

# OPERATION MANUAL

## 8008 Trotec Laserati C100/C150

### Part A - Hardware



2nd Issue 11/2006

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## Operation Manual Trotec Laserati



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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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# Operation Manual Trotec Laserati

## 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 Laserati

## 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 Laserati

## 1.2 Designated Use

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



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 Laserati

## 1.3 Technical Data / Device Specification

### 8008 Laserati

#### Technical Specification

##### *Mechanic*

Working area	840 x 300 mm / 33" x 11,8"
Max. height of workpiece	10 mm / 0,4"
Max. engraving speed	200 cm/sec. / 79 inch/sec.
Cutting speed	depending on material, thickness, laser power
Motor	Brushless DC Servo motor
Encoder	Increment
Work piece table	Vacuum table
<b>Optics, Lens</b>	<b>1,5" lens, all optic elements are air cooled and cleaned</b>

##### *Features*

*S = Standard Feature*

**Vacuum table (S), compressed air on optic elements (S), Mac compatibility (S), Air assist (S)**

##### *Control system*

Laser power	Adjustable from 0 - 100%
Interface Hardware	RS-232, USB
Interface Software	ASCII, HPGL, AD-Logic System

##### *Laser Equipment*

Laser tube	Sealed off CO <sub>2</sub> Laser (closed gas volume), maintenance free, laser output 60, 105 or 180W
Wavelength	10,6µm

##### *Cooling system*

Water cooling system All systems with a water cooling unit as a standard.

##### *Electricity*

60 Watt version	Single phase 230V/ 50-60Hz or 115V/ 50-60 Hz
105 and 180 Watt version	Triple phase 3x230V/ 50-60Hz

##### *Dimensions*

Width/depth/height	142 x 85 x 142 cm/ 55,2 x 31,5 x 55,9 inch
Weight (approx.)	approx. 400 kg (180 W unit)

##### *Ambient conditions*

Ambient conditions	Operating temperature +15 to +25° C humidity 40% to max 70%, not condensing
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##### *Laser Safety*

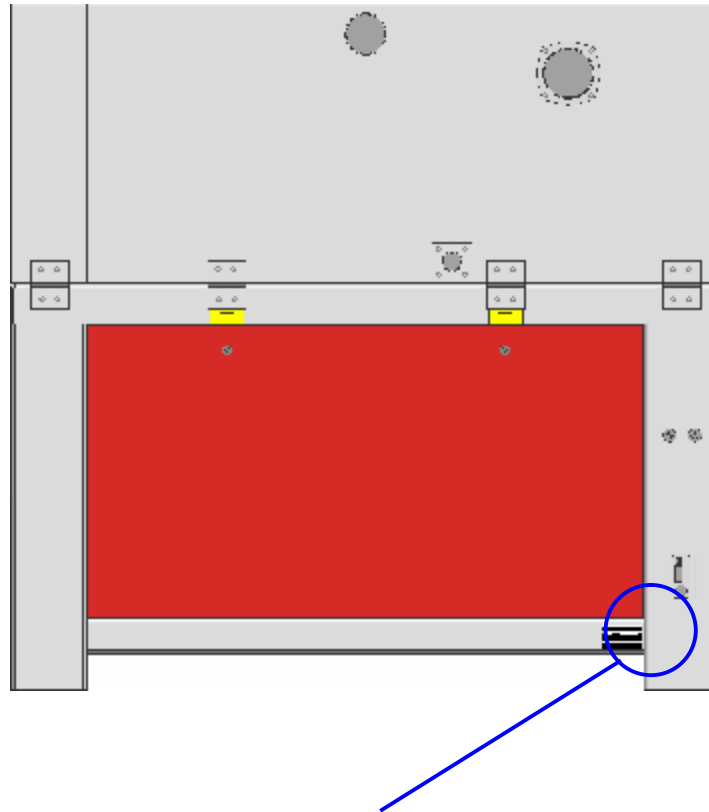
Laser class	CDRH Laser Safety Laser Class 1 CE tested
Interlock	Duplicate Interlock safety system

SUBJECT TO CHANGE WITHOUT PRIOR NOTICE !

# Operation Manual Trotec Laserati

## 1.4 Manufacturer's Label


The manufacturer's label is located on the back of the device (see Figure below).



TROTEC LASER ENGRAVER		
Modell:	Typ:	8008 Laserati C100
Seriennummer:	Serial No.:	LA-0019
Baujahr:	Manufactured:	September/2006
Stromaufnahme:	Input Power:	220-240VAC~, 1.6A, 50/60Hz
Hersteller:	Manufacturer:	TROTEC Produktions u. Vertriebs Ges.m.b.H Linzerstraße 156, 4600 Wels AUSTRIA
CO <sub>2</sub> -Laser, max. power 250Wcw, wavelength 10,6µm Laserdiode max.power<0,99mWcw, wavelength 655nm EN 60825-1 (2003)		
CE		www.trotec.net

## Operation Manual Trotec Laserati

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:	8008 Laserati C100
Seriennummer:	Serial No.:	LA-0019
Baujahr:	Manufactured:	September/2006
Stromaufnahme:	Input Power:	220-240VAC~, 1.6A, 50/60Hz
Hersteller:	Manufacturer:	TROTEC Produktions u. Vertriebs Ges.m.b.H Linzerstraße 156, 4600 Wels AUSTRIA
CO <sub>2</sub> -Laser, max. power 250Wcw, wavelength 10.6µm Laserdiode max.power<0,99mWcw, wavelength 655nm EN 60825-1 (2003)		
		<a href="http://www.trotec.net">www.trotec.net</a>

# Operation Manual Trotec Laserati

## 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 8008 Laserati**  
**Model N° 8008 Laserati C100/150/180**

has demonstrated conformity to the following guidelines:

98/37/EEC Directive for Machines Annex IIA  
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 60825-1/2001 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 November 2006

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



# Operation Manual Trotec Laserati

## 1.6 Warranty Regulations

### LIMITED WARRANTY TERMS AND CONDITIONS FOR TROTEC LASERATI SERIES

Trotec Produktions- und Vertriebs GmbH, Wels (hereinafter referred to as "Trotec") grants the purchaser at his discretion a claim within the terms of the following warranty obligations in addition to the statutory warranty claims against the seller.

#### Beginning and duration of warranty:

1. The warranty period shall begin with the date of invoice by Trotec. No extension of the original warranty period occurs by any substitute deliveries or repairs for warranty reasons.
2. Warranty is granted for the following period of time:

12 Months	Housing, print (CPU, motor main, axis), power supply, control board, compressor for air assist, belts, all mechanic components, laser assembly
3 Months	Optics <sup>1</sup> (lens, mirror, beam combiner),

- |       |   |
|-------|---|
| 1 ... | No warranty for optics will apply, however, if such has to be replaced because of inadequate or incorrect cleaning (e.g. scratching during cleaning).<br>Typical picture of optics damaged as a result of improper cleaning: shooting through the mirror or lens. |
| 2...  | 12 month on water cooling unit  |

#### Precondition for warranty

1. The commissioning and the user's training is performed by an authorized Trotec partner or by Trotec itself.
2. The machine is the property of the first user.
3. The user operates the machines in the environment as defined by Trotec (e.g. room temperature, fuse protection, etc.) as well as with a suction system supplied by Trotec. The predefined minimum requirements must be fulfilled when using any other suction system.
4. Immediate detailed notice of defects in writing to Trotec and/or the authorized Trotec partner.

#### Content and scope of warranty

1. Defects that occur within the warranty period are remedied by Trotec by replacement of the defective parts. Exchanged parts become Trotec's property.
2. In the event of unrepairable relevant defects, Trotec shall have the right to avoid any claim to recede of the contract by effecting a gratuitous replacement.

#### Exclusion of warranty

1. Improper commissioning and installation.
2. Improper operation or use, inadequate or improper maintenance, use of unsuitable accessories or operating material.
3. External influences, e.g. damage during transport, surges, damage to surface, damage by weathering or other natural phenomena.
4. Repairs or interferences by unauthorized third parties.
5. Use of not original Trotec spare parts.

#### Miscellaneous provisions

1. Wels shall be place of performance and place of jurisdiction for all claims arising from the warranty obligation. Austrian law applies exclusively.
2. Trotec shall not assume any liability for loss of profit, turnover, goodwill or expected savings or for any direct or indirect damage or for claims made by third parties against the customer from use of, or the inability to use, the product.
3. In the event that individual provisions of the present warranty obligation should be or become legally ineffective for any reason whatsoever, then this shall not affect the validity of the other provisions herein.
4. In the case of warranty, both the costs for the part as well as the freight costs (standard freight) will be borne by Trotec.
5. In general the terms of businesses of Trotec are valid which you can see on the webpage [www.troteclaser.com](http://www.troteclaser.com).

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Linzer Strasse 156  
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email: [trotec@at.trotec.net](mailto:trotec@at.trotec.net)  
[www.troteclaser.com](http://www.troteclaser.com)

Effective from 20<sup>th</sup> of April 2004

## Operation Manual Trotec Laserati

# 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 Laserati

## 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.

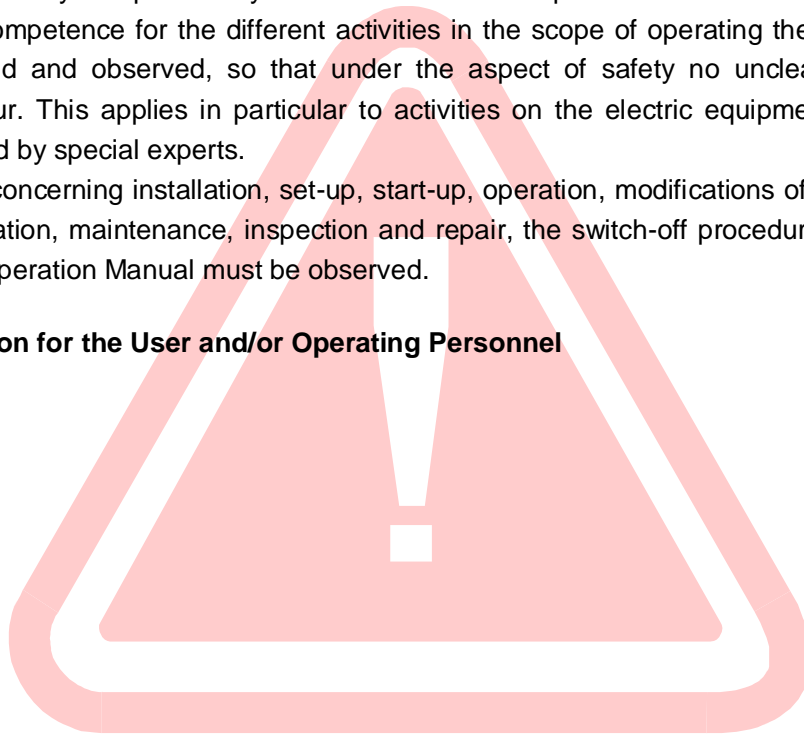
### Safety-conscious Working

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.

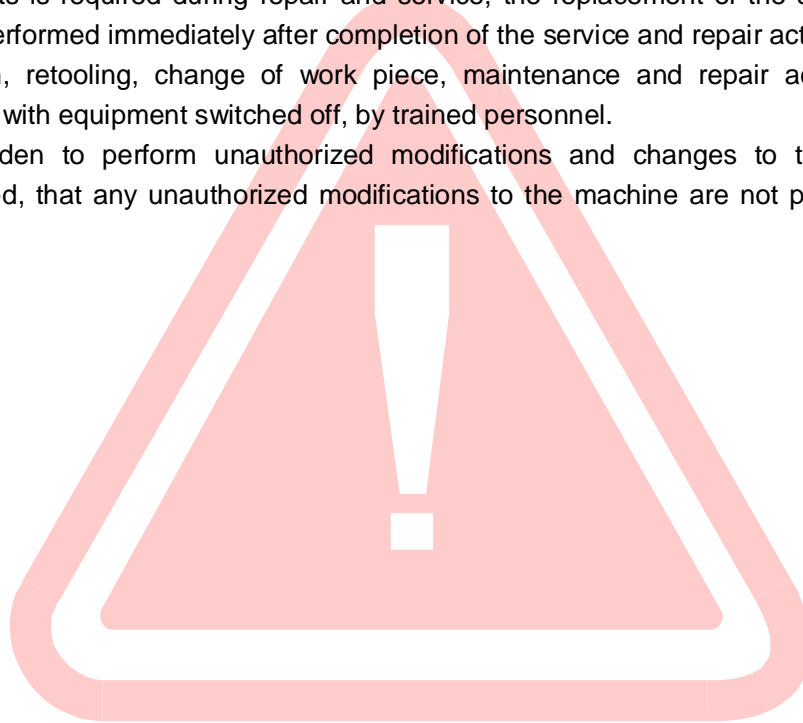
For all activities concerning installation, set-up, start-up, operation, modifications of conditions and methods of operation, maintenance, inspection and repair, the switch-off procedures that may be provided in the Operation Manual must be observed.

### Safety Information for the User and/or Operating Personnel



## Operation Manual Trotec Laserati

- 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.
- 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 repair and service, the replacement of the safety components must be performed immediately after completion of the service and repair activities.
- Preparation, retooling, change of work piece, maintenance and repair activities must only 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 Laserati

## 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. Laserati is a device of **class 2 (USA: Class II)**. 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 2 and can cause the emission of harmful radiation.



This laser engraving system contains a carbon dioxide (CO<sub>2</sub>) 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 CO<sub>2</sub> lasers (wavelength 10.6 µm).

# Operation Manual Trotec Laserati

## 2.3 Safety Precautions when Operating the Device

In your Laserati, 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, 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, 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.

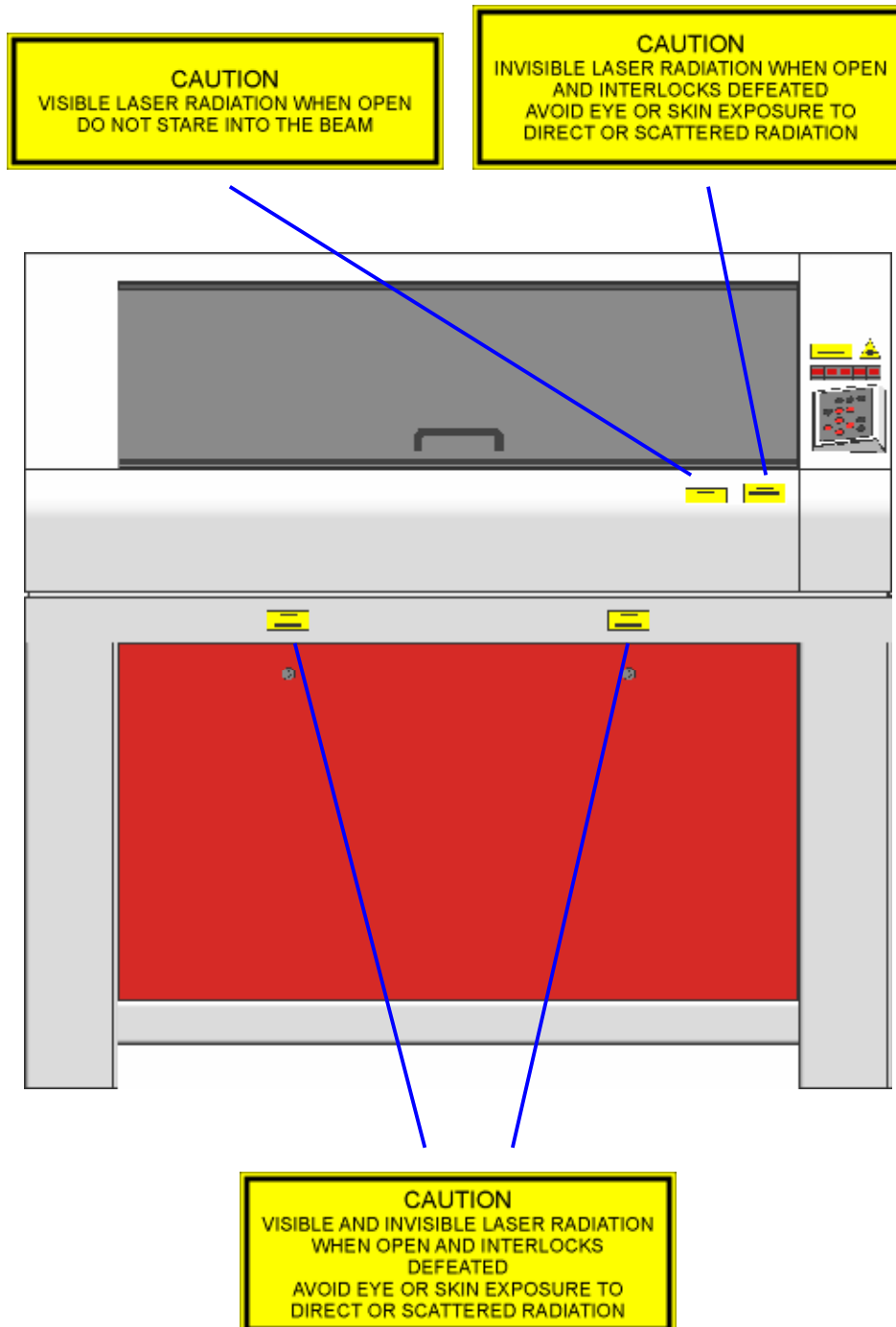
# Operation Manual Trotec Laserati

## 2.4 Warning and Information Labels

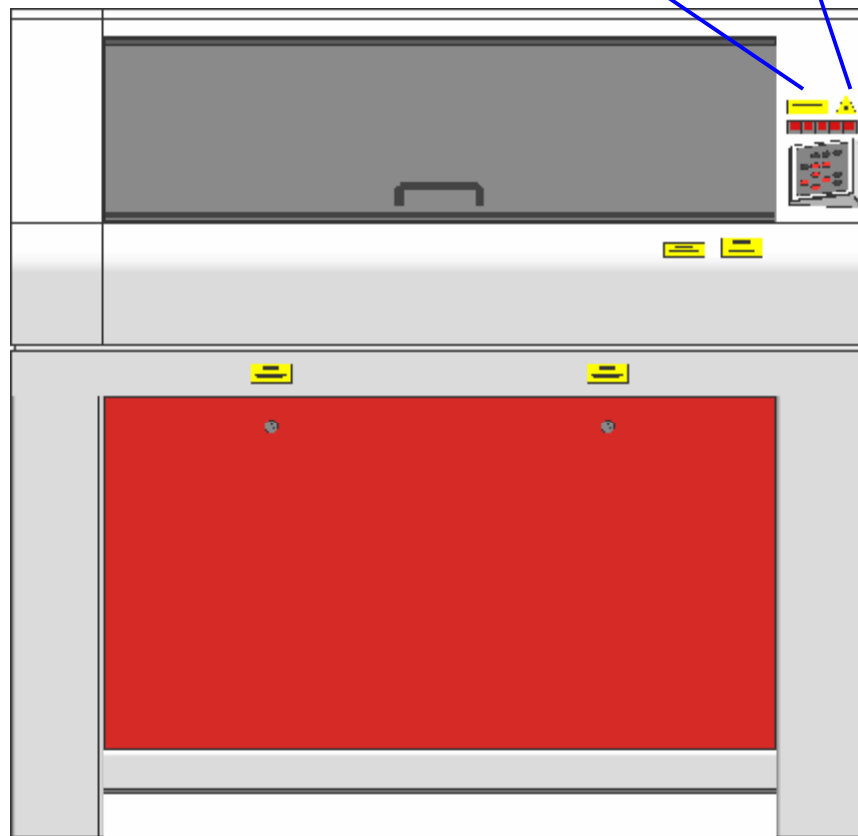


The warning and information labels are attached in such positions of the device that could represent a source of danger during set-up and operation. Therefore, follow the information on the labels. If labels are lost or damaged, they must be replaced immediately.

## Operation Manual Trotec Laserati 2.4 Warning and Information Labels

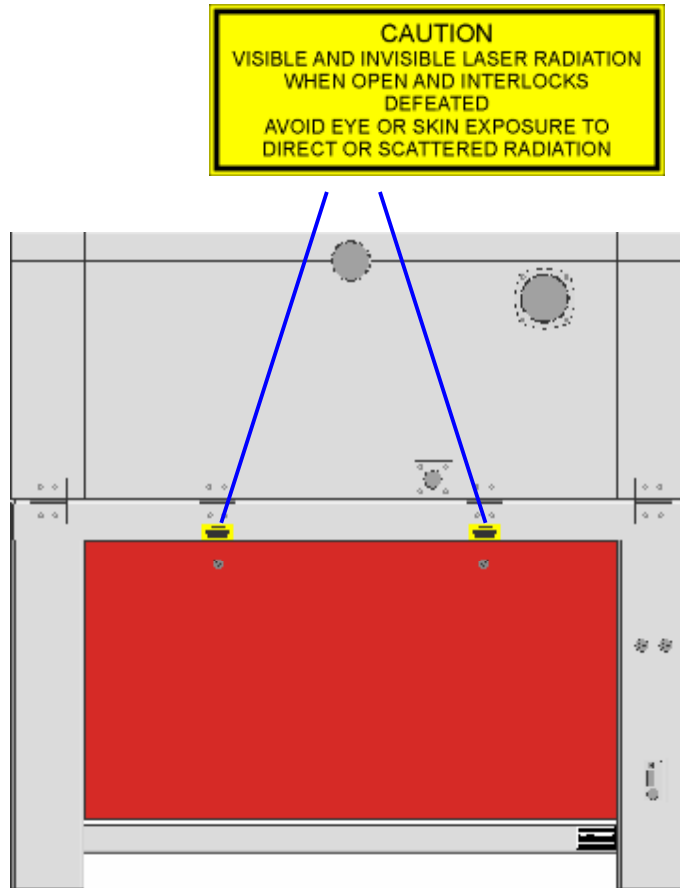


## Operation Manual Trotec Laserati 2.4 Warning and Information Labels

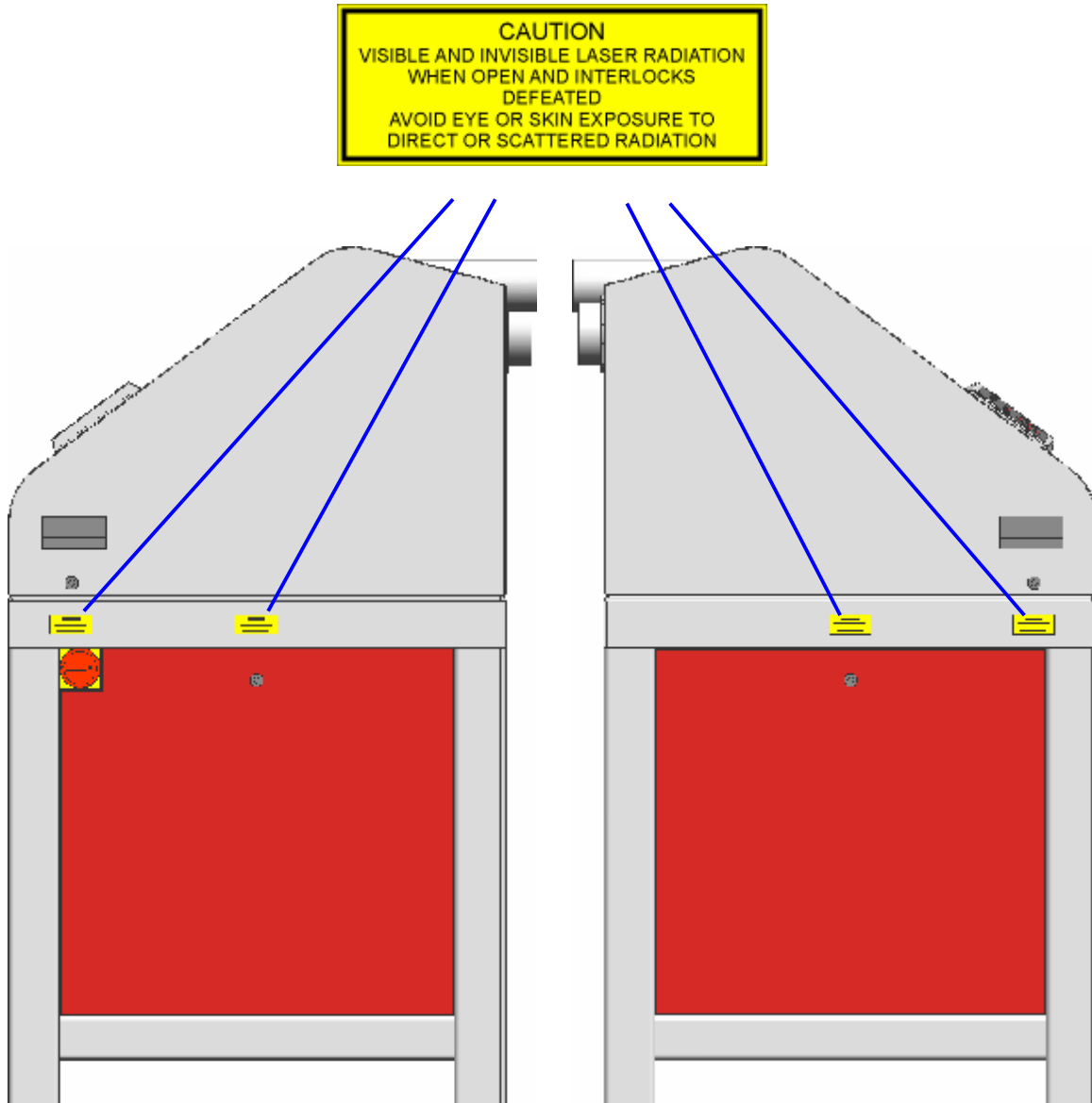


## Operation Manual Trotec Laserati

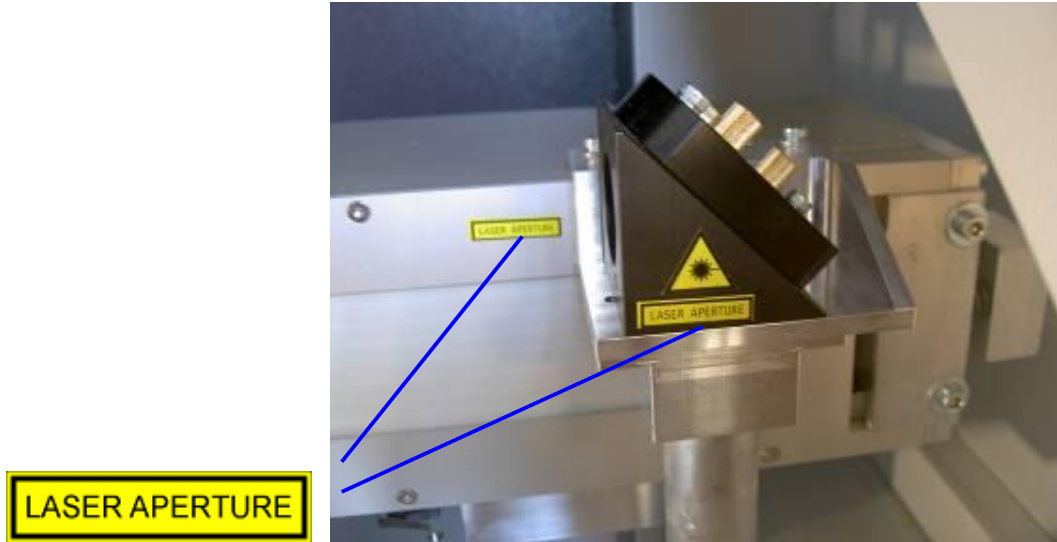
### 2.4 Warning and Information Labels



## Operation Manual Trotec Laserati 2.4 Warning and Information Labels



## Operation Manual Trotec Laserati 2.4 Warning and Information Labels



## SECTION 3 – BEFORE OPERATION

- 3.1 Electrical – Requirements/Connection
- 3.2 Exhaust System – Requirements/Connection
- 3.3 Cooling System – Requirements/Connection
- 3.4 Computer – Requirements/Connection

# Operation Manual Trotec Laserati

## 3.1 Electrical – Requirements



Make sure that your electrical outlet is capable of providing the proper voltage, frequency and amperage that the laser system requires.

We recommend having individual circuits for  
laser engraver  
extractor  
water chiller

Fuse rating 16A/25A / slow characteristics.

Please install your computer to the same circuit as the laser engraver to prevent electromagnetic interactions.

**DAMAGES FROM AN INADEQUATE OR INAPPROPRIATE POWER SOURCE ARE NOT COVERED UNDER WARRANTY.**

Noisy or unstable electricity as well as voltage spikes can cause interference and possible damage to the electronics of the laser system. It is better to connect the laser system to a dedicated electrical line.

It is highly recommended that you use a surge suppression plugs to protect your computer equipment.

If electrical power fluctuations, brown outs, or constant power outages are a problem in your area, an electrical line stabilizer, UPS (Uninterruptible Power Supply), or backup generator might be required. If installing any of these devices, make sure that they meet the electrical requirements of the laser system.

**It is your responsibility to provide a suitable electrical supply.**

## Operation Manual Trotec Laserati

### 3.2 Exhaust System – Requirements



#### **Trotec specifies the *Mistral Super Plus* to be used for the Laserati.**

DAMAGE CAUSED TO THE SYSTEM BY THE USE OF IMPROPER EXTRACTION EQUIPMENT WILL NOT BE COVERED UNDER WARRANTY



**NEVER operate the laser engraving system without a properly installed and operating exhaust system. Some materials when cut or engraved can produce fumes that are hazardous in concentrated amounts.**

The exhaust blower **MUST** be mounted on the **OUTSIDE** of the building either on the roof or on a cement pad next to the building possibly mounted on vibration dampers. Maximum tubing length should not exceed 30m.

Rigid tubing should be used for 90% of the distance traveled. The tubing should be smooth walled and have as few 90 degree bends as possible. Two 45 degree bends have better airflow than one 90-degree bend. Use tubing with a diameter that matches the blower unit. Do not connect the rigid tubing directly to the laser system. Use a short piece of industrial grade, wire reinforced rubber tubing to connect the end of the gate, or rigid tubing, to the laser system. This will provide mobility and will dampen blower vibrations. Do not use the silver foil type of flexible tube, as this is not hard wearing enough. Use only a meter or so because it's spiral construction reduces airflow. Install a hose clamp on both ends of the hose to prevent leaks and to prevent the hose from slipping off. Finally, have the blower wired to a wall switch in the same room for easy ON/OFF control.

Also consider installing a gate to control airflow and to close off the exhaust from the outside environment when the laser is not in use. This is especially useful in colder climates where it can be damaging to the laser system to have cold air coming into it from the outside.

## Operation Manual Trotec Laserati

In order to meet the laser system's requirements, a high-pressure, high static pressure rated, exhaust blower must be installed. This type of blower has self-cleaning blades and can maintain airflow even though restrictions are introduced. Length of exhaust pipe, exhaust pipe diameter, number of 90-degree angles, and other restrictions must be calculated when determining the correct exhaust blower unit. Installing an incorrect or undersized blower is not only unsafe, but it can also lead to premature and excessive wear and tear to the laser system. We recommend you seek a specialist, local supplier for this equipment.

DO NOT install forward incline, backward incline, in-line, or ventilator fans because these types of air handlers are inadequate and inappropriate for this type of installation. If your contractor has any questions concerning blower specifications or exhaust system requirements, please contact our Support Department directly before installation.



Do not start the Laserati without an adequate exhaust system.

## Operation Manual Trotec Laserati

### 3.3 Cooling System – Requirements



To achieve sufficient cooling of the laser tube, the Laserati requires the installation of a cooling aggregate which can work engraver.



Do not start the Laserati without an adequate exhaust system.

### 3.4 Computer – Requirements



**Minimum Computer Configuration:**

Pentium 1.4 GHz or faster  
256 MB of RAM, 512 MB recommended  
20 Gigabyte hard drive or bigger  
17 inch color VGA monitor or larger  
3.5" floppy disk drive  
CD-ROM Drive  
Mouse or other pointing device  
Microsoft Windows XP or 2000 (SP4)

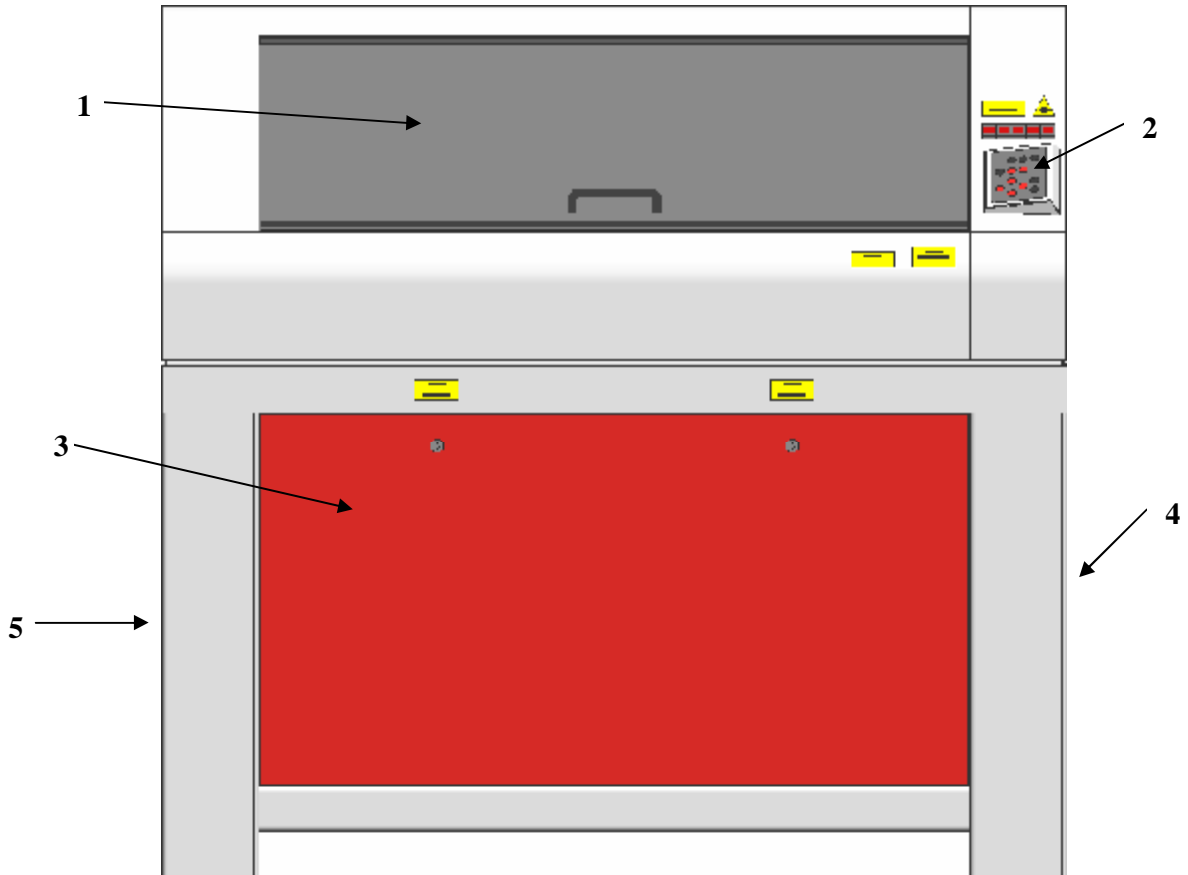
Remember that the laser system is an output device just like a printer is. With a higher specified computer you can create graphics and manipulate your software faster and process data faster to the laser, increasing your productivity.

## 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 Tips and Tricks for Laser Engraving

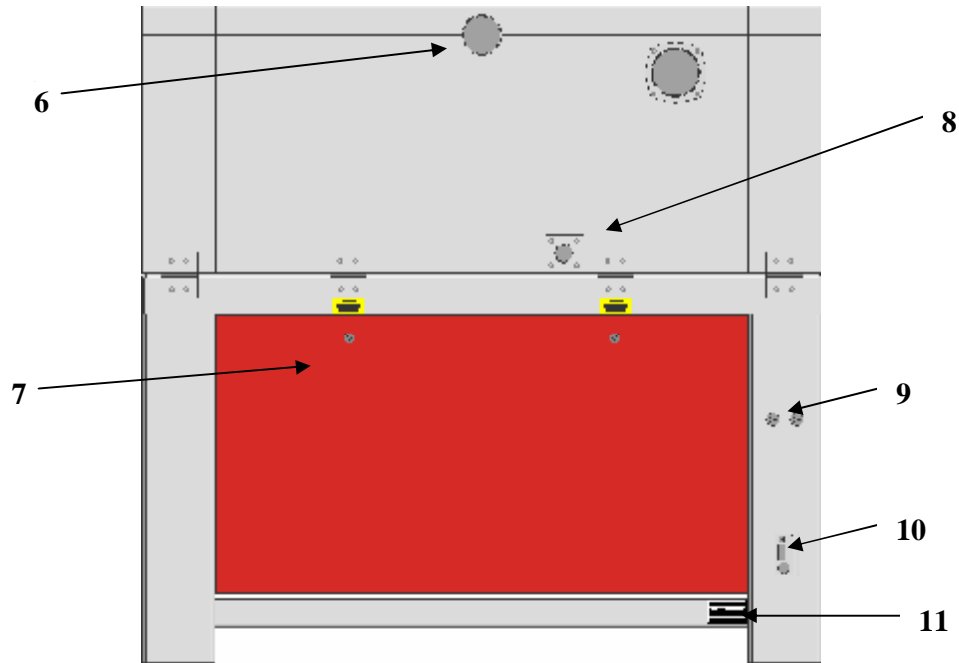
# Operation Manual Trotec Laserati

## 4.1 System View / Assemblies and Control Elements



- 1 top lid
- 2 keypad
- 3 front panel
- 4 maintenance panel
- 5 service access panel

## Operation Manual Trotec Laserati



- 6 connection for exhaust hose
- 7 back panel
- 8 connection for vacuum table
- 9 connection for cooling unit
- 10 connection for PC and exhaust unit
- 11 product ID label

## Operation Manual Trotec Laserati

- 01 Top lid
- 03 Front panel
- 04 Service panel
- 05 Maintenance panel
- 07 Back panel



If one of these panels is opened, no data is processed. After closing all of them, the device is not ready to process commands for 5 seconds. If one of these panels 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 incomplete. During processing of commands the protection cover must only be opened after pressing the "Pause" button.

### 02 Control Panel (Keypad)



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

- 06 Connection for exhaust hose
- 08 Connction for vaccum table



The connctions for the exhaust and the vaccum table have to be connected to the proper exhaust unit.

### 09 Connction for vaccum table



The connctions for the cooling unit have to be connected to the proper cooling unit.

## Operation Manual Trotec Laserati

### 10 Connction for PC and exhaust unit



The connction for the PC has to be connected with the PC controlling the engraver.  
The connction for the exhaust has to be connected to the proper exhaust unit.

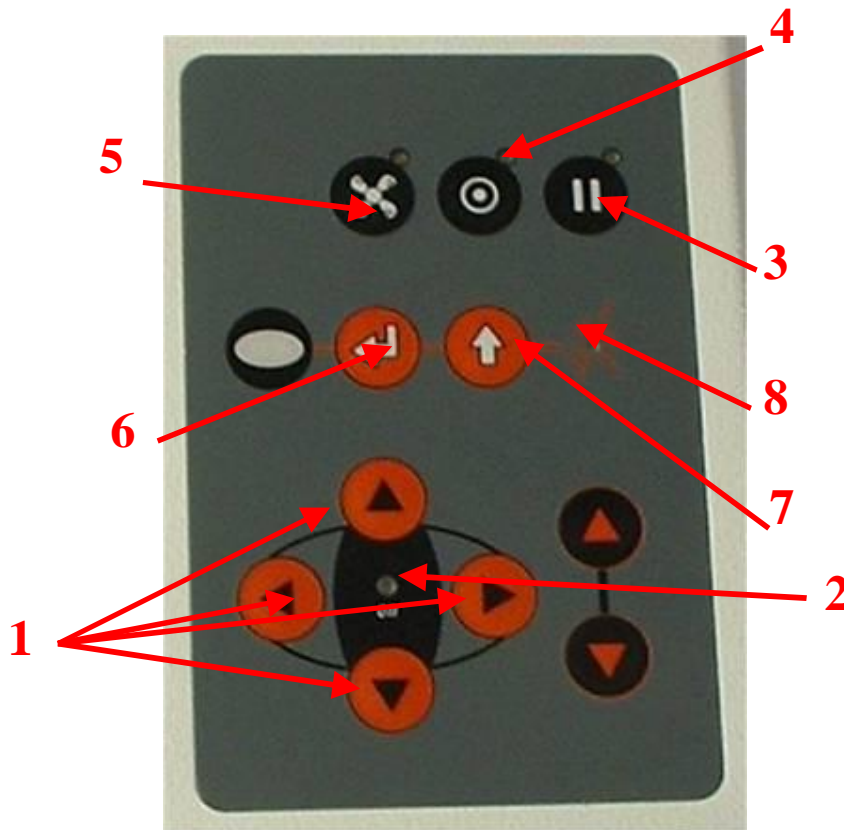
### 11 Manufacturer's Label (Product ID Lable)



The Product ID Lable identifies the kind of engraving machine.  
Control Panel contains multiple buttons and displays for controlling the device.



## Operation Manual Trotec Laserati



### 1 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 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 possible velocity, if opened, the speed is 1/4<sup>th</sup> of the maximum.

## Operation Manual Trotec Laserati

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

### 2 STATUS DISPLAY (indicates the current status of the device):

green, flashing slowly (0.5 Hz)	<b>10</b>	Laserati is ready
green, flashing fast (2 Hz)	<b>10</b>	Cover has been opened
green permanent light / Pause mode	<b>10</b>	Data available in the Laserati
red permanent light	<b>8</b>	Laser beam is being emitted
green/red flashing alternately	<b>8</b> <b>+</b> <b>10</b>	Cover open during switch-on process, simultaneously acoustic signal - no referencing

### 3 PAUSE



Used to stop the current working process (key lights up).  
If this key is pressed a second time, the key illumination goes out, the interrupted working process is continued.

## Operation Manual Trotec Laserati

### 4 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.

### 5 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).

### 6 REPEAT (SERVICE)



By pressing repeat, the jobs which are currently positioned on the  
selected plate in the Trotec manager are started.  
If the jobs have been processed before, they will be reset  
automatically.

## Operation Manual Trotec Laserati

### 7 TEST (SERVICE)



The key "Test" is used for doing some maintenance works.

### 6+7 TEST / REPEAT (SERVICE)



The keys "Test" and "Service" pressed simultaneously fire a laser test pulse. This is used for maintenance and only works with the door closed or with the interlocks closed at all.



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

### 8 STATUS INDICATOR LASER BEAM



Indicates, that a laser beam is currently being emitted.

### 7+ 3 TEST / PAUSE

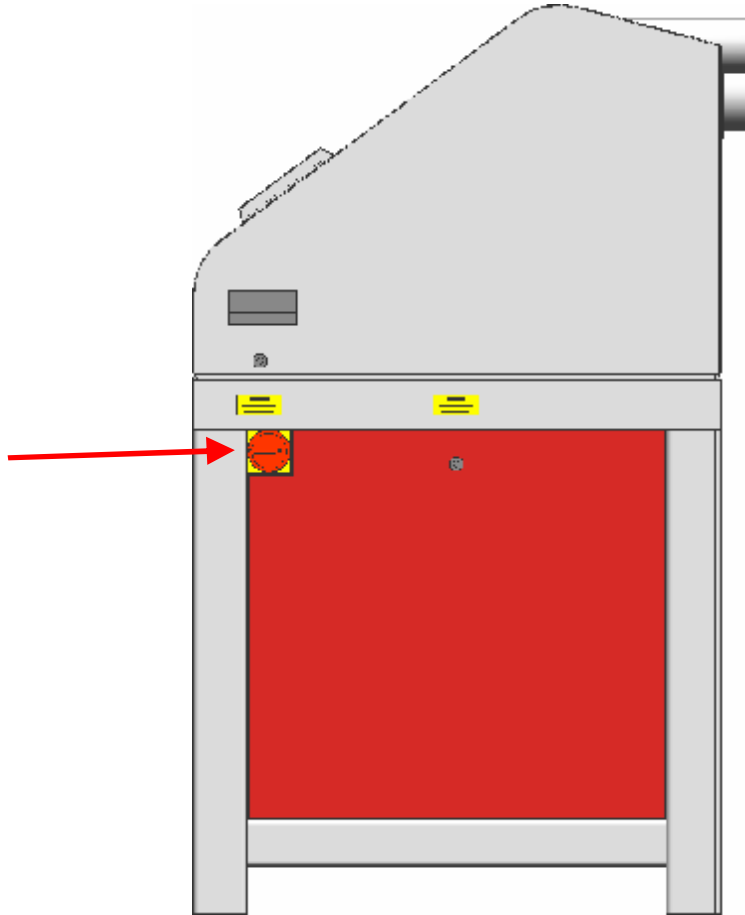
By pressing the keys "Test" and "Pause" the buffer memory in the machine is emptied.

# Operation Manual Trotec Laserati

## 4.2 First Steps Before Engraving

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

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



2. The working table automatically references in X & Y direction.
3. Open the protection cover and place work piece on the engraving table.



Usually you position the work piece 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.

## Operation Manual Trotec Laserati

### 4. Focusing the Laser Beam

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

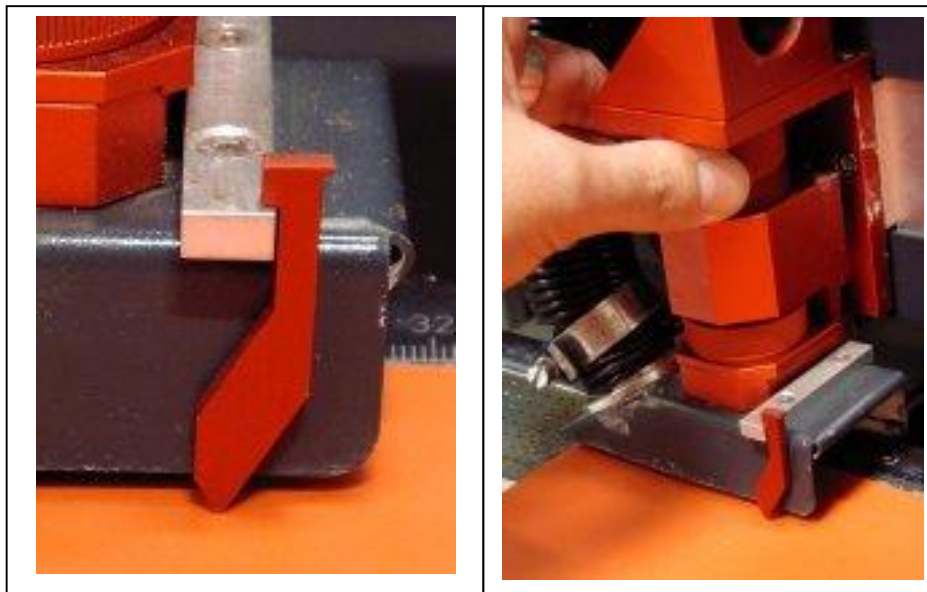


The focusing point of the laser beam (for the high-resolving lens, which is part of the delivery) is located 3.81 cm (1.5 inch) below the lens.

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

There is the following method to focus the laser beam:

The right focus level is reached, when the focus tool is touching the engraving material. It is not necessary that the fokustool falls off. Please ensure that the exhaust unit is not working when you are focusing. To get the proper focus, you will have to turn the adjustment right or left.



# Operation Manual Trotec Laserati

## ON/OFF Switch

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

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 (2).



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.



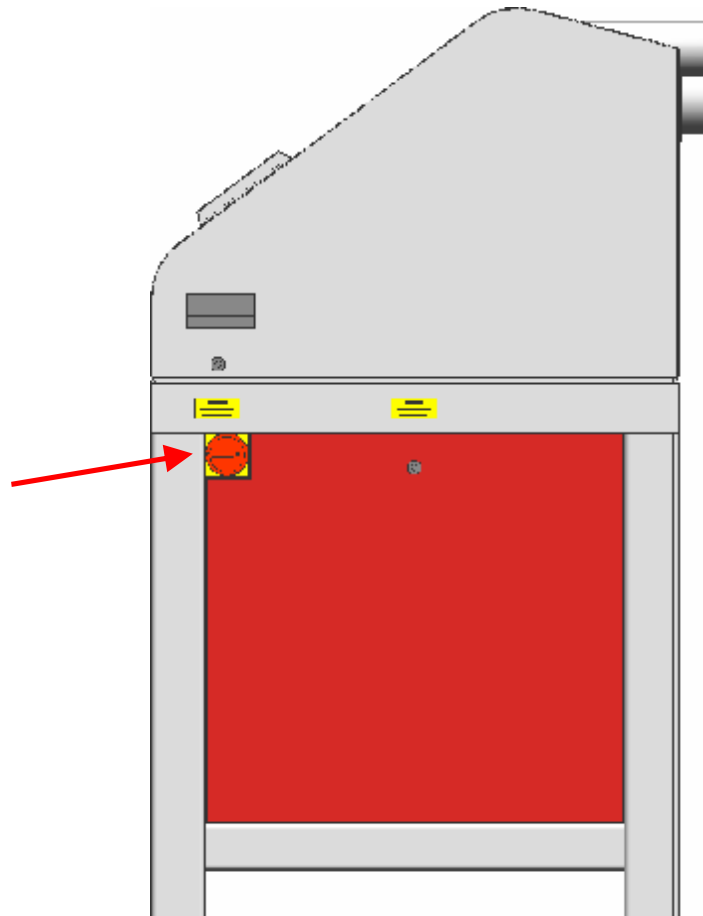
When switching off the mains supply, all processing data is lost.

# Operation Manual Trotec Laserati

## 4.3 First Engraving Tests

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

1. Switch on the computer first, then turn on the Laserati.



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 the lens is positioned over the material to be engraved. You focus with the help of the focusing tool according to the manual.

## Operation Manual Trotec Laserati

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 work piece automatically if requested.



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

5. Select "File Print", to access the Laserati printer driver, where you can perform work piece 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 work piece 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.  
**Make sure that on engraving flammable materials the air assist is on!**
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. Also switch on the cooling system for the laser tube.
10. Finally press the START button (green arrow) in the Engraver Control of the Manager, to start the engraving process.
11. 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 Laserati

### 4.4 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.



#### 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 Laserati will select the raster automatically.



#### Multiple cutting (insert logo)

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

## Operation Manual Trotec Laserati

### 4.5 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 micro porous 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.

We recommend to use at least a 10000HZ setting for cutting the rubber die.

You may also use the settings within the JobControl for getting links.

Therefore you will have to open the "Settings" and "Advanced Settings ..." to select even if you wanna get the "Links" or not. In case of Links, 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 Laserati

## 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 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.
3. Thoroughly remove all loose dirt particles and deposits in the interior of the machine.
4. Clean the cover of the laser tube.
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 Laserati

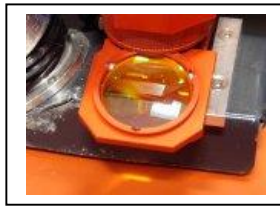
## 5.2 Cleaning the Optical Parts

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:

Check the lens before you start to work the Laserati. If you do a lot of cutting jobs, ensure that there is no dust to the lens. If there is some dust to the lens, remove it by blowing to the lens. If there is still some dust, you may have to use a cleaning tissue and some cleaning liquid. Take a tissue and drop some liquid on it. Be carefully when cleaning the lens. You **MUST NOT** rub to the lens. Just move the tissue slightly over the surface to the lens. Repeat this cleaning as long as there is no more dust to the lens.



1. Hold the lens assembly 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.
2. 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.
3. 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.

4. Examine the lens. If it is still soiled, repeat the cleaning process until the lens is clean.

## Operation Manual Trotec Laserati

5. Carefully insert the lens into the lens holder.



Ensure, that the rounded side (= convex) of the lens is facing upwards

6. Carefully assemble the lens in reverse order.

### CLEANING THE MIRRORS #2 AND #3:

Check the mirrors every week if there is may be dust or some other kind of contamination to them. You will just have to check the mirror on the laser head and on the right hand side of the x-axis. Remove them carefully and just one after the other. For cleaning the same things as for the lens will come up. Be carefully and do not scratch or misalign the mirror.



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 Laserati. To be able to access mirror #2, you have to open the top lid.

## Operation Manual Trotec Laserati



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

2. The mirror #2 is attached by means of two allen screws (arrow), which are located on the mirror holder. Open the screws and remove the lens holder 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.

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 two knurled screws (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.

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

## Operation Manual Trotec Laserati

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.

# Operation Manual Trotec Laserati

## 5.3 Maintenance Plan

	before every shift	daily	weekly	monthly
<b>Laser System</b>				
Focus	Check			
Lens	Cleaning			
Mirror			Cleaning	
Nozzle			Cleaning	
Vacuum table and rulers			Cleaning	
Entire working area			Cleaning	
Hoses			Check	
<b>Prefilter System</b>				
Manual dedusting	Every plate 3 times clockwise and 3 times counter clockwise			
Prefilter bag				Change
Prefilter cartridge				Change or when blocked
Hoses		Check		
<b>Exhaust System</b>				
Compact filter unit				Check
Hoses			Check	
<b>Cooling System</b>				
Temperature		Check		
Water fill level			Check	
Filter mate (front of chiller)				Cleaning

## Operation Manual Trotec Laserati

Kind of control	Activity/construction units	Frequency	✓
Control of the operation behaviour	Observe the PreFilter on normal behaviour: – Smell development. Stop the connected suction device and laser if necessary and inform maintenance personnel.	Daily	
Control for residue	Check the PreFilter and surrounding for residues of material and operating material and if necessary remove it.	Daily	
Remove contamination	– Corridor, work surface, inscriptions	Daily	
Filling level of the dust bin	– The filling level is to check on the window of control	Daily	
Wear control	– Mobile supplying and disposal pipes, – Outwardly recognisable seals etc. Renew construction units if necessary.	Monthly	
Lubrication	– Lubricate seal for lead through shaft in the cover part with a suitable lubricant.	Monthly	
Control for damage	– Outwardly recognisable damages at all construction units	Monthly	
Examine for leakage	– Hoses for supplying and disposal from the PreFilter	Monthly	
Examine filter cartridge	If the filter cartridge is accurate: – Dust flags	Yearly	

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 Training Program
- 6.3 Support Sheet

# Operation Manual Trotec Laserati

## 6.1 Tips for Troubleshooting

- ⌋ Laserati does not react after activating the "ON" key.
  - Check the mains connection.
  - Check the main fuses of the Laserati. They are located next to the mains connection socket.
  
- ⌋ No referencing is performed after switching on the Laserati.  
An acoustic signal can be heard.
  - Check whether the door of the Laserati is tightly fastened.
  - Check if the interlock system is closed.
  
- ⌋ The following error message is displayed when trying to establish a connection between the Manager and Laserati:  
"Could not build up connection to the laser engraver."
  - Check the cable connection between computer and Laserati.
  - Make sure that you are actually using the correct serial interface COM 1/2/3/... 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 Laserati 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 Laserati

## 6.2 Support Sheet

### Customer Data

Date		Customer no.	
Company		Contact person	
Address		Phone Fax e-mail	

Problem	.. Engraver	.. Manager	.. Printer Driver
Engraver model		Serial #	

<b>Failure description (how can the problem be reprocessed)?</b>

<b>Error Message</b>

<b>Work piece</b>		<b>Mode</b>		<b>Material</b>	
-------------------	--	-------------	--	-----------------	--

<b>Operating System</b>	
-------------------------	--

Graphics card		Network	
Main Memory		Hard Disk	
DTP Program		Version	

## Operation Manual Trotec Laserati

Remarks

### Processing

Received by		Date	
Forwarded to		On	
Solved by		Close Date	

# Operation Manual Trotec Laserati

## 6.3 Training Sheet

### TRAINING SCHEDULE

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

CHAPTER 1	<b>SAFETY</b> <ul style="list-style-type: none"> <li>• Laser safety</li> <li>• Safety, information and warning labels</li> <li>• Interlock system</li> </ul>
CHAPTER 2	<b>Operation</b> <ul style="list-style-type: none"> <li>• Operation of the system</li> <li>• Operation of the exhaust system</li> <li>• Operation of the chiller system</li> </ul>
CHAPTER 3	<b>SOFTWARE (incl. Corel Draw® version 12 or higher)</b> <ul style="list-style-type: none"> <li>• Fonts, fillings, outlines, ....</li> <li>• 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</li> </ul>
CHAPTER 4	<b>ENGRAVING TRIALS</b> <ul style="list-style-type: none"> <li>• Handling the engraver</li> <li>• Setting the focus position</li> <li>• Parameters for different results and materials</li> </ul>

# Operation Manual Trotec Laserati

## TRAINING SCHEDULE

CHAPTER 5	<b>CLEANING AND MAINTENANCE</b> <ul style="list-style-type: none"><li>• General cleaning of the system</li><li>• Cleaning the optics</li><li>• Cleaning the exhaust system and replacing the filters</li><li>• Observance of the maintenance intervals</li></ul>
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- Training performed in .....
- Training, test and installation at customer, location

Remarks:	
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CUSTOMER

TECHNICAL SUPPORT

DATE / SIGNATURE

DATE / SIGNATURE