

→ **Operation Manual**
SP 500



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In case of failure, please check the device first. If unsuccessful, please note all data of the device (year of manufacture, software version, etc.) and call us from a telephone next to the switched on device.
For queries or technical problems please contact your dealer or Trotec Produktions- u. Vertriebs GmbH directly at the above address.



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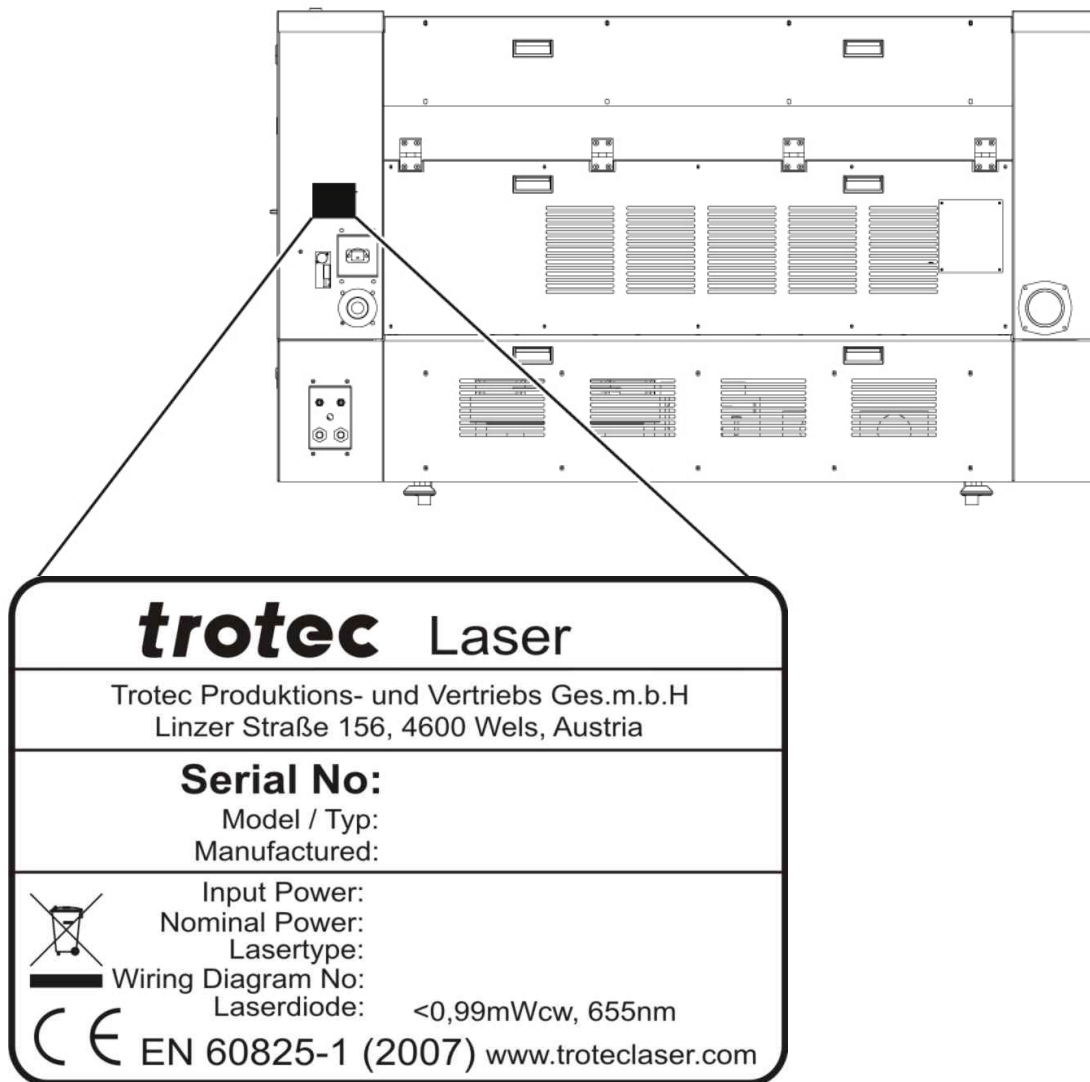
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1 Manufacturing label

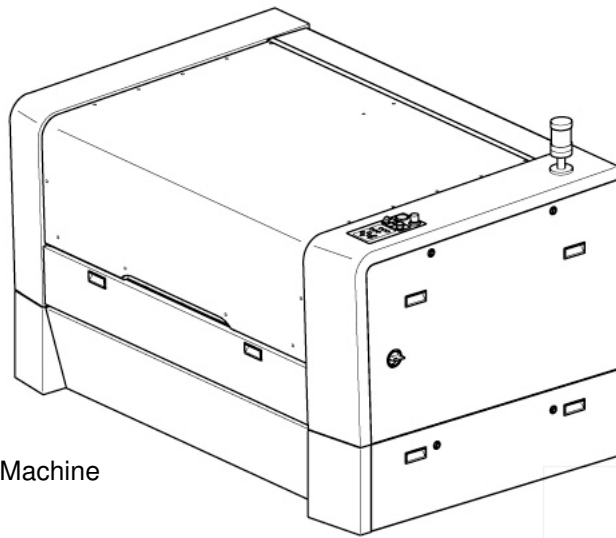
You find the manufacturing label with the CE-sign on the rear side of the machine.



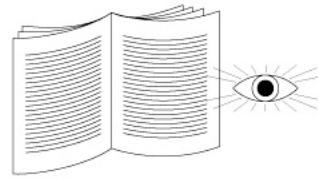
Enter the serial number, model and year of manufacture from the manufacturing label here.

This information is important for troubleshooting problems with the product and for ordering replacement parts.

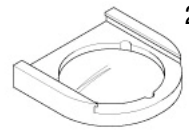
2 Product Components



Machine



Operating instructions
Please read!



2,0"

Lenses



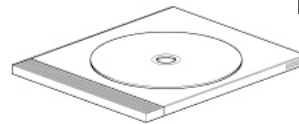
ø 5mm

Nozzles

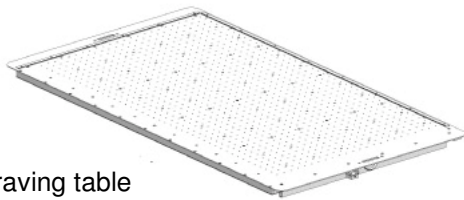


ø 2mm

(per order)



DVD



Engraving table
(standard table)

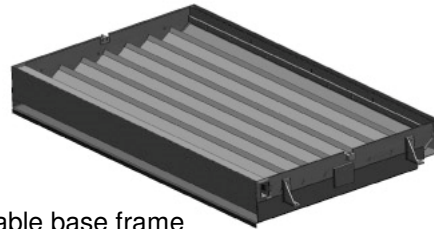
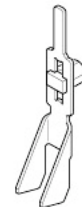
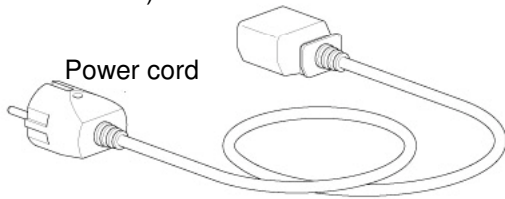


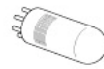
Table base frame



Focusing tool



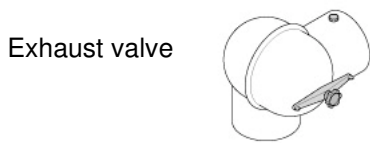
Power cord



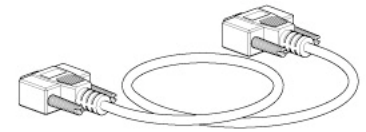
Bypass jumper for
Pass-through



Exhaust connection cable

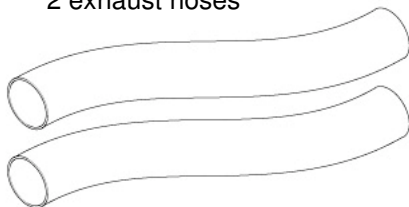


Exhaust valve



RS232 cable (per order)

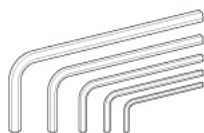
2 exhaust hoses



Broom with
holder



USB cable



Allen wrench kit



Cleaning kit

3 Preface

3.1 How to use the operation manual

This operation manual is intended to simplify the following for you:

- Learning about the machine, and
- Utilizing the machine's capabilities according to its intended use.

The operating manual contains important notes on how to operate the machine:

- Safely,
- Properly, and
- Economically

Following the operating instructions helps you to:

- Avoid hazards and risks,
- Minimize repair costs and downtimes, and
- Increase the reliability and service life of your machine.

3.2 Product Tracking

We have a legal duty to track our products after delivery to our customers.

In particular, this relates to:

- Recurring faults in functions
- Anything that is unclear, e.g. in operation, maintenance or instructions
- Any accidents that occur
- Other unusual observations
- Recommendations for improvement, requests

This information serves as a basis for potential corrections and/or changes to the product, and it is therefore of great interest to us.

We request that you inform us of any such events and offer us your recommendations. This is the only way that we can improve our products as necessary, and to make them as safe and reliable as possible.

Please use the response forms included in the Appendices for this purpose.

4 Technical Data

4.1 General Description

The SP 500 consists of a machine and a base frame.

All electronic components are integrated in the base frame.

All necessary connections are made on the back side of the SP 500.

Controls for the SP 500 are located on the keypad.

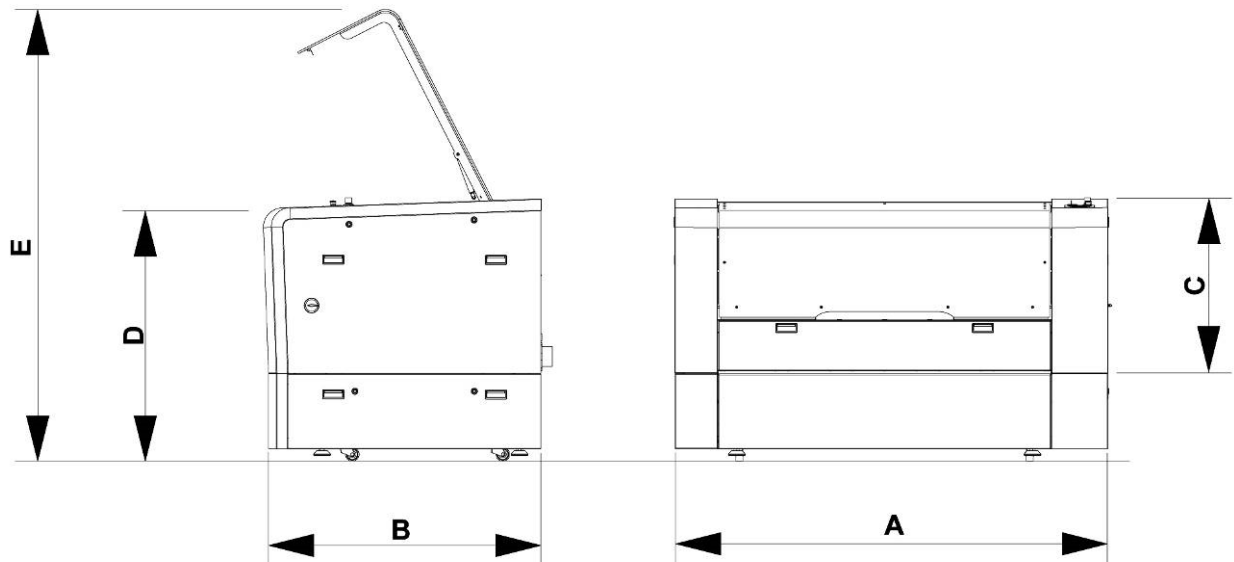
The SP 500 is equipped with an interlock safety system. When the interlock is activated, only setup tasks can be performed on the SP 500.

The machine has a manual table changing system that enables use of the optimal table for specific jobs. This system ensures faster and safer table changes.

4.2 Intended Use

The Trotec SP 500 is designed for engraving and cutting of the materials listed in this document.

4.3 Dimensions



Item	Description	Dimension	Units
A	Length	1920 (79.59)	mm (inch)
B	Width	1240 (48.82)	mm (inch)
C	Height, closed without base frame	780 (30.71)	mm (inch)
D	Height, closed with base frame	1140 (44.88)	mm (inch)
E	Height, open	2100 (82.68)	mm (inch)

Weight – depends on product model 550 to 600 kg
(1210 to 1320 lbs)

4.4 Technical Specification

• Mechanics

Working area	1245 x 710 mm (49 x 28 in) or optional 1245 mm (40 in) x ∞ (with pass-through)
Loading area	1420 x 820 mm (56 x 32 in) or optional 1420 mm (56 in) x ∞ (with pass-through)
Max. height of work piece	112 mm (4.4 in) slat cutting table, 95 mm (3.7) aluminum cutting grid table and acrylic cutting grid table, 98 mm (3.7) vacuum table; at removed table 300mm(12 in) at an area 1245 x 610mm (49 x 24 in) (flatness at removed tables cannot be guaranteed)
Work piece table	Multifunctional table concept: slat, aluminum, acrylic cutting grid table or vacuum table – one table included as standard; also available: honeycomb cutting tabletop, aluminum cutting grid tabletop or acrylic cutting grid Tabletop; electronic, programmable z-axis with servo motor
Speed of motion system	254 cm/sec. (100 in/sec)
Acceleration	19m/s ² (748 in/sec ²)
Motor	Brushless DC servomotor
Encoder	Increment measuring system
Optical elements	lens and all mirrors air-flushed and therefore protected from soiling (preinstalled air pump)
Lens	2.0" (standard); 2.5", 5.0" (optional), 2.5" clearance lense (optional) – gives 12,5 mm (0,5 in) more clearance than standard lenses, 3.75" rotary lens –additional clearance especially for rotary jobs
Accuracy of motion system	+/- 0,1 mm (0.004 in) (on the whole working area)
Addressable accuracy	0,0046 mm (0.0002 in)
Repeatability	<± 0,015 mm (0.0006 in)
Accuracy to size of parts	According to material an process
Maximum material load	25 kgs (55 lbs) area load over the whole working area
Exhaust	Travelling exhaust; table exhaust (with cutting- and vacuum table)

• Options

Pass-through (back)	height/width: 70 x 1420 mm (2.7 x 56.0 in) maximum material height 63mm (2.5 in)
Rotary attachment	Cones and roller version; max length of work piece: 104 cm (41 in) (roller) / 84 cm (33 in) (cones); diameter: 15 cm (0,59 in) (roller) / 25 cm (10 in) (cones)
JobControl® Vision	Registration mark and compensation system; max. working area: 1245 x 710 mm (49 x 28 in)
Gas-Kit (for compressed air respectively process gas)	For control of compressed air and process gas (free of mechanical dust, water and oil) max. flow rate 150 l/min (40 gpm) with max. 10 bar (145 psi) max. limit 4 bar on working head push fitting connection with out diameter) connection on the machine with hose out diameter of 6mm (0.23 in)

TroCAM Basic / Advanced	CAD / CAM software for perfect cutting results; inclusively nesting-function, lead-in/lead-out, tool paths
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Extraction System lead /follow-up time	Lead- and follow-up time fully adjustable
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• Control System

Software	JobControl Expert
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Laser power	Adjustable 0 – 100%
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Interface hardware	USB, RS-232 (RS-232 mandatory for TroCAM and CCD-camera)
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Interface software	ASCII, HPGL, AD-Logic System
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• Laser features and power levels

Laser features and power levels	Sealed-off CO ₂ laser With 40 – 200 watts, air – or water cooled (depending on model)
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Wavelength	10,6µm
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• Dimensions

Width x depth x height	1920 x 1240 x x1140 (780 without base frame) mm or 75.5 x 48.8 x 45.0 (30.7 without base frame) inches
------------------------	---

Weight	520 - 580 kgs / 1100 - 1300 lbs (depending on laser power)
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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)
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• Laser Safety

Laser class	CDRH laser safety; CE tested Laser class 2 (Laser class 4 with pass-through)
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Interlock	Duplicate interlock safety system
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Loading lid	Front side loading lid
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• Exhaust (Minimum requirements)

Volume	Min. 640 m ³ /h at 8500 pa
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• Electrical Equipment

Power consumption	Up to 5,6 kW
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Up to incl. 120 W Laser power	1x230V (L+N+PE) 50/60Hz
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200 W Laser power	3x230V (3xL+N+PE) 50/60Hz
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4.5 Electrical Connection

4.5.1 Electrical connection for laser system

Laser Power	60Wac	60Wwc	75Wac	85Wac	95Wac
Voltage	208/230V	208/230V	208/230V	208/230V	208/230V
Fuse	16A slow	16A slow	16A slow	16A slow	16A slow
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Phases	1 L,N, Ground (PE)	1 L ,N , Ground (PE)	1 L , N, Ground (PE)	1 L , N, Ground (PE)	1 L , N, Ground (PE)
Power consumption	2100W	1600W	2100W	2800W	2800W

Laser Power	105Wac	120Wac	120Wwc	200Wwc	200Wwc US
Voltage	208/230V	208/230V	208/230V	400V	208/230V
Fuse	16A slow	16A slow	16A slow	16A slow	20A slow
Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
Phases	1 L,N, Ground (PE)	1 L ,N , Ground (PE)	1 L , N, Ground (PE)	3 L1,L2,L3,N, Ground (PE) L – L: 400V L - N: 230V	3 L1,L2,L3, Ground (PE) L – L: 208/230V
Power consumption	3100W	3100W	3100W	4500W	4500W

4.5.2 Electrical connection for water cooling unit (optional)

	EU			US		
	60W	120W	200W	60W	120W	200W
Laser power						
Voltage	1x230V	1x230V	1x230V	1x115V	1x115V	1x230V
Frequency	50/60Hz	50/60Hz	50Hz	60Hz	60Hz	50/60Hz
Phases	L, N, Ground	L, N, Ground	L, N, Ground	L, N, Ground	L, N, Ground	L, N, Ground
Power consumption	900W	1800W	3000W	900W	1800W	3000W

4.6 Materials



CAUTION

Caution when processing conductive materials (carbon fibers,...)! Conductive dust or particles in the ambient air might damage electrical components and lead to short circuits.

Bear in mind that those defects are NOT warranted

Material	Engraving	Cutting	Marking
Acrylic	●	●	
Painted metal			●
Delrin	●	●	
Stainless steel (with Thermark)			●
Anodized aluminum			●
Veneer	●	●	
Handicrafts	●	●	
Glass	●		
Wood	●	●	
Gum rubber	●	●	
Ceramic	●		●
Cork	●	●	
Plastics	●	●	
Laser rubber	●	●	
Leather	●	●	
MDF	●	●	
Melamine	●	●	
Micro porous rubber	●	●	
Paper	●	●	
Polyester	●	●	
Stone	●		
PC (Polycarbonate)	●	●	

Other materials only with written approval by Trotec.



The following materials are not recommended for processing:

Polyurethane PUR, Polyvinyl chloride PVC, Polyvinyl butyral PVB, Polytetrafluorethylene PTFE and materials containing epoxy or phenolic resins



CAUTION

Trotec assumes no responsibility for any consequences of laser processing in any application such as medical or pharmaceutical applications

5 For your Safety

5.1 Safety Indication

Operating personnel must read and understand the operating instructions, and especially the “Safety” chapter, before operating the equipment. We recommend that the operator create internal instructional documentation for equipment safety and operation and to acknowledge receipt of these instructions/operating manual and participation in training/education in writing (see documents in the Appendices).

5.1.1 Intended user group

The machine may only be operated by authorized persons.

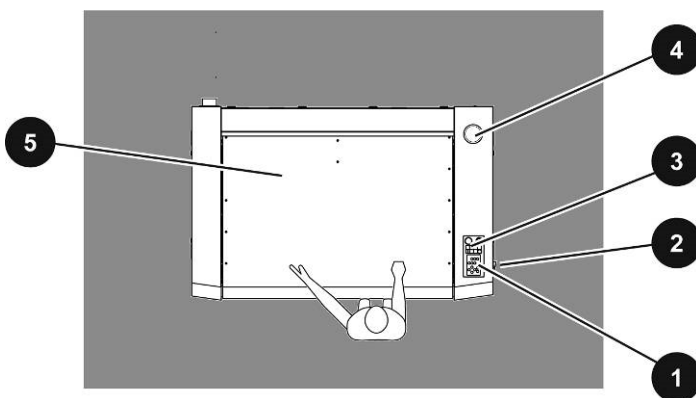
Authorities must be clearly defined and observed, so that no unclear competencies result under the aspect of safety. This applies in particular to work performed on the electrical equipment that may only be performed by specially trained professionals.

Activity	Intended group of users
Control/operation	Trained personnel
Other activities (e.g. error correction, maintenance)	Specially trained personnel or hired tradesmen

5.1.2 Operating instructions / Safety equipment

The safety zone is defined by the operator. Instructions and guidelines must be observed and followed!

Top view



No.	Description
1	EMERGENCY-OFF pushbutton
2	ON-OFF switch
3	Key switch
4	Warning lamp (option for pass-through)
5	Safety cover

5.2 General Safety Instructions

5.2.1 General



Hazard due to improper use of the machine!

Improper use may lead to hazards and bodily injury and damage to assets.

- **Prohibit or prevent improper use.**

Hazard due to disregard of safety instructions!

Improper activities at the machine may lead to death, bodily injury and/or damage to the machine.

- **Before startup read and observe the operating manual and safety instructions!**

Hazard due to faulty behavior by untrained persons!

Improper activities at the machine may lead to death, bodily injury and/or damage to the machine.

- **Inform personnel about machine functions and potential risks and record this in the training record.**
- **Observe legal regulations related to operation of machines and accident prevention regulations.**

Hazard due to poor lighting, poor housekeeping and moisture!

Shadows, reflections and poor housekeeping increase the risk of an accident.

- **Light the work area well, and always keep it clean and dry.**

Hazard due to missing, defective or bypassed safety equipment or machine parts!

Nonfunctioning or missing safety equipment or machine parts may lead to death, bodily injury and/or damage to the machine.

- **Carefully check safety equipment and machine parts for proper operation.**
- **In case of a functional fault or defect, immediately take prescribed actions to correct the problem.**

Hazard due to operator error (especially in setup mode)!

Adjustment and control with insufficient knowledge of the machine may lead to death, bodily injury and/or damage to the machine.

- **Before startup read and observe the operating manual and safety instructions!**

Hazard due to unsupervised operation of the machine!

Unsupervised operation may lead to fire resulting in death, bodily injury and/or damage to the machine.

- **Never operate the machine without supervision!**

Hazard due to reckless actions!

Reckless actions may lead to death, bodily injury and/or damage to the machine.

- **Make sure that no personnel remain in the hazardous area or at the machine.**
- **Do not leave any foreign objects in the machine (tools, etc.).**

Hazard due to operator error by unauthorized persons!

Adjustment and control of the machine by persons with inadequate knowledge of machine operation may lead to death, bodily injury and/or damage to the machine.

- **Never inadvertently actuate the machine.**
- **Turn the main switch off when the machine is not being used.**

Hazard during faulty work process!

Deviations in machine processing and work results may be an indication of hazardous conditions (jammed product, loose guides, etc.).

- **Observe machine movements for proper operation and check workresults on a regular basis.**
- **In case of deviations, initiate prescribed actions.**

Hazard due to premature actuation!

Premature actuation of the machine may lead to death, bodily injury and/or damage to the machine.

- **Do not reach into hazardous areas until you have turned off the main switch and placed a service sign on it.**

Hazard due to inadequate cleaning or functional checks!

Inadequate cleaning or functional checks result in machine damage. Accumulation of dirt could impair mechanical functions.

- **Regularly check machine and connection lines for damage and wear. In case of damage, immediately initiate prescribed actions.**
- **Keep machine, handles and switches free of oil, grease, dirt and moisture.**

Hazard due to unsuitable tools!

The use of improper tools could result in a risk of bodily damage and/or damage to the machine. Poor housekeeping leads to elevated accident risk.

- **Use proper tools for maintenance jobs.**

Hazard due to missing machine signage!

The risk of machine operator error results from making incorrect assumptions.

- **Replace missing machine signage.**

Hazard due to fault that cannot be corrected!

A fault that cannot be corrected may lead to injury and/or damage to the machine.

- **Turn off the machine and call customer service!**

Hazard due to improper disposal (waste, production materials)!

Improper disposal of waste materials can lead to environmental damage.

- **Recycle recyclable materials in separated and clean state. Dispose of waste in accordance** with applicable legal regulations.

Hazard due to inferior replacement parts or parts from other companies!

The use of inferior replacement parts or parts from other companies impairs machine safety and invalidates the supplied Conformity Declaration (CE).

- **Replace wear parts or damaged machine, safety or electrical components with original replacement parts. Only use the accessories or auxiliary** devices identified in the operating manual.

Hazard due to unsuitable work clothing or lack of protective equipment!

Risk of injury due to catching on machine parts, falling loads, inhalation of dust particles and noise.

- **Wear suitable work clothing.**
- **Wear safety glasses.**
- **Wear ear protection (mandatory for noise levels >85 dB(A))**

5.2.2 Laser Safety



There are versions of the machine for:

- Safety class 2
- Safety class 4 (With pass through option)

Class 2

The accessible laser radiation of Class 2 laser systems does not pose any hazard for the skin. Any short-term radiation of the eyes also poses no risk due to the low level output. In the event of longer, more intensive radiation, the eye is protected by the natural lid reflex.

The SP 500 uses a Class 2 laser pointer. In order to prevent irritation of the eyes during operation, the operator should not look directly at the laser source.

Diffuse reflections of the pilot laser are entirely harmless.

Class 4

Class 4 lasers pose the risk of direct radiation and indirect stray radiation and may cause damage to both the skin and eyes.

Class 4 lasers also pose a fire and explosion hazard if used improperly and the radiation strikes any flammable material.

The operator is responsible to take all necessary protective measures to entirely rule out the possible ignition or explosion of materials by the laser beam.

Class 4 lasers should be operated according to the following precautionary measures among others:

- The operator is obliged to appoint a trained Laser Protection Officer responsible for compliance with the relevant regulations.
- The danger zone must be identified by installing warning lights and warning signs outside the area.
- The danger zone must be secured against unauthorised access.
- The operator of a Class 4 laser system should always wear laser protection glasses suitable for the wave length and output of the laser within the danger zone.
- An additional emission warning light should also be installed in a position visible to the operator to warn them of any emerging laser radiation.

Compliance with the points above does not absolve the operator from meeting the relevant standards and guidelines for the operation of a Class 4 laser system.



Hazard due to laser radiation without protective measures!

Lack of protective measures can result in:

- Burns on the cornea of the eyes,
- Skin burns, and
- Fire hazard for clothing
- **Never operate machine without protective equipment**
- **Unapproved modification or disassembly of the laser is prohibited**
- **Never manipulate the laser unit**
- **Do not bypass the interlock system**



Hazard in processing unapproved material!

Processing of materials not listed and approved in this operating manual is prohibited.



Processing medical technology and pharmaceutical products!

Trotec assumes no responsibility for any consequences or the suitability of laser processing for any applications, especially those in the medical technology or pharmaceutical fields.



Hazard when working with the cutting table!

If not all of the partition plates are used in the cutting table, there is a risk of fire due to reflection of the laser beam.

Insert anti-reflective material beneath the partition plates.

5.2.3 Transport Safety



Hazard of loads impacting persons or objects!

Falling, tipping or sliding loads may lead to death, bodily injury and/or damage to the machine.

- **Never let loads impact persons.**
- **Set up unloading station before lifting loads. Avoid unnecessarily long periods of lifting.**
- **Do not lift loads until you have a clear view of the travel route. Choose travel routes that are as unobstructed as possible.**



Hazard due to lifting equipment operator error by untrained personnel!

Improper operation of lifting equipment may lead to death, bodily injury and/or damage to the machine.

- **Operation of lifting equipment only by trained personnel.**
- **Wear protective helmet, safety shoes and gloves.**

5.3 Secondary Risks

5.3.1 General



Hazard due to materials hazardous to health!

- In processing with or use (cleaning, etc.) of hazardous materials (toxic, etc.), appropriate measures should be taken to avoid health hazards.



Hazard due to operator error!

Errors are possible even when the machine is operated properly following the functions and sequences described in the operating manual. Such errors may lead to death, bodily injury and/or damage to the machine.

- Do not initiate any work or adjustment activities while any personnel are located in the hazardous area.



Hazard due to add -on options or machines!

Adding on options or machines can lead to unknown risks and hazards.

- Modifications made to the machine without approval by Trotec invalidates the Conformity Declaration (CE) supplied with the product.

5.3.2 Crushing hazard



Hazard due to moving parts!

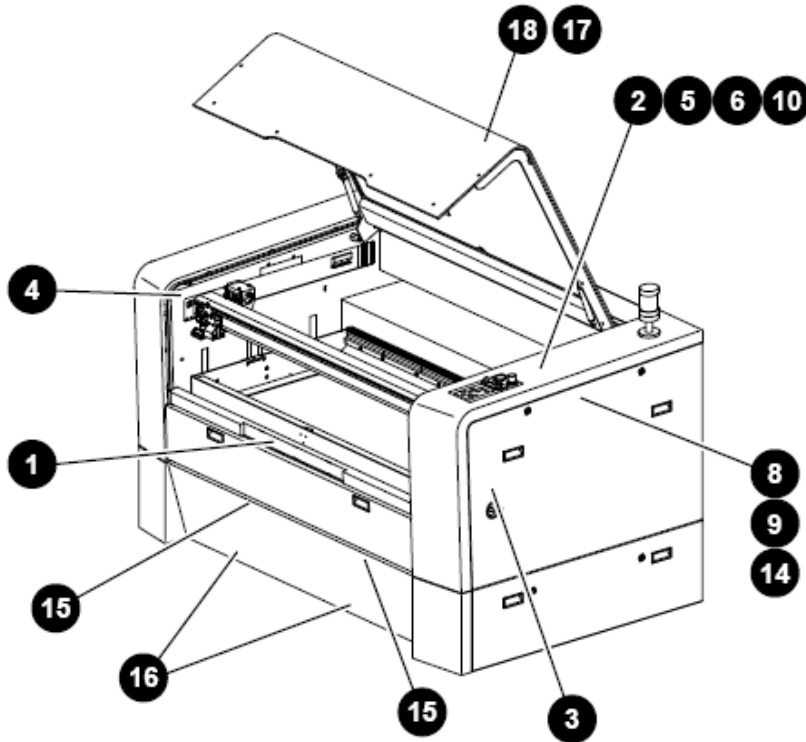
Reaching, stepping or leaning into the hazardous area may result in serious injury by crushing body parts, severing fingers or the hand!

- Do not initiate any work process on the machine while persons (helpers, etc.) are located in the hazardous area of the machine.
- Prohibit access to the hazardous area.
- Wear suitable work clothing (no loose clothing, jewelry, or similar.).

5.4 Signage



The warning and information labels are attached in such positions of the device that could represent a source of danger during set-up and operation. Therefore, follow the information on the labels. If labels are lost or damaged, they must be replaced immediately.



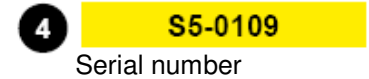
Warning of hand injury



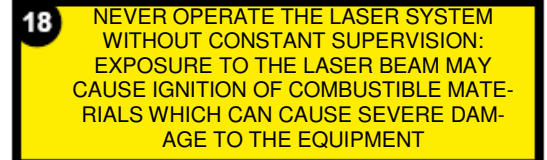
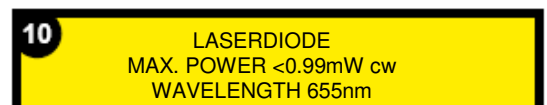
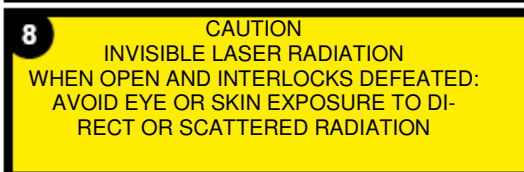
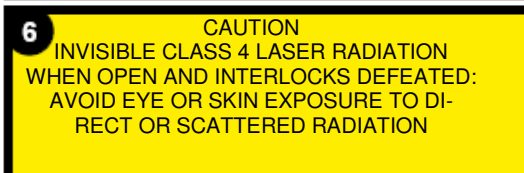
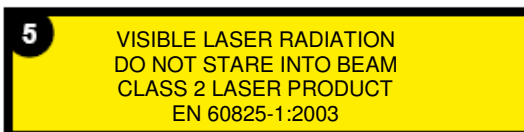
Warning of laser radiation

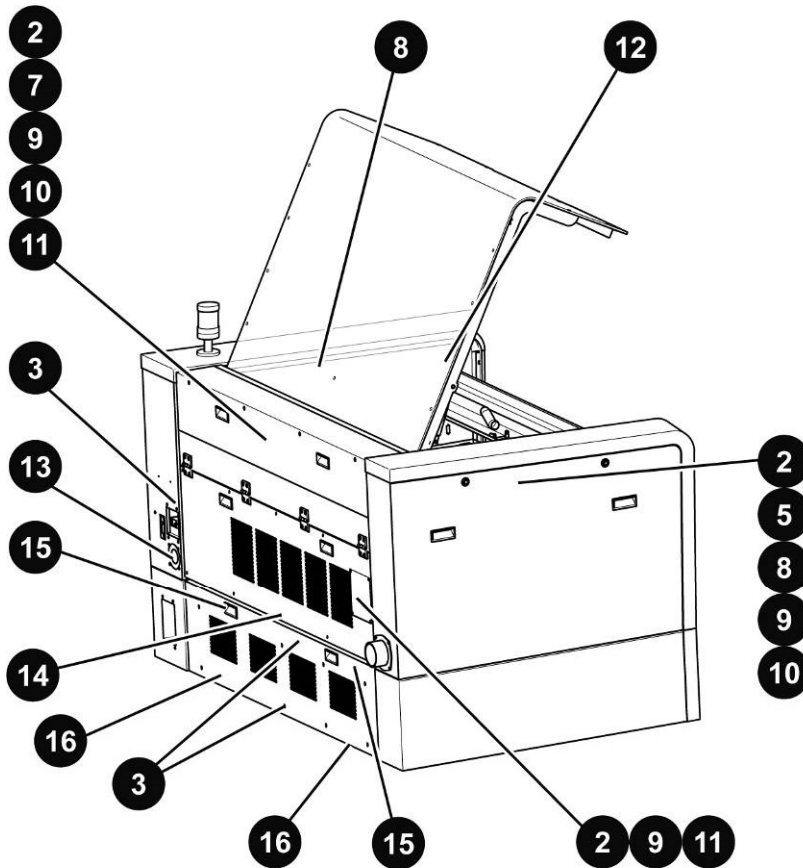


Warning of electrical power



Warning of fire





Warning of laser radiation



Warning of electrical power

5 VISIBLE LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
EN 60825-1:2003

7 INVISIBLE LASER RADIATION
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION
CLASS 4 LASER PRODUCT

8 CAUTION
INVISIBLE CLASS 4 LASER RADIATION
WHEN OPEN AND INTERLOCKS
DEFEATED
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION

9 CAUTION
VISIBLE LASER RADIATION
WHEN OPEN DO NOT STARE INTO BEAM

10 LASERDIODE
MAX. POWER <0.99mW cw
WAVELENGTH 655nm

11 CAUTION
INVISIBLE LASER RADIATION
WHEN OPEN AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED RADIATION

12 CAUTION
VISIBLE AND INVISIBLE LASER RADIATION
WHEN OPEN AVOID EYE OR SKIN EXPOSURE
TO DIRECT OR SCATTERED RADIATION

13 INPUT POWER
380-400 VAC 50Hz

14 BEFORE OPEN
UNPLUG THE MACHINE FIRST

15 LIFTING POINTS

16 <- DO NOT LIFT HERE ->

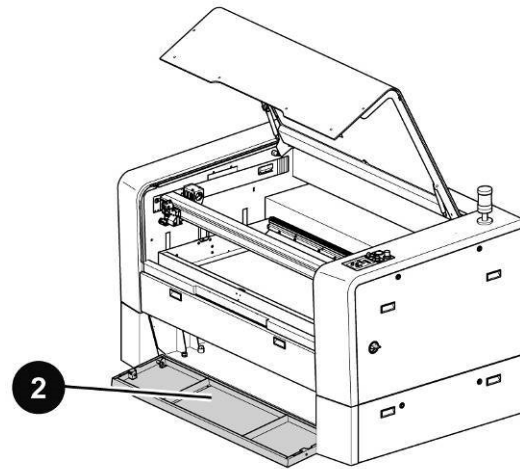
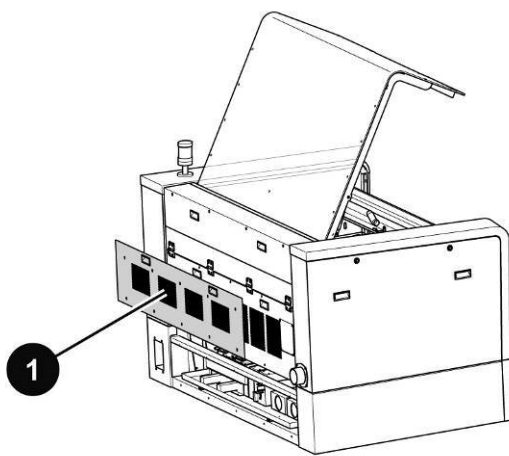
6 Transport – Storage - Setup

The machine has 4 rollers for moving it. All 4 feet must be fully screwed in before moving. The machine is also designed to be moved by forklift.

6.1 Forklift transport

Before moving the machine, perform the following on the base frame:

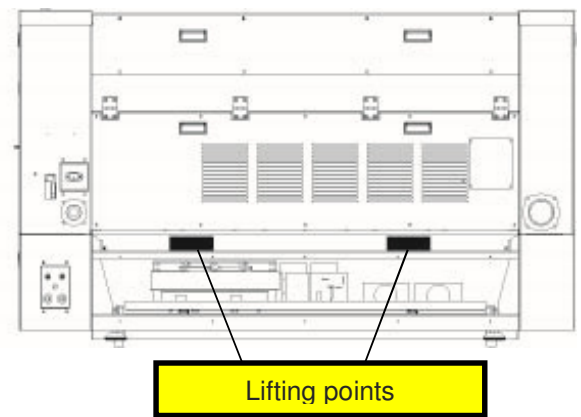
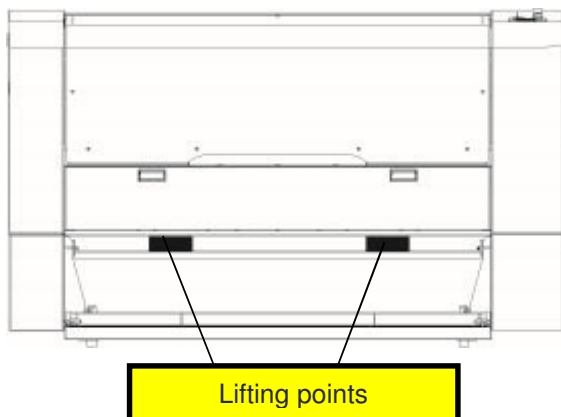
- Remove rear trim panel (1)
- Open the front door (2) with a 10mm Allen key



In addition, the following should be performed:

- Disconnect all attached lines.
- Fasten down all moving parts to stationary and sufficiently stable parts of the frame.

6.2 Lifting points



The machine may only be lifted and transported:

- Under the guidance of a 2nd person, and
- At the points identified.

After moving the machine, reinstall the rear trim panel (1) and close the door (2).

6.3 Shipping conditions

-Remove table before shipping



CAUTION

When transporting outdoors, only transport in shipping vehicles with roofs or sufficient weather protection.



CAUTION

Protect machine from shipping damage using tie-down straps, packaging materials and sufficient gaps to other shipped goods.

- Ambient temperature for transport:

Minimum temperature +10 °C (+50 F)

Maximum temperature +40 °C (+104 F)



CAUTION

- Handle machine and machine parts with care.
- Do not place any heavy loads on top of the machine or machine parts.
- Avoid harsh impacts.
- Only lift at the specified points.
- Take special care in transporting electronic components.

6.4 Unloading, inspection and damage reporting

After unloading:

1. Remove shipping packaging.
2. Dispose of packaging according to applicable waste disposal law.
3. Inspect machine and machine parts for shipping damage.
4. Check shipment for completeness.

In case of shipping damage or incomplete shipment:

1. Immediately document the details of the damage.
2. Also note the claim on shipping papers.
3. Photograph the damage.
4. Send report to TROTEC.

6.5 Storage conditions

- Store machine and machine parts in a dry area.
- Protect machine and machine parts from scratches.
- Store electronic components especially carefully in a packaged state.
- In case of longer term storage, protect exposed metal parts (e.g. oil the parts).
- Ambient temperature for storage:

Minimum temperature +10 °C (+50 F)

Maximum temperature +40 °C (+104 F)

6.6 Storage Location

In storage room or packaged with adequate weather protection.

The storage location must be free of caustic materials, vapors and combustible materials.

6.7 Installation Site

- Weather-protected, roofed building with vehicular access
- Low dust environment

Properties of the installation site:

- Adequate lighting
- Uniform, level, horizontal and firm floor, planarity +/-5 mm
(+/-0.1969 inch), no special foundation required
- Load bearing capacity of base frame at least 300 kg/m²
(62 lbs/sq.ft.)

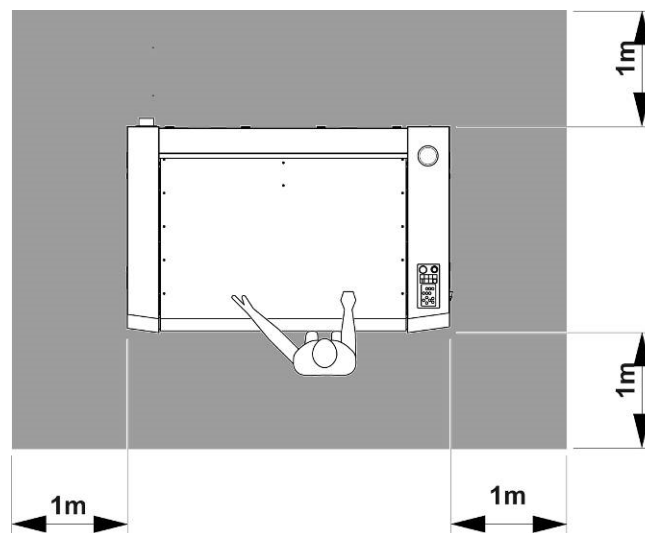
Installation site must:

- Be free of noisy electrical installations, hoses and pipe lines
- Have power supply that is free of fluctuations
- Be shielded from EMC

Ambient Conditions:

- Relative humidity: 40% to max. 70%
- Ideal room temperature: +15 °C to +25 °C (+59 F to +77F)
- Dust-free environment (2nd degree per IEC60947-1)

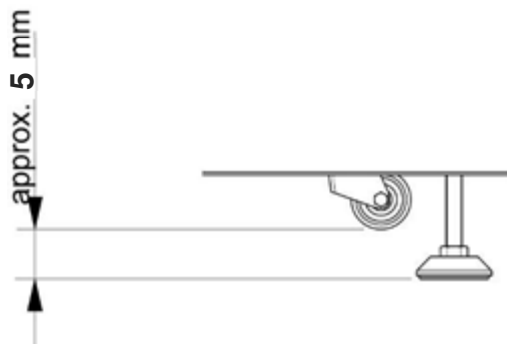
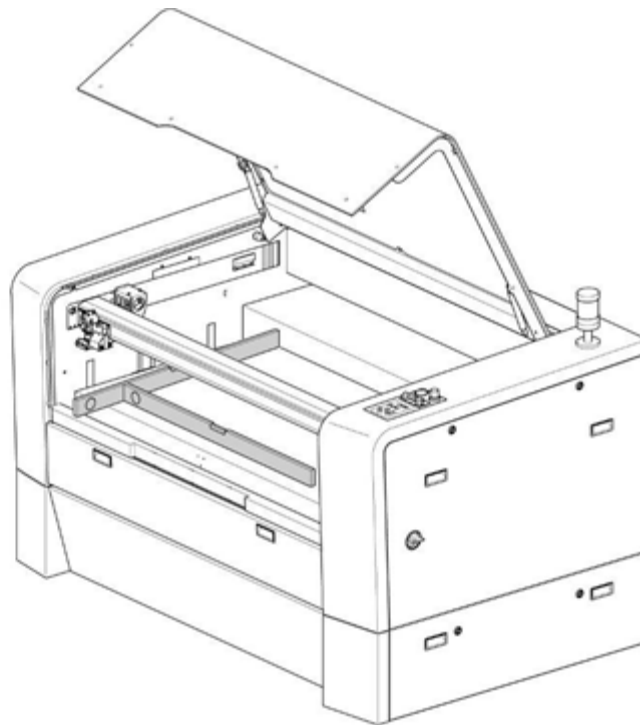
6.8 Space Requirements



6.9 Necessary Feed Lines

- Electrical
- Compressed air: Free of oil, water and dirt at max. 10 bar (145 psi)
- Gases (Neutrogen, Argon, protective gas, ...)

6.10 Setup

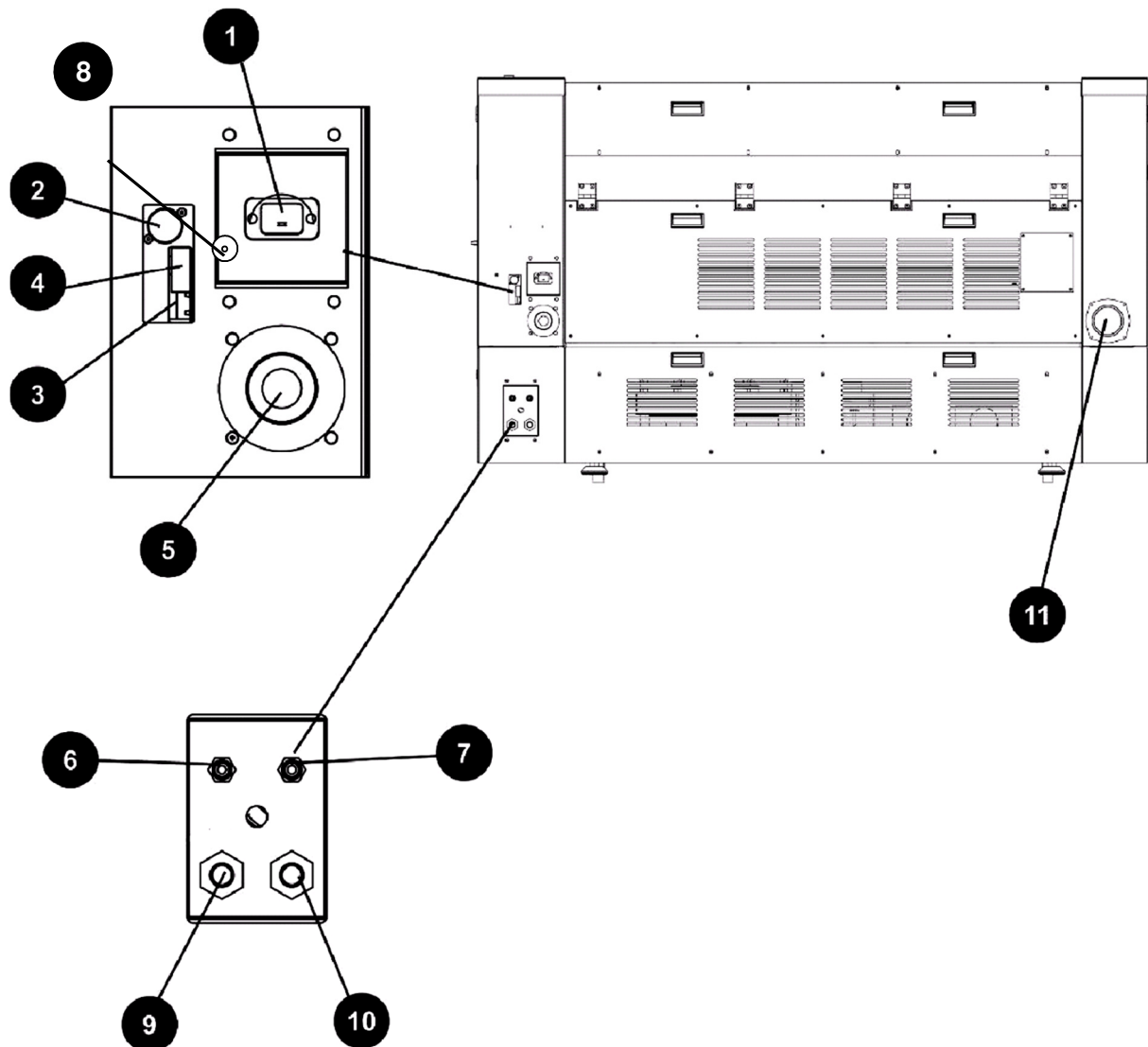


Unscrew all 4 feet until the distance from rollers to floor is approx. 5 mm (0.2 inch)

Tools: Wrench 22mm and 24 mm

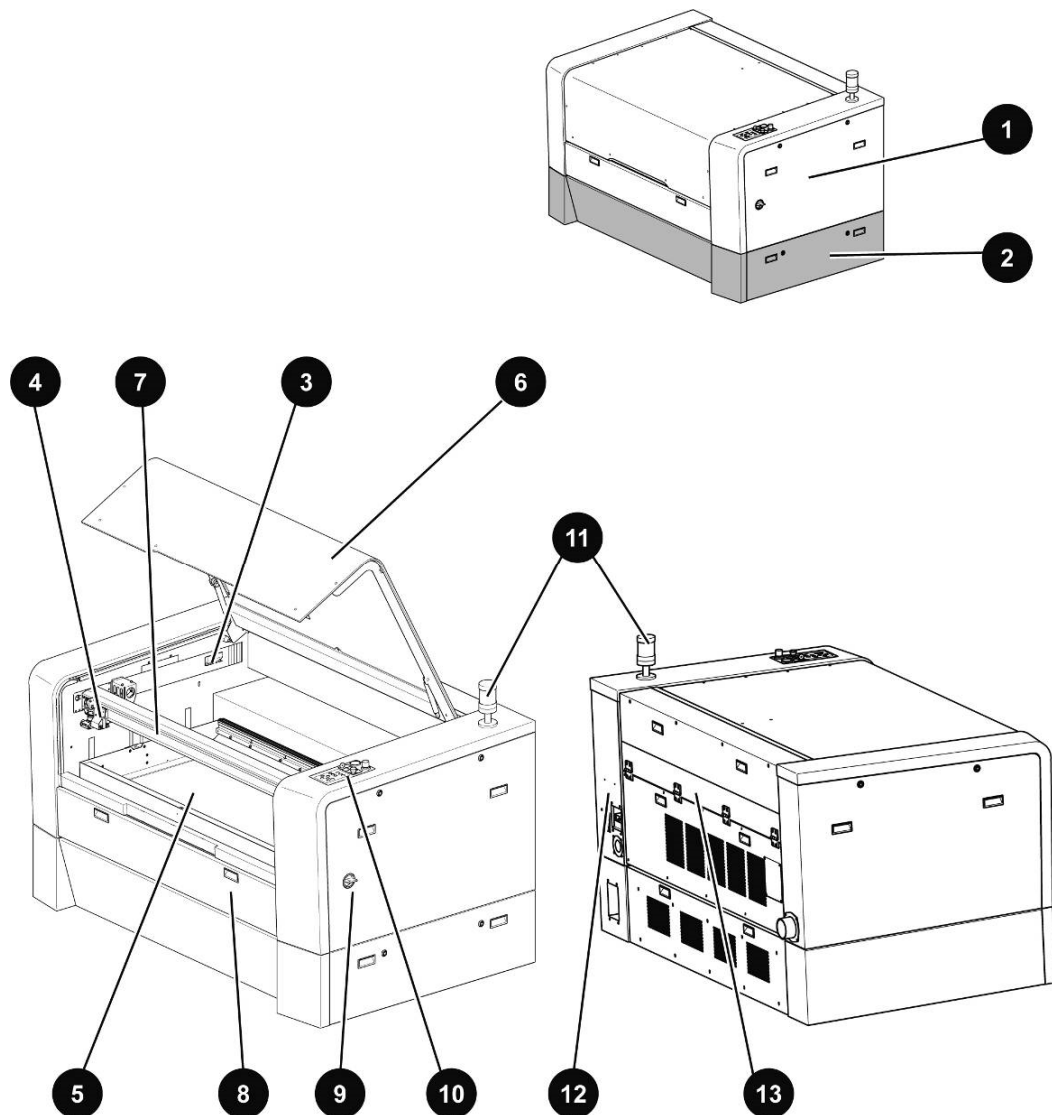
Align machine to horizontal level by adjusting feet, and check with a fluid level

7 Connections



Item	Description	Item	Description
1	Electrical power	7	Gas 2
2	Connection cable: Exhaust	8	JobControl® Vision BNC connector
3	USB for PC	9	Cooling water inlet
4	RS-232 for PC (necessary for JobControl® Vision/Alpha-Cam)	10	Cooling water drain
5	Exhaust: Working head	11	Exhaust: Vacuum table
6	Compressed Air (Gas 1)		

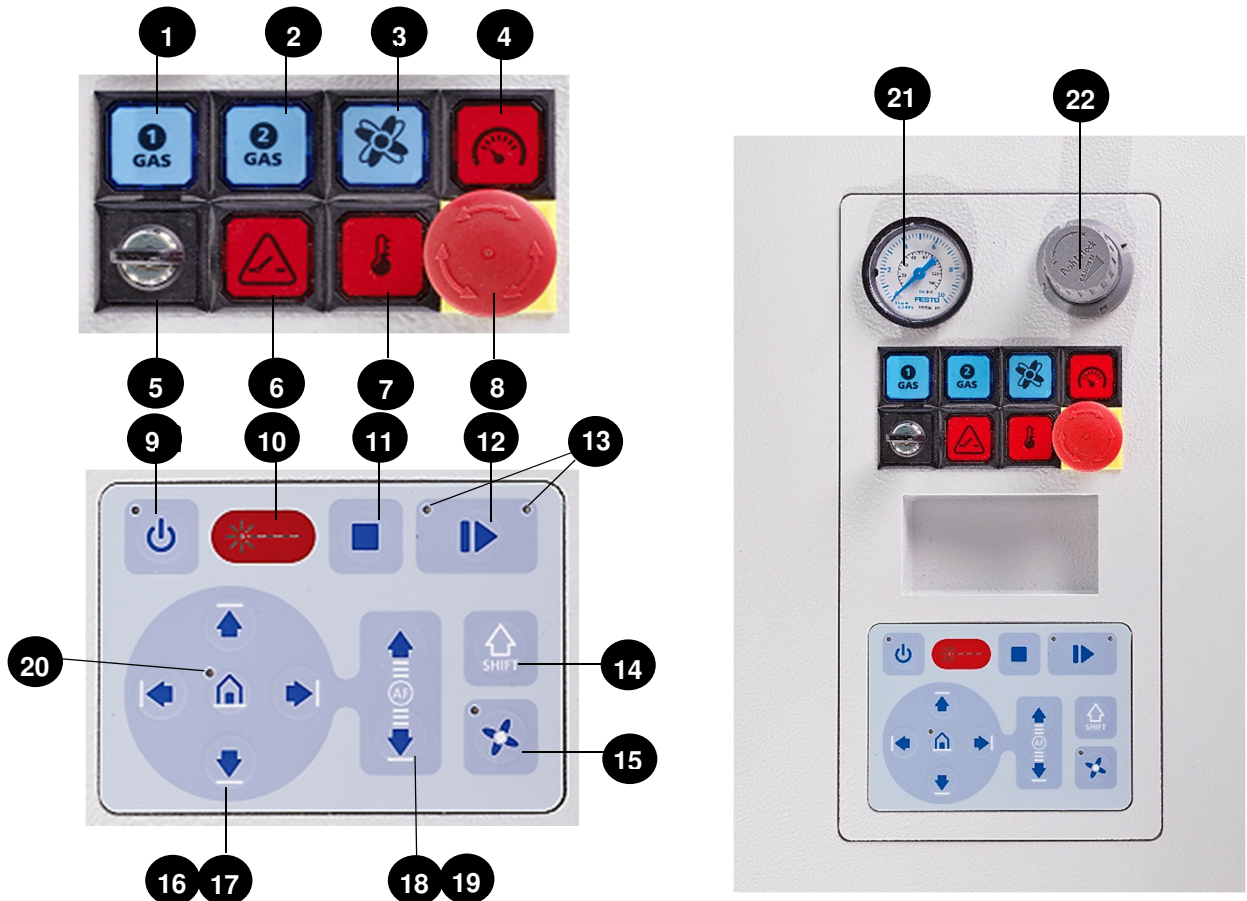
8 Machine view



Item	Description	Item	Description
1	Machine	8	Workpiece removal door
2	Base frame with electronic components	9	Main switch
3	Auto-focus sensor	10	Operator panel - keypad
4	Engraving head	11	Warning lamp (option for pass-through)
5	Engraving table	12	Manufacturin label
6	Safety cover	13	Pass trough (option)
7	X-Axis		

9 Operation

9.1 Key pad – Overview

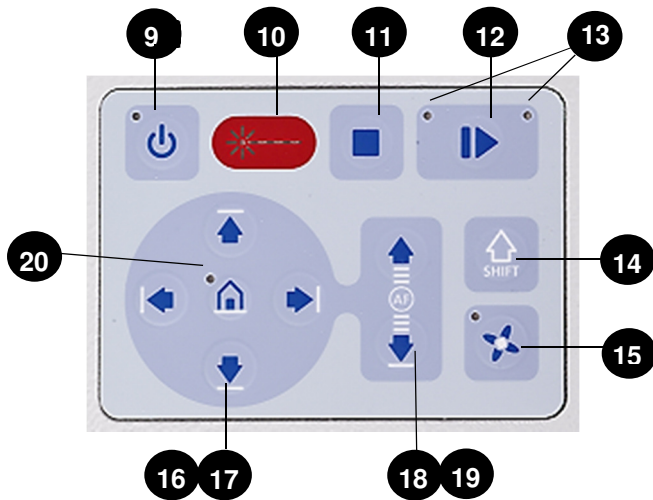



Item	Description	Item	Description
1	Button: Gas 1	12	Button: Start/Pause/Repeat
2	Button: Gas 2	13	Status display
3	Button: Air assist (internal)	14	Button: "Shift" for 2 nd function key level
4	Indicator: Compressed air, Voltage (AC, DC)	15	Button: Exhaust on/off
5	Key switch	16	Button: Working head to left/right
6	Indicator: Interlock open/close	17	Button: Working head forward/backward
7	Indicator: Water cooling on/off	18	Button: Work table upward
8	EMERGENCY STOP push button	19	Button: Work table downward
9	Button: Standby	20	Button: Home
10	LED status indicator: Laser busy	21	Manometer for gas pressure
11	Button: Stop	22	Pressure regulator



9.2 Key pad – Description





1	Gas 1 Gas 1 on/off key
2	Gas 2 Gas 2 on/off key
3	Air Assist Switch on/off the air assist
4	Compressed air, Voltage (AC, DC) indicator Lights in following conditions: → Compressed air missing → AC-Voltage failure (L1, L2, L3, N) → DC-Voltage failure (power supplies)
5	Key switch
6	Interlock on/off indicator Interlock indicator lights when the machine is turned on, and: → Guard door or door is open → Cover plate is not installed If the Interlock Indicator is unlit, the machine is ready for production.
7	Cooling on/off indicator
8	EMERGENCY STOP push button Pressing this button shuts the machine down completely. The EMERGENCY OFF pushbutton must be unlocked to start up the machine again.

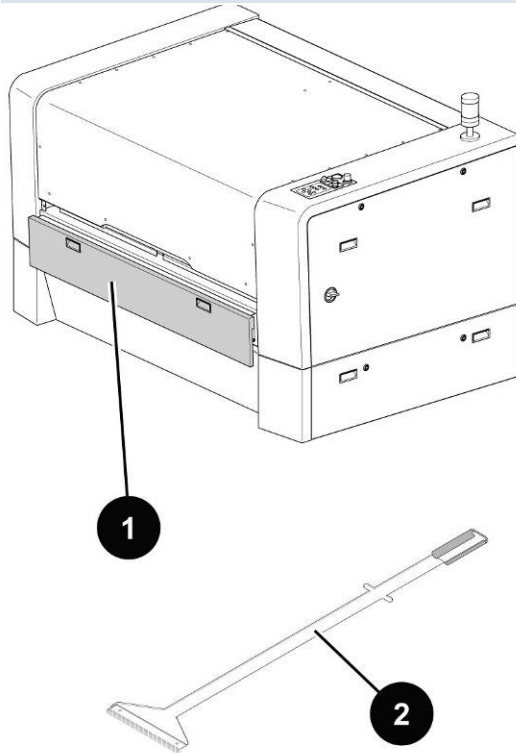


9	<p>STANDBY</p>  <p>Switches the device into Standby mode (Laser ready, illumination off) - key lights up.</p> <p>By pressing the key again the device is switched back to Ready mode.</p> <p>If the Standby button is pressed while the Z- axis is in an automatic move (e.g. autofocus), the Standby mode is entered after finishing the Z- axis- move (Z- axis move can be stopped by pressing any of the Z- axis keys).</p>															
10	<p>LED status indicator: Laser busy</p> <p>Indicates, that a laser beam is currently being emitted.</p>															
11	<p>STOP</p> <p>By pressing this button, the actual process running will be stopped.</p>															
12	<p>Start/Pause/Repeat</p> <p>Pressing the button with no Job running the actual Jobs positioned on the selected plate in Job-Control are started.</p> <p>Used to pause the current working process (key lights up). As soon as the last processing command is finished, the motion system stops.</p> <p>If this key is pressed a second time, the key illumination goes off, the interrupted working process is continued.</p> <p>Pressing the button after a Job is finished will repeat the actual Jobs positioned on the selected plate in JobControl. The Jobs will reset automatically.</p>															
13	<p>Status Display</p> <p>Indicates the current status of the device.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">green, flashing slowly (0.5 Hz)</td> <td style="text-align: center;">13</td> <td style="text-align: center;">Machine is ready</td> </tr> <tr> <td style="text-align: center;">green, flashing fast (2 Hz)</td> <td style="text-align: center;">13</td> <td style="text-align: center;">Cover has been opened</td> </tr> <tr> <td style="text-align: center;">green permanent light / Pause mode</td> <td style="text-align: center;">13</td> <td style="text-align: center;">Data available in the machine</td> </tr> <tr> <td style="text-align: center;">red permanent light</td> <td style="text-align: center;">13</td> <td style="text-align: center;">Laser beam is being emitted</td> </tr> <tr> <td style="text-align: center;">green/red flashing alternately</td> <td style="text-align: center;">13+10</td> <td style="text-align: center;">Cover open during switch-on process, simultaneously acoustic signal - no referencing</td> </tr> </table>	green, flashing slowly (0.5 Hz)	13	Machine is ready	green, flashing fast (2 Hz)	13	Cover has been opened	green permanent light / Pause mode	13	Data available in the machine	red permanent light	13	Laser beam is being emitted	green/red flashing alternately	13+10	Cover open during switch-on process, simultaneously acoustic signal - no referencing
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green permanent light / Pause mode	13	Data available in the machine														
red permanent light	13	Laser beam is being emitted														
green/red flashing alternately	13+10	Cover open during switch-on process, simultaneously acoustic signal - no referencing														

14	<p>“Shift” for 2nd function key level For additional Operations. When this key is pressed together with the following keys, the functions indicated are activated:</p> <ul style="list-style-type: none"> → Exhaust (5): Air assist on/off → Positioning keys X/Y/Z (2): These keys drive the laser head to the end position
15	<p>Exhaust on/off Used to manually switch the exhaust system on and off. The key illumination shows the status of the exhaust system. When the key is illuminated, the exhaust system is switched on. After completing the engraving process, the exhaust system can only be switched off after some seconds (follow-up time). Air assist is switched on/off by simultaneously pressing these keys:</p> <ul style="list-style-type: none"> → “Shift” for 2nd function key level (14) → And Exhaust on/off (9)
16 17	<p>Positioning keys Z</p> <div style="display: flex; align-items: center;">  <p>When pressing one of these two keys the working table moves in Z direction (upwards or downwards).</p> </div> <p>Use these positioning keys to move the table manually. When both keys are pressed simultaneously, the material is focused automatically.</p> <p>Before the autofocus- move is started, the head is moved backward in line with the light barriers. If the light barrier is broken, e.g. by an air assist nozzle, the upward move will be suppressed to prevent a collision between the nozzle and the table.</p> <div style="display: flex; align-items: center; margin-top: 10px;">  <p>The Autofocus option might not work on transparent materials or materials which are not flat. Bear in mind that defects from head crashes (working head hits material or working table) are NOT warranted.</p> </div> <p>By pressing the "Shift" key and a Z- positioning key an automatic move to the corresponding end- positions is performed: Shift + Down: the table moves down to the lowest possible position Shift + Up: the table moves up to the autofocus- position. Note: Shift + Up will cause the head moving backwards to the light barriers (according simultaneous pressing of both z-keys).</p> <p>If any of positioning keys X and Y is pressed, no moves in Z are possible. An automatic move of the Z- axis can be stopped by pressing of the positioning keys (1 or 2).</p>

18 19	Positioning keys X/Y Use the positioning keys to manually move the lens holder into the indicated directions. When you press two keys simultaneously, the lens holder moves diagonally.
	 When you press the "Shift" key and one of the positioning keys simultaneously, a movement to the corresponding end position is performed. If all panels are closed, the movement is done with the maximum velocity, if opened, the speed is 1/4th of the maximum. While the Z- axis is in movement (e.g. autofocus), no cursor moves in X and Y axis are performed.  The Autofocus option might not work on transparent materials or materials which are not flat. Bear in mind that defects from head crashes (working head hits material or working table) are NOT warranted.
20	HOME Pressing this button will change the machines home position temporary (Home-move to this position)
21	Manometer for gas pressure
22	Pressure regulator This is used to adjust the required gas pressure of the gas used. The pressure setting is displayed on the: manometer for gas pressure.

9.3 Workpiece Removal Door

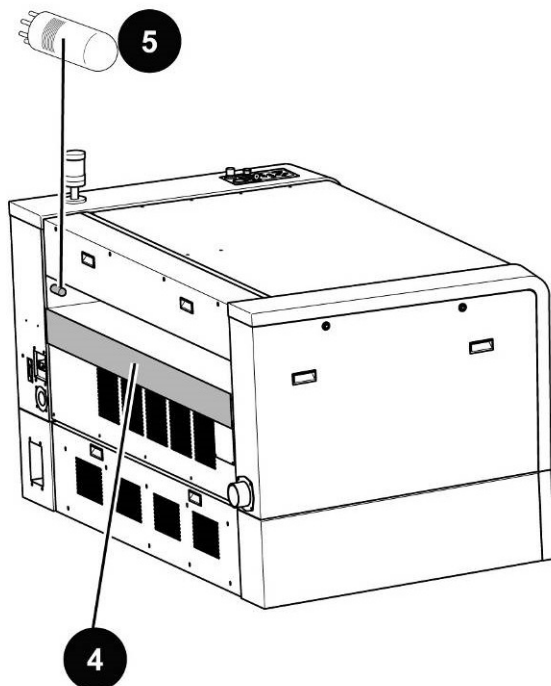


- Open door (1) by pulling forward on the two handles
- Remove the workpieces with the broom (2)
- The bracket (3) for the broom has 3 magnets and is mounted on the side of the machine



Door must be closed during laser operation.

9.4 Pass-through opening (optional)



- Open the pass-through by folding down door (4)
- Insert bypass jumper in socket (5) for pass-through.



Do not reach into opening during operation.



Warning of laser radiation Class 4. Take all necessary measures (compare section 5.2.2 Laser Safety)

9.5 Exhaust System



**Trotec advises to use the *Atmos Duo Plus* for the SP 500.
If only a Cutting table is installed, a VENT 3000 would be sufficient.**



The laser may only be operated with properly installed and operating exhaust system.
Fumes and dust created during cutting or engraving have to be exhausted properly. Some materials when cut or engraved can produce fumes that are hazardous in concentrated amounts.



Damage to the system caused by the use of no or improper extraction equipment will not be covered by warranty.



The life time of optics and mechanical components will be reduced by fumes and dust accumulating in the machine. This will be avoided by a capable exhaust system.



The cutting quality will be reduced by fumes and dust accumulating in the machine. This will be avoided by a capable exhaust system.



The laser power interacting with the work-piece will be reduced by fumes and dust accumulating in the machine. This will be avoided by a capable exhaust system.

Depending on the type of table installed in the machine the exhaust requirements and recommended Trotec exhaust systems for standard applications are:

	Flow rate	Pressure	Atmos Mono	Atmos Duo	Vent 3000	Vent HP
Head Exhaust (45mm)	50 m ³ /h	5300 Pa	✓	✓	✗	✓
Vacuum table (75mm)	250 m ³ /h	3900 Pa	✗	✓	✗	✓
Cutting table (75mm)	350 m ³ /h	1500 Pa	✗	✓	✓	✓
Standard table	Not applicable (Table Exhaust inactive)					

Monitoring point for flow-rate and pressure is at the exhaust port at the laser machine. Pressure loss by hoses / pipes or filter parts of the exhaust has to be determined and additionally calculated when selecting a proper exhaust.



The exhaust power which is available for the application will be reduced by e.g. bending, small hose diameters and long hoses.
Therefore, avoid bending, keep hoses as short as possible and use hoses with diameters as large as possible.



Applications generating large amounts of dust or fumes may require a stronger exhaust system.
Also the use of separate exhaust systems for head and table exhaust may be necessary.
It is absolutely necessary to consult your distributor in such cases.

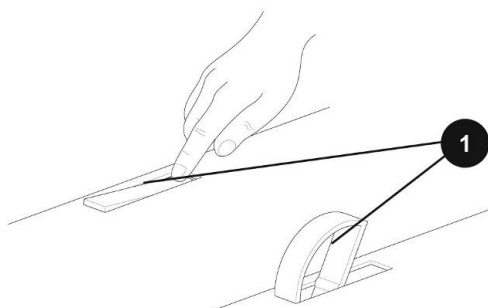
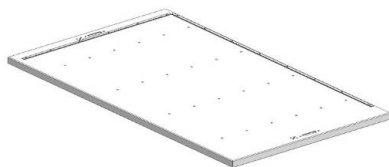
9.6 Tables

9.6.1 Base Frame (with/without lamellas)



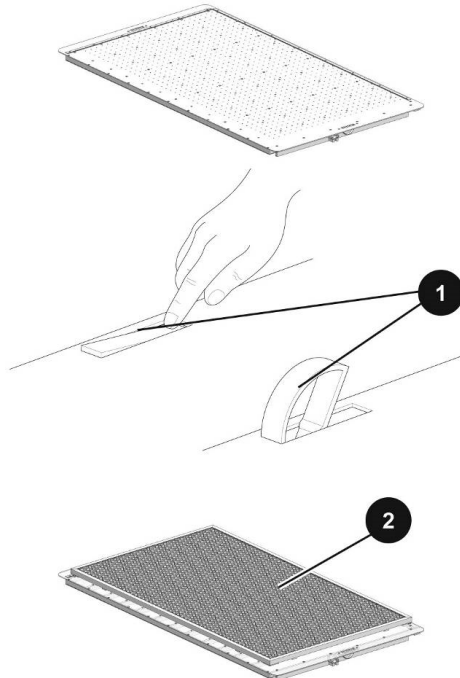
- The frame is permanently attached to the machine's Z axis.
- The following individual table variants are placed on it (with our without lamellas):
 - Engraving table
 - Vacuum table
 - Cutting table
- The table is secured in the center by mounted latching pins.
- It is easy to remove parts that have fallen into the frame via a door.
- To do this, the table must be driven to its lowermost position.
- The "Rotary engraving attachment" option is placed directly in the base frame.

9.6.2 Engraving Table (Standard table)



- The engraving table rests on the base frame and is supported by additional braces there.
- The engraving table is only for engraving heavy objects, such as metals, marble, granite, glass, heavy wood and acrylic parts.
- Two swiveling handles (1) make it easier to lift out the engraving table. To use them, swivel the handles (1) upward.

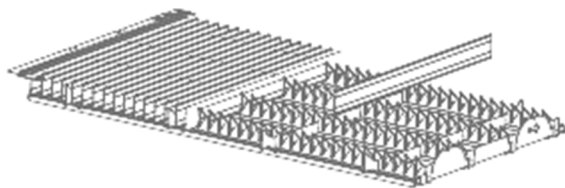
9.6.3 Vacuum Table



such

- The vacuum table rests on the base frame and is supported by additional braces there.
- The vacuum table is only intended for engraving and/or cutting thin and lightweight materials as films, plastic laminates, veneers, thin sheets of wood, paper, cardboard, and similar.
- The entire surface of the vacuum table must be covered to ensure the maximum vacuum effect
- Two swiveling handles (1) make it easier to lift out the engraving table
To use them, swivel the handles (1) upward.
- To ensure even better contact (2), the “Contact” option is recommended.

9.6.4 Cutting Table



- The cutting table rests on the base frame and is supported by additional braces there.
- Specially shaped air guides are used in the cutting table. This ensures that parts falling into the frame are not damaged by the laser. Custom made acrylic bars may also be used.



Hazard when working with the cutting table!

If not all of the partition plates are used in the cutting table, there is a fire hazard due to reflection of the laser beam.

Insert an anti-reflective material beneath the partition plates

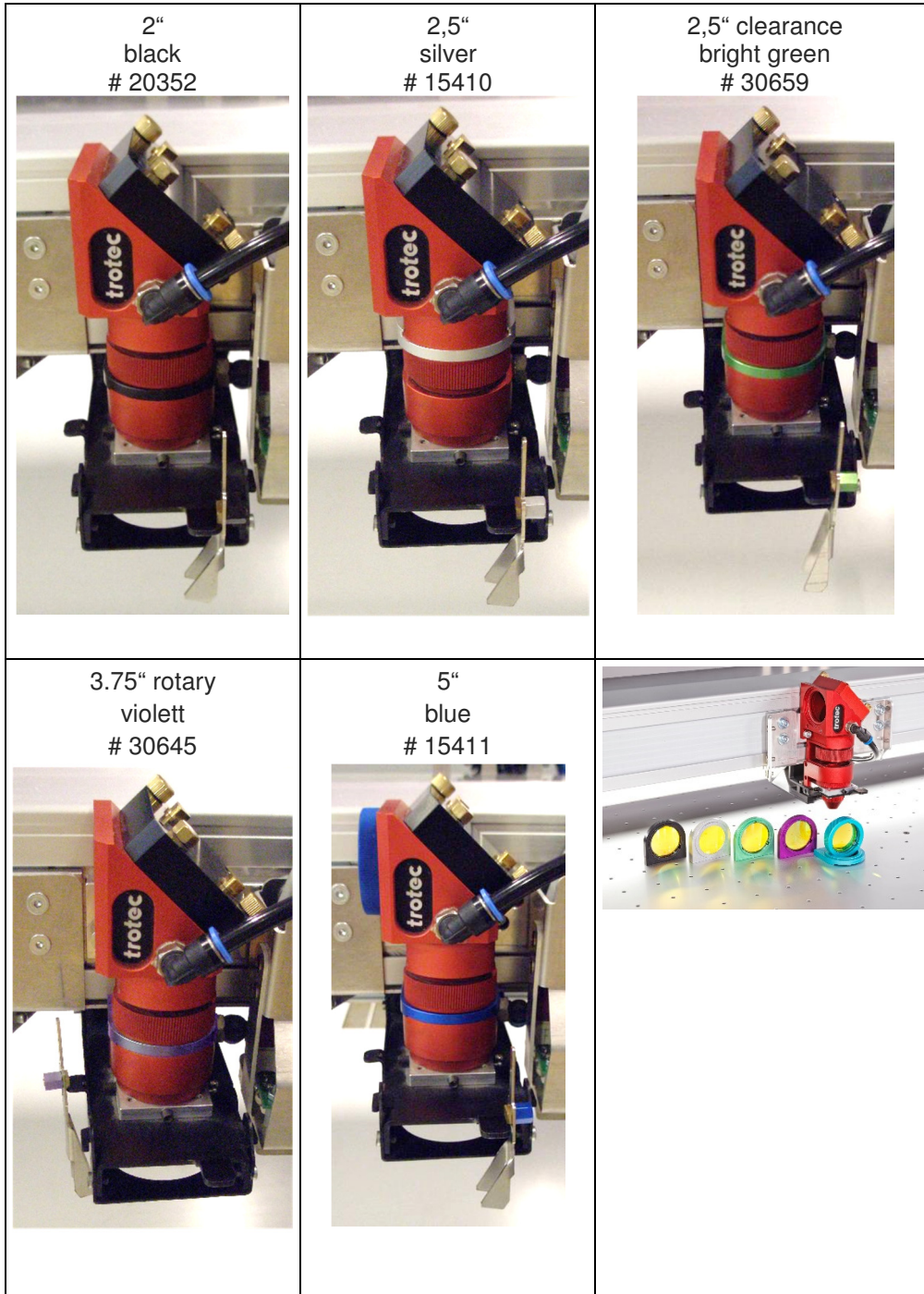


It is not allowed to place Workpieces into the baseframe without a Table attachment (e.g. Standard-, Vacuum- or Cutting Table).

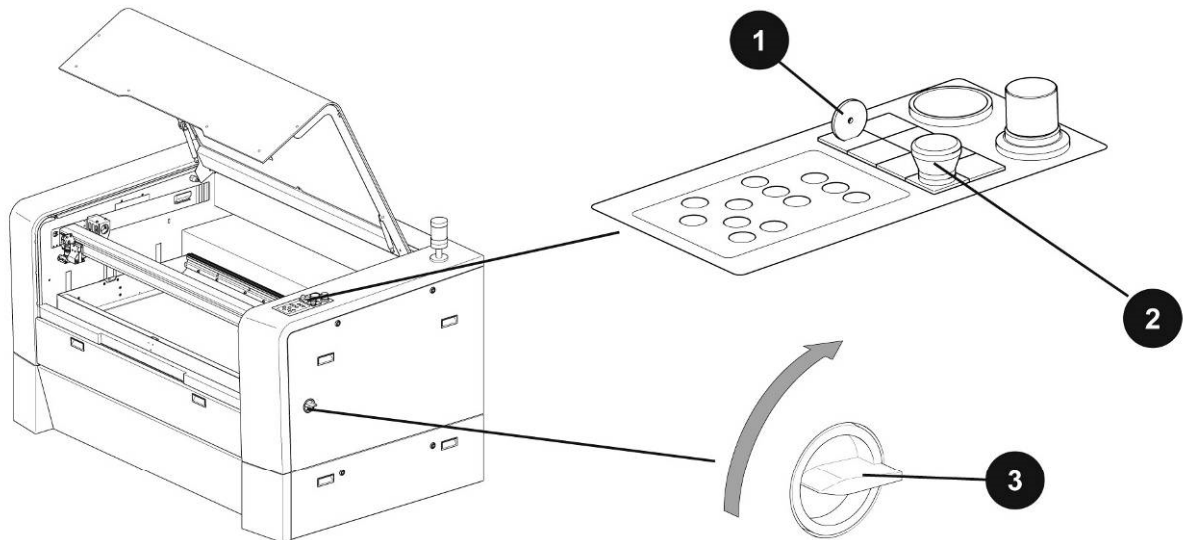
This is important so no bending on the frame and impairment of the exhaust function is possible

9.7 Lenses

The following lenses are available for SP 500.



9.8 Start of Operation



Enable machine with key (1)

Check whether EMERGENCY-OFF pushbutton (2) is unlocked

Turn on main switch (3)

Close the top lid. Wait for reference move.

Drive the laser head to its forward-most position

Key

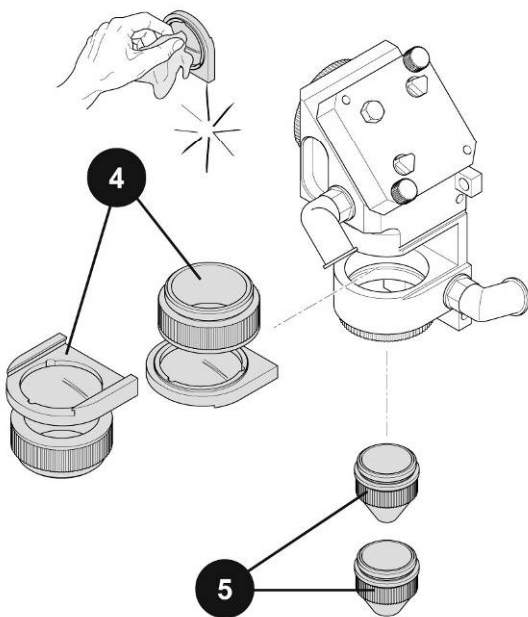


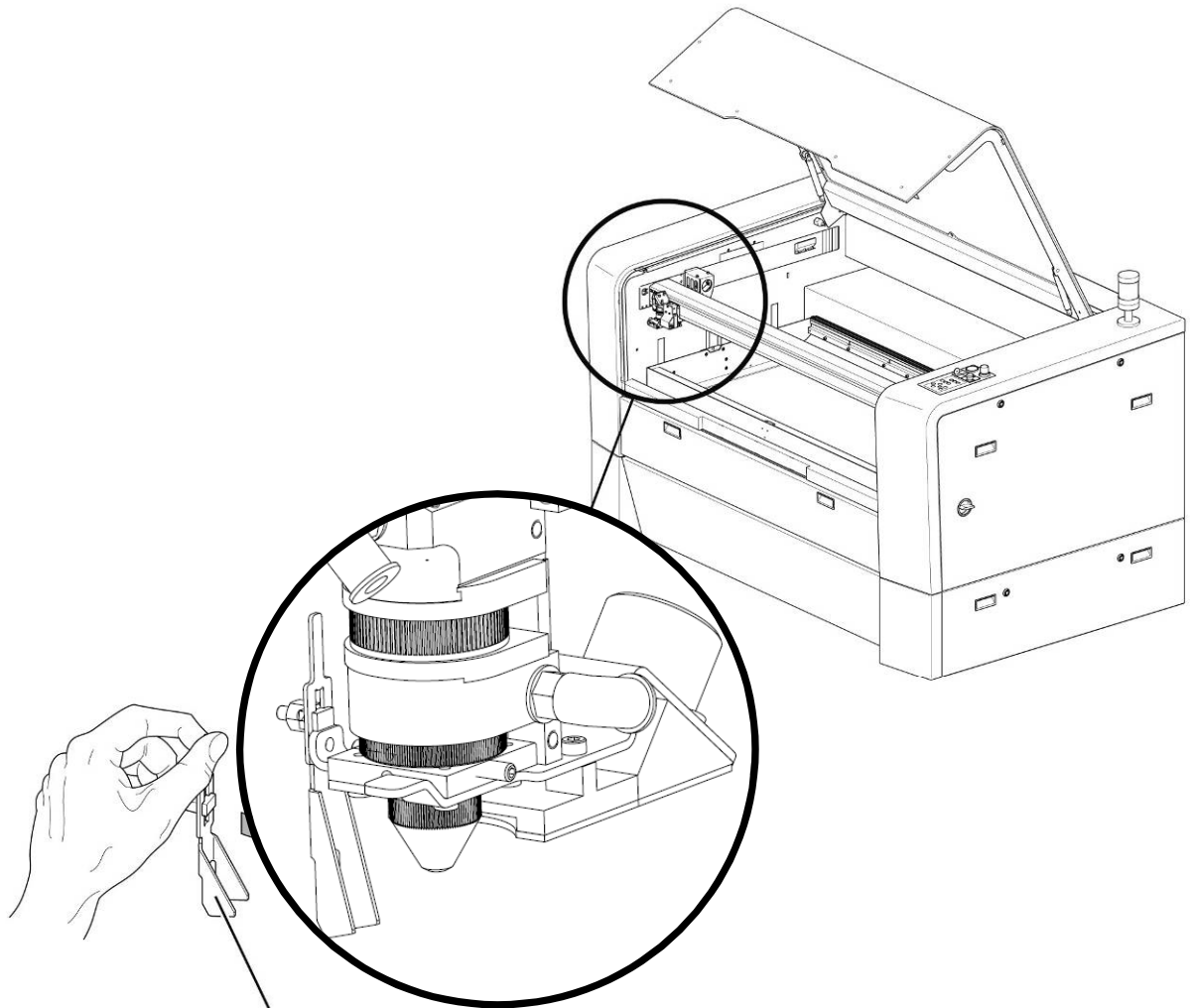
Clean lens (4), reinstall and secure

Install nozzle (5)

Drive the laser head to reference point by simultaneously activating these

Keys





6

Drive the work table downward

Key

Place material on table



Focusing the laser

Place focus tool (6) on laser head

Drive the work table upward until focus tool drops tilts

Key



Machine is now ready for production.



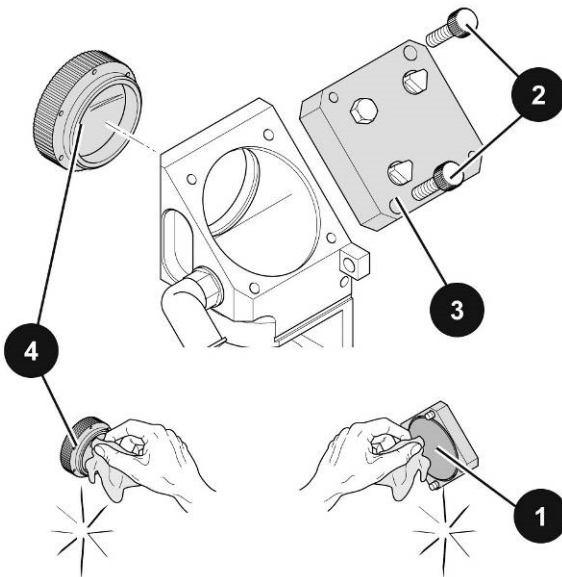
The Autofocus option might not work on transparent materials or materials which are not flat.

Bear in mind that defects from head crashes (working head hits material or working table) are NOT warranted.



9.9 Cleaning optics on the Laser Head

Cleaning the mirror (1):

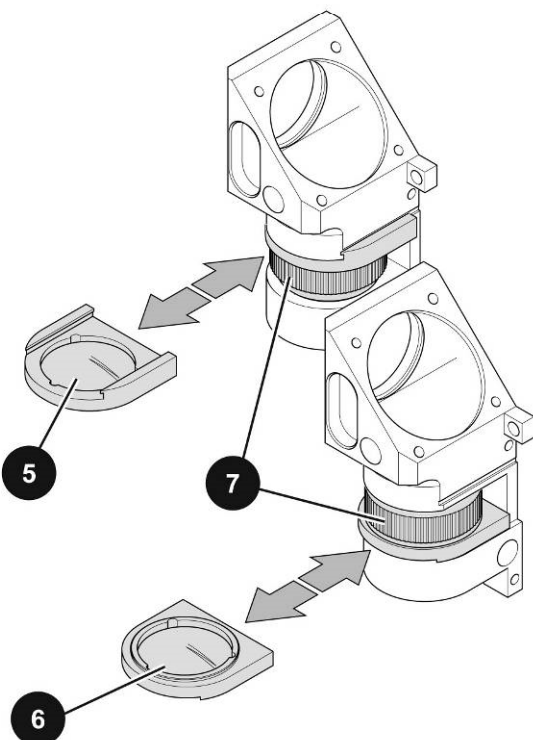


- Loosen both screws (2)
- Remove mirror mount (3)
- Check mirror (1) for damage
- Clean mirror (1) with cleaning liquid and cleaning tissue
- Check mirror (1) once again for damage
- Reinstall mirror mount (3) and secure with two screws (2)

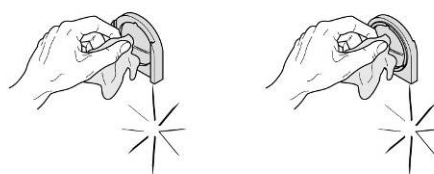
Cleaning the 5" lens (4):

- Unscrew 5" lens (4)
- Check 5" lens (4) for damage
- Clean both sides of 5" lens (4) with cleaning liquid and cleaning tissue
- Check 5" lens (4) once again for damage

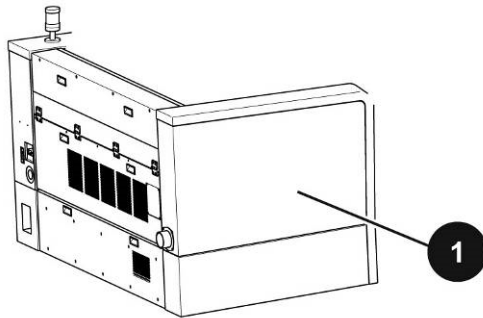
Cleaning lenses (5) and (6):



- Loosen lenses (5) and (6) by screwing retainer inward (7)
- Remove lenses (5) and (6)
- Check lenses (5) and (6) for damage
- Clean both sides of lenses (5) and (6) with cleaning liquid and cleaning tissue
- Check lenses (5) and (6) once again for damage
- Insert lenses (5) and (6) and clamp with retaining ring (7)

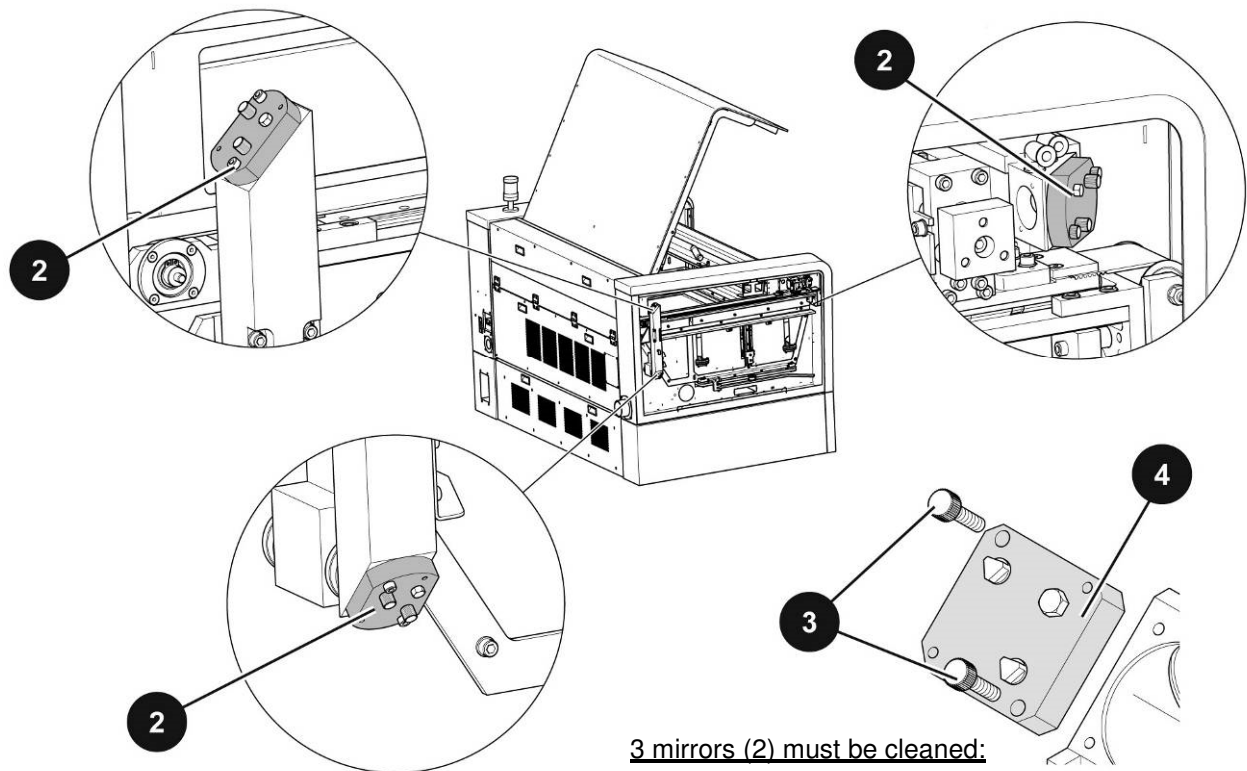


9.10 Cleaning the Mirrors



- Unlock cover (1)
- Tool: Metric Allen wrench No. 10

- Remove cover (1) by pulling on the handles



3 mirrors (2) must be cleaned:

- Loosen both screws (3)
- Remove mirror mount (4)
- Check mirror (5) for damage
- Clean mirror (5)
- Cleaning liquid and cleaning tissue
- Check mirror (5) once again for damage
- Put on mirror mount (4) and secure with two screws (3)

9.11 Maintenance plan

	daily	weekly	monthly	yearly
Laser				
Lens, mirror #4	Check Cleaning if required			
mirrors #1...3		Check Cleaning if required		
Processing table and rulers	Cleaning			
Entire working area – general cleaning			Cleaning	
Exhaust System				
Bag filter	According to the operation manual of the exhaust system			
Filter mat				
Particle filter				
Activated carbon filter				
Cooling System				
Pump filter	According to the operation manual of the exhaust system			
Condenser heater				
Cooling agent				
Pump				

For detailed information on the maintenance activities on exhaust and cooling systems please refer to the respective manuals.

10 Appendix

10.1 EC – Declaration of Conformity

(Machine directive 2006/42/EG, appendix II A)

Manufacturer:

TROTEC Produktions u. Vertriebs GmbH.
Linzer Straße 156,
A-4600 Wels

Authorized person for the compilation of technical documentation:

Gerhard KREMPL, TROTEC Produktions u. Vertriebs GmbH., Linzer Straße 156, A-4600 Wels

We hereby certify that

Speedy 500
Modell N° 8014 Speedy 500 C40/50/60/70/80/90/100/110/120/200

in its conception, construction and form put by us into circulation is in accordance with all the relevant essential health and safety requirements of the EC machinery directive 2006/42/EEC.

Further valid guidelines/regulations for the product:

2006/95/EG Low Voltage Directive
2004/108/EG EMC Guideline

Applied harmonized standards:

- EN ISO12100 Machine Safety
- EN 60335-1/2007 Safety of Household and similar Appliances
- EN 55014-1/2006, EN 55014-2/1997 Electromagnetic Compatibility
- EN 60204-1 Machine Safety – electr. Equipment
- EN 60825-1/2007, EN 60825-4/2006 and EN 60825-14/2006 Safety of Laser Equipment
- EN 55022/2008, EN 55024/2003 Electromagnetic Compatibility

Place, Date:

Wels, 30.03.2011

Personal data of the signer:

Stephan FAZENY, Head of Research and Development

Signature:



10.2 Acceptance report

Dear customer!

Please check applicable items:

We request your confirmation of properly completed transfer of the machine

Please transmit a copy of this document – filled out and signed by an authorized company representative – to an employee of our sales affiliate for forwarding to the manufacturer.

Thank you very much.

- Machine parts checked for shipping damage
- Machine parts checked against delivery note
- Setup of the machine discussed
- Startup of the machine discussed
- Operation of the machine discussed
- Maintenance of the machine discussed
- Electrical voltage checked
- Safety Instructions discussed
- Trial run performed
- Deficiencies determined

The machine with the

machine designation: SP 500

has been checked according to the listed items and has been transferred properly.

City, Date

Company stamp / Signature

10.3 Training Verification Form

Employee/Trainee:.....

Trainer:.....

Date of Training:

The above mentioned Employee received instruction on the operation of the SP 500 Lasersystem.
Especially the following topics are covered:

- Machine Function
- Danger Area
- Warnings
- Position **Emergency-OFF** Button
- Personal Protective Equipment
- Operating Facilities
- Work Flow
- Setting-up
- Taking into Service and Shutdown
- Announcement of unexpected working result and the resulting procedure
- Announcement of Failure and instituting Procedure
- Responsibility on remedial measure
- Operation Manual and its depository for inspection

.....

Signature of Trainer

.....

Signature of Trainee

10.4 Response Form

If you face any trouble with the machine, please provide the following information and add the service file (procedure on how to create a service file, is described on the following pages).

Date	
------	--

Machine Details

Serial Number	
JobControl Version	
Driver Version	
Layout Software	
Firmware Version	

Contact Details

First Name	
Last Name	
Country	
Phone	
Email	

Problem Description

Does an error message show up on the PC, if so which one?

What happened before the error appeared? (Thunder & Lightning, Windows-Update,...)

What was tried to solve the problem?

Please send the information to your sales representative or to techsupport@troteclaser.com.

10.5 How to create a Service File

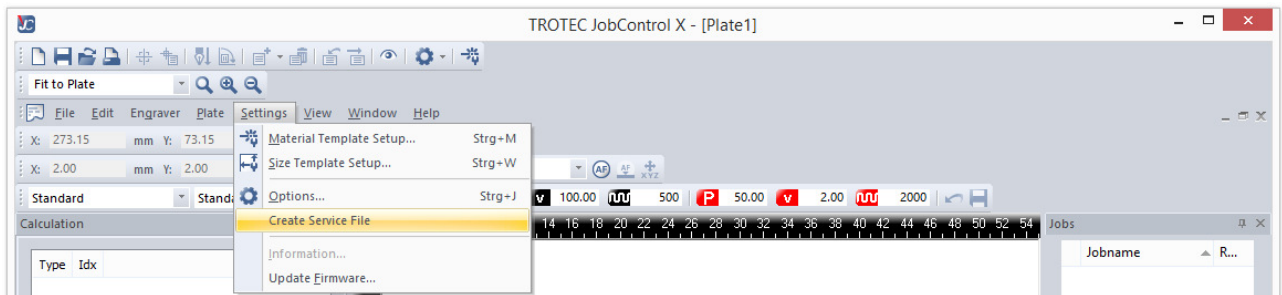
1. Start JobControl.
2. Position the job (which possibly caused a failure) on the plate.
This can be done by either
 - a) double clicking on the appropriate job name in the queue
 - b) dragging the job onto the plate using the mouse
 - c) selecting the job by clicking on the job name in the queue and then clicking on the icon

"Position Job"  .

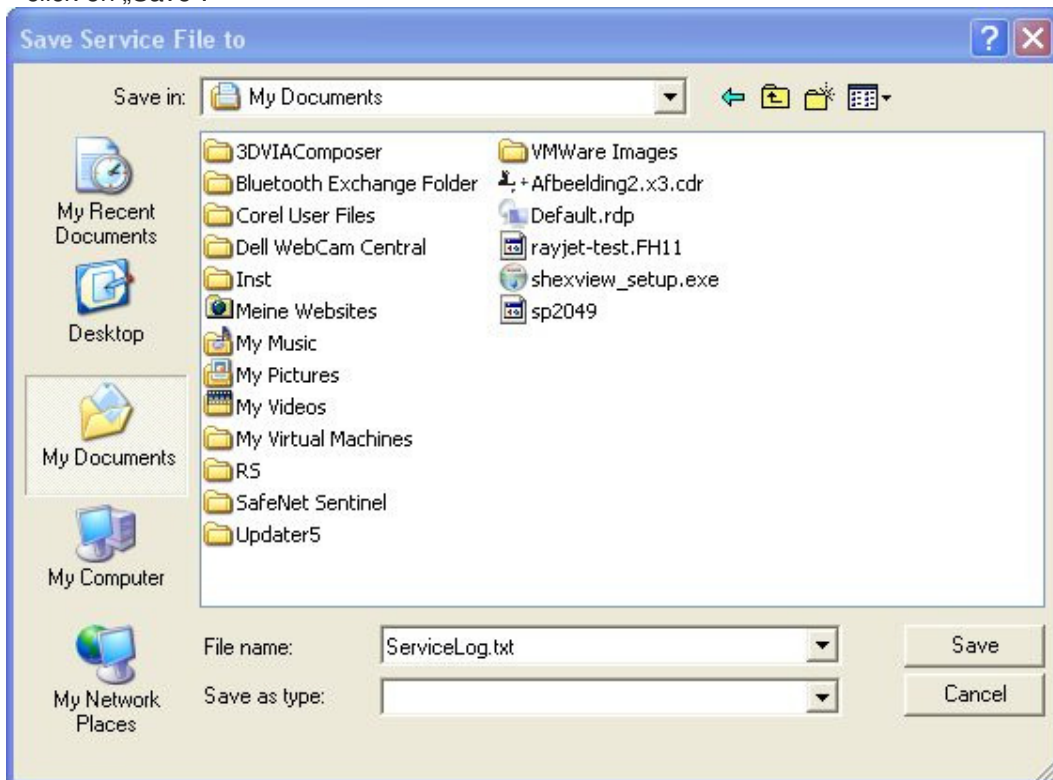


3. Run the job and leave the job on the plate.

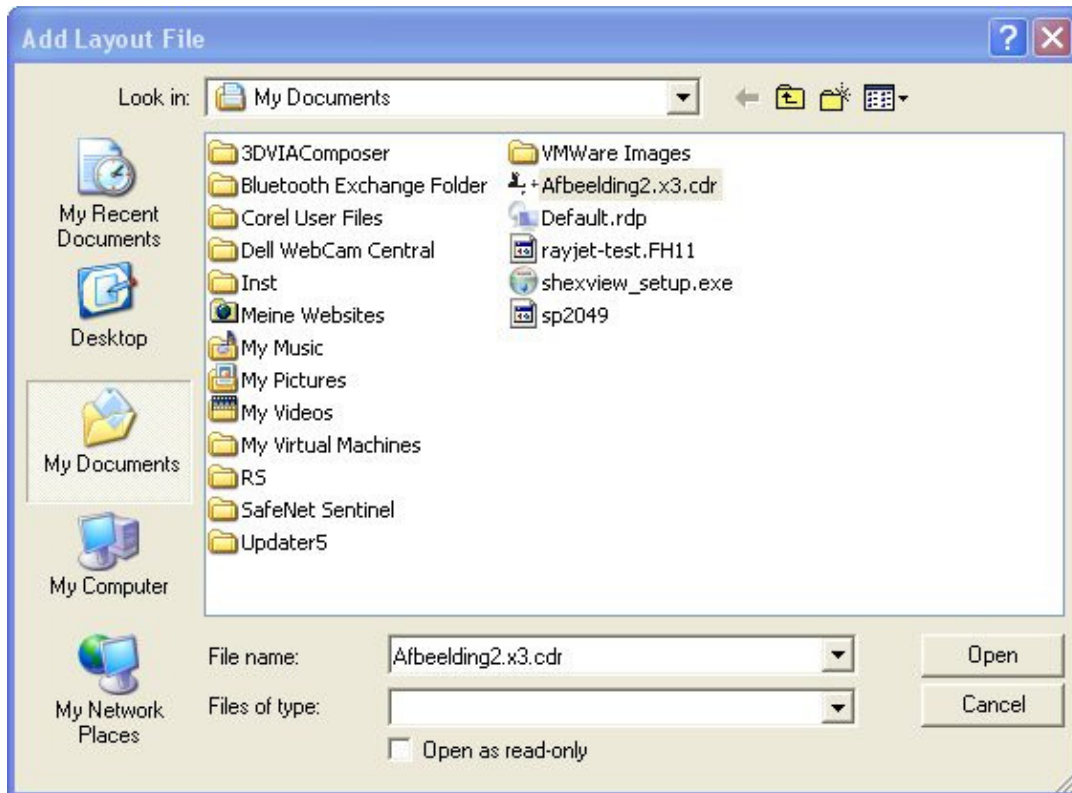
4. Go to "Settings" > "Create Service File".



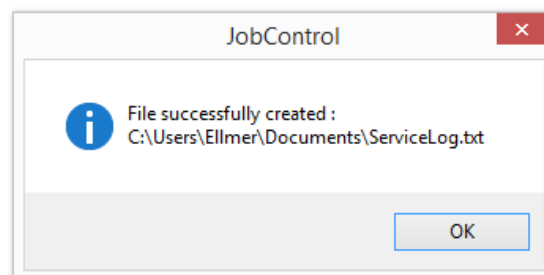
5. The window „Save Service File to“ shows up. Please select a directory to save the file and click on „Save“.



- The window „Add Layout File“ appears. Please select the layout file, which was sent to Job-Control and possibly caused a failure (e.g.: a CorelDraw file, Photoshop file, AutoCAD file,...). Now click on „Open“.



- The following window confirms, that the service file (ServiceLog.txt) was created successfully and shows the path where it was saved.



- Please forward the service file "ServiceLog.txt" together with a screenshot of e.g. the error message and detailed description to your sales representative or to techsupport@troteclaser.com.