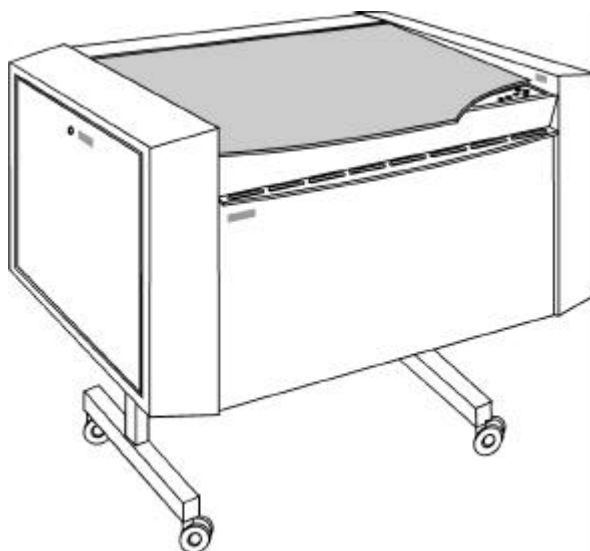


OPERATION MANUAL

**8003 Trotec Speedy
C12 / C25 / C50 / C100**

PART A - Hardware



1. Issue 12/99

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Operation Manual Trotec Speedy



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TROTEC cannot be held responsible for any direct or indirect damages, which result from using or working with the products electric circuits or software described herein. The apparatus must be used only by trained and skilled personnel. Before use the manual should be read and followed carefully.

Furthermore TROTEC reserves the right to change or alter any product described herein without prior notice.



In case of failure, please check the device first according to section 6.1 (page 62) - Troubleshooting. 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 directly at the above address.

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SECTION 1 – GENERAL

- 1.1 General Information on the Use of the Operation Manual
- 1.2 Designated Use
- 1.3 Technical Data / Device Specification
- 1.4 Manufacturer's Label
- 1.5 EU Conformity Declaration
- 1.6 Warranty Regulations

Operation Manual Trotec Speedy

1.1 Operation Manual Use. – General Information

Caution:

Please read and follow this Operation Manual carefully, before installation and operation. Damage to persons and/or material can result from not following individual points of the Operation Manual !

Operation of the system is only permitted with equipment and spare parts supplied or listed in the spare parts and consumables lists.

Auxiliary equipment must be adjusted to the base machine (any queries to dealer or manufacturer).

The following symbols are used for easier understanding of the Operation Manual:



If the Operation Manual is not observed, this area represents a particular danger for the operating personnel or the personnel responsible for maintenance.



Caution: This component is under voltage. In these areas strictly observe the safety instructions regarding electricity, care is to be taken in particular during maintenance and repair work.



Caution: In this area pay attention to the possible dangers of the laser beam.



Note or information on individual components of the device, that simplify the use or make it more understandable.

(30/11)

Reference to several parts, which are described in more detail on a different page of the Operation Manual. The first number indicates the page, the second number indicates the part number on this page.

Operation Manual Trotec Speedy

1.2 Designated Use

The TROTEC laser engraver, Speedy, is used for engraving and cutting of signs stamps and suchlike.

A wide variety of materials such as rubber, acrylic, coated metal, tin, special steel, elox-aluminum, cork, cardboard, glass, leather, marble, several plastics, and wood can be processed on the laser engraver.



The engraving process must only be performed with a perfectly adjusted machine (see also Section 4 – Operation).



Use of the system in other areas is against the designated use. The manufacturer does not admit liability for damage to personal and/or equipment resulting from such use.



The system must only be operated, maintained and repaired, by personnel that are familiar with the designated field of use and the dangers of the machine !



Non-observance of the instructions for operation, maintenance and repair described in this Operation Manual excludes any liability of the manufacturer if a defect occurs.

Operation Manual Trotec Speedy

1.3 Technical Data / Device Specification

Model designation	8003 Speedy
max. engraving surface	740 x 435 mm
max. workpiece size	800 x 460 x 165 mm/1050 x 400 x 5 mm
max. engraving speed	200 cm/sec.
Laser type	12 W sealed-off CO ₂ laser air-cooled
	25 W sealed-off CO ₂ laser air-cooled
	50 W sealed-off CO ₂ laser water-cooled
	100 W sealed-off CO ₂ laser water-cooled
Wavelength of the laser radiation	10.6 µm
Focal length	1.5 inch (standard lens), 2.5 inch as option
Repetition accuracy of positioning	+/- 0.025 mm
Interfaces	1 x serial = RS-232C PC
	1 x serial = RS-422 Apple
Dimensions	1090 x 890 x 590 mm
Weight	depending on laser
	depending on laser
Safety class (without Laserpointer)	Class 1 / USA Class II
Height adjustment of working surface	200 mm
Power consumption	Speedy C12: 400 W Speedy C25: 700 W Speedy C50: 1300 W Speedy C100: 3000 W
Sound pressure level	70 dB(A)

Prerequisite for the installation:



Mains: AC voltage; 220 - 240 V; 50 Hz; 3.6 A
AC voltage; 100 - 120 V; 60 Hz; 7 A

Room temperature 20 ° to 25 °C

Air humidity <70%

Operation Manual Trotec Speedy

1.4 Manufacturer's Label

The manufacturer's label is located in the center of the backside of the device (see Figure below).

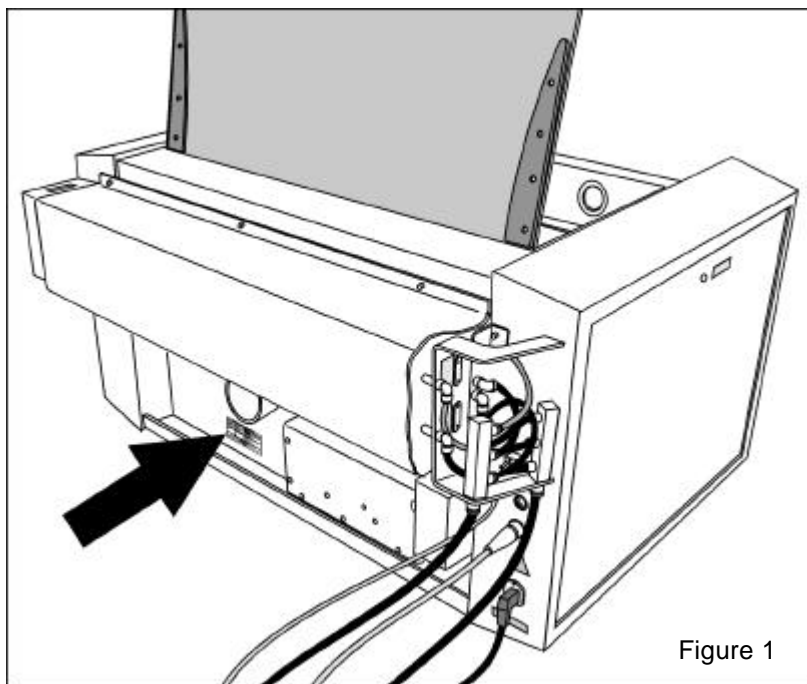


Figure 1

It is recommended to enter data such as serial number and year of manufacture into the manufacturer's label below so that you always have this data handy if you have problems with your device or require spare parts.

TROTEC LASER ENGRAVER		
Modell:	Typ:	Speedy
Seriennummer:	Serial No:	
Baujahr:	Manufactured:	
Stromaufnahme:	Input Power:	220-240VAC-, 3,6A, 50Hz
Schaltplan:	Wiring diagram:	BlocksbSP.dwg
Hersteller:	Manufacturer:	TROTEC Produktions u. Vertriebs Ges.m.b.H Linzerstraße 156, Wels AUSTRIA
CO2-Laser, max. Leistung 75Wcw, Wellenlänge 10,6µm nach EN 60825-1 (1997)		
		

Operation Manual Trotec Speedy

1.5 EU – Declaration of conformity

The manufacturer

TROTEC Produktions- u. Vertriebs GmbH.

Linzer Strasse 156,
A-4600 Wels, OÖ.,
AUSTRIA

hereby declares that the following product

**TROTEC 8003 SPEEDY
Model N° 8003 Speedy C12/25/50/100**

has demonstrated conformity to the following guidelines:

89/336/EEC Directive for Machines (392)
73/23/EEC Low Voltage Directive
89/336/EEC EMC Guideline and
92/31/EEC Amendment

Applied during design and construction of this product:

- EN 60335-1 Safety of Household and Similar Appliances
 - EN 55014/1993 Electromagnetic Compatibility
 - EN 55014/1995
 - EN 60204-1 Machine Safety
 - EN 60825-1/1997 Safety of Laser Equipment
- EN 60950/A1+A2 Safety of Electric Devices for Informatics Including Electric Office Machines
- EN 55022/94 and EN 50082-2/95 Electromagnetic Compatibility

Wels, 1st January, 1999

Trotec Produktions u. Vertriebs Ges.m.b.H



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Operation Manual Trotec Speedy

1.6 Warranty Regulations

For devices of the laser product family Speedy and Power Laser PRO TROTEC Produktions- und VertriebsGmbH, Wels (hereinafter called "TROTEC") grants a warranty of 3 years from the date of purchase (datum of distribution) for devices of the laser product family Speedy and Power Laser PRO. During this time TROTEC will, according to your preference, replace all parts of those products, which by failure in material or design cause a failure of the readiness for operation, with a part of equal value or to repair it free of charge. Under warranty the cost of both parts and freight (standard freight) are covered by TROTEC.

TROTEC must be notified immediately if faults are noticed. Send the part in its original packaging to TROTEC or to a designated point of service and at TROTEC's discretion, customers receive a credit note for sending the replacement part. All replaced parts become property of TROTEC. Repair of failures does not extend the warranty obligation.

Wear-and-tear on parts is not covered by the warranty with the following exceptions; A warranty covers 1000 hours operating time for wear-and-tear on parts of motors (in particular replacement of brushes of the servo motors.). Optics (lenses and mirrors) are covered by a three-year warranty when an exhaust system from TROTEC is used, or if a different exhaust system is used and a certification of the flow capacity is presented immediately and certified by TROTEC in writing to be sufficient. The warranty for optics however is void if replacement is necessary due to insufficient or inappropriate cleaning (e.g. scratching during cleaning). (Typical image with optics damaged by inappropriate cleaning: Shooting through mirror or lens). The refilling of the laser tube with gas mixture is considered natural wear-and-tear and is not covered by the warranty. With wear-and-tear on parts, the warranty only covers damage that already existed at the time of distribution of the device, and was claimed immediately.

No warranty covers damage resulting from the following: Inappropriate handling, inadequate or inappropriate maintenance and cleaning, external influences (e.g. voltage fluctuations), operation and installation errors, transport damage, modifications, added parts and interference not performed by TROTEC authorized persons, use of unsuitable accessories or operating material.

Any improper use or modification of the devices without previous permission by TROTEC renders the warranty void. TROTEC is under no circumstances liable for the loss of profit, turnover, company value or expected cost-savings or special, direct or indirect damages resulting from the use or attempted use of the product, even if TROTEC has been advised of the possibility of such damages. TROTEC is also not liable for claims, being made by third parties against the customer. Therefore, in particular costs for third parties assigned without the explicit agreement of TROTEC and costs for replacement devices, cleaning and maintenance work will not be born.

TROTEC reserves the right to implement technical innovations as well as later changes to the warranty regulations. Place of performance and venue for both parties is Wels, the laws of the Republic of Austria apply exclusively.

SECTION 2 – SAFETY

- 2.1 General Safety Information
- 2.2 Laser Safety Information
- 2.3 Safety Precautions when Operating the Device
- 2.4 Warning and Information Labels

Operation Manual Trotec Speedy

2.1 General Safety Information

All personnel involved in installation, set-up, operation maintenance and repair of the machine, must have read and understood the Operation Manual and in particular the "Safety" section. The user is recommended to generate company-internal instructions considering the professional qualifications of the personnel employed in each case, and the receipt of the instruction/Operation Manual or the participation at introduction/training should be acknowledged in writing in each case.

Safety-conscious Working

The machine must only be operated by trained and authorized personnel.

The scopes of competence for the different activities in the scope of operating the machine must be clearly defined and observed, so that under the aspect of safety no unclear questions of competence occur. This applies in particular to activities on the electric equipment, which must only be performed by special experts.

For all activities concerning installation, set-up, start-up, operation, modifications of conditions and methods of operation, maintenance, inspection and repair, the switch-off procedures that may be provided in the Operation Manual must be observed.

Safety Information for the User and/or Operating Personnel

- No work methods are permitted that affect the safety of the machine.
- The operator must also ensure that no unauthorized persons work with the machine (e.g. by activating equipment without authorization).
- It is the duty of the operator, to check the machine before start of work for externally visible damage and defects, and to immediately report changes that appear (including behavior during operation) that affect the safety.
- The user must provide that the machine is only operated in perfect condition.
- The user must guarantee the cleanness and accessibility at and around the machine by corresponding instructions and controls.

Operation Manual Trotec Speedy

2.1 General Safety Information

- Principally, no safety components may be removed or disabled (already here we emphasize the imminent dangers, for example severe burns, loss of eye-sight). If the removal of safety components is required during preparation, repair and maintenance, the replacement of the safety components must be performed immediately after completion of the maintenance and repair activities.
- Preparation, retooling, change of workpiece, maintenance and repair activities must only be performed with equipment switched off, by trained personnel.
- It is forbidden to perform unauthorized modifications and changes to the machine. It is emphasized, that any unauthorized modifications to the machine are not permitted for safety reasons.



Operation Manual Trotec Speedy

2.2 Laser Safety Information



To assess the potential dangers laser systems pose, they are classified into 5 safety classes: 1, 2, 3a, 3b and 4. If used professionally, Speedy is a device of **class 1 (USA: Class II)** and consequently absolutely safe. This is guaranteed by the protective housing and the safety installations.

Please note that improper operation of the device can override the status of safety class 1 and can cause the emission of harmful radiation.

With the laser pointer the laser system complies with laser class 2 (USA: class II).



This laser engraving system contains a carbon dioxide (CO₂) laser of class 4, that emits ***intensive*** and ***invisible*** laser radiation. Without safety precautions the direct radiation or even diffuse reflected radiation is dangerous!



Without safety precautions, the following risks exist with exposure to laser radiation:

Eyes: Burns to the cornea

Skin: Burns

Clothing: Danger of fire



Never try to modify or disassemble the laser and do not try to start up a system that had been modified or disassembled!



Dangerous radiation exposure can result from the use of operation or adjustment equipment other than that described here, and if different operational methods are performed.



Service technicians using the service plug are required to wear standard laser safety glasses for CO₂ lasers (wavelength 10.6 µm).

Operation Manual Trotec Speedy

2.3 Safety Precautions when Operating the Device

In your Speedy, a closed safety system is integrated which immediately switches off the power to the laser tube when the protection cover is opened. Consequently an incomplete engraving can occur if the cover is opened during operation. Therefore, first press the "PAUSE" button (34/4), if you want to interrupt an engraving process.

Please remember the following safety precautions when working with this device:

A fire extinguisher must always be handy as the laser beam can ignite flammable materials. Do not store any flammable materials in the inside of the device or in the immediate vicinity of the device.

Unsupervised operation of the system is not permitted.

Because of their low absorption many metals, in particular un-coated aluminum, copper, silver and gold cannot be processed with the laser engraver and lead to high reflections of the laser beam. Such materials must not be inserted into the beam path in an uncontrolled way, as a directed reflection could destroy the protection cover.

Adjustment of the beam path must be performed only by especially trained personnel. An improper setting can lead to uncontrolled emission of the laser radiation.

Before processing materials the user must verify, whether harmful materials can be generated and whether the filter equipment of the exhaust system is suitable for the harmful materials. We emphasize that it is the responsibility of the user, to consider the national and regional threshold values for dust, fogs and gases when selecting the filters and the exhaust system. (The values for the maximum workplace concentration must not be exceeded.)

Please refer to the manual of the exhaust system on how and in what intervals you need to replace filters.

PVC (polyvinyl chloride) must under no circumstances be processed with the laser engraver.

Should you have further questions before starting work, please contact your dealer or TROTEC.

Operation Manual Trotec Speedy

2.4 Warning and Information Labels



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.

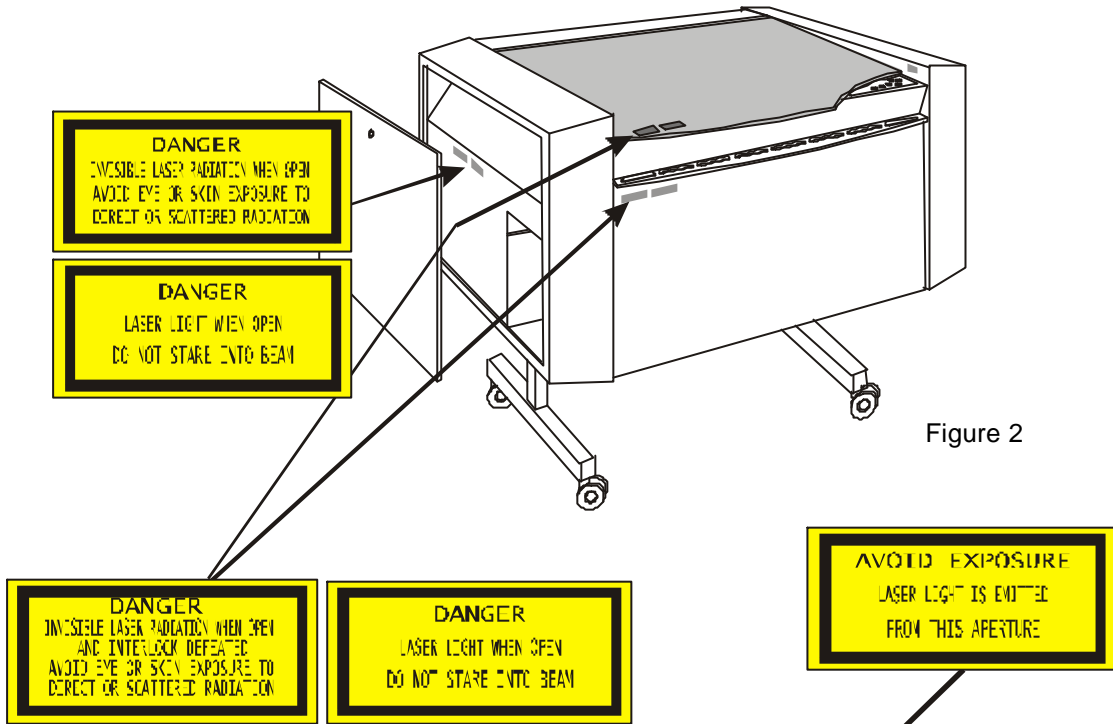


Figure 2

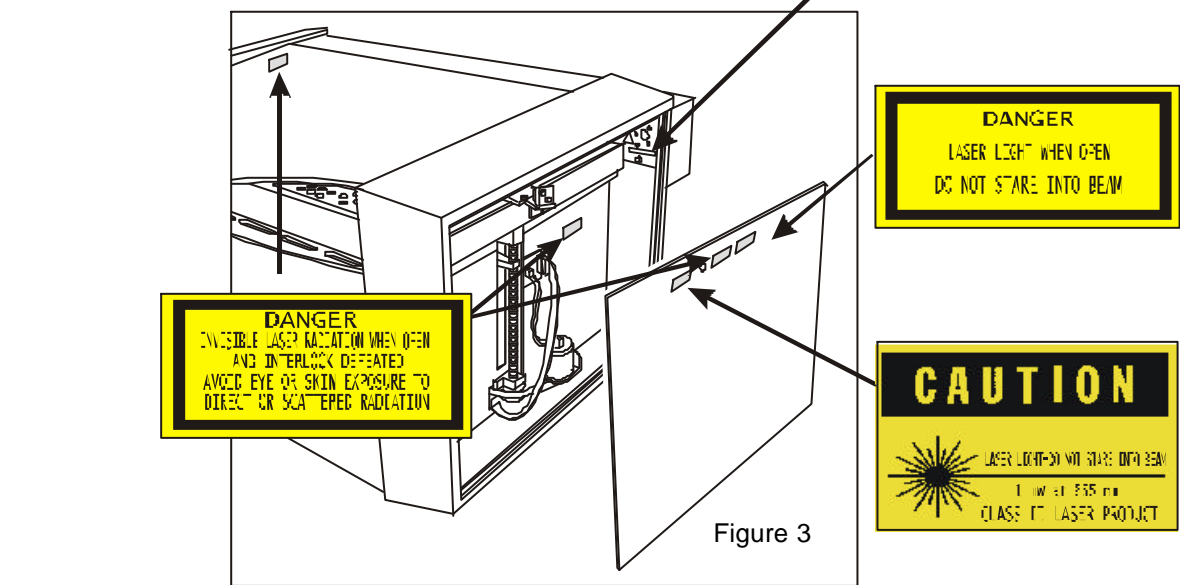
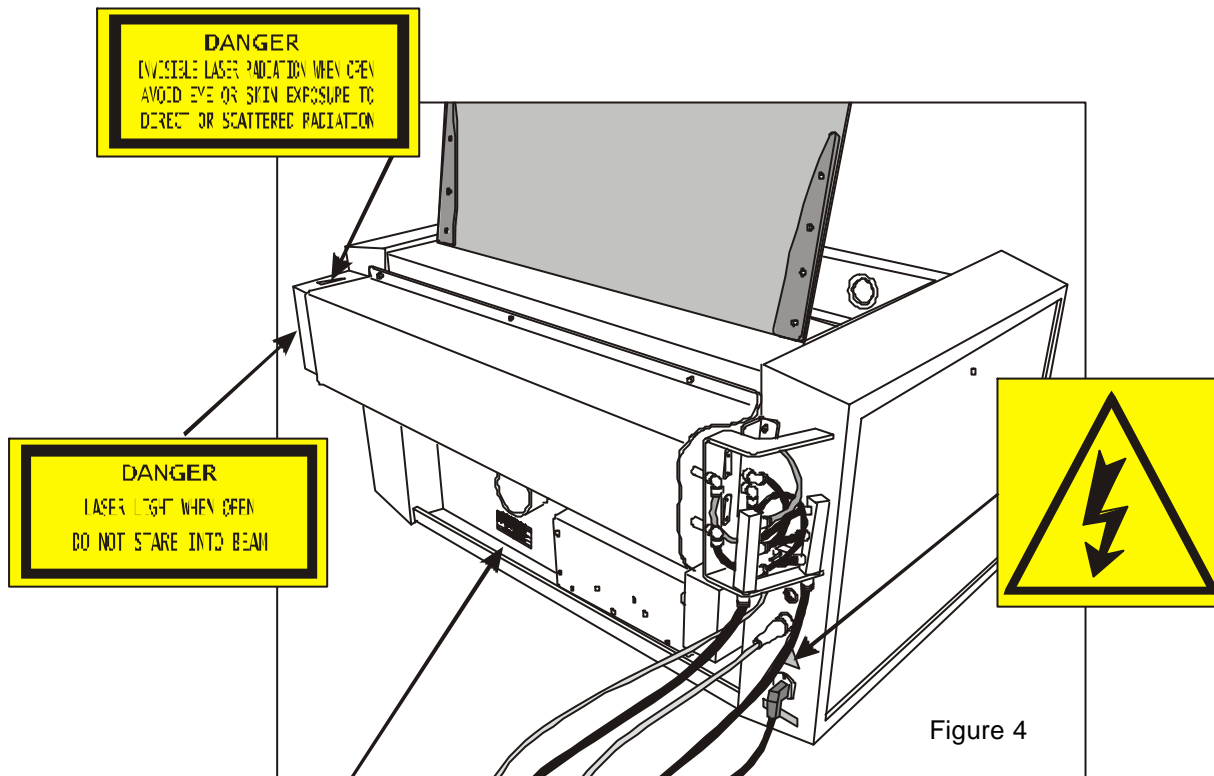


Figure 3

Operation Manual Trotec Speedy

2.4 Warning and Information Labels



TROTEC LASER ENGRAVER	
Model No. :	8003 Speedy C25
Serial No. :	SP0019
Manufactured:	January 2000
Input Power:	110-120VAC~, 6A, 60Hz
Manufacturer:	TROTEC Produktions u. Vertriebs Ges. m. b. H Linzerstraße 156, 4600 Wels AUSTRIA
Product conforms to 21 CFR 1040.10 & 1040.11 at the date of manufacture	

SECTION 3 – BEFORE OPERATION

- 3.1 Unpacking the Speedy
- 3.2 Contents of Delivery
- 3.3 Location
- 3.4 Exhaust System – Requirements/Connection
- 3.5 Cooling System – Requirements/Connection
- 3.6 Computer Requirements
- 3.7 Connection of the Speedy

Operation Manual Trotec Speedy

3.1 Unpacking the Speedy

You receive your Speedy packed in a wooden box, that contains the laser and additional accessories. The following steps give you an overview of the unpacking and assembly of the laser. Please follow these steps carefully.



Keep the packing box. You will require it in case of a return.

1. Remove the cover and the wooden box. Please do not forget to store this box in a dry place.

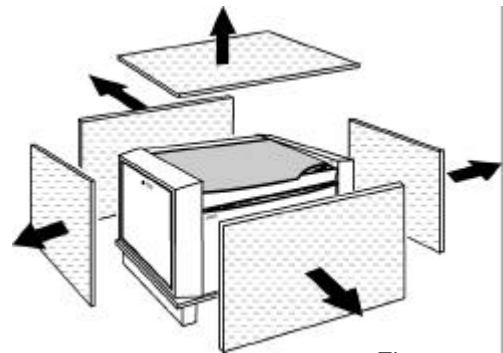


Figure 5

2. Carefully remove the foam material, which protects the viewing window of the cover, and the tape that holds this cover in place.

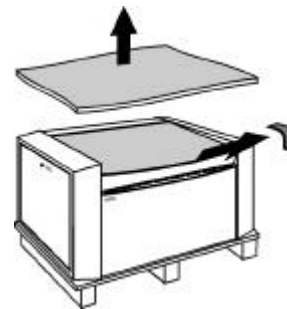


Figure 6

3. Open the front door and remove the accessories box located under engraving table, which contains all accessory parts required for the installation of the laser engraver.

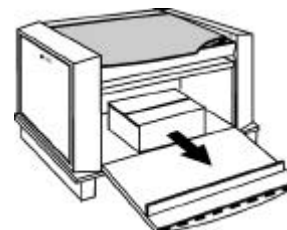


Figure 7

Operation Manual Trotec Speedy

3.1 Unpacking the Speedy

4. Lift the laser engraver out of the box.
For this you will require two persons.
Position the laser engraver on a stable table or the delivered stand (optional).

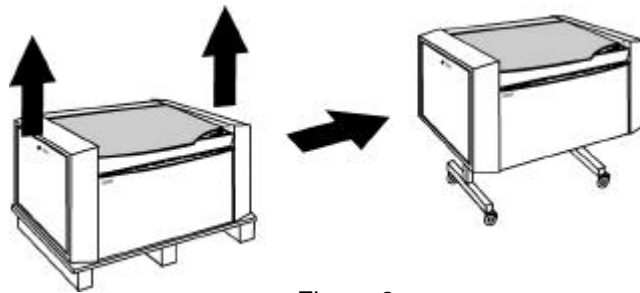


Figure 8

5. Open the accessories box.

Operation Manual Trotec Speedy

3.2 Contents of Delivery

- Transport and service packaging
- Laser engraver including all optics
- Stand
- Accessories box, which contains the following parts:
 - Operators manual
 - CD TROTEC Manager software/Engraver driver software (1)
 - Lens cleaning tissues / Optics cleaning liquid (2)
 - Mains cable (3)
 - Computer connection cable (4)
 - Computer adapter 25 - 9 pins (5)
 - Focussing gauge 1.5" (6)
 - Allen key set 1.5 - 10 mm (7)
 - Fork wrenches 5.0 x 5.5 mm / 12 x 13 mm / 16 x 17 mm (8)
 - Screws for assembly (9)

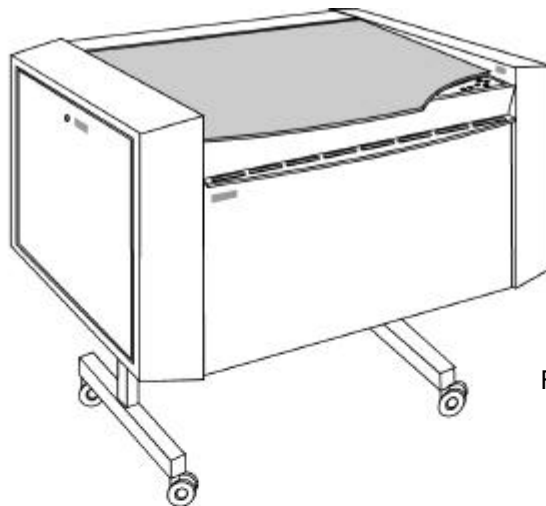
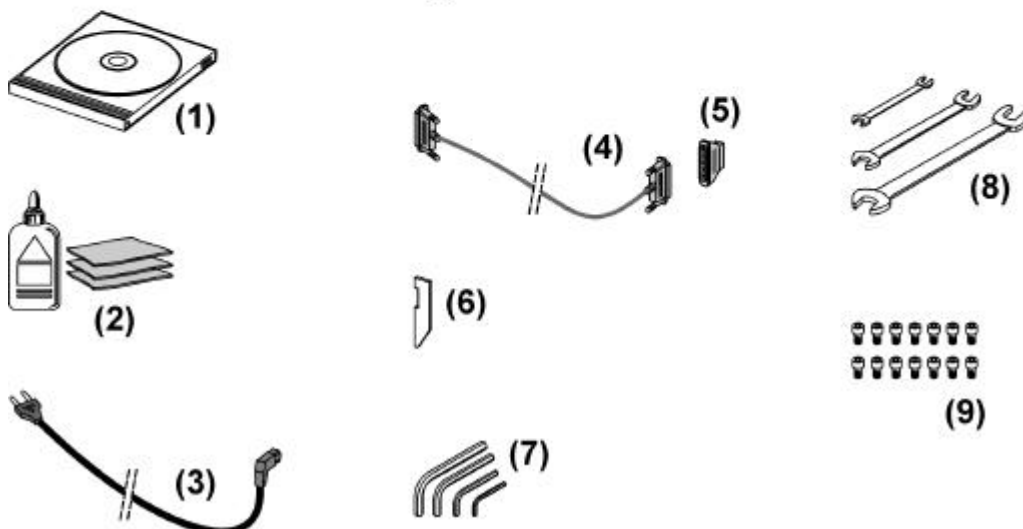


Figure 9



Operation Manual Trotec Speedy

3.3 Location

Before you install the laser system, you should select an appropriate location. Follow the guidelines shown below:



Avoid locations where the system is exposed to high temperatures, dust and high humidity. (The humidity must not exceed 70% and the temperature must not be close to the dew point.)



Avoid locations, where the system is exposed to mechanical shocks.



Fuse protection of 16 amperes.
Do not connect other devices via this fuse, as the laser engraver system requires the full 16 amperes.



Avoid locations with poor air circulation.



Select a location, whose room temperature is between 20 °C and 25 °C. Avoid higher ambient temperatures and strong exposure of the engraver to the sun. Use blinds, if required.



Select a location close to ventilation (if available).



Select a location that is not more than 2.50 m away from your computer (max. cable length to avoid disturbing interferences).



Try to place a working table or a place to put things next to it. This shall avoid, that the Speedy is misused as a table.

Operation Manual Trotec Speedy

3.4 Exhaust System – Requirements



To guarantee the right ventilation during the engraving of rubber, an exhaust system with a suction power of minimum **300 m³/h** is required. The device must be equipped with a preliminary filter and a fine dust filter (generation of rubber dust) as well as an activated carbon filter (neutralization of smells). A good filtering of the outgoing air is also required when cutting plastics or engraving wood. If only elox plates are engraved, the suction power can be reduced.

Connection - see section 3.7.3



Do not start the Speedy without an adequate exhaust system.

3.5 Cooling System – Requirements



To achieve sufficient cooling of the laser tube, the Speedy 50 W and 100 W require the installation of a cooling aggregate.

Connection - see section 3.7.4

3.6 Computer – Requirements



The following recommendation represents the **minimum requirements**. When using a more powerful computer the graphics are generated and displayed faster and the computing times and the data transfer to the laser are reduced.

- Pentium 300 or more powerful PC-compatible computer
- 64 MB RAM
- 1 GB hard disk
- a CD drive
- VGA color monitor
- mouse
- 1 free serial interface for the laser engraver
- Microsoft Windows 95®/98/2000
- Windows-compatible graphics software

Operation Manual Trotec Speedy

3.7 Connecting the Speedy



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

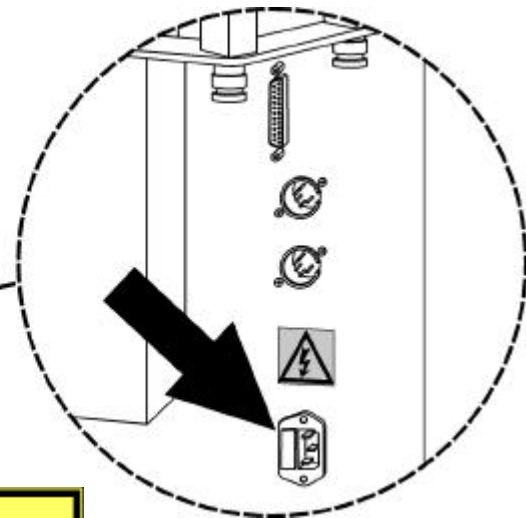
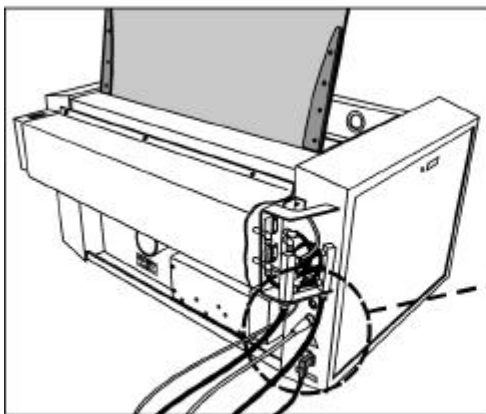
3.7.1 Connecting the Mains

Connect one end of the mains cable with the connection socket at the rear side of the laser device (see Figure below) and the other end with a protected power outlet.



Mains voltage and operating voltage must correspond (optional AC 230 V/50 Hz or AC 115 V/60 Hz) – see information label below the connection socket.

Under no circumstances switch on the device if the voltages do not correspond.



NENNSPANNUNGSBEREICH 220-240V AC, 3,5A, 50Hz	NENNSPANNUNGSBEREICH 100-120V AC, 7A, 60Hz
---	---

Figure 10



The main fuses of the Speedy are located under the small cover plate next to the connection socket.

Operation Manual Trotec Speedy

3.7 Connecting the Speedy

3.7.2 Connecting the Computer



The computer must be connected to the mains voltage and switched off.

Connect the laser engraver (see Figure below) to a free serial interface on your computer. For this use the cable (20/4) and, if required, the adapter (20/5) from the accessories box.

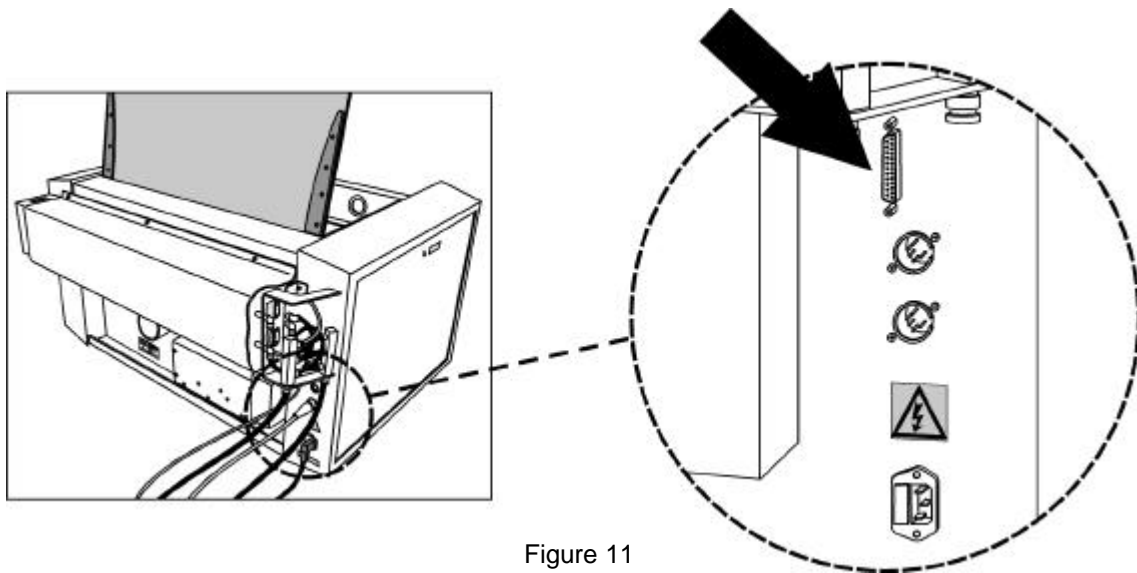


Figure 11

Operation Manual Trotec Speedy

3.7 Connecting the Speedy

3.7.3 Connecting the Exhaust System

- Connect your exhaust system to the mains socket (1).

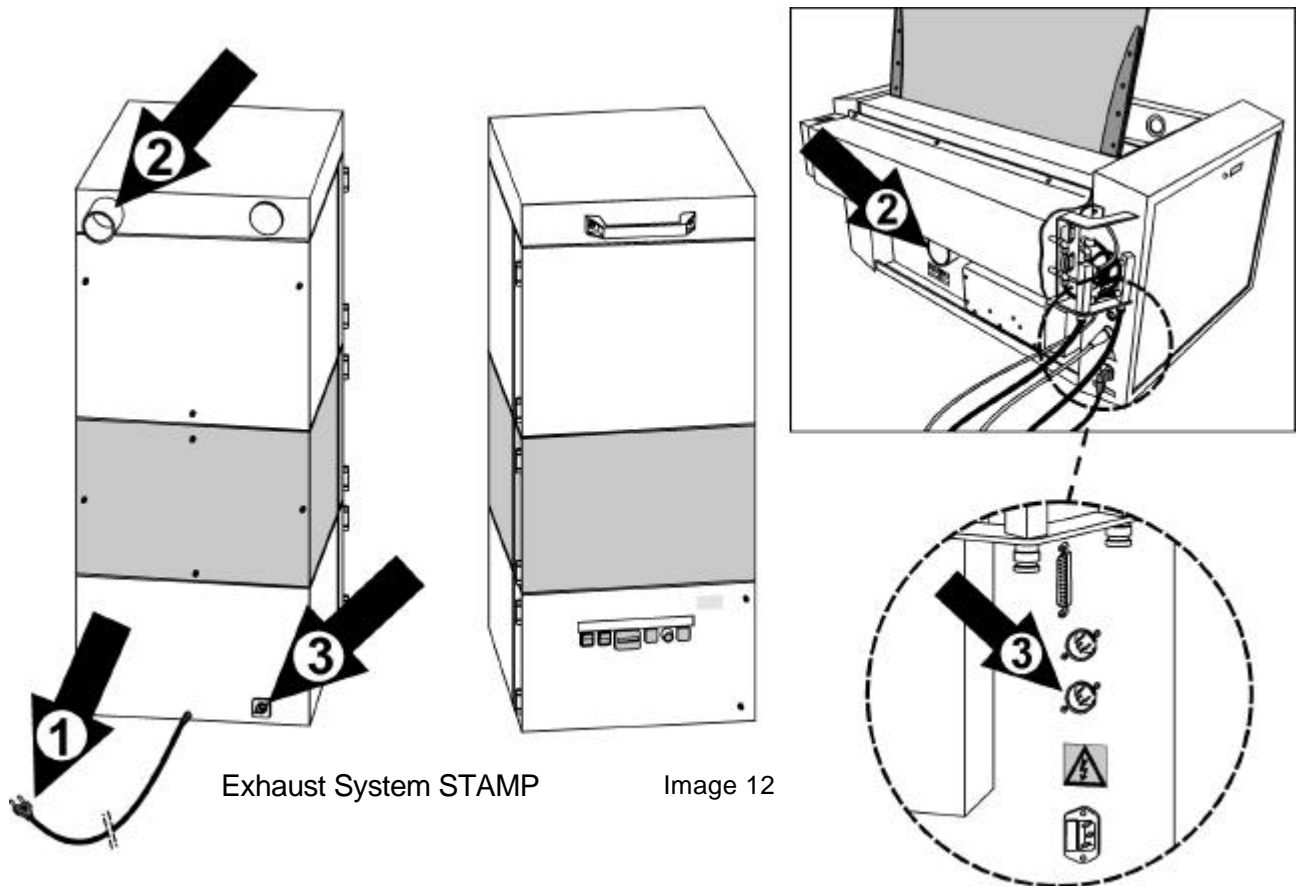


Make sure that the mains voltage corresponds with the voltage allocated for the exhaust system.

Plug the ends of the exhaust duct into the allocated connection (2).

- When using the original TROTEC exhaust system, also connect it with the cable included to the remote control connection of the Speedy (3).

Also follow the operation and maintenance instructions in the Operation Manual of the exhaust system.



Operation Manual Trotec Speedy

3.7 Connecting the Speedy

3.7.4 Connecting the Cooling System



The installation of the cooling system – for cooling of the laser tube – is only required for the Speedy 50 W and 100 W.

1. Connect the cooling system to the mains voltage.



The mains voltage must correspond with the voltage specified on the cooling system.

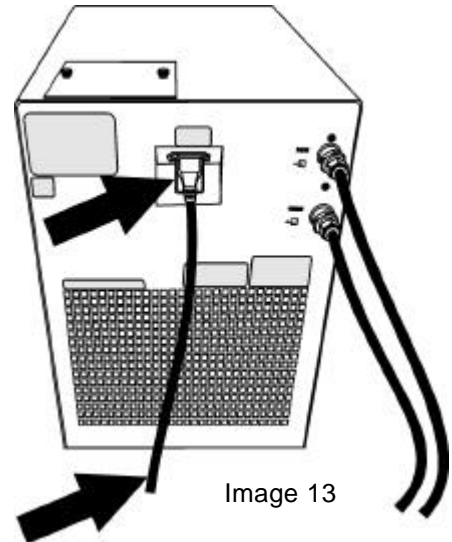


Image 13

2. Two hose connections are located on both the left-hand side of the laser tube as well as rear side of the cooling system. Plug the two hoses, which were included in the delivery, into these connectors.

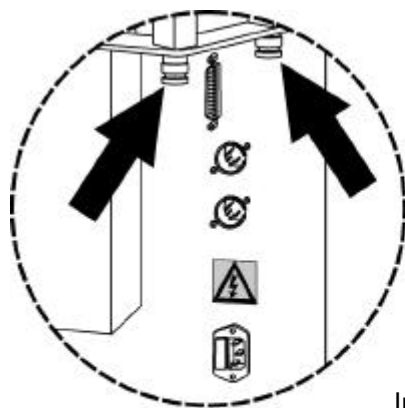
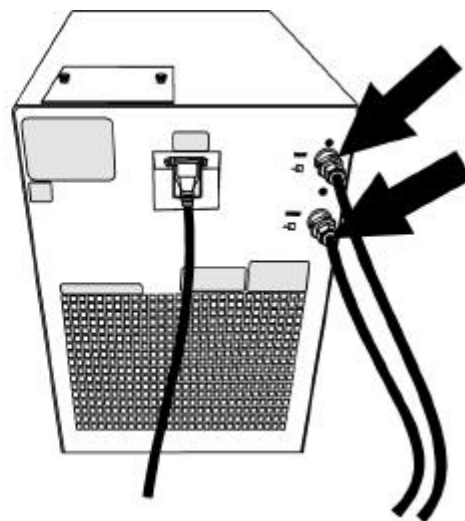


Image 14



In this case the arrangement of the hoses is unimportant, because it is a closed system.

Operation Manual Trotec Speedy

3.7 Connecting the Speedy

3.7.4 Connecting the Cooling System

3. To fill the reservoir, perform the following instructions:

- Undo the two screws (1) at the protection cover and remove the protection cover (2).
- Open the plug of the reservoir (3) and fill the reservoir with **distilled water**. The capacity of is approx. 4.3 liters.

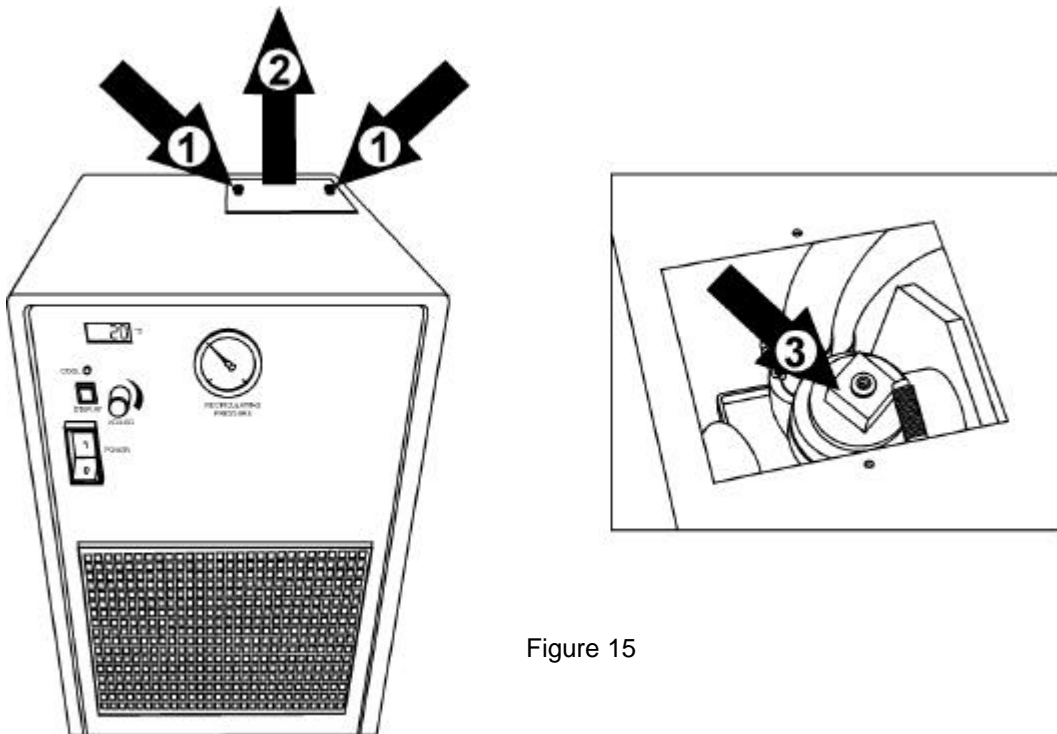


Figure 15



The 4.3 liters capacity is an approximate value.

Fill the reservoir until the water level is approx. 3 cm below the upper edge of the filler neck. Shake the cooling system from time to time during the process of filling and refilling, this guarantees that the water fills correctly. The water level must be checked regularly.

Subsequently refit the plug of the reservoir and the protection cover.

Operation Manual Trotec Speedy

3.7 Connecting the Speedy

3.7.4 Connecting the Cooling System

4. To set the temperature perform the following steps:

- Switch on the cooling system by setting the main switch (1) to "ON" (the switch is illuminated, when the device operates).
- Set the desired temperature. To do this, press the "Display" switch (2), hold the switch in, and simultaneously turn the "Adjust" switch (3) until "20°" appears on the display (4). When the temperature is set, release the "Display" switch.
- The actual temperature of the cooling liquid in the reservoir is shown on the display (4). Do not set the desired temperature to a lower value or condensation on the optics of the laser tube may occur.

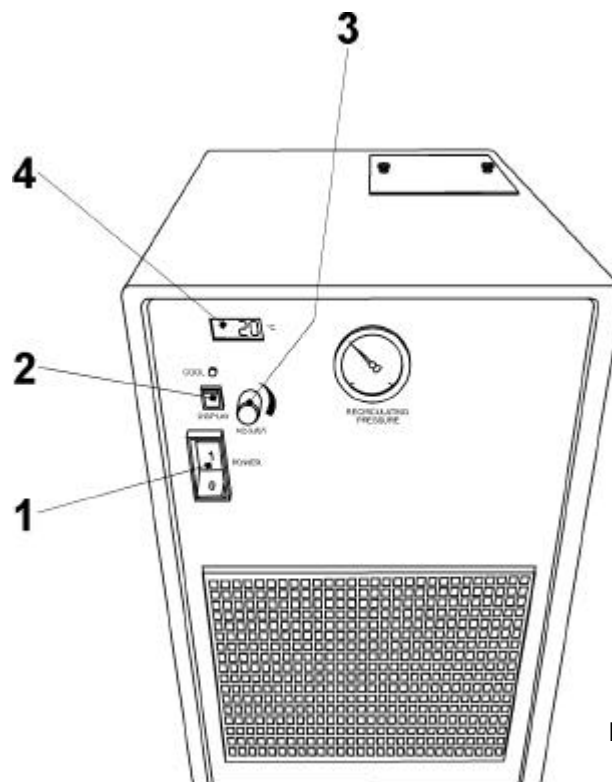


Figure 16



For information on cleaning, maintenance and other information please refer to the Operation Manual of the cooling system.

SECTION 4 – OPERATION

- 4.1 System View / Assemblies and Control Elements
- 4.2 Control Panel
- 4.3 First Steps Before Engraving
- 4.4 First Engraving Tests
- 4.5 Rotary Engraving Attachment
- 4.6 Tips and Tricks for Laser Engraving

Operation Manual Trotec Speedy

4.1 System View / Assemblies and Control Elements

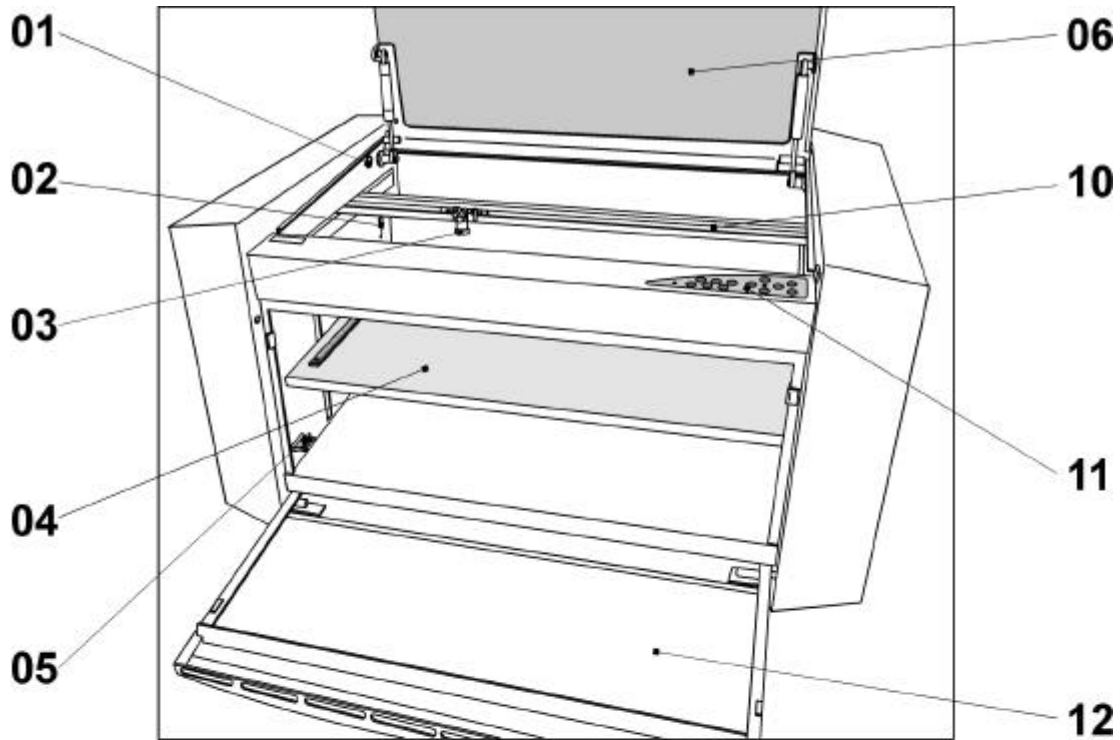


Figure 17

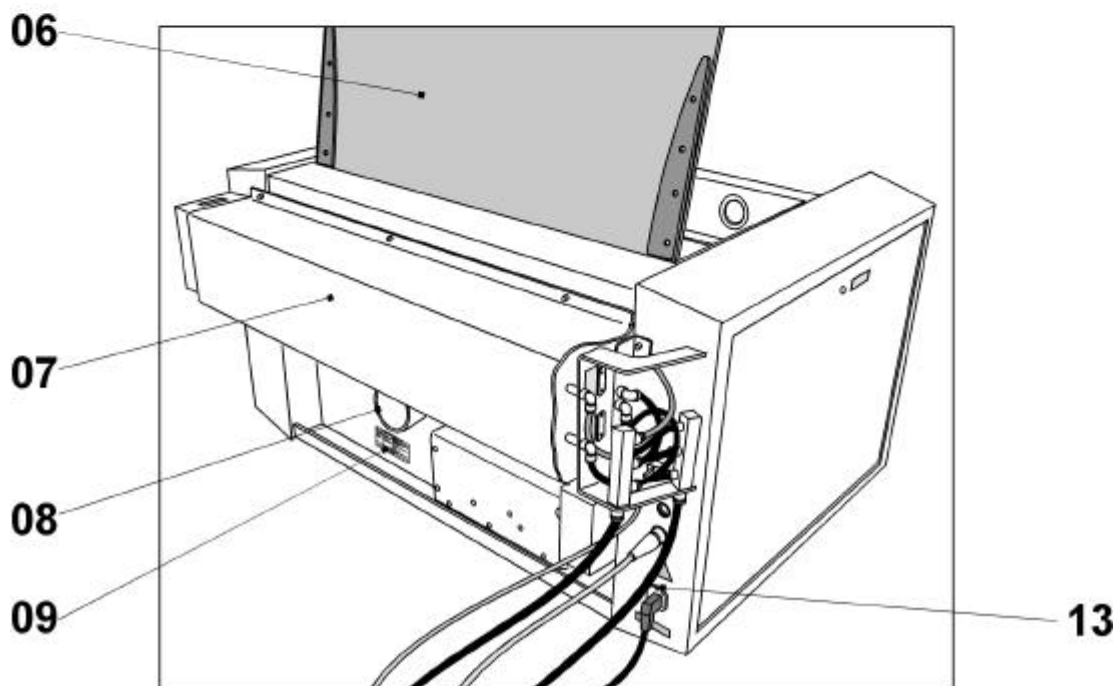


Figure 18

Operation Manual Trotec Speedy

4.1 System View / Assemblies and Control Elements

01 Service Socket



Used for the service plug, which is required for maintenance and adjustment work.



This service plug bypasses the safety installations and the laser engraver becomes laser class 4. Bypassing is only by authorized personnel.

02 Light Barriers



Used for the automatic focussing of the workpiece.

03 Lens Holder



The lens that focuses the laser beam onto the material is mounted inside the lens holder.

04 Engraving Table



The workpieces to be processed are put onto the engraving table. To facilitate orientation, a horizontal and a vertical ruler are located on the engraving table.

05 Connection Socket for Rotary Engraving Attachment



Connector for the rotary engraving attachment (option). Disables the Y axis and supplies the rotary engraving attachment with the required electric signals.

Operation Manual Trotec Speedy

4.1 System View / Assemblies and Control Elements

06 Protection Cover



If the protection cover is opened, no data is processed. After closing the protection cover, the device is not ready to process commands for 5 seconds. If the protection cover is opened during operation, the motion system is stopped. The device switches into "Pause" mode, the "Pause" button lights up. The last processed command is completed.



Please note, that the laser tube is switched off **immediately** and consequently the result of the engraving is incorrect. During processing of commands the protection cover must only be opened after pressing the "Pause" button (34/4).

07 Laser Tube



The laser tube is mounted under a cover profile with 4 cooling fans.

08 Exhaust System Connection Sleeve

09 Manufacturer's Label

10 Motion System



The motion system is that part of the Speedy that performs the mechanical movements in X direction (horizontal) and Y direction (vertical).

11 Control Panel (see also pages 34 and following)



The Control Panel contains multiple buttons and displays for controlling the device.

Operation Manual Trotec Speedy

4.1 System View / Assemblies and Control Elements

12 Front Door



If the front door is opened, no data is processed. After closing the front door, the device is not ready to process commands for 5 seconds. If the front door is opened during operation, the motion system is stopped. The device switches into "Pause" mode, the "Pause" button lights up. The last processed command is completed.

13 Connection Panel



The connection panel is located at the rear side of the Speedy. It contains the connections for mains voltage, exhaust system and the computer. The main fuses are also located here.

Operation Manual Trotec Speedy

4.2 Control Panel

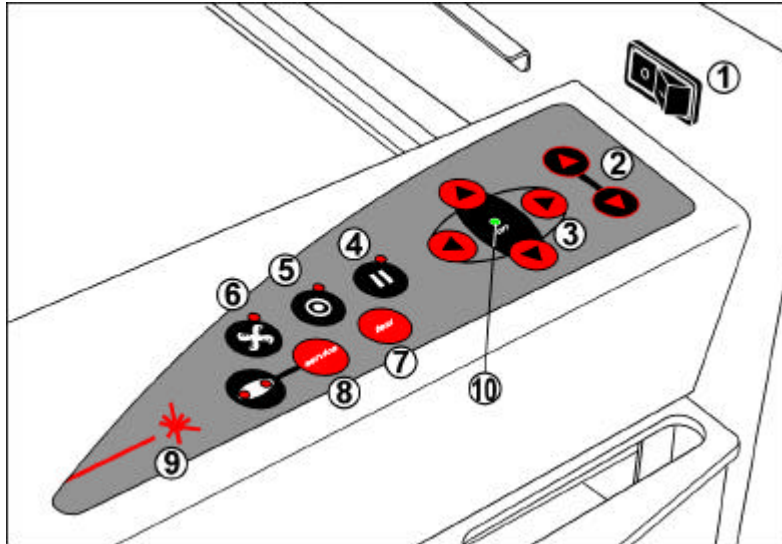


Figure 19

1 ON/OFF Switch

Switches the mains supply ON/OFF.

The following conditions must be fulfilled for correct start up:

- unrestricted freedom of motion of the mechanics
- no materials under the engraving table
- protection cover closed
- service plug removed

If the service plug is plugged in or the protection cover is open, an acoustic signal sounds and the status display (10) flashes fast in green.

Immediately after being switched on, the device starts the referencing process. If the referencing process is completed correctly, an acoustic signal sounds and the device is ready for operation. The readiness for operation is additionally displayed by green (slow) flashing of status display (10).



Before switching on the device, the user must make sure that no objects of any kind are located inside the operating space, which could limit or obstruct the mechanics of the device.



When switching off the mains supply, all processing data is lost.

Operation Manual Trotec Speedy

4.2 Control Panel

2 POSITIONING KEYS Z

When pressing one of these two keys the engraving table (30/4) moves in Z direction (upwards or downwards).



Use these positioning keys to move the workpiece manually.

When both keys are pressed simultaneously, the material is focused automatically (only with light barriers = option).

3 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 "Test" keys (34/7) and one of the positioning keys simultaneously, a movement to the corresponding position is performed.

The status display of the device (10) is located in the center of the key pad.

4 PAUSE



Used to stop the current working process (key lights up). As soon as the last command has been completely processed, the motion system moves to the upper left – the device is in Pause mode.

If this key is pressed a second time, the key illumination goes out, the interrupted working process is continued.

Operation Manual Trotec Speedy

4.2 Control Panel

5 STANDBY



Switches the device into Standby mode (Laser ready, illumination off) – key lights up.

By pressing the key again the device is switched back to Ready mode.

6 EXHAUST



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 (after running time).

7+8 TEST / SERVICE



The keys "Test" and "Service" pressed simultaneously cause a laser test pulse. This is used for maintenance work and only works with the door closed or with the service plug.



As in this case an increased danger of laser radiation exists, an acoustic signal sounds.

9 STATUS INDICATOR LASER BEAM



Indicates, that a laser beam is currently being emitted.

Operation Manual Trotec Speedy

4.2 Control Panel

10 STATUS DISPLAY (indicates the current status of the device):

green, flashing slowly (0.5 Hz)	10	Speedy is ready
green, flashing fast (2 Hz)	10	Cover has been opened
green permanent light / Pause mode	10	Data available in the Speedy
red permanent light	9	Laser beam is being emitted
green/red flashing alternately	9 + 10	Cover open during switch-on process, simultaneously acoustic signal - no referencing

Operation Manual Trotec Speedy

4.3 First Steps Before Engraving

To prepare your laser engraver for the first engraving tests, perform the following steps:

1. Switch Speedy on with the ON / OFF switch.

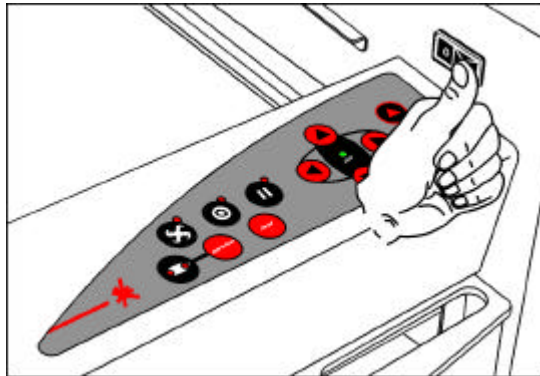


Figure 20

2. The working table automatically references in X/Y/Z direction.
3. Open the protection cover and place workpiece on the engraving table.



Usually you position the workpiece into the upper left-hand corner of the engraving table against the horizontal and vertical rulers. However, any other position on the engraving table is also possible.



Workpieces, that are larger than 740 x 435 mm, can be processed provided they can be installed and the protection cover can still be closed properly. Do not try to manipulate the safety system to install larger workpieces on the system. This could lead to exposure to laser radiation.

Operation Manual Trotec Speedy

4.3 First Steps Before Engraving

4. Focussing the Laser Beam

For the laser beam in your laser system to be able to engrave and cut precisely, the energy is focussed with a lens system, which is mounted on the motion system in a lens holder.



The focussing point of the laser beam (for the high-resolving lens, that is part of the delivery) is located 3.81 cm (1.5 inch) below the lens.

For optimal processing the surface of the material that you want to engrave or cut, must be adjusted to this point.

There are three methods to focus the laser beam:

- A:** Manual focussing
- B:** Focussing by software
- C:** Automatic focussing by means of light barriers (option)

To **A** – Manual focussing:

- A1. Move the processing head over the material to be engraved by means of the positioning keys X/Y

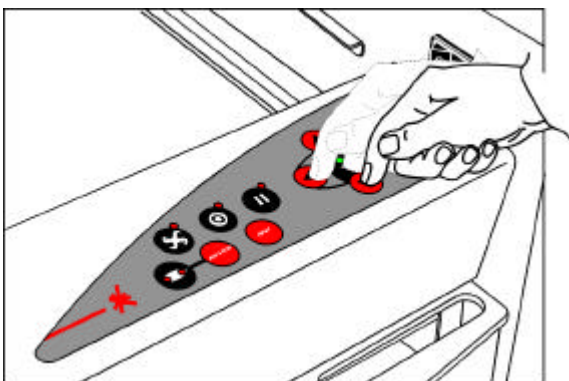


Figure 21

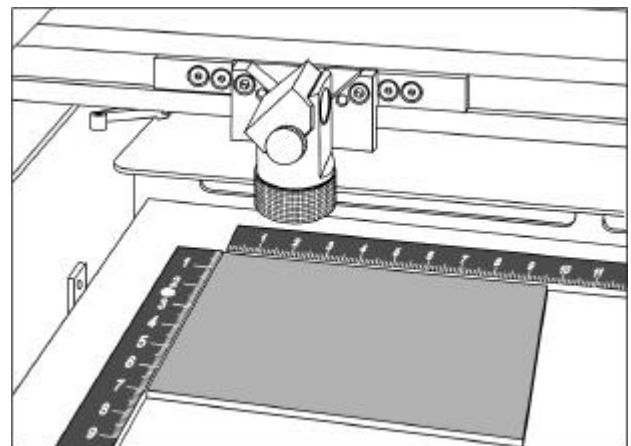


Figure 22

Operation Manual Trotec Speedy

4.3 First Steps Before Engraving

- A2. Hang the focussing tool on the external ring of the working head so that the focussing tool can move unhindered. Move the working table upwards by pressing the Z positioning key. While doing this carefully observe the focussing tool.

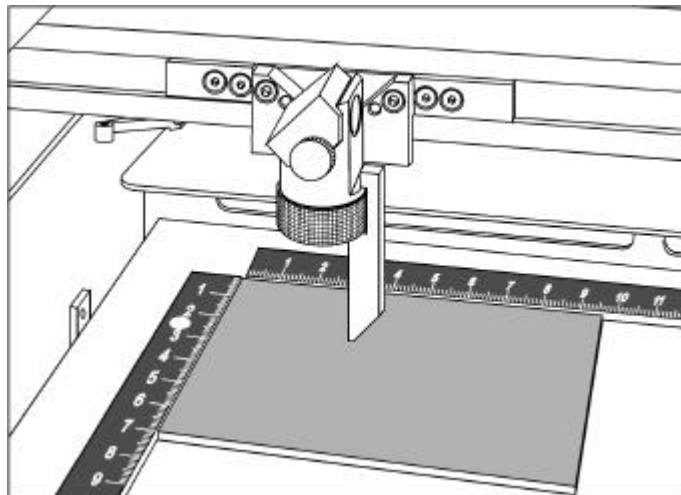


Figure 23

Before the focussing tool reaches the workpiece, move the working table upwards only very slowly and step by step by briefly tapping the positioning key, until the tool tilts to the side. Now the lens is focussed onto the surface of the material.

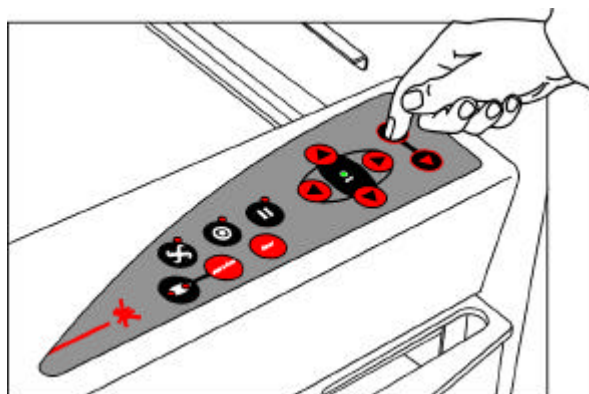


Figure 24

Operation Manual Trotec Speedy

4.3 First Steps Before Engraving

To **B** – Focussing by software:

- B1. The working table moves in Z direction, The thickness of the material, that was entered, is used as target value for the focussing (see also description of the software).

To **C** – Automatic focussing by means of light barriers (option):



The automatic focussing is only possible if the workpiece is thicker than the rulers.

- C1. By pressing the two keys for Z positioning of the working table simultaneously, the laser beam is automatically focussed onto the workpiece.

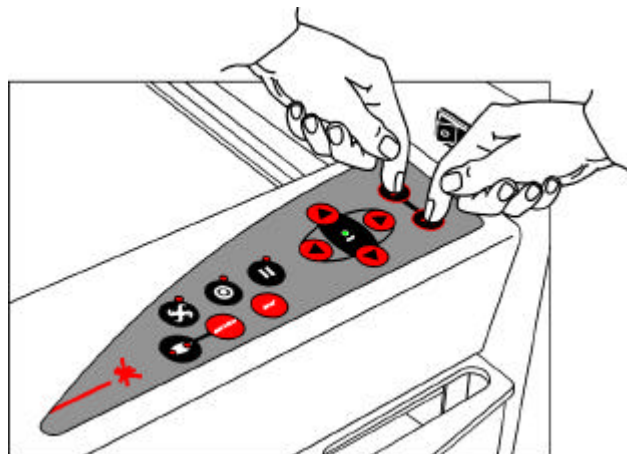


Figure 25

Operation Manual Trotec Speedy

4.4 First Engraving Tests

The following steps describe, how to successfully engrave a first pattern. Please follow the individual steps:

1. First switch on the computer, then the Speedy. It is important that you switch on in this order.



Figure 26

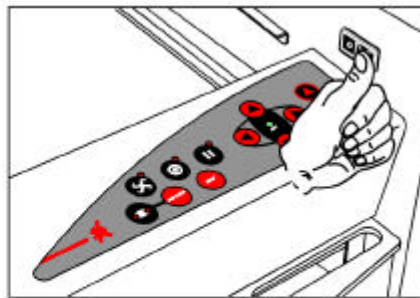


Figure 27

1.

2.

2. Put the object to be engraved into the laser and move into the desired position on the engraving table. Usually the object is positioned in the upper left-hand corner. Use the rulers to determine the dimensions of the object to be engraved.
3. With the positioning keys (34/3) the lens is positioned over the material to be engraved. You focus with the help of the focussing tool or by auto focus (see pages 39 – 41).

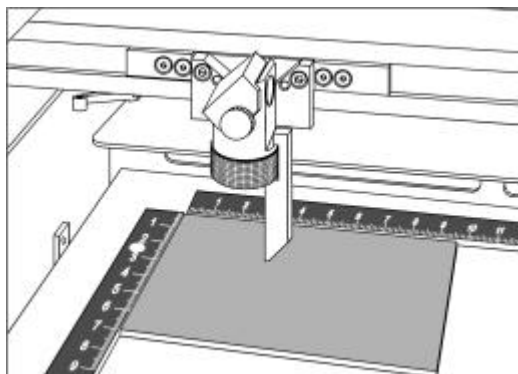


Figure 28

Operation Manual Trotec Speedy

4.4 First Engraving Tests

4. Generate a graphic with the help of your graphics software. The size of the graphic does not matter as the printer driver adjusts it to the workpiece, automatically if requested.



Pos. 5 – 7 and 12 also see Operation Manual Part B – Software

5. Select "File Print", to access the Speedy printer driver, where you can perform workpiece and material settings as well as specify a job name or a job number. This file is automatically transferred into the TROTEC Manager.
6. After the engraving material, the engraving direction, die orientation of the workpiece and the orientation of the plate have been specified in the TROTEC Manager under "Plate, Setup Plate", the job can be positioned on the plate with a double-click. If necessary, the job can be positioned at any position on the plate by dragging with the mouse. The position of the job corresponds with the engraving position on the engraving table.
7. Establish a connection with the engraver by clicking on the button "Establish Connection" in the Engraver Control.
8. Switch on the exhaust system. When using an original TROTEC exhaust system, this happens automatically – check only, whether in the indicator "Exhaust Ready" is green in the Engraver Control of the Manager.
9. If you have a Speedy with a 50 W or 100 W laser tube, also switch on the cooling system.
10. Finally press the START button (green arrow) in the Engraver Control of the Manager, to start the engraving process.
11. While the laser is engraving, you can generate the next graphic.
12. When the engraving is complete, the Manager offers you the following possibilities:
 - delete the job
 - Job Reset and placing back in to the waiting list for later repeat of the engraving.
 - Job Reset and immediate repeat

Operation Manual Trotec Speedy

4.5 Rotary Engraving Attachment



The rotary engraving option in the Speedy printer driver is used in combination of the rotary engraving attachment, to engrave cylindrical objects.

To compensate for the different diameters of different objects, the image must be adjusted. This is performed automatically by the engraving driver, by selecting the rotary engraving option and entering the diameter of the object to be engraved.



The rotary engraving attachment permits engraving of cylindrical object with a diameter of up to 175 mm and a length of up to 300 mm.

Two attachment parts are delivered with the rotary engraving attachment. A cone-shaped disk that is attached to the motor side, and a flat disk with a foam layer that is attached to the adjustable side of the rotary engraving attachment. These attachment parts are designed to hold wine glasses, cups etc.

To install and set-up the rotary engraving attachment proceed as described as follows:

1. Move the working table to the lower position, switch off the laser and open the protection cover of the laser engraver.

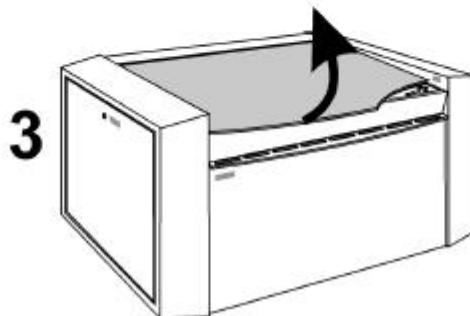
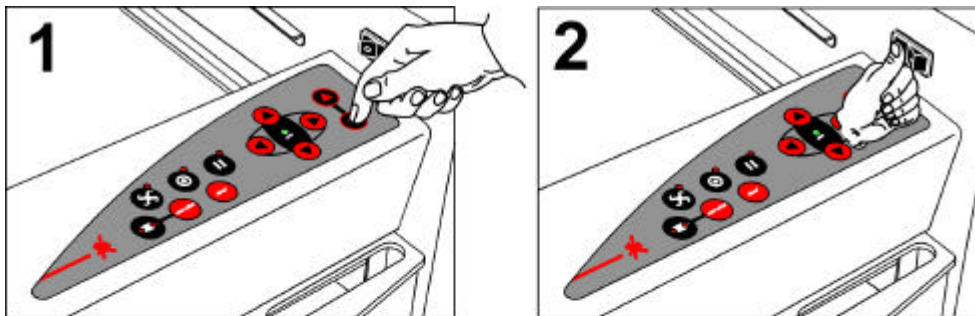


Figure 29

Operation Manual Trotec Speedy

4.5 Rotary Engraving Attachment

2. Put the rotary engraving attachment onto the working table and connect the rotary engraving attachment to the working table. Before you fix the rotary engraving attachment, align it so that its sides are parallel to the rulers. The rulers offer a visual aid for placing the graphic.
3. Connect the rotary engraving attachment via the control cable with the connector of the Y axis of Speedy's motion system. The connector is located inside the left front of the interior under the engraving table (see Fig.).

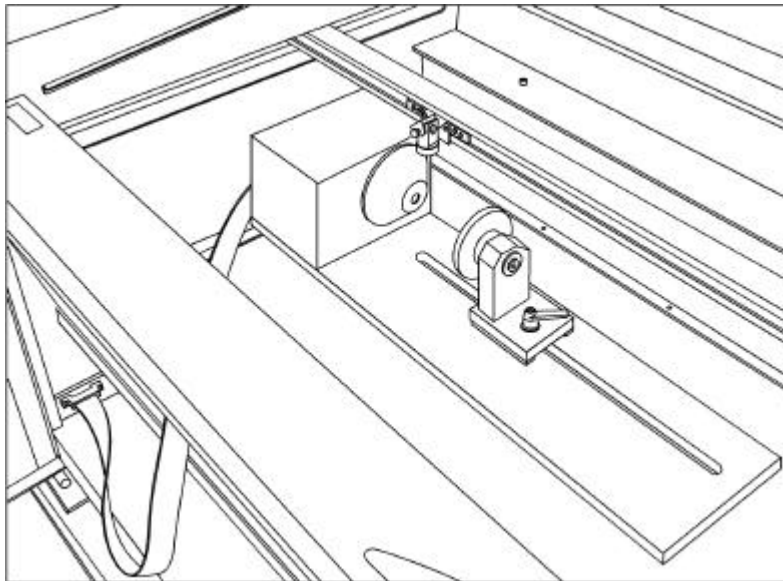


Figure 30

Operation Manual Trotec Speedy

4.5 Rotary Engraving Attachment

Mounting the workpiece:

4. Before you mount the glass into the rotary engraving attachment, measure the diameter of the glass at the position to be engraved with a sliding caliper or a similar tool. Write down this value.
5. Press the open end of the glass against the left-hand side of the rotary engraving attachment. Loosen the lever (arrow) of the adjustable side of the device and move the device to the left, until the glass is held by both disks. Now fasten the lever at the adjustable end to fix the setting.

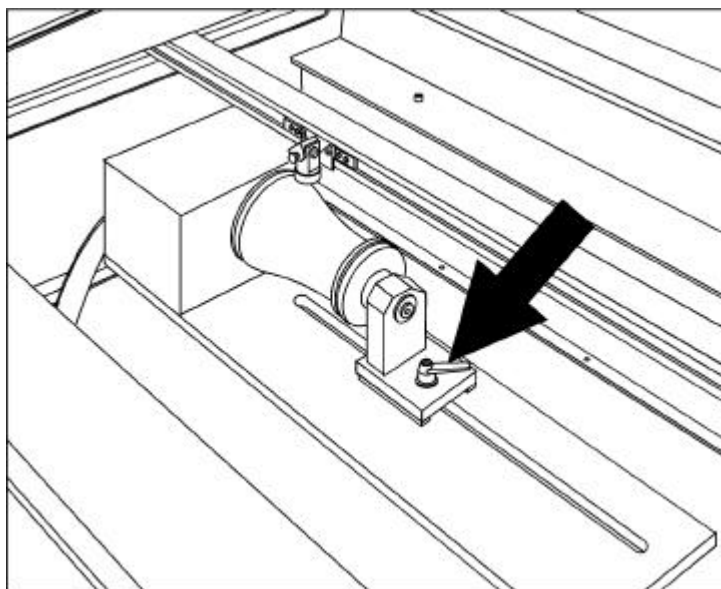


Figure 31

6. Now switch on the laser and wait until the referencing is complete. Position the working head over the glass at the position, where you want to engrave. Now focus the object with the focussing tool. If the glass slopes too much in the area to be engraved, the rotary engraving attachment can be tilted, so that the surface of the glass is running again parallel with the X axis of the motion system. To do this, lift the right-hand side of the rotary engraving attachment and place a wedge under it. Take care not to lift the rotary engraving attachment too high, as it can touch the lens holder.

Operation Manual Trotec Speedy

4.5 Rotary Engraving Attachment

Engraving:



Pos. 8 – 14 and 17 see also Operation Manual Part B – Software

7. Generate a graphic with the help of your graphics software. The size is not important, as the graphic is adjusted to the dimensions of the workpiece by the printer driver.
8. Then perform the settings for size and orientation in the Manager under "Plate, Setup Plate" and, if necessary, select the engraving material. Please note especially, that you can determine the orientation of the graphic on the glass with "Stamp Orientation".
9. In the "Options" menu of the Manager select "Rotary Engraving Attachment" and enter the diameter of the glass.
10. Place the previously generated engraving job into the waiting list with a double-click.
11. Use the mouse to drag the job to the position of the plate, at which the desired engraving area is located on the glass. Use the rulers of the Speedy and the Manager for orientation and move the lens holder directly over the desired position, after you have connected the computer with the laser engraver, and position the job on the screen according to the position of the lens.

Operation Manual Trotec Speedy

4.5 Rotary Engraving Attachment

12. Establish the connection to the engraver.
13. Switch on the exhaust system (only necessary if you do not use an original TROTEC exhaust system).
14. If you have a Speedy in 50 W / 100 W configuration, switch on the cooling system.
15. Activate the START button in the Engraver Control of the Manager and start the engraving process.

Operation Manual Trotec Speedy

4.6 Tips and Tricks for Laser Engraving



The engraving depth can easily be varied through the laser power or the speed. To increase the engraving depth, reduce the speed or increase the power setting. This way you increase the amount of energy per area unit. Engraving too deep, however, reduces the quality of the details. With coated materials the required power depends of the kind and thickness of the coating. With power set too high the individual lines become too thick and a sharp picture cannot be achieved. The resolution of the graphics should usually be at 500 dpi. The dpi setting (number of laser dots per inch) depends on the material. The lower this setting is, the lower the resolution of the engraved picture will be. This, however, reduces flaming and increases the energy of a pulse, which can improve the overall result (e.g. when engraving some sorts of plastic materials).



Protection foil:

Remove the protection foil from the engraving area. However, leave the protection foil on the area that is not engraved, to avoid scratching of the material.



Plastics:

Plastics for engraving are available in many different colors and thicknesses and with many different coatings and surfaces. The majority of available plastics can be well engraved and cut with the laser. Plastics with a micro-porous surface seem to give the best result, because less surface material needs to be removed. As most plastic materials have a low melting point, a low ppi setting should be selected to reduce the danger of melting.

Operation Manual Trotec Speedy

4.6 Tips and Tricks for Laser Engraving



Acrylic:

There are two different types of acrylic – cast and extruded. The cast acrylic becomes white or mat after engraving, the extruded acrylic remains clear. Use extruded acrylic for engravings that are filled with paint and cast acrylic for normal engravings. Cast acrylic can be best engraved without protection foil. It is better to engrave the entire surface with a low energy setting.



Engraving photographs:

Engraving photographs can be quite a challenge at the beginning. But as soon as you understand the basics it will become easier for you. Scan the desired picture with a resolution of 300 dpi. Adjust brightness and contrast so that lighter colors become lighter and darker colors become darker. The photo might look better if you use a filter, which sharpens the contours. The next step is the selection of a raster. Usually the software offers a selection of different rasters with a specified number of lines per inch and different raster angles. Use a raster with between 20 and 100 lines per inch. Increasing the number of lines per inch decreases the size of the points. Try which raster you think looks best. With one material large points look better, with another material smaller points look better. If you cannot select rasters with your software, the Speedy will select the raster automatically.

Operation Manual Trotec Speedy

4.7 Tips and Tricks for Laser Cutting



Distance to the Surface of the Workpiece

If you want to achieve very good results, when laser-cutting acrylic or wood, we recommend, that the plate be attached at least some millimeters above the engraving table. By doing this the smoke and the melting residuals underneath the plate can escape unhindered. A slight moistening of the plate will reduce the area of heat influence. Generally the protection foil should be removed, except when there is considerable development of fumes. During laser cutting the Hz setting (pulses per second) should be set to low, in particular for flammable materials.



Multiple cutting (insert logo)

Often a clearer contour can be achieved by cutting twice rather than cutting only once.

Operation Manual Trotec Speedy

4.8 Tips and Tricks for the Production of Rubber Dies



The various mixtures and densities of rubber plates cause a slightly varying engraving depth. The settings in the overview table give a good indication. Since engraving a standard rubber material requires a relatively high laser power, the laser power is principally set to 100% and only the speed is varied.

Due to their lower density, so-called microporous rubber materials allow a significantly higher engraving speed. Test the rubber first, to find out the correct speed setting.

The TROTEC Manager software simplifies the creation of a stamp significantly. Mirroring as well as converting is performed automatically and a cone-shaped shoulder is generated around each letter. Due to the wider base the letters are stabilized during stamping and therefore the imprint becomes clearer. If you engrave rubber dies without using this option, the letters will have no shoulders making them very thin and unstable.

To avoid flaming, we recommend a very low HZ setting for cutting the rubber die. If the Hz setting is further reduced, the laser pulses are set so far apart from each other that their edges just touch. This results in a perforation. The rubber die stays connected to the rubber plate but can be torn off easily. The advantage of this method is, that there is practically no further risk of deformation or melting of the material. Furthermore, the entire plate can be removed from the laser at one time instead of having to collect all dies individually.

Engraving rubber produces a considerable amount of dust. Therefore a well-dimensioned exhaust system and its regular maintenance are very important.

SECTION 5 – MAINTENANCE

- 5.1 Cleaning the System
- 5.2 Cleaning the Optical Parts
- 5.3 Maintenance Plan

Operation Manual Trotec Speedy

5.1 Cleaning the System



Caution – use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.



Before starting cleaning and maintenance work always switch off the device and unplug the mains plug.



You should check at least once a day, whether dust has accumulated in the engraving system. In case of soiling the machine must be cleaned.

The cleaning interval strongly depends on the material that is being processed and the operating time of the device. Please bear in mind that only a clean machine guarantees optimal performance and reduces the service costs.

General Cleaning:

1. Move the engraving table (30/04) into a position in which it is easiest for you to clean the surface with a window cleaning agent and paper towels.
2. Make sure, that the device is switched off and unplugged. Open the protective cover (30/06).
3. Thoroughly remove all loose dirt particles and deposits in the interior of the machine.
4. Clean the cover of the laser tube (30/07).
5. You can clean the viewing window with a cotton cloth. Do not use paper towels as they could scratch the acrylic.

Operation Manual Trotec Speedy

5.2 Cleaning the Optical Parts

The lens has a durable multi-coating and cannot be damaged by correct and careful cleaning. You should inspect the mirrors and the lens at least once a week. If you discover a veil of haze or dirt, you must clean them.

Follow the instructions below for the cleaning of optical parts:

CLEANING THE LENS

1. Move the engraving table to a distance approx. 10 cm under the lens holder.
2. Move the working head into the center of the working surface and put a cloth under the lens holder (so that the lens is not damaged if it accidentally falls out of its holder).
3. Now you can unscrew the lens holder.

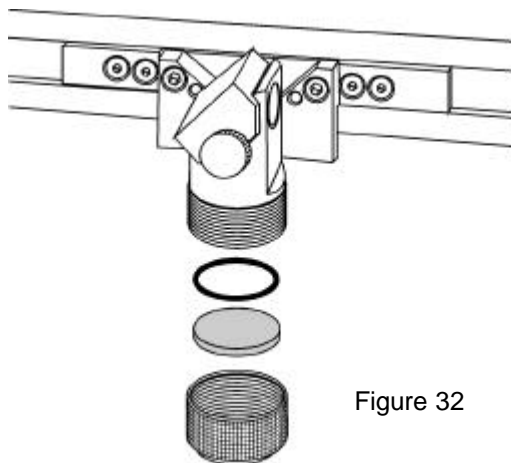


Figure 32

4. Once positioned over a clean lens cleaning tissue, remove the lens from the lens holder by carefully turning the lens holder and letting the lens and the O-ring drop onto the cleaning cloth.
5. Examine the O-ring and clean it, if necessary, with a cotton bud and a lens cleaning tissue.
6. Remove the coarse dust by blowing air onto the lens surface.

Operation Manual Trotec Speedy

5.2 Cleaning the Optical Parts

7. Hold the lens by its edge with a lens cleaning tissue and use a drop of lens cleaning liquid from the little bottle which you received as an accessory delivered with the laser. While holding the lens on an angle, flush both surfaces of the lens, to wash away coarse soiling.
8. Put the lens on a clean lens cleaning tissue. Put some lens cleaning liquid on one side of the lens. Leave the liquid to take effect for approximately one minute and then gently wipe it away with lens cleaning tissues soaked with lens cleaning liquid.
9. Finally, dry this side of the lens with dry lens cleaning tissues and repeat the cleaning process on the other side of the lens.



Never use a cleaning tissue twice. Dust accumulated in the cleaning tissue could scratch the lens surface.

10. Examine the lens. If it is still soiled, repeat the cleaning process until the lens is clean.
11. Carefully insert the lens into the lens holder.



Ensure, that the rounded side (= convex) of the lens is facing upwards. Then put the O-ring on top of the lens.

12. Carefully screw the lens holder back to the working head.

Operation Manual Trotec Speedy

5.2 Cleaning the Optical Parts

CLEANING THE MIRRORS #2 AND #3



There are two mirrors in the operating area of the laser, which may have to be cleaned if they are soiled. To clean the mirrors, follow the instructions below.

MIRROR #2

1. The mirror #2 is located on the right-hand side of the Speedy. To be able to access mirror #2, you must remove the right maintenance panel.



The laser must be switched off before the facing is removed !

2. The mirror #2 is attached by means of a knurled screw (arrow), which is located on the mirror holder. Open the screw and remove the lensholder together with the mirror.



Make sure that you do not touch the mirror surface with your fingers as this reduces the mirror's working life significantly.

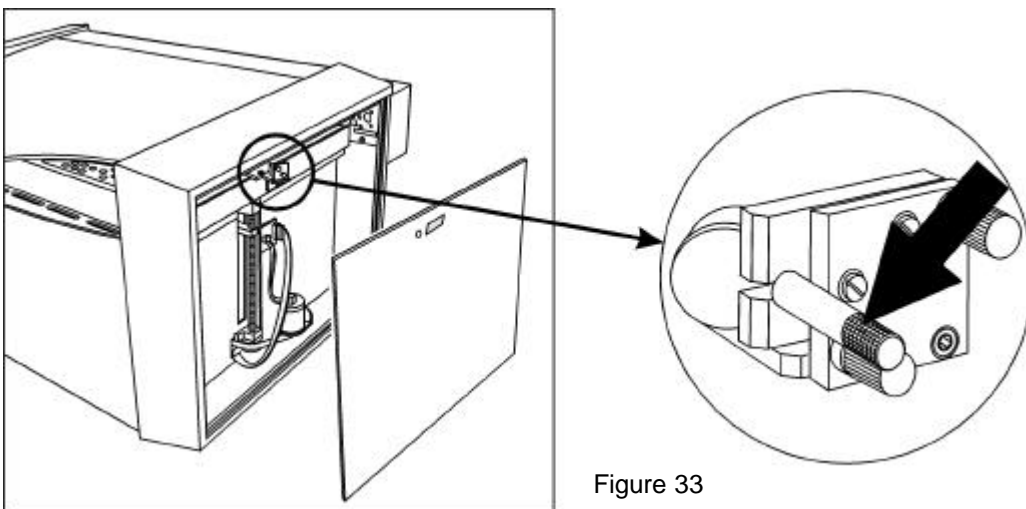


Figure 33

Operation Manual Trotec Speedy

5.2 Cleaning the Optical Parts

3. Use a drop of lens cleaning liquid from the accessories box and, while holding the mirror on an angle, flush the surface of the mirror, to wash away coarse soiling.
4. Put the mirror on a working surface. Put some drops of lens cleaning liquid on the mirror and leave the liquid take effect for approximately 1 minute.
5. Use a folded piece of lens cleaning tissue soaked with lens cleaning liquid and wipe gently over the mirror only once. Use a fresh lens cleaning tissue soaked with lens cleaning liquid each time and again wipe over the mirror only once. Then wipe the mirror dry with a new dry lens cleaning tissue. Never use a cleaning tissue twice, as it could carry dust particles, which can scratch the mirror surface.
6. Examine the mirror and repeat the cleaning process, if necessary.

MIRROR #3

1. While holding the mirror, loosen the knurled screw (1) and lift the mirror from the mirror holder (2).



Pay attention that the mirror doesn't grind over the mirror holder, as it can be scratched very easily.

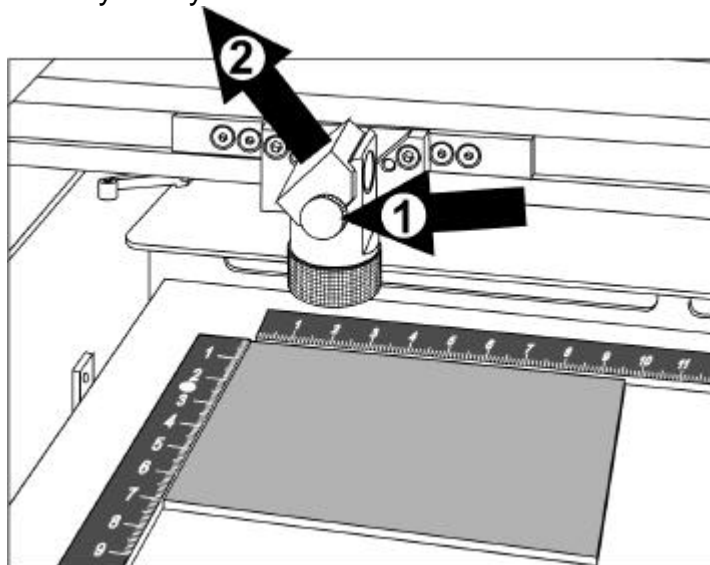


Figure 34

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5.2 Cleaning the Optical Parts

2. Use a drop of lens cleaning liquid from the accessories box and, while holding the mirror on an angle, flush the surface of the mirror, to wash away coarse soiling.
3. Put the mirror on a working surface. Put some drops of lens cleaning liquid on the mirror and leave the liquid to take effect for approximately 1 minute.
4. Use a folded piece of lens cleaning tissue soaked with lens cleaning liquid and wipe gently over the mirror only once. Use a fresh lens cleaning tissue soaked with lens cleaning liquid each time and again wipe over the mirror only once. Then wipe the mirror dry with a new dry lens cleaning tissue. Never use a cleaning tissue twice, as it could carry dust particles, that can scratch the mirror surface.
5. Examine the mirror and repeat the cleaning process, if necessary.
6. Re-insert the mirror into the mirror holder by setting it straight onto the holder and tightening the screw.

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5.3 Maintenance Plan

	daily	weekly	monthly	yearly
Laser				
Lens, mirrors 2 and 3		Check Cleaning if required		
Engraving table and rulers	Cleaning			
Cover of the laser tube and housing			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 (50 W and 100 W devices only)				
Pump filter			Cleaning	
Condenser heater			Cleaning	
Cooling agent		Examination		Replacement
Pump				Lubricate

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

SECTION 6 – ADDITIONAL INFORMATION

- 6.1 Tips for Troubleshooting
- 6.2 Requirements for the Serial Cable
- 6.3 Connector Assignment
- 6.4 Training Program
- 6.5 Support Sheet

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6.1 Tips for Troubleshooting

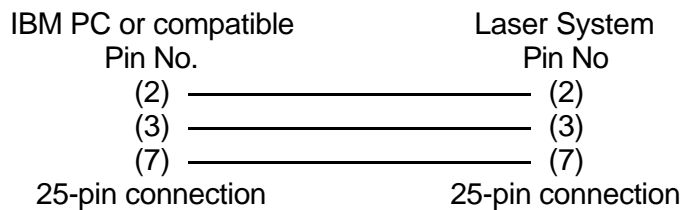
- Speedy does not react after activating the "ON" key.
 - Check the mains connection.
 - Check the main fuses of the Speedy. They are located next to the mains connection socket. Replace defect fuses with fuses of the same type and value.
- No referencing is performed after switching on the Speedy.
An acoustic signal can be heard.
 - Check whether the door of the Speedy is tightly fastened.
- The following error message is displayed when trying to establish a connection between the Manager and Speedy:
"Could not build up connection to the laser engraver."
 - Check the cable connection between computer and Speedy.
 - Make sure that you are actually using the correct serial interface COM 1 or COM 2 of your computer and that it is functional.
 - Check the interface selection in "Options" in the "Settings" menu of the Manager.
- After starting a job the exhaust system is not switched on.
 - Check whether the exhaust system is connected with the mains socket and whether the mains switch is set to "On"
 - Check the cable connection between Speedy and the exhaust system.
- A job, which was created with the graphics software, does not appear in the waiting list of the Manager.
 - Check whether the sorting function "Kind" and "Resolution" are activated in the waiting list.
 - Make sure that the directories "Archiv", "Spool" and "Work" have been created in the directory of the Manager ("TROTEC") and that the correct paths to these directories have been set under "Options" in the "Settings" menu.
- A job transferred to the Manager does not contain any graphics,
 - Use the "Fit to page" option in the printer menu of your graphics software.

Operation Manual Trotec Speedy

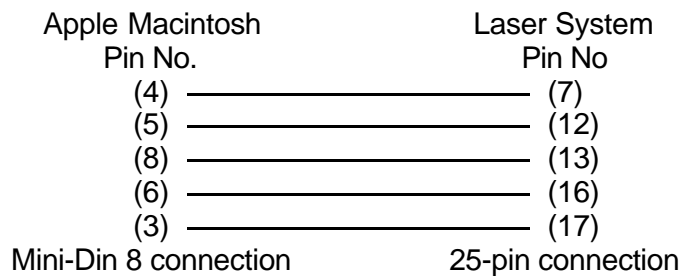
6.2 Requirements for the Serial Cable

The following drawing describes the pin assignment for the serial cable:

for PCs

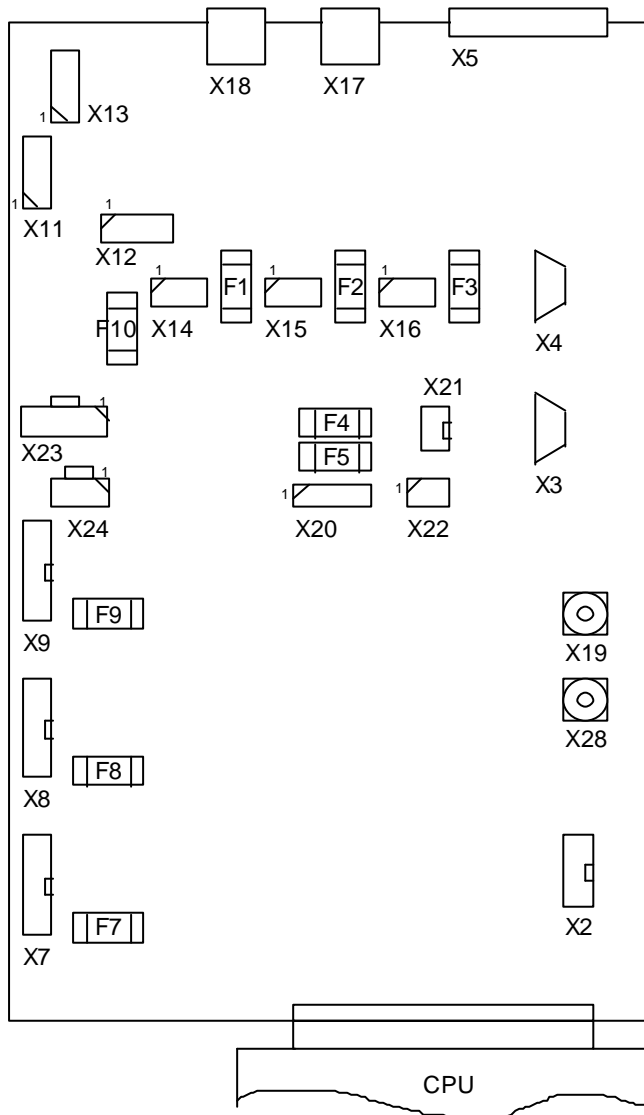


for Apple Macintosh



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6.3 Connector Assignment



ACHTUNG: Vor dem Öffnen des Gehäuses Netzstecker ziehen.

CAUTION: Before opening the system unplug the mains connection.

Sicherungen im Power-Laser Pro

Netzspannung:	230 VAC	115 VAC
Hauptsicherungen	2 x 6,3 AT	2 x 10 AT
Relais-Einschaltkreis	F10 200 mAT	200 mAT
Kühlventilatoren-Laser	F1 1 AT	2 AT
Luftkompressor	F2 1 AT	2 AT
Gravurraum-Beleuchtung	F3 1 AT	2 AT
interne DC-Versorgung	F4 2 AT	2 AT
interne DC-Versorgung	F5 2 AT	2 AT
DC-Versorgung X-Achse	F7 6,3 AT	6,3 AT
DC-Versorgung Y-Achse	F8 6,3 AT	6,3 AT
DC-Versorgung Z-Achse	F9 6,3 AT	6,3 AT

ACHTUNG: Sicherungen nur durch solche vom gleichen Wert und Typ ersetzen !

Fuses in the Power Laser Pro

Mains voltage		230 VAC	115 VAC
Main fuses		2 x 6.3 AT	2 x 10 AT
Relay	F10	200 mAT	200 mAT
Cooler fans - Laser	F1	1 AT	2 AT
Air compressor	F2	1 AT	2 AT
Illumination Engr. Area	F3	1 AT	2 AT
Internal DC supply	F4	2 AT	2 AT
Internal DC supply	F5	2 AT	2 AT
DC supply X axis	F7	6.3 AT	6.3 AT
DC supply Y axis	F8	6.3 AT	6.3 AT
DC supply Z axis	F9	6.3 AT	6.3 AT

Caution Replace fuses only with the same value and type

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6.4 Training Program

(English Version)

TLE - TRAINING SCHEDULE

Customer No.:		Company, City	
Machine/Type:			
Serial No.:			
Operating System/ Version:			
DTP Program/ Version:			

CHAPTER 1	<p>SAFETY</p> <ul style="list-style-type: none"> • Laser safety • Safety, information and warning labels • Interlock system
CHAPTER 2	<p>INSTALLATION</p> <ul style="list-style-type: none"> • Installation of the system • Installation of the exhaust system • Installation of the printer driver and the Manager
CHAPTER 3	<p>SOFTWARE (incl. Corel Draw®)</p> <ul style="list-style-type: none"> • Fonts, fillings, outlines, • Introduction printer driver and Manager Positioning, selecting material, defining the engraving parameters speed and power raster engraving, cutting, bitmaps, job list, Archive/Spool/Work sub-directories
KAPITEL 4	<p>ENGRAVING TRIALS</p> <ul style="list-style-type: none"> • Handling the engraver • Setting the focus position • Parameters for different materials • Handling the rotary engraving attachment (optional)

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6.4 Training Program

CHAPTER 5	<p>CLEANING AND MAINTENANCE</p> <ul style="list-style-type: none"> • General cleaning of the system • Cleaning the optics • Cleaning the exhaust system and replacing the filters • Observance of the maintenance intervals
CHAPTER 7	<p>ELECTRONICS</p> <p>Explanation of the electronics (prints) Explanation of the fuses</p>
CHAPTER 8	<p>LASER SOURCE</p> <ul style="list-style-type: none"> • Description and attachment
CHAPTER 9	<p>BEAM ALIGNMENT</p> <p>Adjusting the deflection mirror 2</p>
KAPITEL 10	<p>ADJUSTING ENGRAVING TABLE AND RULERS</p> <p>Explanation of the adjustment of the rulers and the engraving table.</p>

- Training performed in
- Training, test and installation at customer, location

Remarks:	
----------	--




.....
 CUSTOMER
 DATE / SIGNATURE

.....
 TECHNICAL
 DATE / SIGNATURE

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6.5 Support Sheet

Customer Data

Date:	<input type="text"/>	Customer No.:	<input type="text"/>
Company:	<input type="text"/>	Contact Person:	<input type="text"/>
Street:	<input type="text"/>	Phone 	<input type="text"/>
City:	<input type="text"/>	Fax 	<input type="text"/>
Post Code:	<input type="text"/>	E-Mail 	<input type="text"/>
Country:	<input type="text"/>		

PROBLEM Engraver Manager Printer Driver

Engraver Model: Language: Version:

Failure Description:

(How can the failure be reproduced?)

Error Message:

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6.5 Support Sheet

Workpiece:	<input type="text"/>	Mode:	<input type="text"/>	Material:	<input type="text"/>
Operating System:	<input type="text"/>	Computer:	<input type="text"/>		
Graphics Card:	<input type="text"/>	Network:	<input type="text"/>		
Main Memory:	<input type="text"/>	Hard Disk:	<input type="text"/>		
DTP Program:	<input type="text"/>	Version:	<input type="text"/>		

Remarks:

Processing

Received by:	<input type="text"/>	on:	<input type="text"/>
Forwarded to:	<input type="text"/>	on:	<input type="text"/>
Solved by:	<input type="text"/>	Close Date:	<input type="text"/>

SECTION 7 – INDEX

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APPENDIX

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Options

Laser pointer: With the laser pointer the laser safety class changes from 1 to 3a, enables precise positioning of the engravings as a point is projected onto surface of the material. The laser pointer is attached in front of mirror #2.

Auto focus with sensors: for auto focus tool, control by positioning keys (both pressed simultaneously = auto focus),
Caution: Material must be thicker than the rulers.

Cutting table: Honeycomb table especially for cutting tasks, is placed onto the standard table, during cutting the residuals of the material fall through the honeycombs onto the table, reverse side of the material remains clean, cutting lines are cleaner.