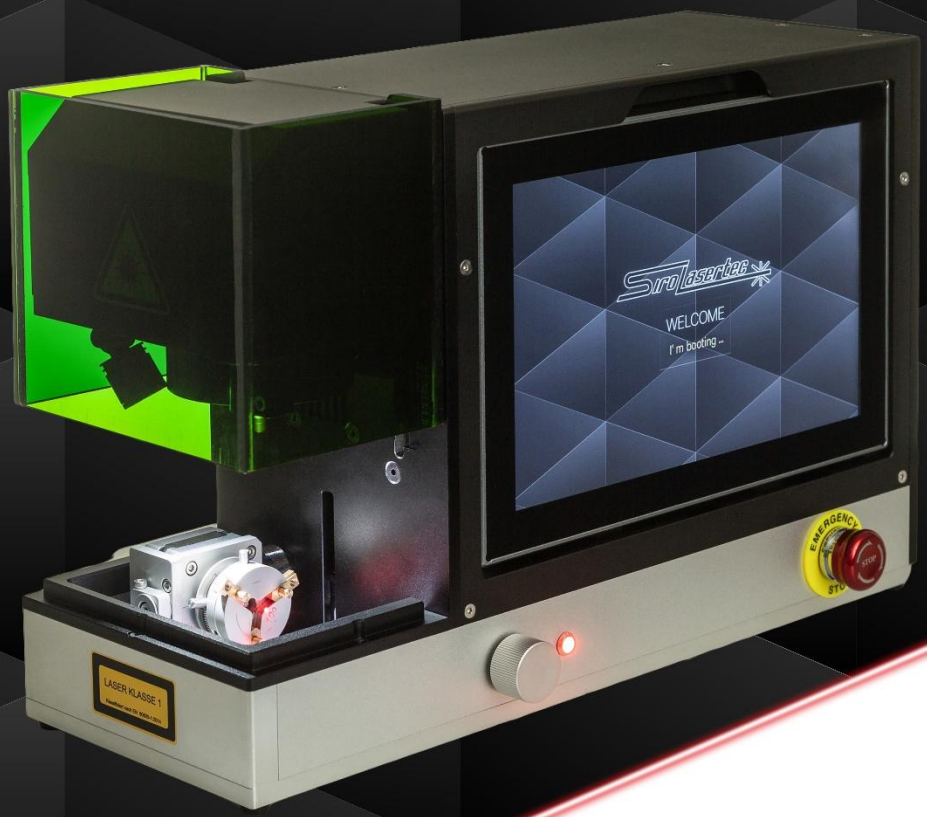
# SLC mini




## Manual Instruction

BEST IN LASER SINCE 1993

LIFTOFF

www.siro-lasertec.com

# Identification Data

| | |
|---|---|
| **Tool / Machine / System** | |
| Model Designation | Laser Marking Machine |
| Type | SLCmini |
| Year of Manufacture | 2025 |
| Serial Number | _____ |
| **Customer Registration** | |
| Company Name | |
| Order Number | |
| Location | |
| **Manufacturer Contact Details** | |
| Company Name | Siro Lasertec GmbH |
| Street | Rastatter Straße 6 |
| Town | 75179 Pforzheim |
| Country | Germany |
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| E-Mail | info@siro-lasertec.de |
| Homepage | www.siro-lasertec.de |
| **Instruction Manual** | |
| Version | END2025 |
| Creation Date | 21.06.25 |

# Index

# 1 Foreword

## 1.1 Introduction

The operating instructions contain important information on how to operate the **Fehler! Verweisquelle konnte nicht gefunden werden.** safely, properly and economically. Observing them avoids hazards, reduces repair costs and downtime, and increases the reliability and service life of the **Fehler! Verweisquelle konnte nicht gefunden werden.**.

The operating instructions must be available at all times and must be read and applied by every person performing work on or with the **Fehler! Verweisquelle konnte nicht gefunden werden.** .

These include, among others

- the operation and elimination of malfunctions in operation,
- maintenance (care, maintenance, repair),
- the transport.

## 1.2 Copyright and Intellectual Property Rights

- Make these operating instructions accessible only to authorized persons.

The operating instructions are protected within the meaning of the Copyright Act.

The passing on and reproduction of documents, even in extracts, as well as the use and communication of their content are not permitted, unless this is expressly admitted in writing.

Violations are punishable by law and oblige you to pay damages. All rights to exercise industrial property rights are reserved by Siro Lasertec .

## 1.3 Information for the operator

The operating manual is an essential part of the **Fehler! Verweisquelle konnte nicht gefunden werden.**.

- Make sure that all people working with or on the **Fehler! Verweisquelle konnte nicht gefunden werden.** take note of these operating instructions.
- Spare parts must meet the technical requirements set by Siro Lasertec. This is always guaranteed with original spare parts.

# 2 Safety

The **Fehler! Verweisquelle konnte nicht gefunden werden.** is developed and built a ccording to the state of the art and the recognized safety regulations.

When operating the **Fehler! Verweisquelle konnte nicht gefunden werden.** , there may be a risk to the persons working on or with the **Fehler! Verweisquelle konnte nicht gefunden werden.** , or impairment of the **Fehler! Verweisquelle konnte nicht gefunden werden.** and other property if they:

- operated by untrained or instructed personnel,
- not used as intended, and/or
- improperly maintained.

## 2.1 Notes on Signs and Symbols

In the operating instructions, the following designations or signs and symbols are used for particularly important information:

- With the eye-catching point work and/or operating steps are marked. Follow the steps in order.
- The dash is used to mark bulleted lists.

**DANGER**

**This is a warning of an imminent dangerous situation, with the inevitable consequence of serious injury or death if the designated instruction is not followed exactly.**

**WARNING**

**Draws attention to a possible dangerous situation that could lead to serious injuries to persons or death if the designated instruction is not followed exactly.**

**CAUTION**

**This is a warning of a possible dangerous situation, resulting in moderate or minor injuries if the designated instruction is not followed exactly.**

**HINT**

**This is a warning of a possible dangerous situation, with the consequence of property damage, if the designated instruction is not followed exactly.**

This is an indication of useful information on safe and appropriate handling.

- Observe the **Fehler! Verweisquelle konnte nicht gefunden werden.** warning s igns, actuation plates, or component markings attached to the laser engraving machine. They must not be removed.
- Always keep these notices and symbols in a fully legible condition.

## 2.2 Intended use

The **Fehler! Verweisquelle konnte nicht gefunden werden.** is used for permanent l aser marking and engraving of metallic materials, such as precious metals (e.g. silver, gold), stainless steel, titanium, coated metals.

For various applications, the **Fehler! Verweisquelle konnte nicht gefunden werden.** is equipped with a manual Z-axis as standard and optionally with a rotation axis for internal and external ring engraving.

- Please refer to the information in Chapter 3, Technical *Data section*. Be sure to follow these instructions.

The intended use also includes compliance with the instructions

– to be on the safe side,
– for operation and control,
– for servicing and servicing,

described in this owner's manual.

Any other or further use shall be deemed to be not as intended. The operator alone is liable for any damage resulting from this. This also applies to unauthorized changes to the **Fehler! Verweisquelle konnte nicht gefunden werden.**.

## 2.3 Reasonably foreseeable misuse

The following processing methods mentioned by way of example are considered not to be in accordance with their intended purpose:

- The use and/or processing of explosive substances.
- Processing of combustible material.
- Processing materials other than those specified.
- Operating the **Fehler! Verweisquelle konnte nicht gefunden werden.** in an e xplosive atmosphere.
- Operating the **Fehler! Verweisquelle konnte nicht gefunden werden.** without f ully attached guards.
- Use by private users, or users without professional instruction and training.
- Storing explosive or highly flammable substances in the vicinity of the **Fehler! Verweisquelle konnte nicht gefunden werden.**.
- Setting up the **Fehler! Verweisquelle konnte nicht gefunden werden.** in u nprotected, weather-accessible rooms or halls.

## 2.4 Residual risk

Even if all safety regulations are observed, **Fehler! Verweisquelle konnte nicht gefunden werden.**laser engraving machine, as described below.

- As an entrepreneur/operator, make sure that all people who work on and with the **Fehler! Verweisquelle konnte nicht gefunden werden.** are aware of the residual risks.
- Follow the instructions that prevent residual risks from leading to accidents or damage.

During set-up and set-up work, it may be necessary to dismantle on-site protective equipment. This creates various residual risks and potential hazards that every operator must be aware of:

**DANGER**

**Danger to life due to electric shock**

**An electric shock results in fatal injuries.**

- **Disconnect the** Fehler! Verweisquelle konnte nicht gefunden w erden. **from the power supply before any repair, setup, and maintenance work.**

**WARNING**

**Exposure to optical radiation**

**Class 4 laser radiation is very dangerous to the eye and dangerous to the skin. Diffuse scattered radiation can also be dangerous. The laser radiation can cause a risk of fire and explosion. The closed safety door downgrades the laser radiation to class 1.**

- **Avoid irradiation of eyes or skin by direct or scattered radiation.**
- **Before using the** Fehler! Verweisquelle konnte nicht gefunden w erden.**, check that all protective devices are installed and working.**
- **Never operate the laser when the safety door is open or damaged.**
- **Use only the materials specified as intended.**

## 2.5 Description of the protective devices

### 2.5.1 Location of the emergency stop facilities

An emergency stop button is located on the right, below the touchscreen.

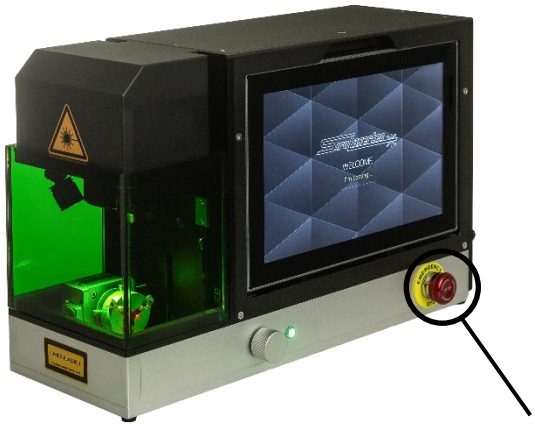


Illustration 1 SLCmini

| Pos. | Designation | Function |
|---|---|---|
| 1 | Emergency Stop Button | In case of emergency: Does the **Fehler! Verweisquelle konnte nicht gefunden werden.** disconnect the power supply. |

- Have the function of the emergency stop devices checked annually and log this process.

### 2.5.2 Security Concept

The safety concept provides for movable or fixed separating protective devices – the following applies in principle::

- Separating guards can only be removed with tools.
- Movable separating guards do not remain in a protective position when unsecured.
- Fasteners are captive to the guards.

The fasteners are chosen in such a way that the removal of switches or actuators for interlocked guards with tools such as:

- objects of daily use, such as keys, tape, twine or wire; or
- Replacement actuators or keys for locking devices with key transfer systems; or
- Tools required and readily available for machinery/equipment, such as screwdrivers and wrenches, hex wrenches, and pliers

is not possible – a reasonably foreseeable circumvention of the protective device is thus prevented.

Additional measures to minimise the possibilities of bypassing locking devices:

- Preventing accessibility to the elements of the locking device (installation out of reach, obstacles, shielding, installation in a concealed position)
- Preventing replacement operation of the locking device by readily available objects (coded actuator)
- Preventing the disassembly or change of position of elements of the locking device by means of non-detachable fastenings (e.g. welding, gluing, one-way screws, rivets)
- Prevention of bypassing (integration of a bypass monitoring system into the control system or plausibility check with the help of an additional locking device)

### 2.5.3 Safety

#### 2.5.3.1 Safety door with viewing window

The safety door protects the operator from the Class 4 laser inside the guard. Thus, the laser is downgraded to class 1.

The viewing window is a special laser safety glass.

#### 2.5.3.2 Light switch

A light switch prevents the laser from operating when the safety door is open.

## 2.6 Markings and signs on the laser marking machine

| Label | Meaning | Location |
|---|---|---|
| | Nameplate with the information:<br>Name and full address of the manufacturer<br>Design<br>Type / Designation<br>Machine No.<br>Year of construction<br>Technical data (e.g. electrical, weight)<br>– CE mark | Easily legible on the **Fehler! Verweisquelle konnte nicht gefunden werden.**. |
|  | Warning of laser beam class 1 | On the outside of the housing. |

## 2.7 Operators / User Groups

People who handle the **Fehler! Verweisquelle konnte nicht gefunden werden.** must meet the following requirements:

| Personal | Operations | Required qualification |
|---|---|---|
| Carrier | Transport from company to company | Qualification of a specialist forwarding company for machines |
| Goods reciept employee | Transport within the company | Trained for transport with lifting equipment (crane, forklift, AGV, etc.) |
| Mechanic fitter | Mechanical installation | Mechanics Specialist |
| Electrics fitter | Electrical installation | Qualified electrician |
| Commissioning Engineers | Initial commissioning Recommissioning | Skilled personnel with an understanding of process engineering plants |
| Fitter | Arrange | Skilled personnel with an understanding of process engineering plants |
| Operator | Operation | Semi-skilled assistant |
| Mechanical maintenance personnel | On mechanical parts:<br>-Troubleshooting<br>-Maintenance<br>-Decommissioning<br>-Storage<br>-Dismantling | Mechanics Specialist |
| Electrical maintenance personnel | On electrical parts:<br>-Troubleshooting<br>-Maintenance<br>-Decommissioning<br>-Dismantling | Qualified electrician |
| Waste disposal company | Disposal of the machine | Waste management specialist |

## 2.8 Safety instructions for operators

Any person tasked with working on or with the **Fehler! Verweisquelle konnte nicht gefunden werden.** must have read and understood this operating manual in its entirety.

- Only use the **Fehler! Verweisquelle konnte nicht gefunden werden.** in t echnically perfect condition and in accordance with its intended purpose, safety and hazard awareness in compliance with these operating instructions.

No liability is assumed for damage and accidents caused by non-observance of the operating instructions.

- Eliminate all disruptions promptly.
- Keep the operating instructions handy at all times on the **Fehler! Verweisquelle konnte nicht gefunden werden.**
- Don't wear loose long hair, loose clothing, or jewelry. There is a risk of snagging, pulling in or being taken along on moving parts.
- If there are safety-related changes to the **Fehler! Verweisquelle konnte nicht gefunden werden.** , immediately stop the **Fehler! Verweisquelle konnte nicht gefunden werden.** and secure it.
- Report the process to the responsible staff / person.
- Only reliable, trained and tested personnel of the legally permissible minimum age according to the Youth Employment Protection Act may work**Fehler! Verweisquelle konnte nicht gefunden werden.**laser engraving machine.
- Personnel to be trained, trained, instructed or undergoing general training may only work under the constant supervision of an experienced person.

## 2.9 Safety instructions for maintenance personnel

- Comply with the prescribed deadlines or specified in the operating instructions for periodic inspections/inspections.

### 2.9.1 Preparation of maintenance work

To carry out maintenance work, workshop equipment appropriate to the work is required.

- Carry out setup, maintenance, repair and troubleshooting work only when the **Fehler! Verweisquelle konnte nicht gefunden werden.** is switched off.
- If necessary, secure the maintenance area with a red and white safety chain and a warning sign.
- In particular, clean connections and screw connections before starting maintenance/repair/care of dirt or care products.

### 2.9.2 Carrying out maintenance work

- During maintenance and repair work, always tighten loosened screw connections with a torque wrench according to specifications.
- Ensure safe and environmentally friendly disposal of operating and auxiliary materials as well as replacement parts, as described in Chapter 7 .

## 2.10 Indications of special types of hazards

### 2.10.1 Electricity

Work on the electrical equipment of the **Fehler! Verweisquelle konnte nicht gefunden werden.** may only be carried out by a qualified electrician or by trained personnel under the supervision of a qualified electrician in accordance with the electrotechnical rules.

- Disconnect the **Fehler! Verweisquelle konnte nicht gefunden werden.** from the p ower supply before opening the guards.
- Use only original fuses with prescribed amperages.
- During repairs, make sure that design features are not changed to reduce safety.

When work on live components is necessary (only in exceptional situations):

- Involve an additional person to press the emergency stop button in an emergency.
- Use only stress-insulated tools.
- Check cables regularly for damage.
- Replace defective cables immediately.

For further information, see also Chapter 6.2.3 Safe maintenance of electrical equipment.

### 2.10.2 Raw materials, solvents, oils, fats and other chemical substances

- When handling raw materials, solvents, oils, fats and other chemical substances, observe and comply with the applicable regulations and safety data sheets of the manufacturers of these substances regarding storage, handling, use and disposal.
- All work with corrosive cleaning agents and substances can cause severe chemical burns and serious eye injuries.
- Therefore, wear personal protective equipment when working with chemical substances:
  - Safety-Glases,
  - Safety-Gloves,
  - Protective clothing resistant to the substances,
  - Safety-Shoes.
- If you come into contact with your eyes or skin, immediately rinse the affected area with plenty of water. Suitable facilities (eyewash bottle, sink, shower) must be available near the workplace.
- Care for skin stressed by cleaning agents and disinfectants after washing. Skin damage can be avoided through the preventive use of skin protection products and appropriate skin care.
- Choose the care product to be used depending on the pollutant load and the individual nature of the skin. Fatty care products are mainly considered.
- Do not eat, drink, smoke and never store food in rooms where there are chemicals.

### 2.10.3 Noise

The A-weighted equivalent continuous sound pressure level at the operator workstations during normal operation of the **Fehler! Verweisquelle konnte nicht gefunden werden.** is below 80 dB(A).

- As an operator, equip the operating personnel with the appropriate protective equipment if a higher sound pressure level is generated at the point of use of the **Fehler! Verweisquelle konnte nicht gefunden werden.** due to the local conditions.

### 2.10.4 Vibration

The total vibration value to which the upper limbs are exposed does not exceed 2.5 m/s2

### 2.10.5 Laser

Due to the special properties of the laser radiation and the resulting biological effects are particularly protective and
Precautions Required When Using Laser Beams.

Lasers are divided into classes according to the hazard potential. Hence

the necessary protective measures are taken in each individual case .

Protective measures are particularly important to protect operators during the Application of high-power lasers in technology and medicine.

| **Laser Class** | **Definition** |
|---|---|
| Class 1 | The accessible laser radiation is reasonably Harmless in foreseeable conditions .<br>1. Lasers that are encapsulated in such a way that an escape of radiation is completely prevented.<br>2. Laser with very low power (40 µW for blue light). These Lasers do not cause damage even with prolonged exposure to radiation on the eye, even if optical instruments (magnifying glasses, lenses, telescopes) are held in the optical path. |
| Class 1M | The accessible laser radiation is in the wavelength range of 302.5 nm to 4 000 nm. The accessible laser radiation is essential for the harmless to the eye, as long as the cross-section is not covered by optical instruments (magnifying glasses, lenses, telescopes)!<br>The laser must be harmless when irradiating the naked eye. When optical instruments are in the optical path during irradiation eye damage can occur. |
| Class 2 | The accessible laser radiation is in the visible spectral range (400 nm to 700 nm). It is not possible for a short period of exposure (up to 0.25 s) is also harmless to the eye. Additional radiation components outside the wavelength range of 400 - 700 nm, the Conditions for Class 1.<br>The power of Class 2 lasers is limited to 1 mW. The Eye is caused by the eyelid closing reflex, which is caused by the glare effect of the radiation occurs within 0.25 s, before damage to a chance to look into the radiation for a short time protected. This also applies when optical instruments in the optical path condition. |

- Avoid intentional, persistent staring in the Beam. If the laser also emits radiation of a different wavelength, it must be completely harmless to the eye.

| Laser Class | Definition |
|---|---|
| Class 2M | The accessible laser radiation is in the visible spectral range from 400 nm to 700 nm. It is not possible for a short period of exposure (up to 0.25 s) harmless to the eye, as long as the cross-section does not reduced by optical instruments (magnifying glasses, lenses, telescopes) becomes. Additional radiation components outside the wavelength range of 400 - 700 nm meet the requirements for class 1 M.<br>Low power lasers up to 1 mW. They are for the naked eye harmless due to the eyelid closing reflex. If the irradiation of an optical instrument in the optical path, eye damage can occur. |
| Class 3R | The accessible laser radiation is in the wavelength range of 302.5 nm to 106 nm and is dangerous to the eye. The performance or the energy is a maximum of five times the limit value of the permissible class 2 radiation in the wavelength range of 400 nm to 700 nm.<br>Lasers in this class are generally dangerous for the eye. The dangerousness is limited by the fact that the performance in the visible 5 mW or less and outside the visible range at most five times the power of lasers of the Class 1. |
| Class 3B | The accessible laser radiation is dangerous for the eye, and in the special cases also for the skin.<br>The radiation from class 3B lasers (medium power) is essential for the eye both under direct action and under the influence of reflected radiation. In the upper performance range these lasers can also damage the skin. The power is set to 500 mW is limited. |
| Class 4 | The accessible laser radiation is very dangerous for the eye and dangerous for the skin. Diffusely scattered radiation can also be dangerous. The laser radiation can pose a risk of fire and explosion cause. Class 4 lasers are high-power lasers. Their radiation is so intense that with any kind of exposure of the eyes or the skin is to be expected. In addition, lasers of this class, fire and explosion hazard. |

Responsible for compliance with the protective measures is the operator of the laser machine.

- Provide appropriate fire extinguishing equipment.
- Make sure that the laser equipment is assigned to a laser class and are marked accordingly.
- Demonstrate the operation of class 3R, 3B and 4 laser equipment at the competent market surveillance authorities.
- When operating such lasers, delimit the laser area and mark select the area.
- Order as an operator of laser equipment of classes 3R, 3B and 4 competent persons as laser safety officers.
- Instruct the personnel who are laser equipment of classes 1M, 2, 2M, 3R, 3B or 4 or in the laser range of lasers of classes 3R, 3B.

# 3 Product Overview

## 3.1 Overview

### 3.1.1 External View

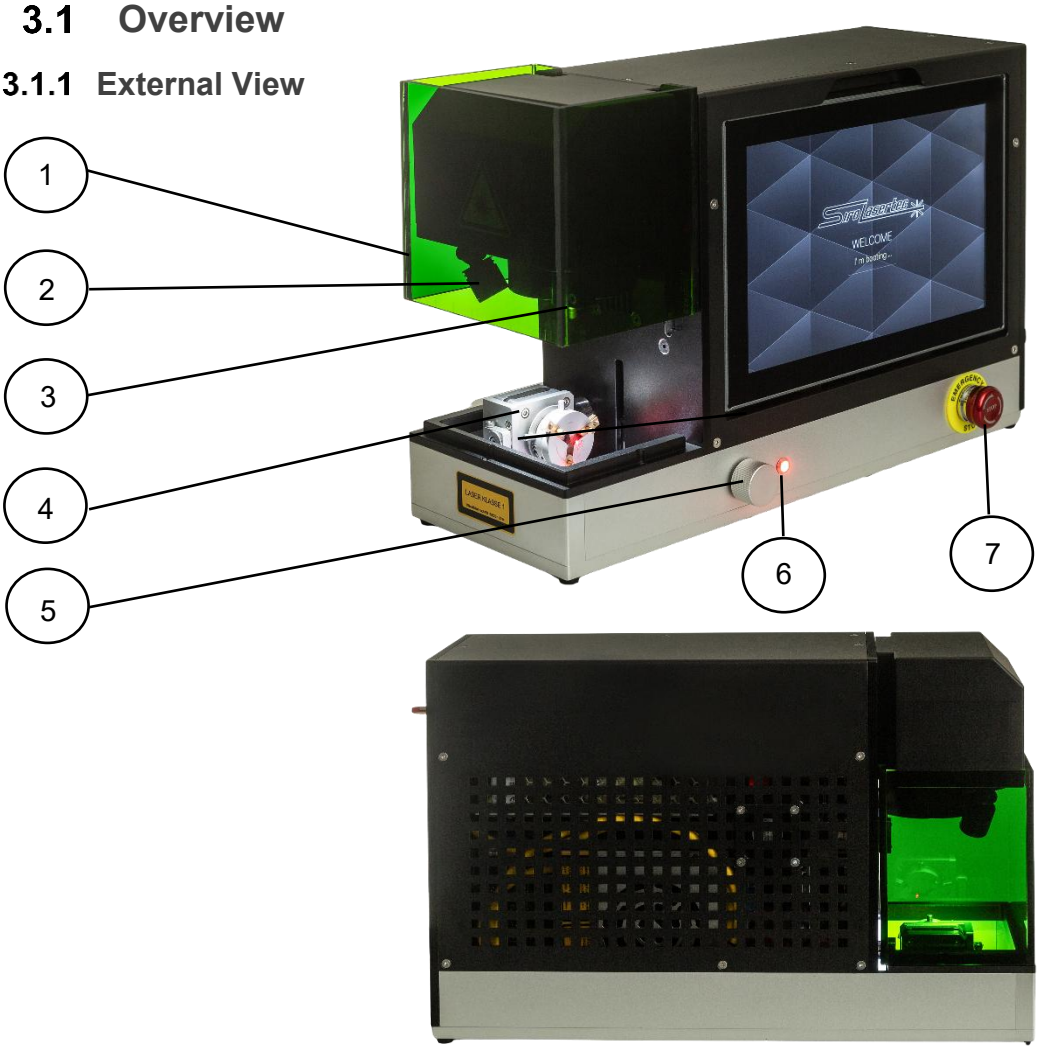



Illustration 2 **Fehler! Verweisquelle konnte nicht gefunden werden.**

| Pos. | Designation |
|---|---|
| 1 | Protective glas |
| 2 | LED working chamber |
| 3 | Focussing laser |
| 4 | Rotation Axis |
| 5 | Z-Axis adjustment |
| 6 | Interlock LED |
| 7 | Emergency Stop Button |

## 3.2 Function Description

In laser engraving, the material is heated very strongly by the incident laser beam. Depending on the exposure time, the color is changed to create contrast, or the material evaporates or burns. The laser engraving achieved in this way is permanent and very abrasion-resistant.

Laser engraving is as easy as printing. First, you create the layout of the engraving in your usual graphics program (CorelDraw, Photoshop, AutoCAD, Illustrator, InkScape and many more). Then send the graphic to the laser via the USB to the "LIFTOFF" software. The scan head now traces the contour and fills it with many individual lines so that a full-surface ablation is achieved.

### 3.2.1 Rotary Axis (optional)

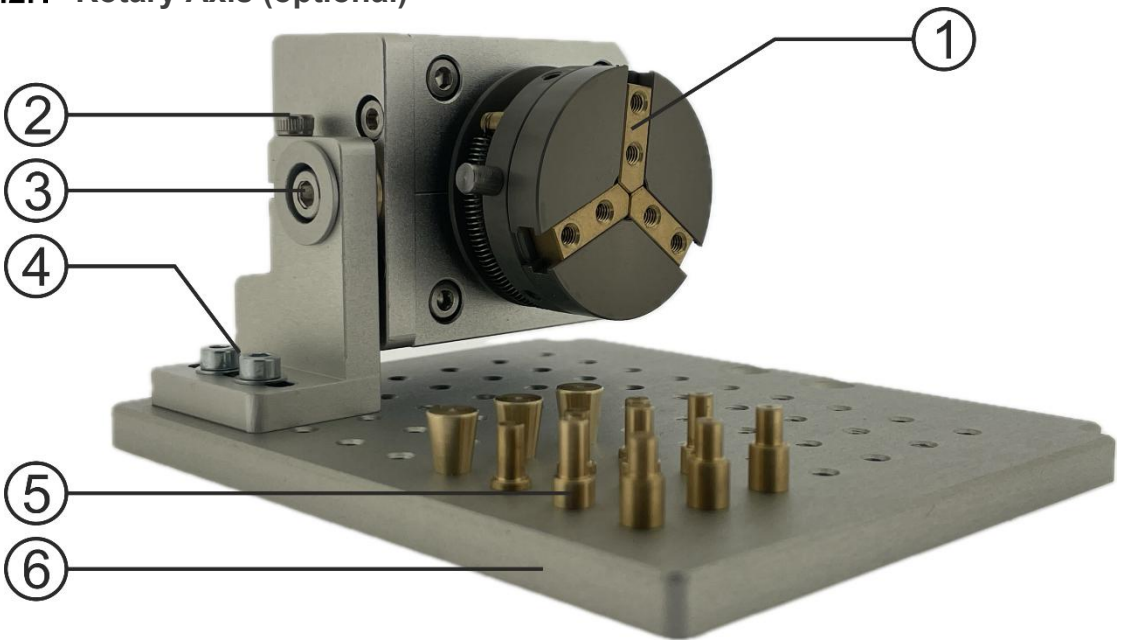



Illustration 3 Rotary Axis (setup for outside engraving)

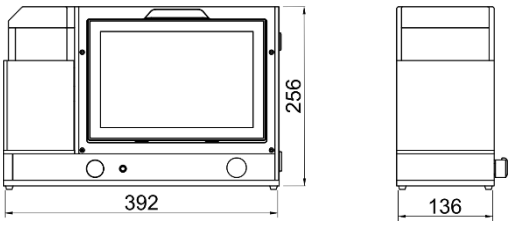
| Pos. | Designation |
|---|---|
| 1 | Jaws |
| 2 | Clamping screw tilt axle |
| 3 | Locking screw tilt axle |
| 4 | Fastening screws rotation axis |
| 5 | Selection of clamping pins |
| 6 | Workbench |

The clamping jaws of the rotation axis can be offset at the same distance on the jaw chuck to clamp rings inside and outside

## 3.3 Electricity

The **Fehler! Verweisquelle konnte nicht gefunden werden.** is equipped with a 230 V power supply cable for electrical power supply.

## 3.4 Technical Data

| | | | | | |
|---|---|---|---|---|---|
| Variant | **According to specifications label** | | | | |
| Performance | 20W | - | - | - | - |
| Pulse Peak Power | 6,0 kW | - | - | - | - |
| Pulse energy | 0,7 mJ | - | - | - | - |
| Pulse rate in kHz | 27 – 60 kHz | - | - | - | - |
| Dimension |  | | | | |
| Marking field | 50 x 50 mm | | | | |
| Depth of engraving | 0,01 – 0,2 mm (depends on material) | | | | |
| Width of engraving | 0,01 – 0,1 mm (depends on material) | | | | |
| Total Weight | 12 kg (without external fume extractor and rotary axis) | | | | |
| Electrical connection | 220V or 110V Versions / 50 – 60 Hz / 10 A | | | | |
| Source of Laser | Diode-pumped fiber laser (Yb:fibre), Q-switched | | | | |
| Pulse width in ns | 90 ns | - | - | - | - |
| Wavelenght | 1064 ±4nm | | | | |
| Lenght of fiber cord | 30cm | | | | |
| Beam quality ($M^2$) | < 1.5 | | | | |
| Deflection of laser beam | 90° | | | | |
| Scanning speed | 0 – 2000 mm/s | | | | |
| Protection door | manuell | | | | |
| Lifting range Z-Axis | 45 mm | | | | |
| Ports | 2x USB 2.0 | | | | |
| Type of cooling | Forced ventilation | | | | |
| Ambient temperature | ideal 22 – 25 °C | | | | |
| Humidity | 30 – 85%, non-condensing | | | | |
| Permanent readiness for work | ≥ 12 h | | | | |

# 4 Transport and assembly

## 4.1 Transport

The **Fehler! Verweisquelle konnte nicht gefunden werden.** was Siro Lasertec L asertec.

If it is necessary to transport the **Fehler! Verweisquelle konnte nicht gefunden werden.** , please note the following instructions.

**WARNING**

**Crushing when lifting and transporting the** Fehler! Verweisquelle konnte nicht gefunden werden.

**Improper lifting and transport can cause the** Fehler! Verweisquelle konnte nicht gefunden werden. **to tilt and fall down.**

- **Close the** Fehler! Verweisquelle konnte nicht gefunden werden. **c ompletely.**
- **You can transport the laser engraving machine on your own.**

| **Reasonable load** (Requirements of the employers' liability insurance association) | **Frequency of lifting and carrying** | | | |
|---|---|---|---|---|
| | occasionally | | frequently | |
| **Age** | Women | Men | Women | Men |
| 15 till 18 Years | 15 kg | 35 kg | 10 kg | 20 kg |
| 19 till 45 Years | 15 kg | 55 kg | 10 kg | 30 kg |
| Older than 45 years | 15 kg | 45 kg | 10 kg | 25 kg |

## 4.2 Assembly

**DANGER**

**Life-threatening injuries possible**

**Improper installation, for example, can cause people to suffer an electric shock.**

- **As an operator, you should only have assembly work carried out by trained specialists.**

The operator must ensure the supply of electricity.

- Check the scope of delivery for completeness using the **Fehler! Verweisquelle konnte nicht gefunden werden.**laser engraving machine.
- Complain about any missing parts with exact details according to the package list.
- Set up the **Fehler! Verweisquelle konnte nicht gefunden werden.** in a clean r oom. Preferably on a sturdy table. Maintain a wall clearance of at least 100 mm on all sides to ensure heat dissipation.

### 4.2.1 Safety

- Comply with applicable and regulatory safety guidelines.

### 4.2.2 Connections

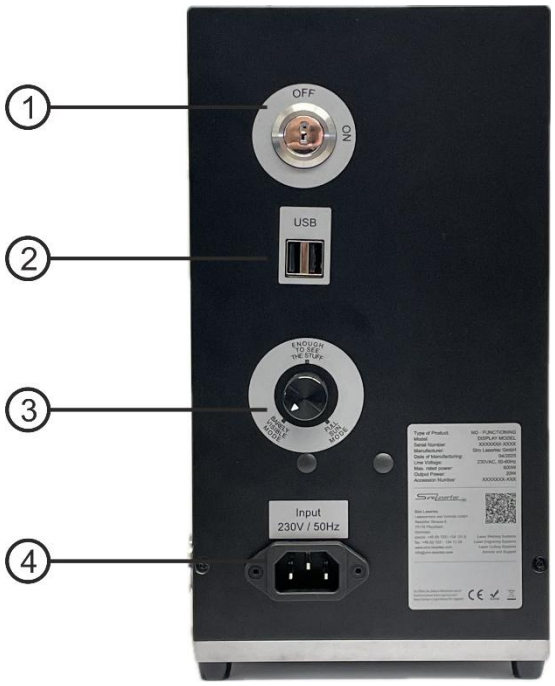



Illustration 4 Connections

| Pos. | Designation |
|---|---|
| 1 | Key switch ON / OFF |
| 2 | 2x USB port for data exchange |
| 3 | Dimmer Lighting Working Chamber |
| 4 | Mains connection |

Dust is generated during the processing of the workpiece, as the workpiece surface evaporates due to the laser.

The use of an external exhaust air filter system is therefore strongly recommended.

### 4.2.3 Software „Liftoff“ Touchscreen

The "Liftoff" marking software is specially designed and tuned for the SLCmini.

### 4.2.4 Workpiece support

The workpiece support offers 7 * 9 (M5) threaded holes in increments of 10mm each. The threaded holes are used to attach additional angles or other extensions. The maximum load capacity is <600g (<0.6kg).

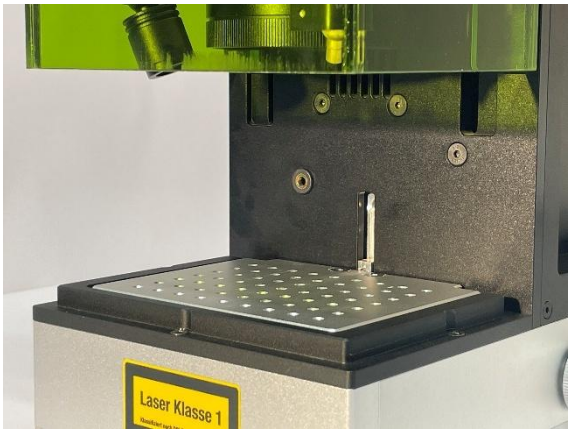
## Rotationsachse

Illustration 5 Rotary Axis (setup for ring outside)

The following explains the assembly process of the rotation axis:

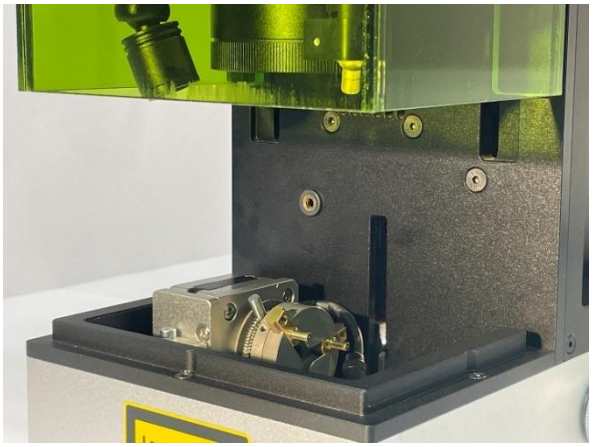
1. Make sure the SLCmini is turned off
   - To do this, turn the key on the back of the SLCmini to “Off”.

2. Open the security door and turn the table upwards

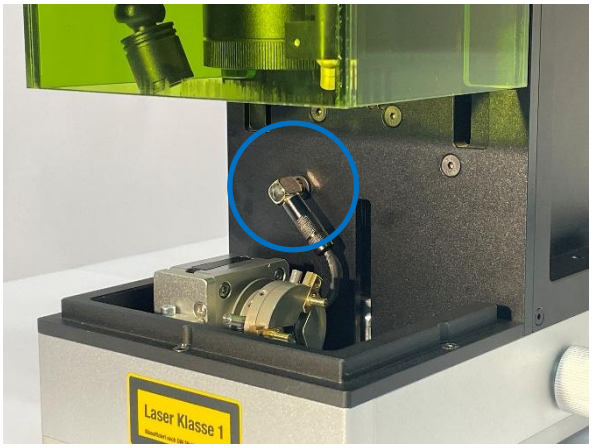


3. Fix the Rotation Axis with the screws supplied


4. Turn the table down to the stop



5. Connect the rotation axis



## 4.3 Commissioning

Before commissioning the system, check all machine parts and important functions with the following points:

| Type of test | Activity |
|---|---|
| Adjustments | ● Carry out all adjustment work according to the operating instructions. |
| Preserved surfaces | ● Depreserve and clean the **Fehler! Verweisquelle konnte nicht gefunden werden.**. |
| Transport Securing | ● Properly release and remove all transport locks. |
| Visual inspection of the system | ● Check the **Fehler! Verweisquelle konnte nicht g efunden werden.** for correct assembly.<br>● Check all system components for damage and remove foreign objects if necessary. |
| Energy supply (electrical) | ● Check the connections for proper condition. |
| Safety devices and warning devices | ● Check the safety devices and warning devices for proper condition. |
| Plant/machine data | ● Check the system for correct data entry. |

# 5 Operation

Every person involved in the operation, maintenance, and repair of the **Fehler! Verweisquelle konnte nicht gefunden werden.** must have thoroughly read and understood this chapter "5 Operation".

## 5.1 Safe operation

Work on the **Fehler! Verweisquelle konnte nicht gefunden werden.** may only be carried out by trained and/or instructed personnel. Incorrect use can result in dangers to life and limb.

The **Fehler! Verweisquelle konnte nicht gefunden werden.** may only be operated by authorized, professionally qualified persons.

A professionally qualified person can assess and carry out the work assigned to him or her and identify possible hazards on the basis of his or her professional training, knowledge and professional experience as well as knowledge of accident prevention and occupational health and safety regulations, if he or she also meets the necessary personal requirements for the activity, e.g. can work independently.

- Use the **Fehler! Verweisquelle konnte nicht gefunden werden.** only for the purpose determined or customary by the manufacturer.
- Always operate the **Fehler! Verweisquelle konnte nicht gefunden werden.** only in perfect technical condition to avoid accidents.
- Do not use any foreign parts on the **Fehler! Verweisquelle konnte nicht gefunden werden.**, otherwise compliance with the required safety will not be guaranteed.
- Refrain from any operation that compromises the safety of the **Fehler! Verweisquelle konnte nicht gefunden werden.** .
- Immediately report any changes to the **Fehler! Verweisquelle konnte nicht gefunden werden.** (which affect safety) to the appropriate supervisor.
- Shut down the **Fehler! Verweisquelle konnte nicht gefunden werden.** immediately in the event of a safety malfunction. Do not put the **Fehler! Verweisquelle konnte nicht gefunden werden.** back into operation until the fault has been eliminated.
- Do not dismantle or tamper with safety devices.
- Properly reattach covers before recommissioning.

### 5.1.1 Notes to the Operator

- As an operator, ensure that the functional test of the safety equipment on the **Fehler! Verweisquelle konnte nicht gefunden werden.** is carried out by trained personnel both before the first and before each subsequent new commissioning.
- As an operator, provide the operators with the necessary personal protective equipment and ensure that it is used.

### 5.1.2 Electro-technical Information

**DANGER**

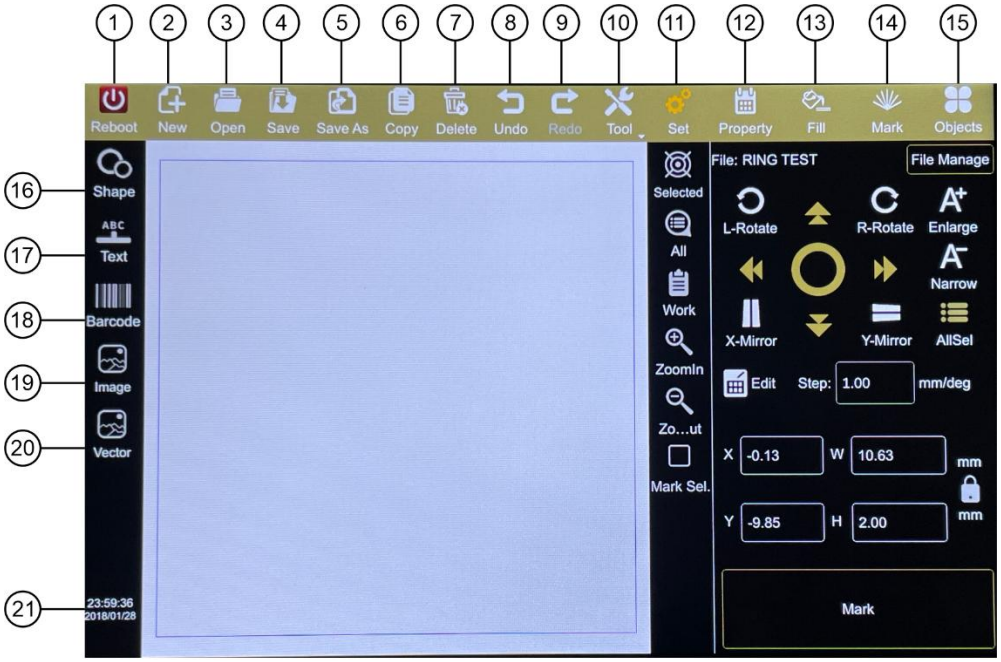
**Danger to life due to electric shock**

**An electric shock results in fatal injuries.**

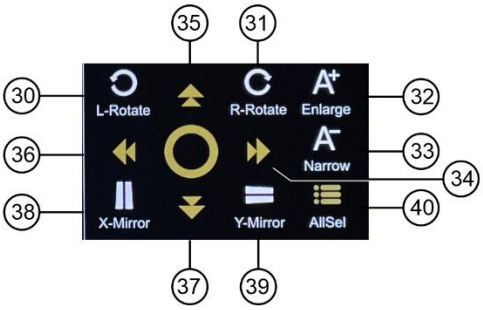
- **Connect the SLCmini in accordance with the regulations.**
- **Check the function of all safety-related switchgear at regular intervals.**
- **Never remove, bypass or impair safety devices (such as emergency switches, limit switches, key switches).**
- **Have the control of the system operated only by trained and instructed personnel.**
- **Have repair and maintenance work carried out only when switched off (de-energized) and only by a qualified electrician.**

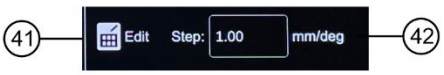
A qualified electrician is anyone who, on the basis of his or her professional training, knowledge and experience as well as knowledge of the relevant regulations, is able to assess the work assigned to him or her and identify possible hazards.

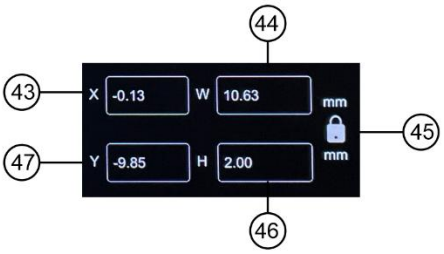
## 5.2 Software „Liftoff“







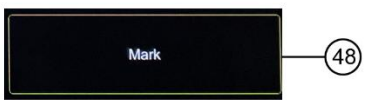




Illustration 6 Mainscreen

| Pos. | Designation | Function |
|---|---|---|
| 1 | Reboot | Restart "Liftoff" (current document is retained in memory) |
| 2 | New | Creates a new template |
| 3 | Open | Open a template |
| 4 | Save | Saves and overwrites the current template (if the template has been recreated, input is required) |
| 5 | Save As | Saves the current template with the condition to choose the path and name |
| 6 | Copy | Copies the selected object and pastes it into the template with an offset of X=+5mm and Y=+5mm |
| 7 | Delete | Deletes the selected object |
| 8 | Undo | One step back |
| 9 | Redo | One step forward |
| 10 | Tool | Opens the Align and Combine submenu |
| 11 | Set | Opens the Setup menu in the settings of the SLCmini or "Liftoff". By entering the admin password beforehand, further setting options are unlocked. This password is reserved for experienced users or authorized persons! |
| 12 | Property | Opens the properties for modifying and customizing text, barcode, image, vector |
| 13 | Fill | Used to fill empty vector objects so that an extensive ablation can be achieved with the laser |
| 14 | Mark | Switches to the Lasers settings to define layer colors and laser parameters. You can also choose between the axis of rotation and the flat area. |
| 15 | Objekts | Used to select and sort the created objects |
| 16 | Shape | Inserting Line, Rectangle, Circle, Pentagon, and Hexagon |
| 17 | Text | Text Input |

| Pos. | Designation | Function |
|---|---|---|
| 18 | Barcode | Creating a barcode > The "Properties" field in the main menu allows you to choose between PDF417, QR code, DATAMATRIX, Micro QR code and 1D barcodes of type Code 39, Code 128, Code 93, UPC-A and UPC-B. Barcodes are automatically filled with 0.10mm! To customize the fill, click "Fill" in the main menu. |
| 19 | Image | Import function of a pixel file in the format Bitmap (bmp), Portable Network Graphic (png), Joint Photographic Experts Group (jpg/jpeg). The properties (12) can be used to select grayscale, black and white, drawing or printed. A maximum of 500DPI can be output. Brightness, contrast, inverted are also adjustable. |
| 20 | Vector | Import function of a vector file in Drawing Exchange Format (dxf) and Hewlett Packard Graphics Language (plt) format. It is recommended to use the export format AutoCAD 2000-2002 (DWG/DXF 2000)! |
| 21 | Time / Date | Displays the current time and date |
| 22 | Selected | Zooms in on the selected object |
| 23 | All | Zooms in on all objects in the workspace |
| 24 | Work | Zooms in on the entire workspace (50mm*50mm) |
| 25 | ZoomIn | Enlarge view |
| 26 | Zo…ut (ZoomOut) | Reduce view |
| 27 | Mark Sel. (Mark Select) | If selection is active, only the selected object is output |
| 28 | File: & | Displays the name of the template. -> "&" means that no template has been loaded or saved |
| 29 | File Manage | Opens the file manager. Existing files on the hard drive or USB stick can be opened, moved, untitled or deleted. |
| 30 | L-Rotate | Rotate the selected objects counterclockwise. For this purpose, according to step (41), the incremental value to be used. |

| Pos. | Designation | Function |
|---|---|---|
| 31 | R-Rotate | Rotate the selected objects clockwise. For this purpose, according to step (41), the incremental value to be used. |
| 32 | Enlarge | Enlarge the selected objects gradually. For this purpose, according to step (41), the incremental value to be used. |
| 33 | Narrow | Shrink the selected objects step by step. For this purpose, according to step (41), the incremental value to be used. |
| 34 | Arrow Right | Move the selected objects to the right. For this purpose, according to step (41), the incremental value to be used. |
| 35 | Arrow Up | Move the selected objects to the top. For this purpose, according to step (41), the incremental value to be used. |
| 36 | Arrow Left | Move the selected objects to the left. For this purpose, according to step (41), the incremental value to be used. |
| 37 | Arrow Down | Move the selected objects down. For this purpose, according to step (41), the incremental value to be used. |
| 38 | X-Mirror | Horizontal mirroring of the selected objects. |
| 39 | Y-Mirror | Vertical mirroring of the selected objects. |
| 40 | AllSel (All Select) | Selects all objects to move, resize, zoom in, or rotate. The special feature of this function is that the reference points are retained. |
| 41 | Edit | Opens the corresponding input field for changing the input (function active only for text and barcode) |
| 42 | Step: 1.00 mm/deg | Incremental value to rotate, move, zoom in, or zoom out of the objects |
| 43 | X (X-Axis) | Center of the X value (horizontal) of the object in the workspace |
| 44 | W (Width) | Width of the object in millimeters |
| 45 | Lock | Closed lock = proportional ratio; Open lock = disproportionate ratio |
| 46 | H (Height) | Height of the object in millimeters |

| Pos. | Designation | Function |
|---|---|---|
| 47 | Y (Y-Axis) | Center of the Y value (vertical) of the object in the work area |
| 48 | Mark | Switches to the Lasers settings to define layer colors and laser parameters. You can also choose between the axis of rotation and the flat area. |

## 5.3 Turn on and off

**WARNING**

**Exposure to optical radiation**

**Class 4 laser radiation is very dangerous to the eye and dangerous to the skin. Diffuse scattered radiation can also be dangerous. The laser radiation can cause a risk of fire and explosion. The closed safety door downgrades the laser radiation to class 1.**

- **Avoid irradiation of eyes or skin by direct or scattered radiation.**
- **Before commissioning, check that all protective devices are installed and working.**
- **Never operate the laser when the safety door is open or damaged.**
- **Use only the materials specified as intended.**

### 5.3.1 Turn on

- Turn on the system using the key switch on the back of the SLCmini.
- Wait for the system to fully boot up.
- The SLCmini and "Liftoff" are ready for operation.

### 5.3.2 Switch off

- Turn off the system using the key switch on the back of the SLCmini.

## 5.4 Operation

### 5.4.1 Setting the focus position.

#### 5.4.1.1 Determining Focus Using the Pilot and Focusing Lasers

- Place your workpiece in the SLCmini (use the supplied aluminium card for this purpose)
- Focus on the workpiece. To do this, they have to turn the Z-axis up or down until both red dots are on top of each other.

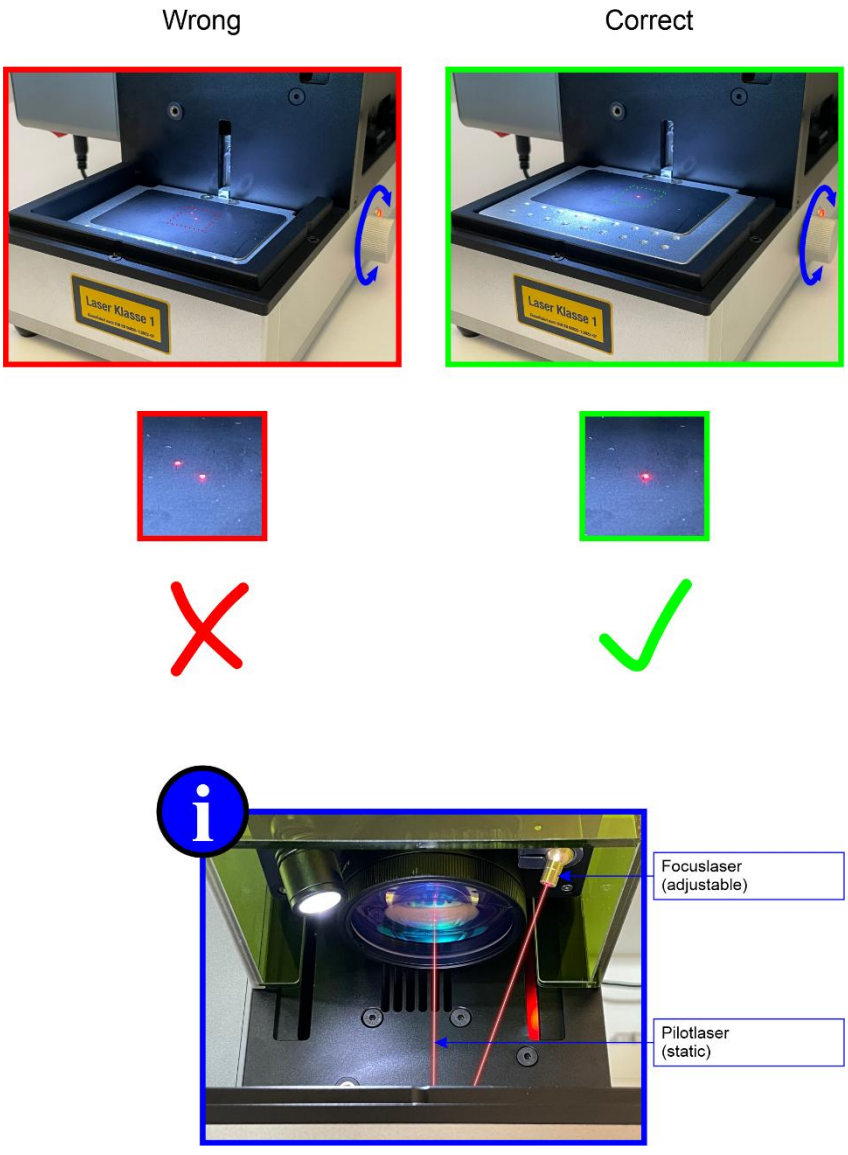
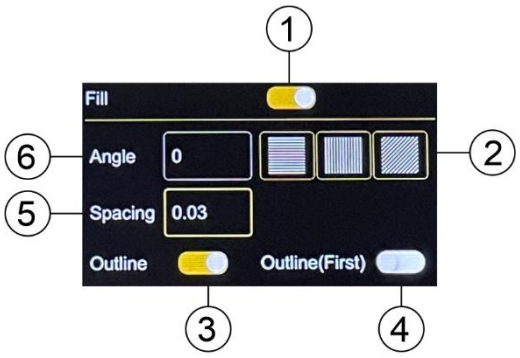



Illustration 7 Focusing in Flat

### 5.4.2 Engraving a flat workpiece

- Open the safety door manually, which also serves as radiation protection
- Place the workpiece in the SLCmini.
- Bring the distance of the focusing lens to the material into focus as explained in Section 5.4.1
- Click on "Text" > tap 2x in the text field in the following window so that the keyboard opens
- Enter your text (e.g.: LIFTOFF) -> Confirm your entry with "OK"
- The text is automatically placed in the center. -> Resize (44/46) and add an infill (13).




| | |
|---|---|
| 1 | Activates filling |
| 2 | Quick angle of 0° / 90° / 45° |
| 3 | Activates Outline |
| 4 | Outline first, then filling |
| 5 | Spacing filling lines |
| 6 | Free choise of angle |

**Influence through focus**

The brightness and noise of the laser during engraving can give clues as to whether the laser is in focus and how the material reacts.

Positive or negative focusing can achieve a special engraving effect depending on the material.

**Influence of laser frequency and pulse width**

In certain cases, the output power can improve the laser frequency and pulse width by reducing the peak power (average power reduction).

At high peak laser power, a "sculpture" effect can occur on the workpiece surface. Also, by increasing the frequency and pulse width, the peak power can be reduced (increase average power).

At high laser medium power, an ablation effect can occur on the workpiece surface. The working frequency range of the laser source is 27-60 kHz.

**Influence of galvanometer scanning and software parameters**

The parameters for engraving set by software have a great influence on the engraving result.

Detailed information on parameterization can be found in the operating instructions of the software in the appendix to these operating instructions.

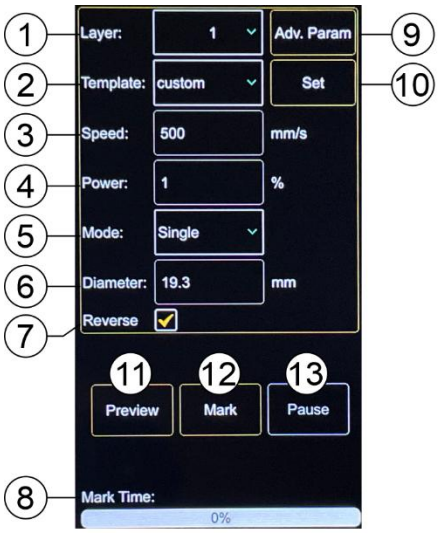
**WARNING**

**Exposure to optical radiation**

**Class 4 laser radiation is very dangerous to the eye and dangerous to the skin. Diffuse scattered radiation can also be dangerous. The laser radiation can cause a risk of fire and explosion. The closed safety door downgrades the laser radiation to class 1 .**

- **Avoid irradiation of eyes or skin by direct or scattered radiation.**
- **Never operate the laser when the safety door is open or damaged.**

- Go to the laser menu (48) and select a suitable laser parameter from the list




1 Assigns the object to a plane and colour

2 Select parameters from a list

3 Quick setting option for speed

4 Quick setting option for power

5 Select mode (single/infinite/axis)

- Single means laser parameter output 1x
- Infinite means the output is repeated until Stop is pressed
- Axis means the axis of rotation is activated

6 Diameter for inner or outer ring engraving

7 Changes the direction of rotation for inner ring engraving

8 Runtime of the current laser programme

9 Advanced setting options for the active parameter

10 Opens the laser parameter sets

11 Activates the preview frame

- Contour LIFTOFF *Wechsel ist dem Admin vorbehalten*
- Rectangle *Wechsel ist dem Admin vorbehalten*

12 Starts the laser process (only possible when the safety door is closed)

13 Pauses the laser process

If the safety door is opened during the laser process, the laser process stops and the message "Door is open" appears.

To restart the laser process:

- Close the safety door and start the laser process again.

**CAUTION**

**Risk of burns due to hot surfaces**

**Depending on the exposure time and focus position, the material can heat up.**

- **Before removing the workpiece, wait for it to cool down.**

- Remove the engraved workpiece.

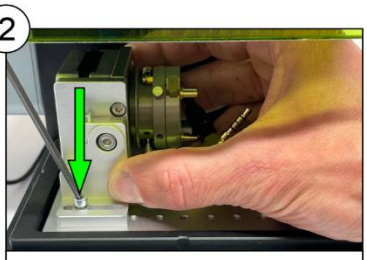
### 5.4.3 Ring Engraving Outside

- Turn off the system using the key switch on the back of the SLCmini.
- Follow the instructions

1

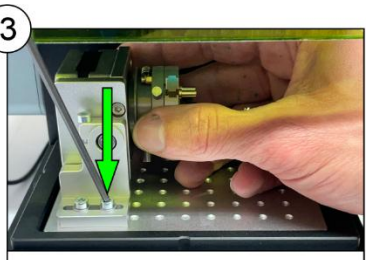
Positioning the rotary axis

2



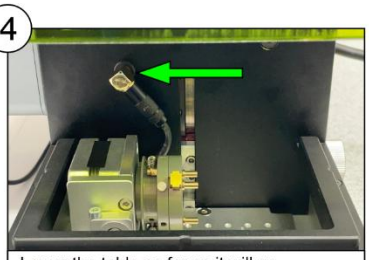
Fasten the first screw

3



Fasten the second screw

4

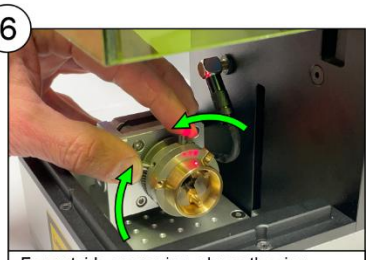


Lower the table as far as it will go and connect the rotary axis

5

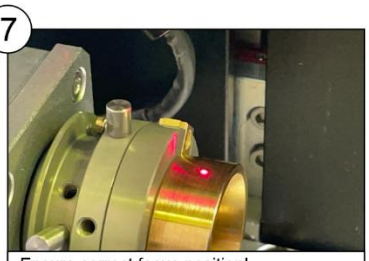

For outer ring engraving, determine the diameterand enter it in the software

6



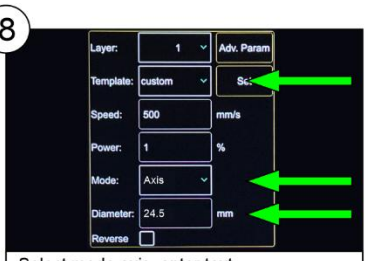
For outside engraving, clamp the ring inside,pressing both pins together.

7



Ensure correct focus position!
If necessary, turn the table up or down.

8

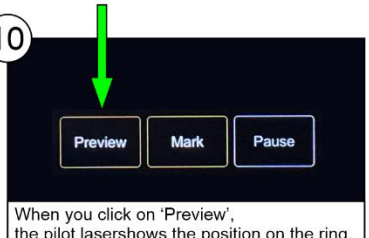



Select mode axis, enter text, select parameters

9

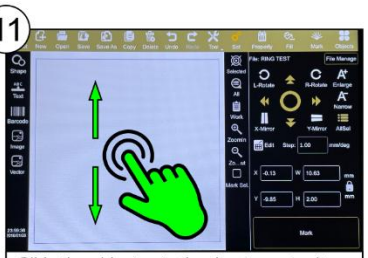

Text engraving in 'Ring' mode = 90° angle, 0.02 mm and no outline recommended

10




When you click on 'Preview', the pilot lasershows the position on the ring. To do this, the pilot laser only moves in X and the rotation axis rotates in an endless loop from the start to end of the engraving.

11



Slide the object onto the ring to centre it

12


Close the safety door and start the laser process.

## WARNING

**Exposure to optical radiation**

**Class 4 laser radiation is very dangerous to the eye and dangerous to the skin. Diffuse scattered radiation can also be dangerous. The laser radiation can cause a risk of fire and explosion. The closed safety door downgrades the laser radiation to class 1.**

- **Avoid irradiation of eyes or skin by direct or scattered radiation.**
- **Never operate the laser when the safety door is open or damaged.**

If the safety door is opened during the laser process, the laser process stops and the message "Door is open" appears.

To restart the laser process:

- Close the safety door and start the laser process again.
- If the laser process is interrupted, the current position of the rotation axis is lost!

## CAUTION

**Risk of burns due to hot surface**

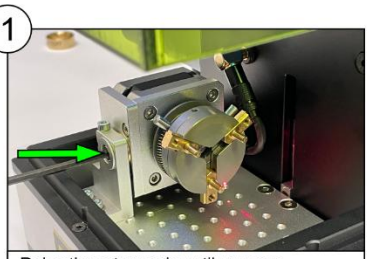
**Depending on the exposure time and focus position, the material can heat up.**

- **Before removing the workpiece, wait for it to cool down.**

### 5.4.4 Ring Engraving Inside

- If you need to mount the axis of rotation first, follow steps 1 - 4 in the chapter "5.4.3 Outer Ring Engraving". Turn off the system using the key switch on the back of the SLCmini.
- Continue to follow the instructions

1

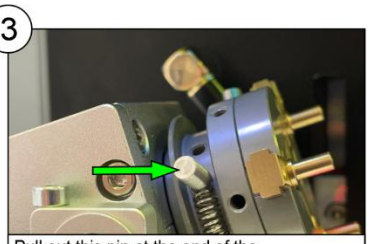


Raise the rotary axis until you can loosen the screw.

2

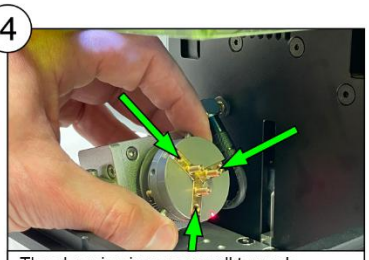
Swivel the rotary axis and tighten the screw again.

3



Pull out this pin at the end of the tension spring.
Reinsert the pin in reverse order.

4

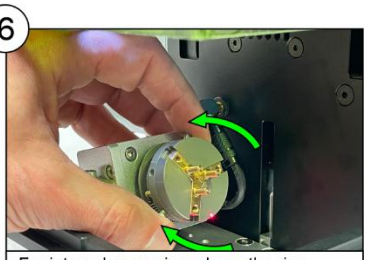


The clamping jaws now pull towards the centre of the axis

5

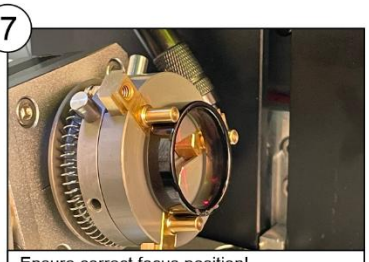

For ring engraving, determine the diameter and enter it in the software.

6



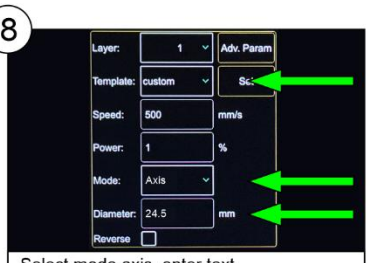
For internal engraving, clamp the ring on the outside, pulling both pins together.

7



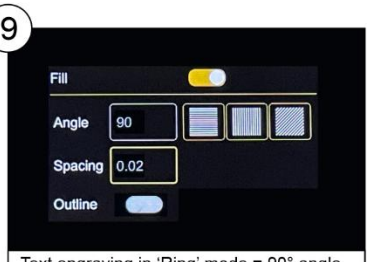
Ensure correct focus position!
If necessary, turn the table up or down.

8



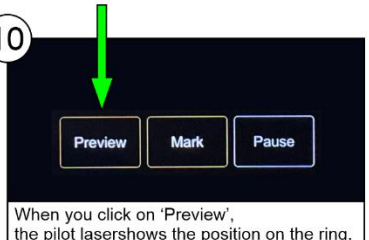

Select mode axis, enter text, select parameters

9



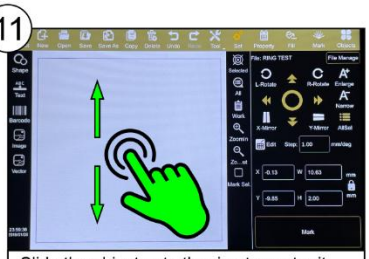

Text engraving in 'Ring' mode = 90° angle, 0.02 mm and no outline recommended

10




When you click on 'Preview', the pilot lasershows the position on the ring. To do this, the pilot laser only moves in X and the rotation axis rotates in an endless loop from the start to end of the engraving.

11



Slide the object onto the ring to centre it

12

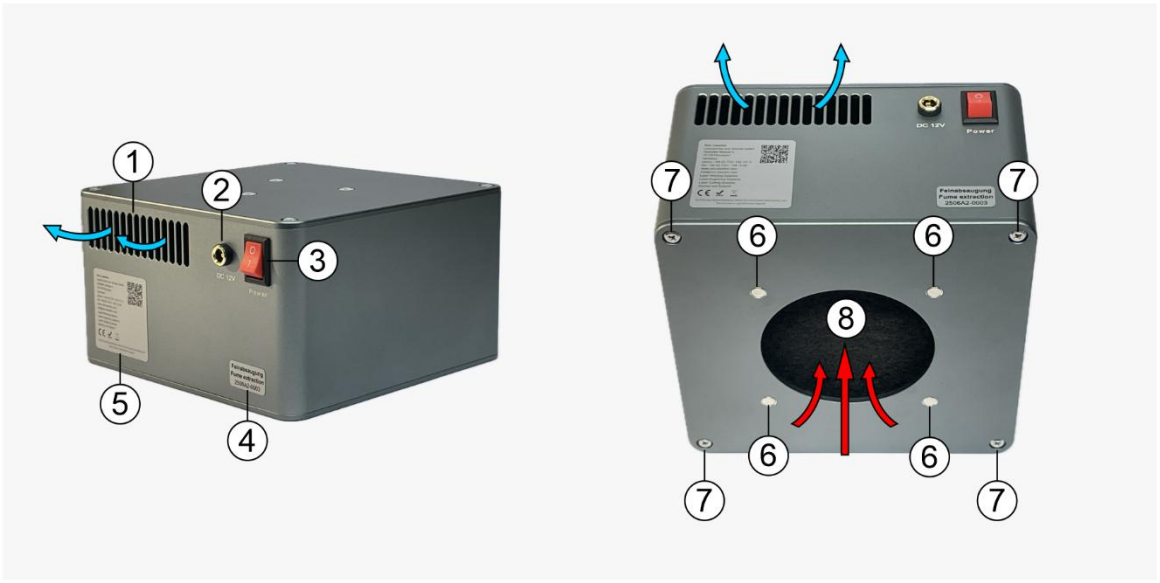

Close the safety door and start the laser process.

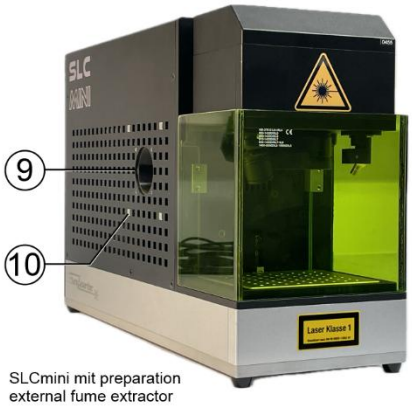
### 5.4.5 Fine dust extraction (optional)

Metal engraving with a laser produces fine dust and fumes that must be extracted and filtered to protect the health of the user and protect the machine. The specific regulations and guidelines for fine dust extraction in metal engraving lasers include the selection of a suitable extraction system, the maintenance of safety distances, the use of personal protective equipment and the correct disposal of waste products.

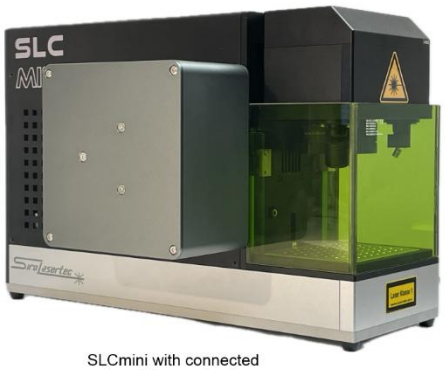
**Fine dust extraction SLCmini:**

- **Function:**
  The extraction system is essential to remove harmful fumes and particles from the work area.
- **Filtering:**
  The SLCmini filter system is advisable to minimise fine dust pollution and protect the health of employees.
- **Maintenance:**
  The system needs regular maintenance and the filters need to be replaced to ensure optimal performance. Contact your local distributor to purchase the filters.

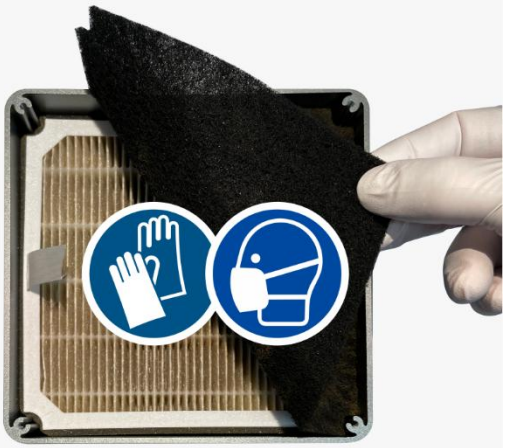




SLCmini mit preparation external fume extractor



SLCmini with connected external fume extractor

| | |
|---|---|
| 1 | Outlet filtered air |
| 2 | 12VDC power input |
| 3 | ON / OFF switch |
| 4 | Type and Serialnumber |
| 5 | Label Manufacturer |
| 6 | Magnets |
| 7 | Servicescrew to change filters |
| 8 | Air inlet |
| 9 | Wastet air output hole |
| 10 | Magnets |



Always wear protective gloves and a mask while change the filters!

- **Function:**
  The extraction system is essential to remove harmful fumes and particles from the work area.

- **Filtering:**
  Our filters are advisable to minimize fine dust pollution and protect the health of employees.

- **Exhaust:**
  The exhaust air is filtered in 3 stages and can be discharged into the room. However, it is advisable to choose a well-ventilated room.

- **Maintenance:**
  The system needs regular maintenance and the filters need to be replaced to ensure optimal performance.

- **Safety distances:**
  The laser must be operated in a safe area with a sufficient safety distance from other people and flammable materials.

- **Personal Protective Equipment (PPE):**
  Protective gloves, hearing protection if necessary and respirators are required.

- **Materials:**
  It is important to only use materials that are suitable for laser processing and do not release toxic fumes or gases.

- **Unauthorized access:**
  The machine should be protected from unauthorized access to avoid tampering or contamination.

- **Cleaning:**
  The machine and the work area must be cleaned regularly to avoid the accumulation of dust and residues.

- **Material selection:**
  When selecting the materials to be engraved, attention should be paid to their composition in order to avoid undesirable reactions or emissions.

- **Machine Maintenance:**
  The machine should be serviced regularly and checked for damage or signs of wear.

- **Documentation:**
  It is advisable to keep a log of the work and maintenance carried out. Compliance with these regulations and guidelines contributes significantly to the safe and efficient use of engraving lasers in metalworking.

| Stage | Pre-filter | Main-filter | activated carbon-filter |
|---|---|---|---|
| New |  |  |  |
| Light to moderate filtering |  |  |  |
| Exceededservice life,filter heavily saturated |  |  |  |

If the safety door is opened during the laser process, the laser process stops and the message "Door is open" appears.

Vapours and fine dust that have not been completely extracted can escape, which can be harmful to health:

- Close the safety door and wait a few seconds.
- Always open the safety door only when the engraving is complete.

**CAUTION**

**Risk of poisoning from particulate matter**

**Depending on how quickly the safety door is opened, fine dust that has not been completely extracted can escape and could enter the room.**

- **Before removing the workpiece, wait a few seconds until you open the door.**

## 5.5 Disturbances

Some of the malfunctions listed here can be rectified with the help of the operating instructions. Only when the system is out of operation may the housing be opened to remedy a possible malfunction. In case of faults that cannot be rectified by the following instructions, contact the local sales partner.

Work on the electrical system may only be carried out by qualified electricians!

| Sign | Cause | Actions |
|---|---|---|
| SLCmini does not start/boot up | Power cord not connected correctly | • Disconnect and connect the power cord.<br>• Check the energy supply. |
| | Emergency stop button operated or key switch in OFF position | • Check the emergency stop button and key switch. |
| Frequent power outages during normal use | Power cord or plug contact faulty | • Disconnect and check the power cord.<br>• Check the energy supply. |
| No laser power | Software parameters faulty | • Check the software to see if the parameters are correct.<br>• Defective laser source, contact the technical support of your local distributor. |
| | Laser defective | • Contact your local distributor's technical support |
| Laser power weak | Lens dirty | • Clean the lens with a cotton ball soaked in ethanol. |
| | Focus not correct | • Adjust the focus via the Z-axis. |
| In the preview, only a red line appears instead of the object | Wrong mode | • Mode Axis is probably active. Switch to Simple or Infinite mode |
| No green indicator display when the door is closed / No output from the laser | Door not fully closed | • Make sure that the door closes completely and that no components block the way |
| | Door sensor is not detected | • Contact your local distributor |

| Sign | Cause | Actions |
|---|---|---|
| No working chamber lighting / light not dimmable | Faulty contact / Defective LED / Defective potentiometer / No power supply | • Contact the local distributor |
| Label field not of uniform intensity | Laser power is unevenly distributed over the surface | • Adjust the table using the counter screws parallel to the table frame |

# 6 Maintenance

The chapter *on maintenance* is divided into the areas of care, maintenance and repair. This is intended to make it easier for you to plan the maintenance work required in each case.

The instructions described in this chapter are to be understood as minimum requirements. Depending on the operating conditions, further instructions may be required to keep them in optimal condition. The specified time intervals refer to single-shift operation. Maintenance instructions for specific assemblies can be found in the corresponding documentation of the suppliers in Chapter 8.

The maintenance and repair work described in this chapter may only be carried out by specially trained maintenance personnel of the operator.

In the case of maintenance and repair work in special specialist areas, e.g. electrics, only specialists trained in the respective specialist area may work.

For repairs and spare parts orders, we refer to the drawings and parts lists belonging to the documentation in Chapter 8 *Appendices*. This also applies to the Siro Lasertec Lasertec.

In particular, liability is waived for defects caused by: poor maintenance, use of non-original spare parts, modification without written consent of the seller, poorly performed repairs by the buyer or normal wear and tear.

Spare parts used must meet the technical requirements set by Siro Lasertec. This is always guaranteed with original spare parts.

- With regard to the storage, handling, use and disposal of gases, fats, oils and other chemical substances, read the manufacturer's applicable regulations and safety data sheets as well as the instructions from the operator's operating instructions. Be sure to comply with these regulations and instructions.
- Ensure the safe and environmentally friendly disposal of operating materials and replacement parts.
- Please note the safety instructions on the following pages.

## 6.1 Care / Cleaning

**HINT**

**Property damage due to improper cleaning**

**Improper cleaning of the SLCmini can lead to malfunctions and damage.**

- **Do not choose an aggressive cleaning agent that attacks metal and plastic surfaces.**
- **Never clean sensitive components with coarse brushes and strong mechanical pressure. Use non-fraying cleaning cloths.**
- **Never clean them with a water jet or high-pressure cleaner.**

**All aqueous industrial cleaners can be used without restriction.**

The maintenance of the is essentially limited to a weekly cleaning of all surfaces from dust and other deposits.

- Just wipe them off. For sensitive surfaces, it is not recommended to use them.

Appropriate care helps to keep them in a functional condition in the long term.

- Clean them thoroughly at least once a week.
- Do not use aggressive cleaning agents or solvents for cleaning.

### 6.1.1 Lens

Dust is generated during the processing of the workpiece, as the workpiece surface evaporates due to the laser. The dust settles on the lens over time.

- Clean the lens at least once a week.
- Cover the lens with the included protective cap when not in use.
- Clean the lens with lens cleaning paper and ethanol in case of heavy soiling.

### 6.1.2 Lüftung

- Clean the ventilation grille regularly to improve the cooling effect.

The regularity depends on the frequency of use. It is recommended to observe the above points weekly at the beginning in order to develop a feeling of how quickly the system gets dirty. If there are signs of soiling, the above-mentioned areas should be cleaned accordingly and adhered to at a constant rhythm.

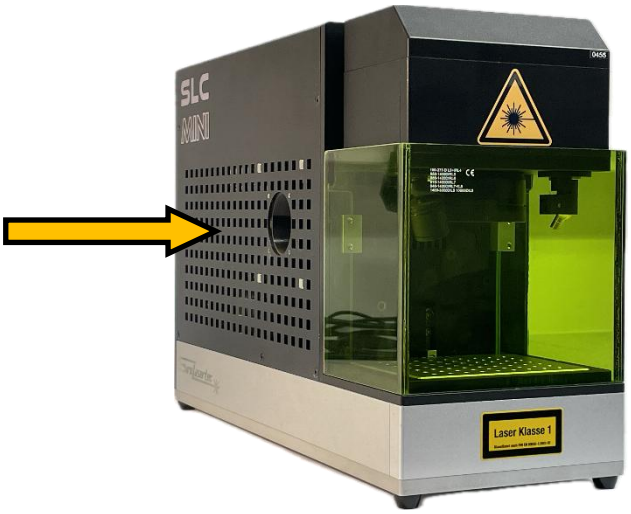



Illustration 8 Ventilation SLCmini

## 6.2 Wartung

High availability of the system is positively influenced by adherence to the suggested care and maintenance intervals.

- Check them regularly and inform the person responsible if repair and maintenance work is necessary.

### 6.2.1 Preparation of repair and maintenance work

- Only use proper tools when working and replace worn parts, such as screws or nuts, with original spare parts.
- Carefully label components before disassembling.

### 6.2.2 Testing of safety devices

- Check all safety devices and devices in accordance with the maintenance plan (Chapter 6.3) or safety checklist in the appendix.
- Document this inspection in an inspection book.

If additional test positions or shorter test intervals have to be observed due to existing operating conditions or other regulations, these must also be included in the safety checklist by a safety officer of the operator.

If defects are found during safety inspections, it may only be put back into operation after appropriate repair and approval by a responsible person of the operator.

A safety check must also be carried out after replacement or repair of electrical and/or electronic components, whereby the setting must also be checked according to the data sheets supplied.

### 6.2.3 Safe maintenance of electrical equipment

**DANGER**

**Danger to life due to electric shock**

**An electric shock results in fatal injuries.**

- **Disconnect the SLCmini from the power supply before all repair, setup and maintenance work.**
- **In addition, trigger an emergency stop button.**

Work on the electrical supply may only be carried out by a qualified electrician.

- As an operator, determine the type and scope of required inspections.
- Set the deadlines for the recurring inspections so that the SLCmini can be safely used until the next scheduled inspection.

Proven inspection periods for periodic inspections are a flat rate for electrical work equipment (stationary): every 4 years. The test must be carried out in accordance with the applicable electrotechnical rules. Furthermore, a reduction of the inspection period to 1 time per year is demanded for all movable electrical appliances.

- Eliminate loose connections and damaged cables instantly.

- As a matter of principle, never work under voltage. This is only permissible in exceptional cases, if there are compelling reasons.
- As the operator, record these compelling reasons in writing before the start of the work under voltage.
- Perform work on live parts only according to national requirements and procedures.

The work may only be carried out by qualified electricians or persons instructed in electrical engineering who have appropriate special training.

## 6.3 Maintenance schedule

- Perform maintenance at the intervals listed below. The times correspond to a single-shift operation. Adjust the time specifications accordingly for multi-shift operation. This work ensures that the SLCmini functions consistently, without interference.
- The maintenance plan shows which work must be carried out at the designated locations on a weekly, monthly or semi-annual basis.

| Interval | Work to be carried out | Responsible personnel |
|---|---|---|
| daily | • Check the safety and protection devices.<br>• Check the display elements.<br>• Clean the lens (see chapter 6.1.1).<br>• Clean the ventilation (see chapter 6.1.2). | Operators |
| monthly | • Clean all components of the SLCmini.<br>• Check all components for wear. | Maintenance personnel |
| every 6 months | • Check the electrical connections for tightness.<br>• Check all protective devices for:<br>– Condition<br>– tight fit<br>• Check the emergency stop button for:<br>– Condition<br>– Function<br>• Check all safety switches, limit switches, signal lights for:<br>– Condition<br>– Fortification<br>– Function | Maintenance personnel |
| every 12 months | • Check the function of the whole machine. | Maintenance personnel |

### 6.3.1 Maintenance of supplied components

Detailed information on the maintenance of the supplied components can be found in the corresponding operating instructions in the appendix.

The ventilation system is maintenance-free.

### 6.3.2 Maintenance of safety-related components

Preventive maintenance or repair of safety-related components is necessary to maintain their specified performance. Deviations from the specified performance lead to a deterioration in safety or even to a dangerous situation after a certain period of time.

Information about safety-related components is specified by marking in the respective plans and associated parts lists.

Wear-prone safety components with an operating life of less than 20 years can be found - if available - in the appendix

## 6.4 Restoration

Repair work on the site may only be carried out by trained and authorised specialists of the operator. The instructions in this chapter are limited to important general information and indications that must be followed during the repair work.

For all cultivation and cutting work, the following applies in principle:

- Identify parts in their cohesion.
- Identify installation location and location and record this data.
- Once reattached, tighten all mechanical connections tightly again.
- Check the safety devices as described in Chapter 6.2.2 Testing of safety devices .

# 7 Disposal

## 7.1 Environmental protection

**HINT**

**Environmental pollution caused by water-polluting substances**

**These substances can pollute the soil and groundwater or end up in the sewer system.**

- **When working on and with the SLCmini, comply with the legal obligations for waste prevention and proper recycling/disposal.**
- **Follow the mistakes when disposing of consumables or replacement materials during maintenance or when decommissioning** Fehler! Verweisquelle konnte nicht gefunden werden. **the applicable legal regulations.**
- **Please note that, especially during installation, repair and maintenance work, water-polluting substances such as lubricating greases and oils, emulsions and petrol-containing liquids must not pollute the soil or enter the sewer system.**
- **Note that these substances must be stored, transported, collected and disposed of in suitable containers.**

## 7.2 Oil and oily waste, lubricating greases

Oil and oily waste as well as lubricating greases pose a high risk potential for the environment. For this reason, they are disposed of by specialist companies.

- Send this waste to the company's internal disposal department, which forwards it to specialist companies.

## 7.3 Plastics

- Sort the used/processed plastics as much as possible.
- Dispose of plastics in compliance with legal requirements.

## 7.4 Metals

- Separate the used/processed metals as far as possible.
- Have metals disposed of by an authorized company.

## 7.5 Electrical and electronic waste

They are responsible for ensuring that all electrical or electronic waste is disposed of via the appropriate places.

- Dispose of devices with this logo on the packaging or separately on the device.
- Do not dispose of these devices with normal household waste.

## 7.6 Scrapping

- Check which materials can be recycled and then arrange for it.

Detailed descriptions of the individual system components can be found in the corresponding operating instructions in the appendix.

# 8 Anhang

- Declaration of Conformity
-
- Parts list with spare parts recommendations

## 8.1 Declaration of Conformity

### EC Statement of Conformity

The manufacturer

Siro Lasertec GmbH
Rastatter Straße 6
75179 Pforzheim

CE

hereby state that the equipment cited below meets the relevant underlying safety and health provisions of the EC directive based on in its planning and construction as well as the design that we are marketing. This statement no longer applies when changes are made to the equipment without our input.

| | |
|---|---|
| Description: | The SLCmini is a Class 1 laser marking machine designed for marking and engraving metals. |
| Type of product: | Laser Marking Machine (OEM-Version, Laser Class 1, EN 60825-1:07/2015) |
| Model: | SLCmini |
| Trade name: | SLCmini |
| Manufacturing Year: | 2025 |
| Serial Number: | _____ |

### Relevant EC directives:

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

### Applied harmonised standards, in particular:

| | |
|---|---|
| EN ISO 12100:2010 | Safety of machinery – General design principles- |
| EN 60204-1:2006+A12009+AC:2011 | Safety of machinery – Electrical equipment of machinery |
| EN 60825-1:2014 | Safety of laser equipment |
| EN 61000-6-2:2005 | Electromagnetic compatibility (EMC) – Part 6-2 |
| EN 61000-6-4:2007+A1:2011 | Electromagnetic compatibility (EMC) – Part 6-4 |

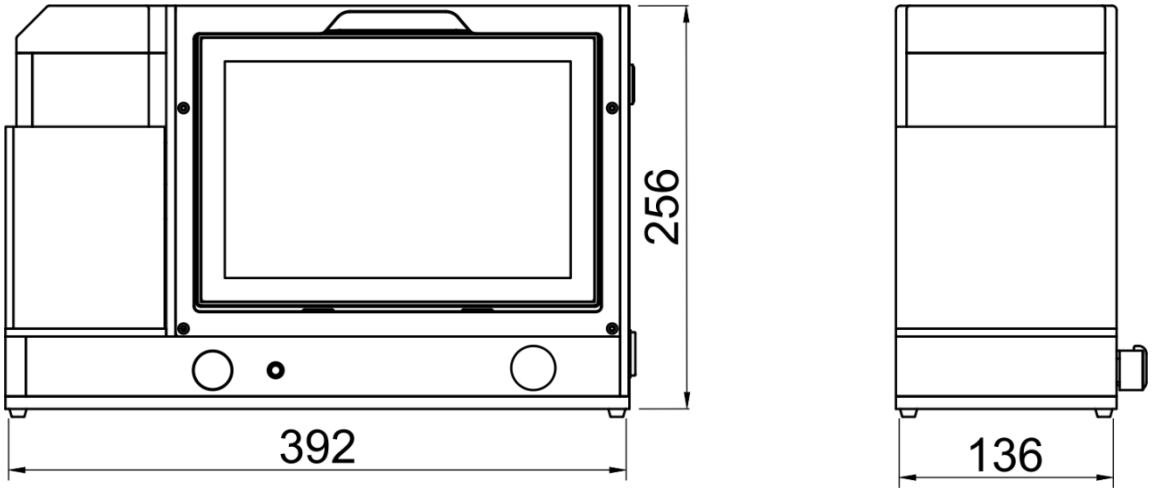
Authorised representative for technical documentation:

Place, Date: Pforzheim, 21. Juni 2025 .....

Rolf Okyay -Geschäftsführer-

Silvio Valenta -Geschäftsführer-

## 8.2 Assembly drawings



## 8.3 Parts list with spare parts recommendations

| | |
|---|---|
| HW-3XXXX | Pre-filter mat |
| HW-3XXXX | Main filter / lamella filter |
| HW-3XXXX | Activated carbon filter |
| HW-3XXXX | Set of pins for rotating axis |
| HW-3XXXX | Protective glass for focusing lens |
| HW-3XXXX | Optics cleaning set |