over and reinsert it.

8.7 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 work table, this is excluded from the warranty.

NOTICE

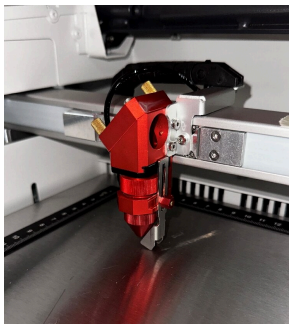
The system equipment may vary depending on the model.

Precise laser engraving depends on various factors. In addition to choosing the right lens, work 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



Focus tool on the work head

1. Place the focus gauge over the material on the groove on the working head.
2. Move the table upward using the “up” button for the Z-axis on the keyboard. It is not necessary for the focus tool to fall off.

✔ The correct focus is set when the focus tool touches the engraving material.

Automatic focusing methods

- Light barrier

8.8 Options

8.8.1 Rotary engraving attachment

The rotary engraving attachment is used for engraving cylindrical workpieces.

NOTICE

Damage to electronics.

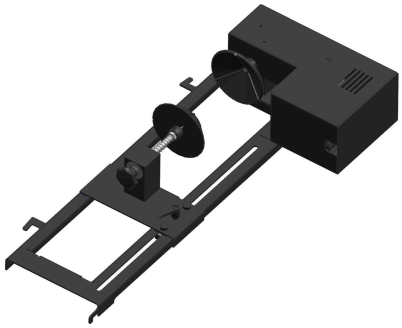
Inserting or removing the rotary engraving attachment during operation can cause irreparable damage to the electronics.

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

Device with cone:
Max. workpiece diameter:

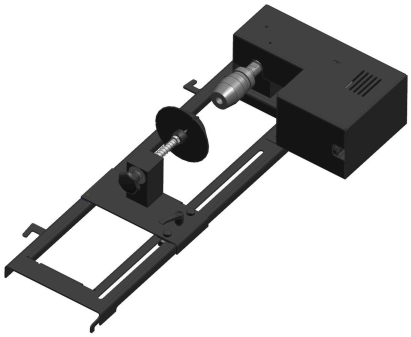
- 1.5" lens: 168 mm
- 2.0" lens: 142 mm
- 2.5" lens: 118 mm

Max. workpiece length: 350 mm
Max. workpiece weight: 7 kg



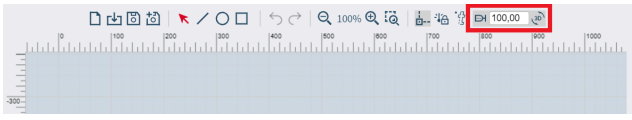
Device with cone

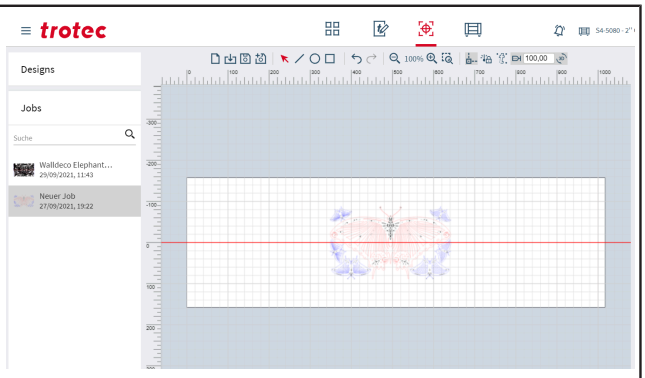
Device with drill chuck:
workpiece diameter: 1-13 mm
Max. workpiece length: 279 mm
Max. workpiece weight: 7 kg



Device with drill chuck

8.8.2 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.	
5. Press the start button on the system to start the selected job (see chapter "Control panel").	

8.8.3 Installation and commissioning

NOTICE

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

Illustration, as an example

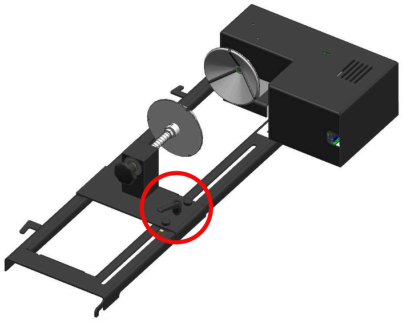
The processing table must be mounted and positioned in the lowest position.

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.
2. Position the device so that the clamps hook correctly onto both of the rulers.
3. Use the connection cable to connect the system to the connector plug on the front side of the housing.

✔ Both LEDs light up until the rotary engraving attachment is configured.

8.8.4 Mounting the work piece in the rotary attachment



1. Measure the diameter of the workpiece.
2. Loosen the slide control to clamp the workpiece between the two cones or between the cone and the drill chuck.
3. Switch on the laser machine and wait until the initializing process is complete.

✔ Initializing is complete when the green LED flashes slowly.

✔ The axis moves automatically over the center of the rotary engraving attachment.

4. Position the working 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 54).

8.8.5 Temperature sensor

The temperature sensors guarantee reliable monitoring of the temperature inside the machine and are available as an additional option.

If a preset temperature value is exceeded, a continuous signal tone sounds to warn the operator of any unusual temperature developments during processing.

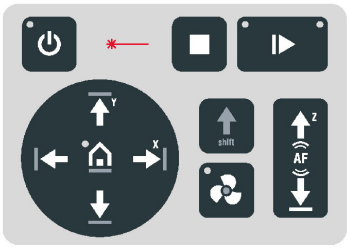
WARNING

Fire hazard

The acoustic alarm upon startup of the machine indicates that the sensors are operating properly. However, the sensors do not guarantee fire prevention.

- The unit must not operate unattended despite the integrated temperature sensors.
- If the acoustic alarm does not sound when the machine is switched on, check the functionality of the sensors.
- In case of questions, contact our experienced Technical Support in your local area.

Confirm temperature sensor alarm



Press any button on the keypad to confirm the alarm.

NOTICE

The signal tone sounds again and again until the temperature returns to normal. Alternatively, switch off the laser system and check the temperature sensors.

9 MAINTENANCE

9.1 Safety notes

WARNING

Risk of injury due to maintenance work

Improper maintenance work can result in 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.
- Always have any absence of voltage checked by a qualified electrician. 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 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.
- Have the absence of any voltage checked by a qualified electrician.

NOTICE

Ensuring machine safety

The safety devices e.g. interlock contacts, emergency stop) on the laser system can be damaged due to components ageing or corresponding operation (e.g. 72,000 lid cycles / year) must 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	Monthly	Annually	Chapter
Laser system						
Inspecting the safety circuit		✓				"Daily inspection of the safety circuits", page 61
Inspecting the safety switch on the right-hand side lid					✓	"Inspecting the safety switch on the right-hand side cover", page 61
Lens, Mirror #3	✓✓					"Cleaning", page 62
Mirror #2				✓✓		"Cleaning the mirrors", page 64
Spindles					**CG**	
Laser tube cover and housing			✓			
Acrylic cover		✓				
Entire engraving area General cleaning			✓			
Extraction slots (machine interior)		✓✓				
Processing table and rulers		✓✓				
Exhaust system						
Compact filter unit				✓✓		
Hoses			✓✓			

✓✓ 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

Before 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 (0.5 Hz)
3. After each time that you clean the mirror and at least once a year, open the side cover and check the safety switch (see "Inspecting the safety switch on the right-hand side cover")

→ 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 Inspecting the safety switch on the right-hand side cover

After each time that you clean the mirror and at least once a year:

Inspect the safety switch:

1. After referencing, open the right-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 (0.5 Hz)

→ Check completed

9.5 Cleaning

9.5.1 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.

1. Bring the processing table to a position where you find it easy to clean the surface with window cleaning agents and paper towels.
2. Switch off the unit and disconnect it from the mains.
3. Close the acrylic cover.
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 air baffle and suction slots of the suction box in the interior with a dry or slightly damp cotton cloth or a brush.
6. Clean the laser tube cover and ventilation slots on the back of the machine with a dry or slightly damp cotton cloth.

NOTICE

Material damage

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

7. Clean the acrylic lid with a dry or slightly damp soft cotton cloth.

9.5.2 Optics in general

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 lens at least once a week. If you discover a layer of haze or dirt, it must be cleaned off.

9.5.3 Lens

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

Step 1: Preparation

1. “Blow away” lint and dust (with bellows) or compressed air (according to ISO 8573:2010 Class 1).
2. Prepare cleaning agents and cloths.
3. Move the processing table up and place a cloth under the lens holder (the lens will not be damaged if it falls out of the holder).
4. Turn the fixing ring to loosen it.
5. Now remove the lens. Do not touch the lens surface with your fingers!

Step 2: with cleaner and cloths

NOTICE

Suitable cleaning fluid for lenses

- Isopropanol
- Ethanol

Do not use any cleaning fluid that contains acetone.

1. Remove the lens and rinse with cleaning fluid so that any dirt is rinsed off.
2. Put a drop of cleaning fluid on the lens and leave it to work for approx. 1 min.

3. Lightly moisten the cleaning cloth with the cleaning fluid and wipe the surface of the lens without applying pressure.
4. Carefully push the lens holder back into the processing head and secure it with the fixing ring.

NOTICE

We recommend using the cleaning set supplied or alternatively, you can use lint-free cloths. The following cleaning products are available as accessories:

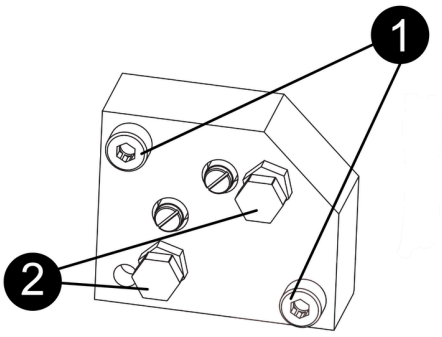
Lens cleaning cloths (part number 69249) and lens cleaning fluid (part number 69248).

9.5.4 Cleaning the mirrors

CAUTION

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

Do not touch the mirrors with your fingers or with tools. Never use a cleaning cloth twice since the risk it too great that it will scratch the surface.

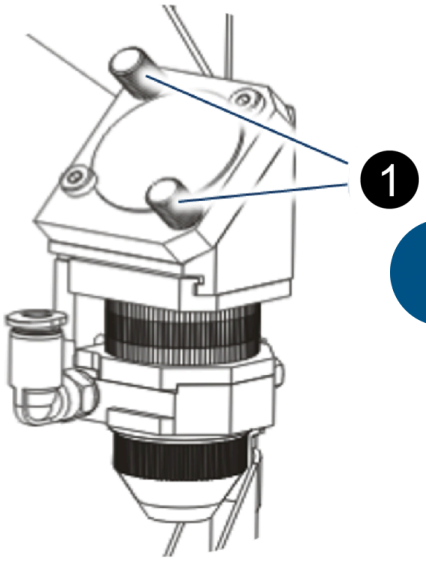


Mirror #2

Cleaning mirror #2

1. If you want to clean mirror #2, you must first remove the right-hand cover on the laser.
2. Mirror #2 is fixed in place with two hexagon socket head screws (1), located on the mirror holder. Open the hexagon socket screws and remove them together with the mirror mount. When cleaning, do not remove the mirror from the dismantled holder. **Do not adjust the hexagon head screws (2) for the mirror adjustment.**
3. Rinse the mirror with cleaning fluid to remove any coarse dirt.
4. Put a drop of cleaning fluid on the mirror and leave it to work for approx. 1 minute.

5. Lightly moisten the cleaning cloth with the cleaning fluid and wipe the surface of the mirror without applying pressure.
6. Carefully replace the mirror and secure it using the hexagon socket head screws (1).



Mirror #3

Cleaning mirror #3

1. While holding the mirror, loosen the knurled thumbscrews (1) and lift the mirror from the mirror mount.
2. Rinse the mirror with cleaning fluid to remove any coarse dirt.

NOTICE

Make sure that the mirror is not dragged over the mirror mount since it may easily become scratched.

3. Put a drop of cleaning fluid on the mirror and leave it to work for approx. 1 minute.
4. Lightly moisten the cleaning cloth with the cleaning fluid and wipe the surface of the mirror without applying pressure.
5. Carefully replace the mirror and secure it with the knurled thumbscrews (1).

10 TROUBLESHOOTING

WARNING

Risk of injury during troubleshooting

Improper maintenance work can result in a fire or explosion.

- Only rectify faults if you have read and understood the descriptions and instructions relating to the installed components that are found in the machine documentation.
- Only carry out troubleshooting work on the machine if you are a trained specialist.
- Only carry out work once the main switch has been switched off and secured so that it cannot be switched on again.
- Always have any absence of voltage checked by a qualified electrician.
- Inform operating personnel before starting any work.

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	Remedy
Engraving depth too shallow	• Inaccurate focusing • Dirty lenses	• Check focus (see chapter "Focusing methods", page 54) • Clean the optics (see Chapter "Optics in general"
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 54) • 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	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	• Front or side door of acrylic cover not closed	• 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	• 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	• Reduce speed
Other faults		• Contact Technical Support (see chapter "Contact details", page 67)

10.2 Contact details

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**

When you call, stay close to the machine and have the following information to hand:

- During which work process did the problem occur?
- What you have done so far to correct the problem?
- Serial number (see "Data plate").
- Error code.

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
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
GPU	Graphical processing unit
HD	High definition
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
LED	Light emitting diode
MPC	Maximum permissible concentration
MPR	Maximum permissible radiation

Acronym	Description
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
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

Speedy 100

Laser engraving system

Mechanics

Working area	610 x 305 mm (24 x 12 inch)
Loading area	690 x 305mm (27.1 x 12 inch)
Max. height of work piece	170 mm (6.7 inch) with 1.5 inch lens 157 mm (6.2 inch) with 2.0 inch lens 144 mm (5.7 inch) with 2.5 inch lens
Working table	Ferromagnetic engraving table, honeycomb cutting tabletop
Max. processing speed	2.8 m/s (110 ips)
Acceleration	40 m/s^2 (1575 ips^2)
Motors	Brushless DC servo motors
Encoder	Incremental measuring system
Optical elements	Telescope, lens and mirrors
Lens	1.5 inch, 2.0 inch, 2.5 inch
Accuracy	+/- 0.015 mm (0.0006 inch), over the whole working area
Addressable accuracy	5 µm (0.0002 inch)
Accuracy to size of parts	According to material, process and temperature
Maximum material load	10 kg (22 lbs), load over the whole working area
Interface	Ethernet

Standard Features

Lens	2.0 inch
InPack Technology™	Protects working head and all moving parts from dust
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	Automatic focussing via light barrier (for use with standard lens)
Work area light	LED bar

Air Assist	System for blowing compressed air
Other standard equipment	OptiMotion™, smart electronics, protected laser beam

Options

Temperature sensor	Temperature monitoring inside / working area.

Accessories

Rotary attachment	Available with conus, three-jaw chuck, three-jaw ring chuck or drill chuck
Trolley	Mobile with storage shelf
TroCare	Comprehensive package of technical services
Exhaust Systems	Atmos Cube, Atmos Pure 300

Laser

Laser system	Sealed-off CO2 laser, maintenance free, air cooled, wavelength 10.6 µm
Laser power	30/50/80 W

Dimensions & Weight

Width x Depth x Height	1018 x 779 x 465 mm (40 x 30.7 x 18.3 inch)
Weight	Approx. 95 kg (209 lbs) depending on laser power
Width x Depth x Height (with Trolley)	1018 x 779 x 1002 mm (40 x 30.7 x 39.4 inch)
Weight (with Trolley)	Approx. 122 kg (269 lbs) depending on laser power

Safety & Environment

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

Exhaust Requirements

Exhaust working point	Min. 200 m^3/h at 1.000 Pa (Min. 117.7 cfm at 4.015 in H2O)

Cooling

Air cooling	Active air flow cooling with fan

Electrical

Voltage & power consumption	1 ~ AC 110-230V 50/60Hz, 900W (30W) 1 ~ AC 110-230V 50/60Hz, 1100W (50W) 1 ~ AC 110-230V 50/60Hz, 1300W (80W)

Subject to change without notice.
Errors and omissions excepted.
Model identification Speedy 100C-8083
August 2024

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	Speedy 100
Model identification	Speedy 100C-8083
Serial number	S1-8###
Machine group	8083
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	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 13849-1:2018	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 60825-1:2022	Safety of laser products - Part 1: Equipment classification and requirements
IEC 61000-3-2:2019	Electromagnetic compatibility - Part 3-2: Limits for harmonic current emissions
IEC 61000-3-3: 2013 +A1:2019	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 60825-4:2012	Safety of laser products - Part 4: Laser guards

trotec
Trotec Laser GmbH
Freilinger Strasse 99, A-4614 Marchtrenk
T +43 7242 239-0
www.troteclaser.com

Marchtrenk, 23 September 2024

City, Date

pp. Dr. Matthias Jörgl
Head of Research and Development