

→ OPERATION MANUAL

SpeedMarker 300



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In case of failure, please check the device first. If unsuccessful, please note all data of the device (year of manufacture, software version, etc.) and call us from a telephone next to the switched on device.

For queries or technical problems please contact your dealer or Trotec Produktions- u. Vertriebs GmbH directly at the above address.

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1 Introduction

The SpeedMarker 300 is a second generation high quality galvo laser marker. The Yb fibre laser source means the system has an extremely **long life-cycle** and **minimal maintenance costs**. The system is maintenance free apart from the filter pad and processing lens.

The combination of a high quality galvo scanner and a fibre laser produce **highly precise marking results** in **short marking times**.

This, together with the marking software and the available interfaces, provides a **flexible** and **productive** marking solution of the highest quality standards.

2 General information

2.1 Information about the manual

This manual describes how to operate the machine properly and safely. Be sure to follow the safety instructions stated here as well as any local accident prevention regulations and general safety regulations.

Before beginning any work on the machine, ensure that the manual, in particular the chapter entitled "Safety Information" and the respective safety guidelines, has been read in its entirety and fully understood. This manual is an integral part of the machine and must therefore be kept in the direct vicinity of the machine and be accessible at all times.

2.2 Symbol legend

Important technical safety instructions in this manual are marked with symbols. These instructions for work safety must be followed. In all these particular cases, special attention must be paid in order to avoid accidents, injury to persons or material damage.



WARNING!

Risk of injury or death

This symbol marks instructions that must be followed in order to avoid harm to one's health, injuries, permanent impairment or death.



ATTENTION!

Risk of material damage

This symbol marks instructions which, if not observed, may lead to material damage, functional failures and/or machine breakdown.



WARNING!

Danger – electric current

This symbol warns of potentially dangerous situations related to electric current. Not observing the safety instructions increases the risk of serious injury or death. Care is to be taken in particular during maintenance and repair work.



WARNING!

Danger – laser beam

This symbol warns of potentially dangerous situations related to the laser beam. Not observing the safety instructions increases the risk of serious injury.



NOTE

This symbol marks tips and information which should be observed to ensure efficient and failure-free operation of the machine.

2.3 Liability and warranty

All information, illustrations, tables, specifications and diagrams contained in this operation manual have been carefully compiled according to the art current at the time of going to press. No liability is accepted with regard to errors, missing information and any resulting damage or consequential loss.

Strict compliance with the safety procedures described in this operation manual and exercising extreme caution when using the equipment are essential for avoiding and reducing the possibility of personal injury or damage to the equipment. The manufacturer shall not be liable for damage and or faults resulting from the disregard of instructions in the manual.

Additionally Trotec Produktions und Vertriebs Ges.m.b.H. is not responsible for any personal injury or material damage, of either an indirect or specific nature, consequential loss, loss of commercial profits, interruption to business, or loss of commercial information resulting from the use of the equipment described in this manual.

Any software incorporated in this equipment should only be used for the purpose for which it was supplied by Trotec Produktions und Vertriebs Ges.m.b.H. It is strictly prohibited for the user to undertake any alterations, conversions, translations into another computer language or copies (except for any essential back-up copies).

Trotec Produktions und Vertriebs Ges.m.b.H. reserves the right to update any of the information, illustrations, tables, specifications and diagrams contained in this operation manual with regard to technical developments at any time without notice.

2.4 Disposal remarks



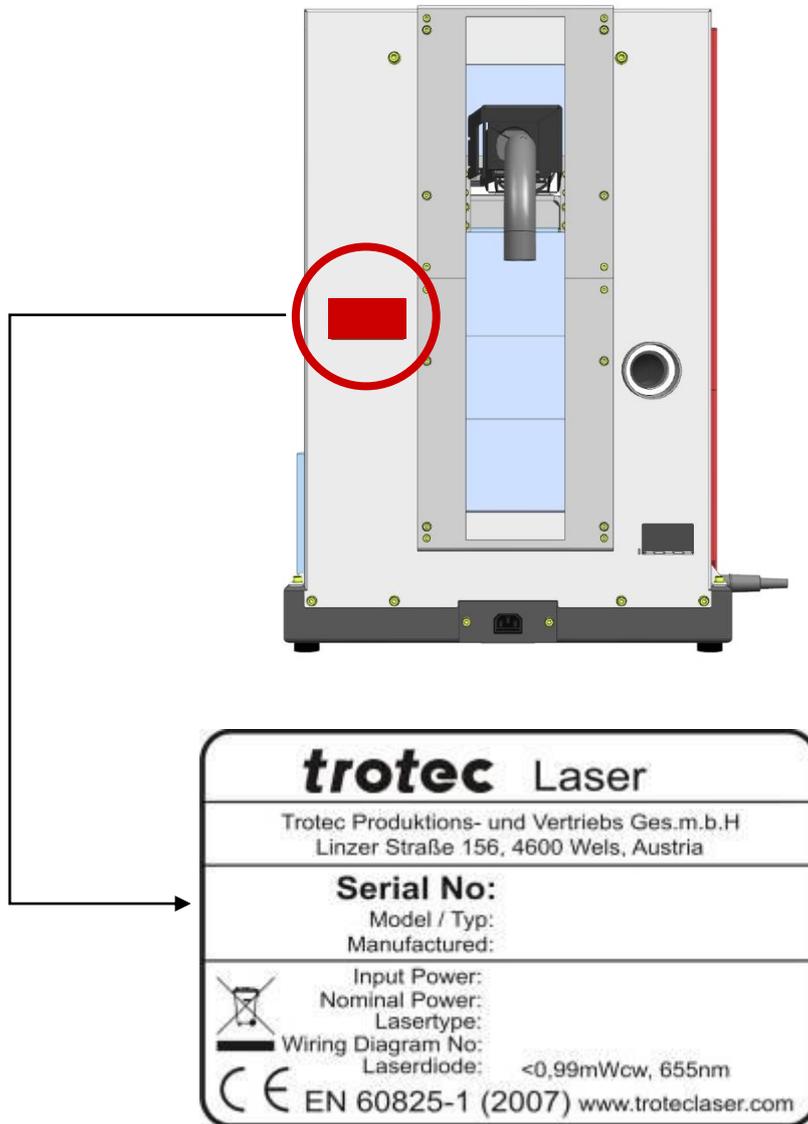
Do not dispose the machine with domestic waste!

Electronic devices have to be disposed according to the regional directives on electronic and electric waste disposal. In case of further questions, please ask your supplier.

Use suitable tools if you have to disassembly the machine. All separate parts need to be sorted into the different material types and also be disposed according to the regional directives on electronic and electric waste disposal.

2.5 Manufacturer's label

The Manufacturer's Label is located on the backside of the machine (see picture below)



Enter the serial number, model and year of manufacture from the manufacturing label here. This information is important for troubleshooting problems and ordering replacement parts.

2.6 EC-Declaration of conformity

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

Manufacturer:

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

Authorized person for the compilation of technical documentation:

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

We hereby certify that

SpeedMarker 300
ProMarker 300
Model N° 8025 SpeedMarker 300
Model N° 8025 ProMarker 300

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

Further valid guidelines/regulations for the product:

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

Applied harmonized standards:

- EN ISO12100 Machine Safety
- EN 60335-1/2007 Safety of Household and similar Appliances
- EN 55011 + A1/2010 Electromagnetic Compatibility
- EN 60204-1 Machine Safety – electr. Equipment
- EN 60825-1/2007, EN 60825-4/2006 and EN 60825-14/2006 Safety of Laser Equipment
- EN 61000-6-2/2005, EN 61000-3-3/2008 and EN 61000-3-2 +A1 +A2/2009 Electromagnetic Compatibility

Place, Date:

Wels, 14.10.2013

Personal data of the signer:

Stephan FAZENY, Head of Research and Development

Signature: _____



3 Safety

At the time of the machines development and production, it was built in accordance with prevailing technological regulations and therefore conforms to industry safety standards.

However, hazards may arise should the machine be operated by untrained personnel, used improperly or employed for purposes other than those it was designed for. This chapter provides an overview of all important safety considerations necessary to optimise safety and ensure the safe and trouble-free operation of the machine.

Other chapters of this manual also contain specific safety instructions.

Signs, labels and pictograms affixed to the machine must be kept visible and must not be removed.

3.1 Intended use

The SpeedMarker 300 is intended exclusively for laser marking using the supplied marking software.

For information about materials contact your Trotec sales person or the Trotec technical support.

The following points should also be observed as part of the intended use:



- Only mark approved materials using suitable parameters
- 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..
- 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!
Perform maintenance and service according to the specifications in this operation manual.
- Use a suitable extraction system to remove fumes, dust or other reaction products
- Operation of the system is only permitted with equipment and spare parts supplied or listed in the spare parts and consumables lists.
- **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 operator shall be solely liable for any damage that results from improper use of the machine.**

3.2 Laser classification

The laser safety class indicates the risk potential based on the level of accessible laser radiation.

The SpeedMarker 300 is a

Class 2 (US: class II) laser marking system as per DIN EN 60825-1 "Safety of laser products".

The SpeedMarker 300 with the option "pass-through" is a

Class 4 (US: class IV) laser marking system as per DIN EN 60825-1 "Safety of laser products".

Integrated laser source of the SpeedMarker 300 is a

Speedmarker FL , Class 4 (US: class IV) laser marking system identified according to DIN EN 60825-1.



Class 2 (US: class II)

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

The SpeedMarker 300 uses a Class 2 (US: class II) pilot laser. In order to prevent irritation of the eyes during operation, the operator should not look directly at the laser source.

Diffuse reflections of the pilot laser are entirely harmless.



Class 4 (US: class IV)

High powered lasers (visible or invisible) considered to present potential acute hazard to the eye and skin for both direct (intrabeam) and scatter (diffused) conditions. Also have potential hazard considerations for fire (ignition) and byproduct emissions from target or process materials.

It is the responsibility of the operator of the machine to take appropriate measurements to eliminate any dangers such as fire or explosions through the laser beam.



When dealing with class 4 (US: class IV) laser follow the following precautions:

- **According to BGV B 2 „Laser Emission“ a trained laser safety officer has to be appointed to evaluate potential hazards and to ensure that appropriate control measures are implemented.**
- The laser controlled area shall be posted with appropriate warning signs or warning lamps.
- The laser controlled area shall be defined to contain the laser radiation.
- Also it must be protected against unauthorized access.
- The operator of class 4 laser systems always has to wear appropriate safety glasses.
- An indicator (typically a light) to provide a warning of laser emission in advance of and during the emission time;

3.3 Manual contents

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.

3.4 Machine modification

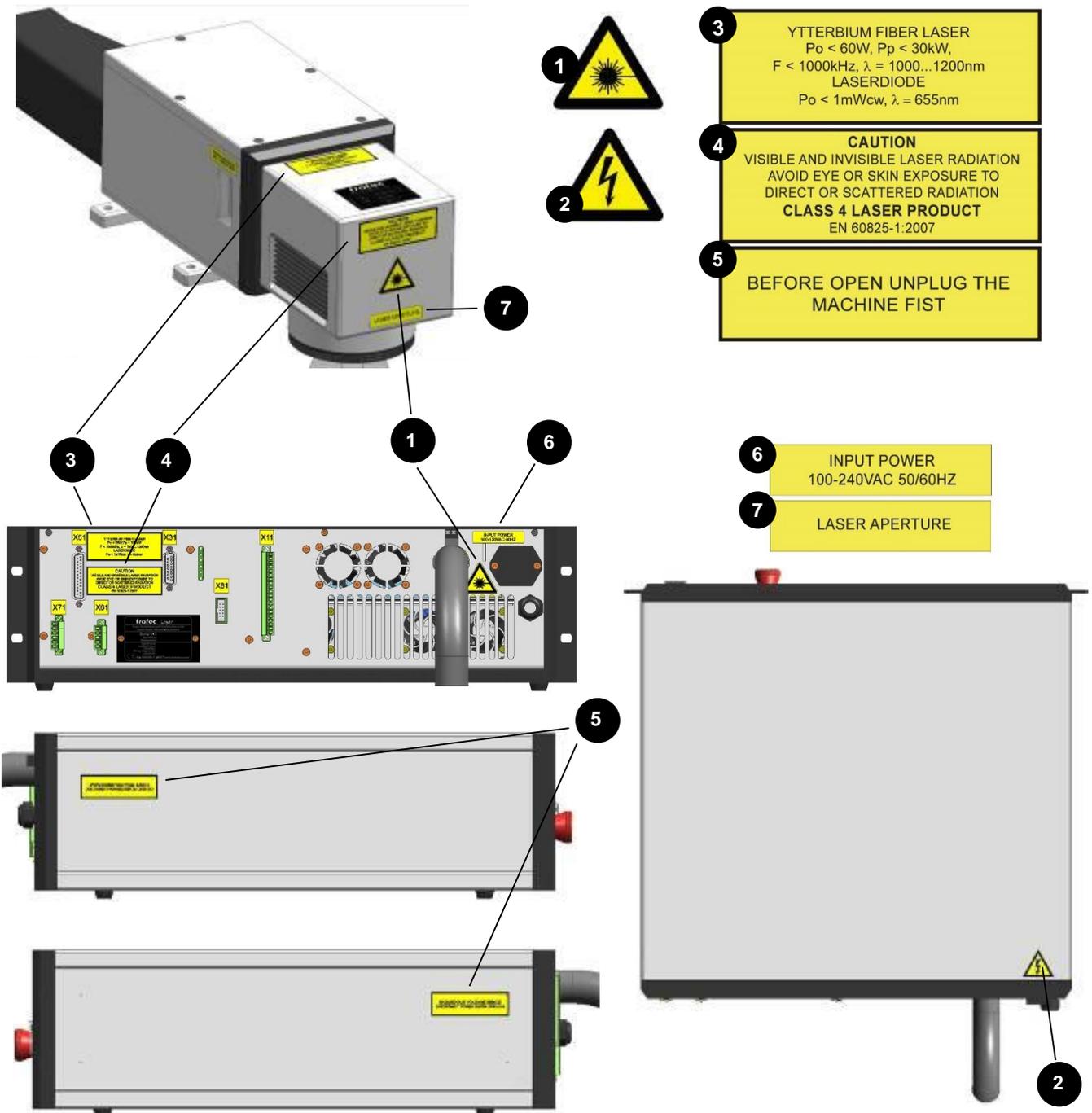
It is strictly prohibited to alter, retrofit or modify the machine in any way without the express consent of the manufacturer.

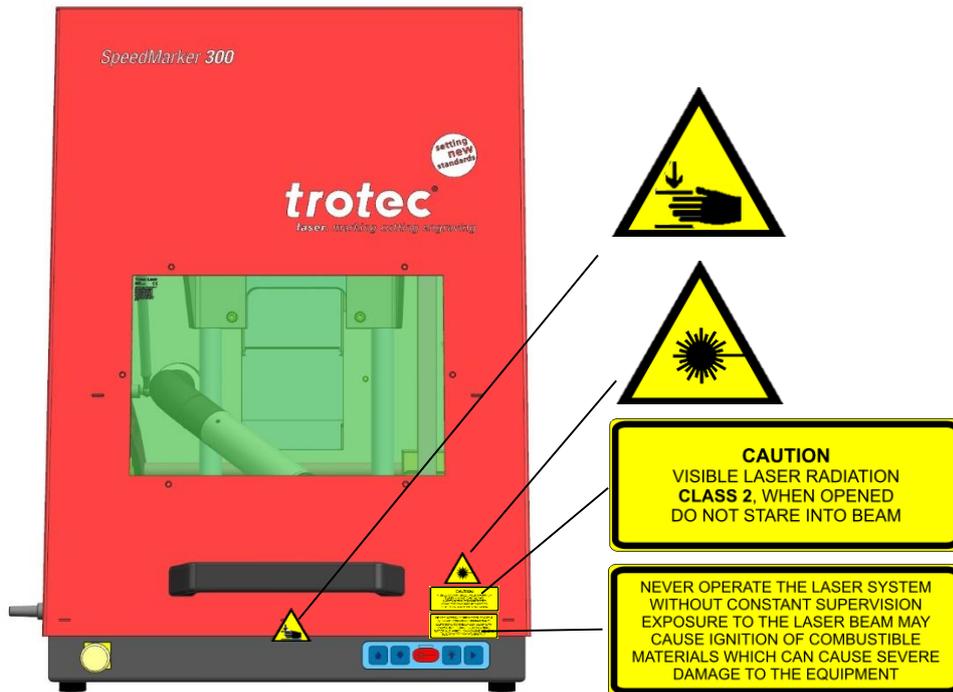
All signs, labels and pictograms affixed to the machine must be kept visible, readable and may not be removed. Signs, labels or pictograms that have become damaged or unreadable must be replaced immediately. Please contact your Trotec dealer for details.

3.5 Warning and information labels



The warning and information labels are attached in such positions of the machine 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. Please contact your Trotec dealer for details.





With pass through option (laser class 4):



3.6 General safety information

3.6.1 Responsibilities of the operator

- Keep this manual in the immediate vicinity of the machine in order to be accessible at all times to all persons working on the machine.
- The user must provide that the machine is only operated in perfect condition.
- 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. Particularly leftovers of produced materials have to be removed to prevent fire hazard.
- The operator must guarantee the cleanness and accessibility at and around the machine by corresponding instructions and controls.

3.6.2 Responsibilities and requirements of the user

- The machine must only be operated by trained and authorized personnel.
- 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.
- 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 behaviour during operation) that affect the safety.
- Preparation, retooling, change of work piece, maintenance and repair activities must only performed with equipment switched off, by trained personnel.
- 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.
- No working methods are permitted that affect the safety of the machine.
- It is absolutely forbidden for anyone who is under the influence of drugs, alcohol or reaction-impairing medication to work or work with the machine.
- 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.

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

3.6.3 Safety-conscious working

- Follow the safety instructions to prevent bodily injury and material damage while working on and with the machine.
- Failure to observe these instructions can lead to bodily injury and damage to or destruction of the machine.
- Disregard the safety advice and instructions given in this manual shall release the manufacturer and their authorised representatives from any liability and from all claims.

3.7 Laser safety information



- Without safety precautions, the following risks exist with exposure to laser radiation:
Eyes: Burns to the retina for **NIR (Near Infra Red) LASER**
Skin: Burns
Clothing: Danger of fire
- The laser beam must never be directed onto persons or animal!
- Never try to modify or remove the safety devices or cover of the laser head!
- 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.**

3.8 Safety regulations

The following directives and ordinances must be observed to avoid hazards when operating TROTEC laser systems.

| | |
|----------------|----------------------------------------------------------------------------------------------------------------|
| EN 60825-1 | Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide |
| EN 60950 | Safety of Information Technology Equipment |
| EN 61010-1 | Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use; General Requirements |
| BGV B2 (VBG93) | Laser beam |
| UL 60950 | Standard for Safety for Information Technology Equipment |
| UL 31011-1 | Electrical Equipment for Laboratory Use - Part 1: General |
| 21 CFR 1040.10 | Performance Standard for Light Emitting Products - Specific Laser Products |
| 21 CFR 1040.11 | Performance Standard for Light Emitting Products - Specific Purpose Laser Products |



The general ordinances and directives listed above may differ according to locality, region or country. Therefore, always observe the directives applicable to you.

The customer is always responsible for carrying out all safety requirements as TROTEC Produktions und Vertriebs Ges.m.b.H. has no influence over the proper use of the machine.

The system integrator is responsible for observing the directives listed above when integrating our laser systems

3.9 Risks



Risk posed by the incorrect actions of untrained individuals!

The improper use of the machine can lead to injury and/or damage to the machine.

→ Inform personnel about the machine's function and any other risks and record this in the training records.

Observe official regulations regarding the operation of machines and accident prevention regulations



Risk posed by missing, faulty or bridged safety installations and machine components!

Faulty or missing safety installations and machine components can lead to death, injury and/or damage to the machine.

→ Check carefully that safety installations and machine components are functioning properly and are fault free.

→ The specified actions should be undertaken immediately if parts are faulty or defective.



Risk posed by incorrect operation (in particular in setup-mode)!

Setting and operating the machine with limited knowledge of its function can lead to injury and/or damage to the machine.

→ Read and observe the operating and safety instructions before commissioning the machine!



Risk posed by incorrect operation by unauthorised individuals!

Setting and operating the machine with limited knowledge of its function can lead to injury and/or damage to the machine.

- Never leave the machine unattended while in operation.
- Turn off the machine at the main switch when not in use.



Risk posed by missing machine signage!

Making the wrong assumptions can lead to the risk that the machine is operated incorrectly.

- Replace missing machine signage.



Risk posed by non-repairable faults!

Any non-repairable fault may damage the machine.

- Turn off the machine and call customer service!



Risk posed by using inferior spare parts or parts of other manufacturers!

The use of inferior spare parts or parts produced by other manufacturers impairs the safety of the machine and invalidates the Declaration of Conformity (CE) supplied with it.

- Wear parts or damaged mechanical, safety or electrical components should be replaced by original spare parts.



Risk posed by missing protective equipment!

- Wear the appropriate workwear.
- Wear safety glasses (**class 4/USA: Class IV**)
- Use a suitable extraction system.



Risk posed by laser marking reaction products!

A suitable extraction system must be used when laser marking due to the possible generation of gases, fumes and any other partially toxic by-product.

In individual cases, the reaction products may consist of static dust. If this enters any electrical systems it can cause short circuits leading to personal injury and material damage.



Risk posed by flammable or explosive materials!

Class 4 laser radiation such as that emitted by the SpeedMarker 1300 may ignite materials or cause explosions. Among others it should be ensured that:

- Parameters are selected so that the material does not overheat
- The system is monitored if necessary
- Dust is extracted safely

There is no accumulation of any flammable residues or remnants in the workspace.

3.10 Gases, fumes and dust

Depending on the materials being marked and the parameters selected, laser marking may generate gases, fumes, aerosols or dust.

The toxicity of such by-products depends on the material.

The operator is responsible for ensuring a suitable extraction system is in place and for compliance with the relevant guidelines in order to protect individuals and the environment.

The guideline VDI 2262 1...3 "Workplace air" provides, among other things, additional remarks.

The operator must also ensure that gases, fumes or dust do not settle on the processing lens. Any dirt accumulating on the processing lens can lead to a loss of performance, poor marking results and damage to the device.

4 Technical data

4.1 Dimensions

4.1.1 Interior and exterior dimensions

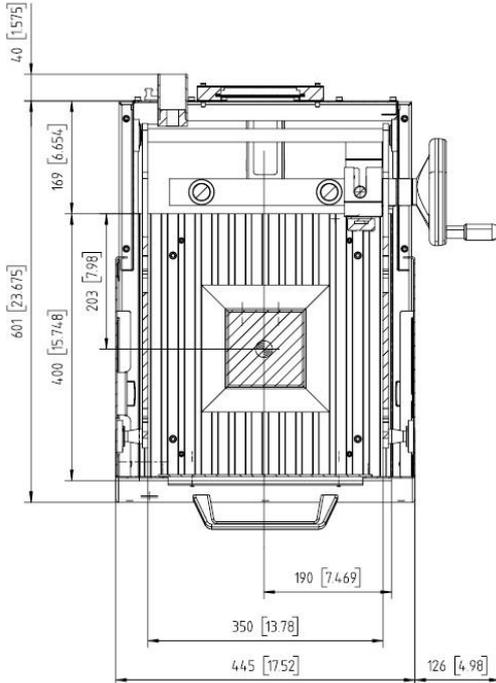


Figure 1: Top view

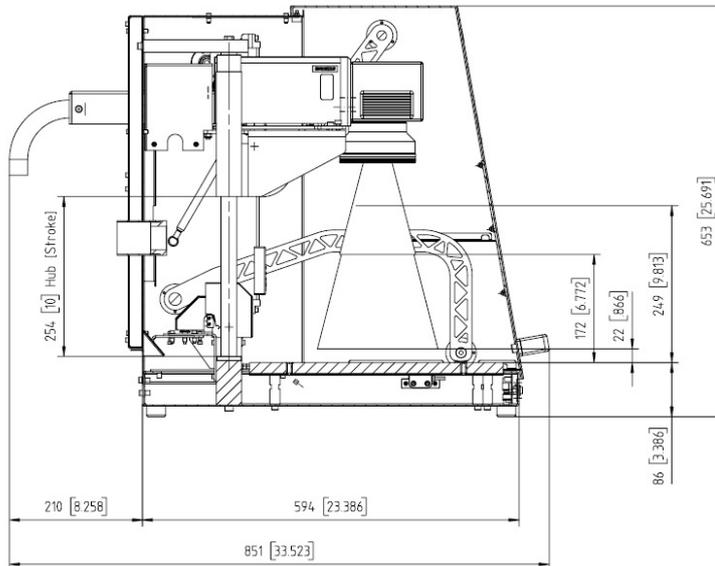


Figure 2: Side view (door closed)

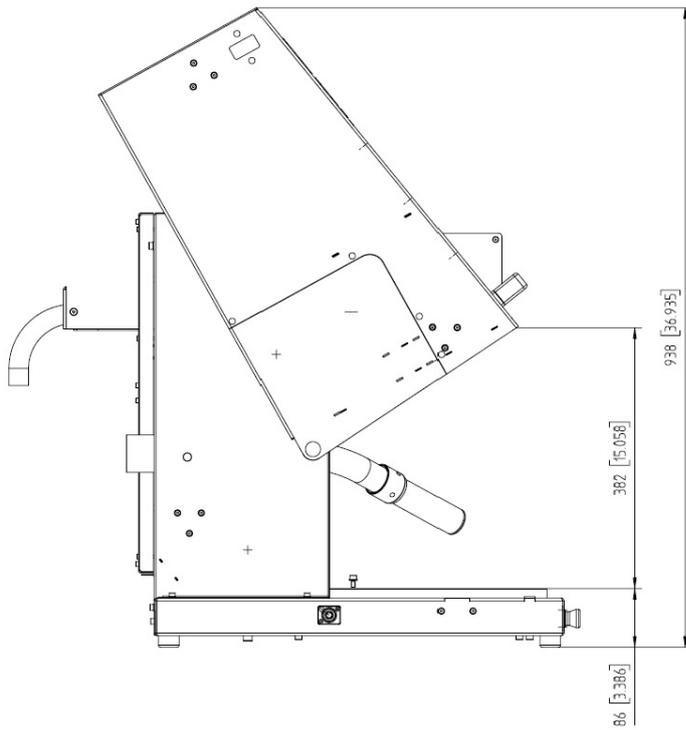


Figure 3: Side view (door open)

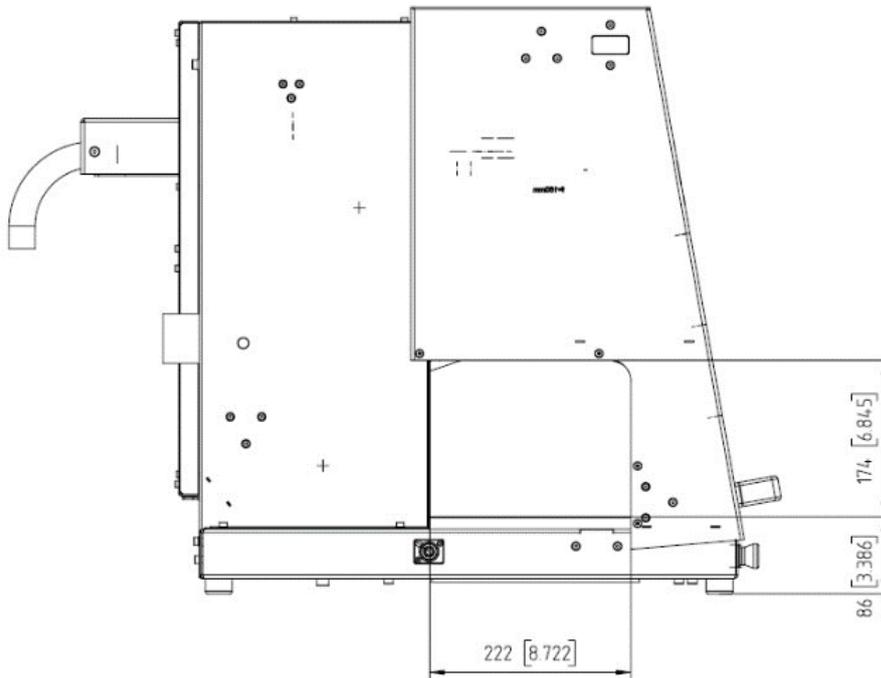
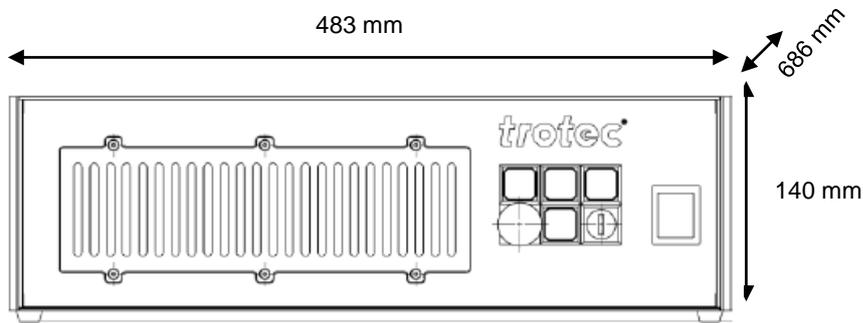
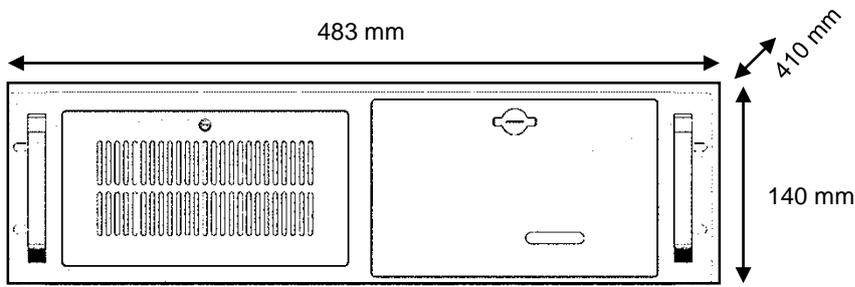


Figure 4: Side view (door closed)

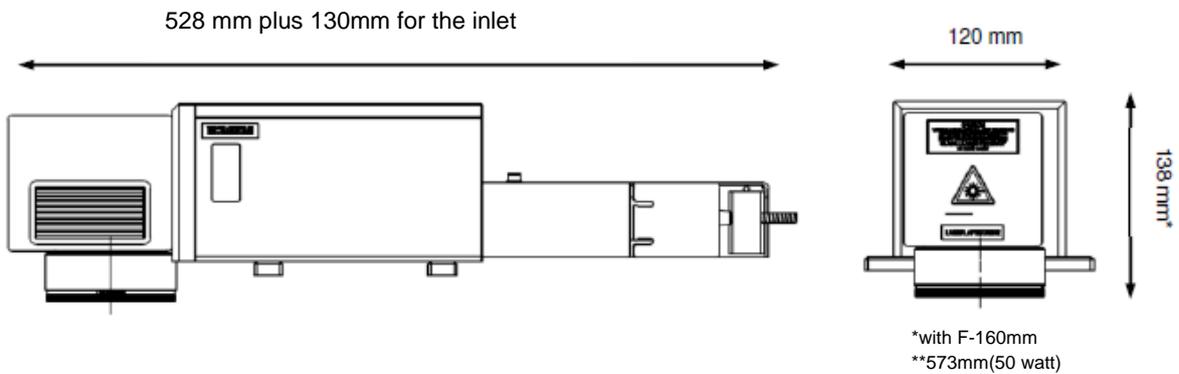
4.1.2 Laser module dimensions



Laser rack: 482,6 x 140 x 686 mm³ (W x H x D) (3RU, 19" compatible)



Industrial-PC: 482,6 x 140 x 410 mm³ (W x H x D) (3HE, 19" compatible)



4.2 Data sheet

| Laser | | | | |
|---------------------------|---------------------------------------------|-----------|-----------|-----------|
| Laser | Q-Switched Yb-fiber laser, maintenance free | | | |
| Wavelength | 1064 nm ± 8 | | | |
| Pulse duration | 110 ns ± 20 | | | |
| Beam quality | M ² < 1,5 | | | |
| Power stability | better ± 5% | | | |
| Cooling | air cooled | | | |
| Laser type | FL 10 | FL 20 | FL 30 | FL 50 |
| Max. average output power | 10 W | 20 W | 30 W | 50 W |
| Max. pulse energy | 0,5 mJ | 1 mJ | 1 mJ | 1 mJ |
| Pulse repetition rate | 20-80 kHz | 20-80 kHz | 30-80 kHz | 50-80 kHz |
| Integrated pilot laser | ✓ | ✓ | ✓ | ✓ |

| Galvo-System | | | |
|--------------------------------------|-----------------------------------------------------|-----------|-----------|
| | <i>Standard:</i> | | |
| Lens / Focal length | F-100 | F-160 | F-254 |
| Marking area [mm x mm] | 70 x 70 | 120 x 120 | 190 x 190 |
| Focus diameter | ~ 27 µm | ~ 45 µm | ~ 68 µm |
| Writing speed | 640 cps – 1 mm single line with F = 160 mm | | |
| <i>(Option high-speed scan head)</i> | <i>(900 cps – 1 mm single line with F = 160 mm)</i> | | |
| Positioning speed | 10.000 mm/s with F = 160 mm | | |
| <i>(Option high-speed scan head)</i> | <i>(15.000 mm/s with F = 160 mm)</i> | | |

| Workstation | | | |
|-----------------------------------------------------------------------|--------------------------------------------------------------|--------|--------|
| Interior dimensions (W x D) | 350 x 400 mm ² | | |
| Dimension of opening (W x H) | 350 x 383 mm ² | | |
| Door | manual | | |
| Maximum part size (W x D) | 350 x 400 mm ² | | |
| Maximum part height | 250 mm | 171 mm | 22 mm* |
| <i>(Depending on lens)</i> * 16mm with optional high-speed scanner | F-100 | F-160 | F-254 |
| Maximum load | 25 kg | | |
| Table | Aluminum t-slot table (Isel PT 25) 375 x 400 mm ² | | |
| Z-axis | Mechanical or software-controlled Z-axis | | |
| Traveling distance Z-axis | 250 mm | | |
| Pass-through option (W x H) | 200 x 165 mm ² | | |
| Color | RAL 3002, RAL 7016, RAL 7035 | | |

| Control | |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Computer | Industrial PC as 19" rack unit, 3RU high, 4 GB RAM, HDD 250 GB, DVD ROM, Windows [®] 7 |
| Interfaces | USB, Ethernet, RS232, |
| Interfaces laser | Laser-interlock, marking-start (24 VDC), marking-stop (24 VDC), E-Stop, Error-Reset, Laser-Busy, optional digital I/O's (24 VDC), |
| Software | SpeedMark |

Options / Accessories

| | |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Optional lenses and galvo scanners | F-100, F-16, F-254 High-speed scan heads with lenses |
| Focus finder | Second pilot laser for precise and user friendly adjustment of working distance |
| Software | DirectMark printer driver: Laser marking as easy as printing. Independent from software |
| Extended I/O interface | Additional in- and outputs, 24 VDC |
| Pass-through | Optional pass-through for marking of larger parts. Machine will become laser class 4; not retrofitable |
| Additional optional accessories | <ul style="list-style-type: none"> • Software controlled Z-axis • Mini rack for computer and laser unit • Rotary unit with different chucks • Foot switch for efficient and user friendly control of the system • Exhaust systems |

Dimensions / Installation / Laser Safety

| | |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions (W x H x D) | Marking head: 120 x 138 x 528 mm ³ Laser rack unit: 483 x 140 x 686 mm ³ <i>(equals 3RU, 19" compatible)</i> |
| | PC: 483 x 140 x 410 mm ³ <i>(equals 3RU, 19" compatible)</i> |
| Footprint (W x D) <i>(with software controlled Z-axis)</i> | 572 x 851 mm ² <i>(445 x 851 mm²)</i> |
| Height (with open door) | 653 mm <i>(938 mm)</i> |
| Weight | App. 48 kg (without PC, laser rack and marking head) PC: app. 11,5 kg, laser rack: app. 17 kg |
| Ambient conditions | Operating temperature range +5 to +35° C. Relative humidity max. 90 %; Non-condensing |
| Electrical requirements | 115 - 230 VAC, 50/60 Hz, 1/N/PE |
| Power consumption | < 600 W <i>(incl. PC)</i> |
| System protection | Marking head: sealed against spray water <i>(IP 54)</i> Laser rack unit: dust protected <i>(IP20)</i> |
| Laser class | CDRH laser safety; laser class 2; CE tested |

5 Transport, packaging and storage

5.1 Safety instructions



WARNING

There is a risk of injury as a result of falling parts while transporting, loading or unloading the machine.



CAUTION

The machine can be damaged or destroyed if it is subject to improper handling during transport.

For this reason the following safety instructions must be observed:

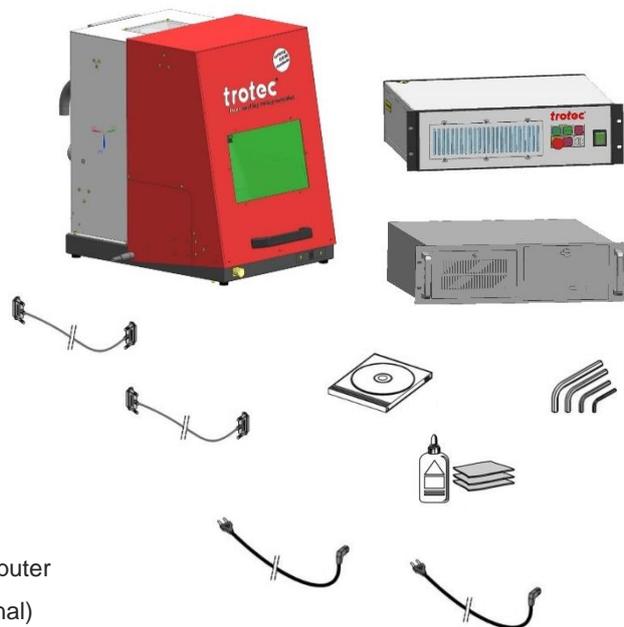
- Almost move the machine with the utmost care and precaution.
- Consider the machine's centre of gravity when transporting it (minimize the risk of it tipping over).
- Take measures to prevent the machine from slipping sideways.
- Transport the machine as carefully as possible in order to prevent damage.
- When transporting the machine overseas, ensure that the packaging is airtight.
- Protect the machine against transportation damage using straps and inserts, and leave sufficient distance between other transported items.
- Do not place any heavy loads on the machine or machine components.
- Ambient temperature for transportation:

Min. temp. 10 °C

Max. temp. 40 °C

5.2 Scope of supply (standard configuration)

- 1x SpeedMaker 300 (incl. laser module)
- 1x Industrial Computer
- 2x Key for Industrial Computer
- 2x Key for laser module
- 1x Connection cable set:
 - Cable W203 (X51 – X53).
 - Cable W503 (X93 – X103)
 - Back bridge Plug (X31)
 - X11 plug (wired)
- 1x CD with marking software
- 1x Windows Backup
- 1x Lens cleaning kits
- 1x Allen key set
- 2x Power cord for laser module and computer
- 1x Power cord for electrical Z-axis (optional)
- 1x Extraction system connection cable (optional)
- 1x Pass-Through interlock key (optional)
- 2x: Additional weights when side panels released (for Pass-Through only)



5.3 Transport and unloading

Unless otherwise agreed, the machine is delivered in a packaging case.
Only use the original packaging case if you need to transport the SpeedMarker 300.



CAUTION

During transport the transport case can slip, tip or fall over.
Always secure the transport case and take into account the center of gravity of the box.



5.4 Transport inspection and reporting faults



CAUTION

The marking head is connected to the actual laser source in the laser rack via an approx. 2.1 m long fibre optic cable. The fiber optic cable is enclosed with the jumper cables in a black protective tube for protection. **Avoid any unnecessary stretching or bending by a radius more than 70 mm of the fiber optic cable.** This could damage the fiber optic cable.



CAUTION

The lens unit should only be uncovered following installation. The lenses are high quality optical components which must be kept clean in order to ensure optimum marking results.
Never touch the lenses with bare fingers!

Upon arrival, inspect the delivery to ensure that it is complete and has not suffered any damage. If any transport damage is visible, do not accept the delivery or only accept it with reservation. Record the scope of the damage on the transport documents/delivery note. Initiate the complain process. For all defects that are not discovered upon delivery, be sure to report them as soon as they are recognized as damage claims must be filed within a certain period, as granted by law.

5.5 Unpack the machine

Only trained and authorised personnel are permitted to transport and unpack the machine.
To avoid that any wooden parts are falling off or the machine is tipping, be very careful when opening the transport case.

1. Position the transport case on level ground.
2. Remove the vertical tightening straps.
3. Remove the top of the transport case.

5.6 Storage

Keep the machine sealed in its packaging until it gets assembled/installed.

Store packed items only under the following conditions:

- The storage location must be dry, free of dust, caustic materials, vapors and combustible materials
- Store in a storage room or packaged with adequate weather protection.
- Avoid subjecting the machine to shocks.
- Storage conditions:

| | |
|----------------------|----------------------------|
| Storage temperature: | +0 bis +40°C (+0 to 104°F) |
| Relative humidity: | max. 85% |
- Avoid extreme temperature fluctuations.
- Take particular care when packing away electronic components.
When storing for a longer period apply a coat of oil to all machine parts open to rusting. Regularly check the overall condition of all parts and packaging.

5.7 Plant-internal transport (repositioning the machine)

The SpeedMarker needs to be transported in an upright position; avoid any strong vibrations.

1. Shut off the machine.
2. Unplug the electrical supply.
3. Remove the exhaust system.
4. Reposition and park the machine on clean, solid level ground again.
5. Adjust the machine, setup the electrics and carry out a performance test.



CAUTION

When transporting the machine over great distances the original transport box including interior protection needs to be used.

6 System Overview

6.1 General System Overview of SpeedMarker 300

Workstation housing:

- 1 Safety door incl. safety glass (closed)
- 2 Safety door handle
- 3 Cable opening (interlock, mark start, rotary)
- 4 Extraction system connector
- 5 Laser safety protection elements
- 6 Backside of marking head incl. fibre
- 7 Manufacturers plate

... with mechanical Z-axis option:

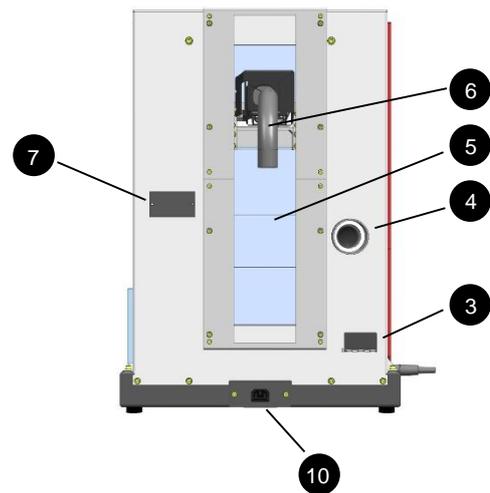
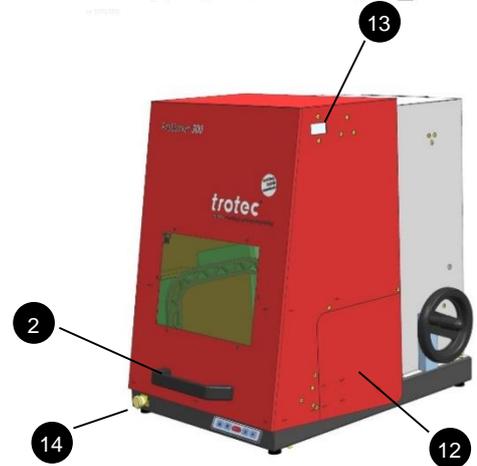
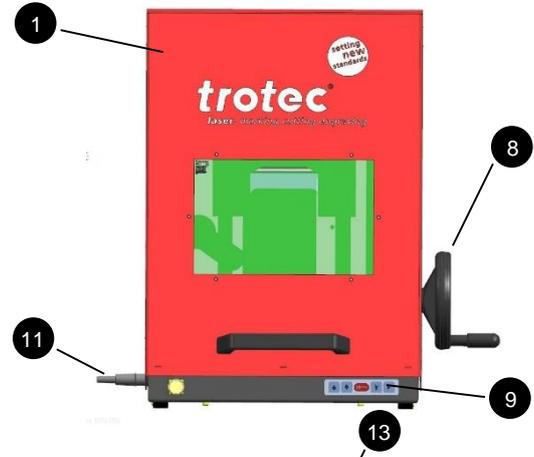
- 8 Z-Axis adjustment wheel

... with software controlled Z-axis option:

- 9 Keypad
- 10 IEC Connector for Z-Axis

... with Pass-Through option:

- 11 Interlock hatch
- 12 Removable side panels (both sides)
- 13 Interlock indication lights (both sides)
- 14 Emergency Stop button



6.2 Processing Area Layout

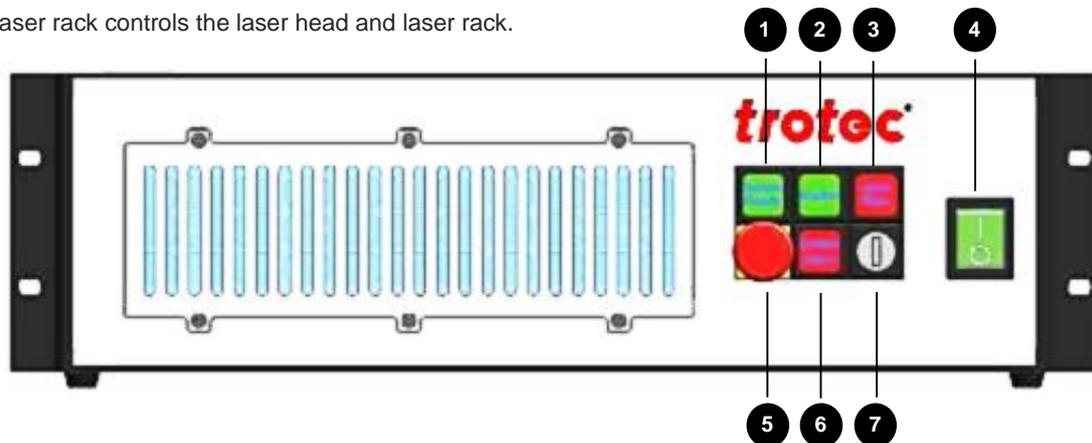
The processing area contains the axis system, extraction hose, light, t-slot table and the marking head including lens.



6.3 Control Elements

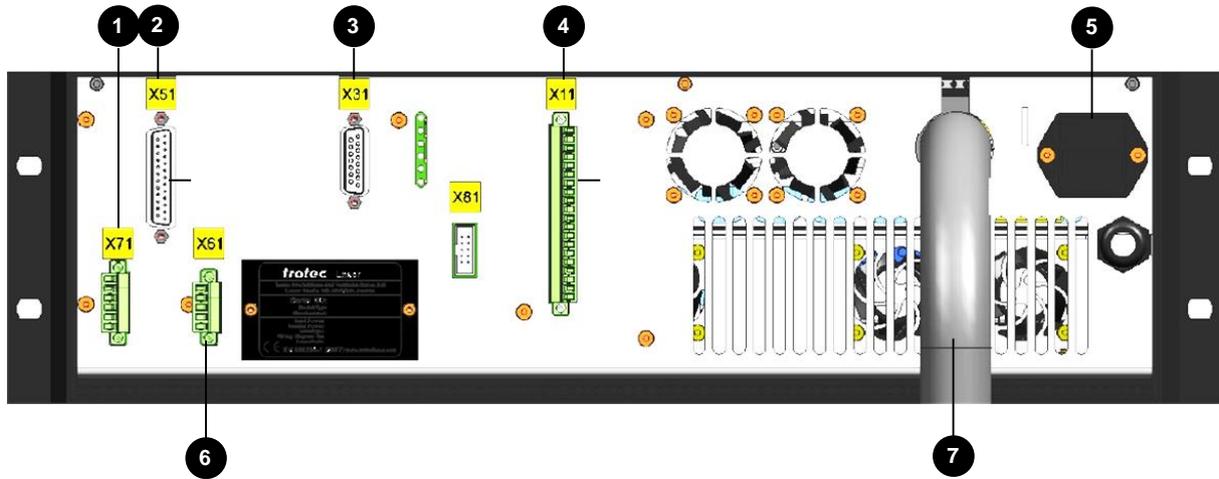
6.3.1 Laser Rack Front View

The laser rack controls the laser head and laser rack.



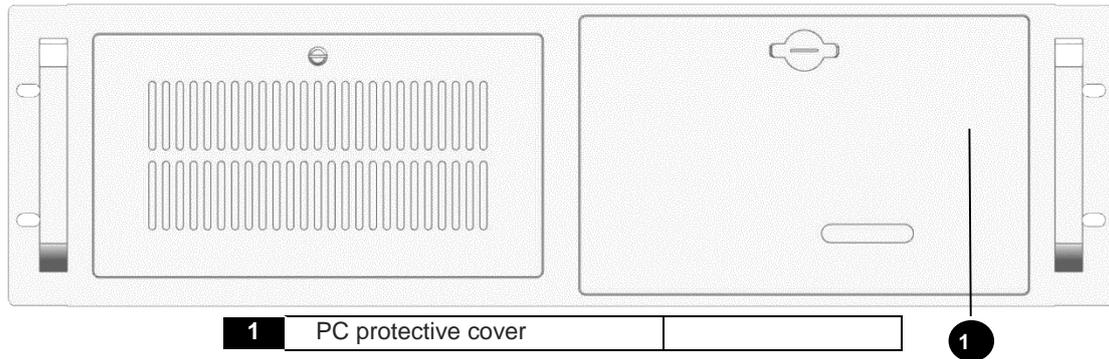
| | | |
|---|-------------------|--------------|
| 1 | System ready | Control lamp |
| 2 | Shutter | Control lamp |
| 3 | Laser busy | Control lamp |
| 4 | Main laser switch | |
| 5 | EMERGENCY STOP | Switch |
| 6 | System Alarm | Button |
| 7 | Key switch | |

6.3.2 Laser Rack Back View

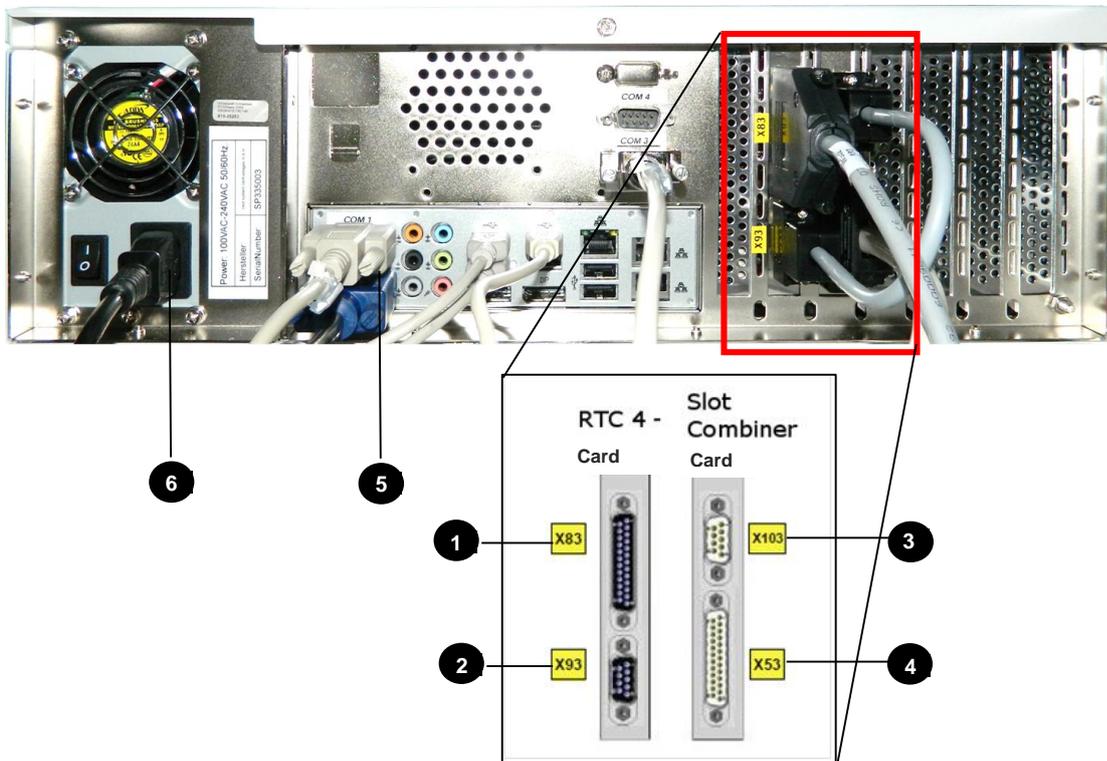


| | | | | | |
|----------|-----|----------------------------------|----------|-----|--------------------------------------------------------------------------------------|
| 1 | X71 | Start/Stop connection | 4 | X11 | Control rack connection-safety door <i>Emergency Stop/Interlock/ext. messages</i> |
| 2 | X51 | I/O Control to the Industrial PC | 5 | | Mains connection via IEC connector Connected to multiple socket |
| 3 | X31 | External panel connection | 6 | X61 | Extraction connection |
| | | | 7 | | Protection tube for fiber cable |

6.3.3 Industrial-PC Front View



6.3.1 Industrial-PC Back View



| | | | | | |
|---|------|----------------------------------------------------------------|---|------|---------------------------------------------|
| 1 | X83 | Laserhead connection | 4 | X53 | I/O Control connection to the industrial PC |
| 2 | X93 | Laser signal EXIT <i>Connected to X103 by a short cable</i> | 5 | COM1 | Servida interface connection |
| 3 | X103 | Laser signal ENTRY <i>Connected to X93 by a short cable</i> | 6 | | Mains connection via IEC connector |



The communication connection between slot combiner card and industrial-PC is established by connecting the slot combiner card to the COM interface on the motherboard inside the industrial-PC

6.4 Safety Devices

The SpeedMarker 300 is fitted with the following safety devices:

- Main switch on laser rack
- Emergency stop button
- Key switch on laser rack
- Observation window of laser protection glass
- Laser protection shutter
- Cover plates



Do not alter or deactivate the safety switches or protective covers on the laser head or the machine. All safety and protection devices must be installed and fully functional every time the machine is put into operation.

6.4.1 Emergency Stop Device

There is one emergency stop button located on the laser module. With the optional pass through option also a second emergency stop button on the front of the SpeedMarker 300 housing

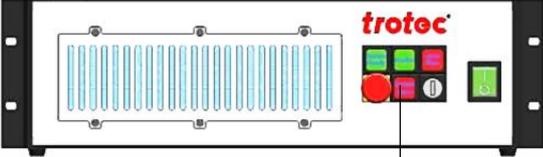
→ The function of the emergency stop device is

- Firstly: to prevent any risks to the operating personnel.
- Secondly: to avoid any damage to/destruction of the machine/material.

The emergency stop automatically shuts off the electric circuit. The laser beam is interrupted by the shutter. All movements are stopped.

When the emergency stop function is triggered, an error message is displayed.

6.4.1.1 Emergency Stop acknowledgement - Steps

| | | |
|------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Unlock the emergency stop button</p> | <p>Press the "Emergency Stop" button.</p> |  <p>Emergency Stop (only with option pass through)</p> |
| <p>2. Acknowledge the laser error message</p> | <p>Press the "System alarm" button on the laser rack module</p> |  <p>System Alarm</p> |

6.4.2 Safety switches inside the safety door

The monitoring to determine whether a safety guard is open or closed is performed by two protective switches. The marking process cannot be started when the safety doors are open. However the pilot laser stays active.

6.4.3 Laser protection glass

The light green observation window in the front door is made of laser protection glass in accordance with DIN EN 207. The glass consists of a special material depending on the type of laser used and which absorbs the laser radiation. The glass should be replaced if it becomes damaged.

6.4.4 Laser protection shutter

If a safety circuit in the laser cell is open, the laser protection shutter shuts momentarily. For reasons of safety this disconnection functions via safe components. The laser is interrupted mechanically. An error message is issued.

6.4.5 Cover plate

Cover plates protect from laser light.

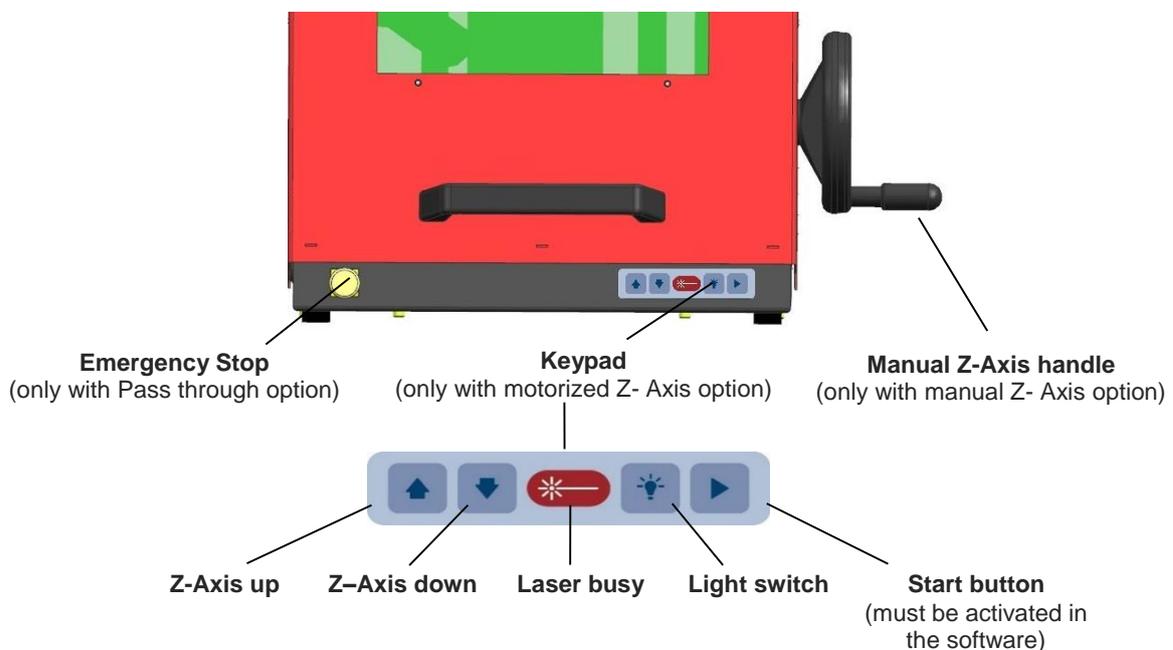


ATTENTION

All protection plates must be mounted all times.

6.5 Operation elements

Operation elements on the front of the SpeedMarker 300:



7 Installation

7.1 Installation environment



- The ambient air temperature must be between +15°C und +35°C and the relative air
 - humidity not exceed 90% (non-condensing).
- If the system has been subject to significant temperature variations, it must be brought back to room temperature before being commissioned.
- A laser system consists of high quality electrical and optical components. Mechanical stresses, vibrations and impacts must always be avoided.
- There must be sufficient air supply to both 19" modules. The accumulation of heat due to covered ventilation slots or filter pads can damage the system.

7.2 Installation SpeedMarker 300

1. Remove the entire packaging material.
2. Remove all transport protection.
3. The machine must **stand upright**.
4. Check if the laser protection glass is intact.
5. Now connect the electrical components (see the following steps).



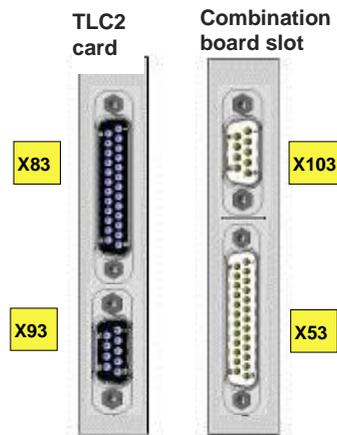
All connectors are clearly identified in order to facilitate the electrical installation. A connector marked X43 belongs to the socket with the same denotation.

The connector denotations are also coded. The last digit of the connector denotation identifies the respective hardware components. Therefore:

| | |
|--------|--------------|
| X ...1 | Laser module |
| X ...2 | Marking head |
| X ...3 | PC |

The laser module and the PC should be located next to or directly above one another if possible in order for the modules to be connected to one another with the cables provided..

7.2.1 Overview – Industrial PC Interface (Reverse Side)



1. Connect the following:

| | |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| X83 | Connector X83 is connected to the cable from the laser module. This cable leads from the laser module via the black tube to X82 on the marking head. |
| X93 | Connectors X93 and X103 are joined directly to one another via a short cable. |
| X103 | Connectors X93 and X103 are joined directly to one another via a short cable. |
| X53 | Connector X53 is joined to X51 on the laser module using the cable supplied. |

2. Connect the monitor, mouse and keyboard to the PC. (Monitor, mouse and keyboard are not normally included in the scope of supply.)



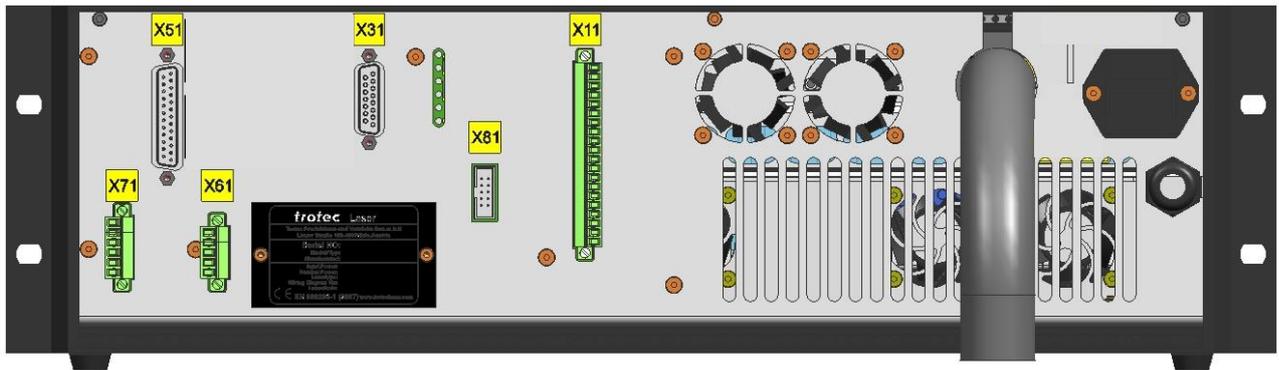
INFO
The PC COM4 interface is not connected prior to delivery!

7.2.2 Overview - Laser Module Interface (Reverse Side)

1. Before the laser marker can be put into operation, the external safety circuits and the external start and stop signals must be connected.



When making these connections, the operator must ensure that all safety circuits comply with the respective valid national standards and guidelines for the use of laser devices. Otherwise the device may cause personal injury or material damage.

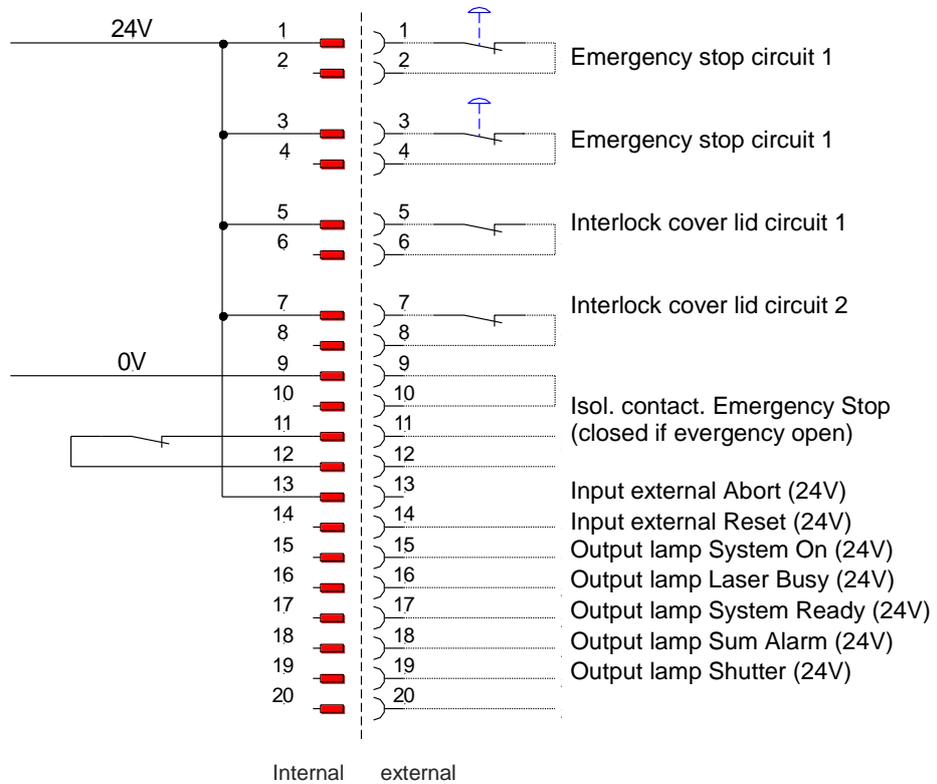


2. Connect the following:

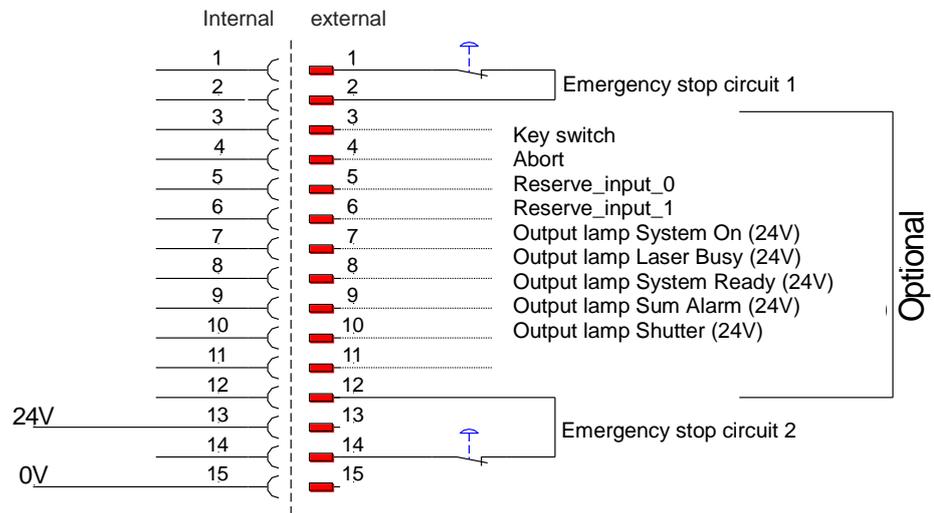
| | |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| X11 | <p>Emergency Stop / Interlock / ext. Messages Connector X11 enables the connection of external safety circuits, additional emergency stop circuits and external warning lamps. This connector comes already wired regarding the configuration of your SpeedMarker 300.</p> <ul style="list-style-type: none"> → The maximum load of each of the digital 24V outputs on the interface X11 is 100 mA. A short circuit of the outputs must be avoided as it will damage the respective inputs. → The digital 24V inputs (pin 14 and pin 15) should only be controlled by isolated contacts with the 24V pin 13. The input of signals with any other reference potential could result in damage to the respective inputs! |
| X31 | <p>External Panel The connector X31 may be used to connect an external control panel such as that located on the front of the laser module. If no external panel is connected, the supplied connector must be used with the bridging devices.</p> |
| X51 | <p>I/O control. This is connected to X53 on the industrial-PC. Only use the original cable supplied.</p> |
| X61 | <p>Extraction System This connector is used to control, start and stop a Trotec extraction unit. Only use the original cable supplied.</p> |
| X71 | <p>Start / Stop The X71 connector is already wired regarding the configuration of your SpeedMarker 300.</p> |

7.2.3 Interface Pin Configurations

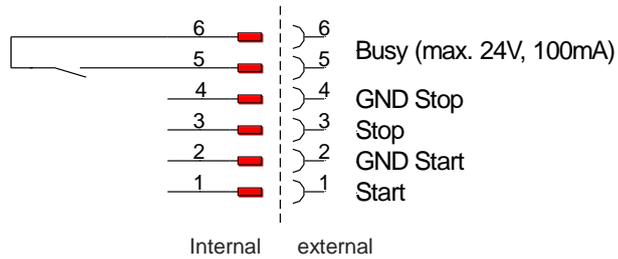
→ X11 – Emergency Stop / Interlock / ext. Messages



→ X31 – External Panel



→ X71 – Start / Stop



7.2.4 Power supply of the laser rack

1. Check if the supply voltage and frequency are correct.
2. Check if the power cable and power plug are intact and undamaged, replace them if necessary.
3. Plug in the power supply at the back of the laser rack and industrial-PC.



The configuration of the laser module is given on the warning- information label above the power supply connector.

The laser rack is fitted with different main fuses depending on the configured supply voltage:

- | | | |
|---------|---|--------------------------------|
| 115V AC | - | 1 X 6.3 A "T" speed/time-delay |
| 230V AC | - | 2 x 4 A "T" speed/time-delay |

The main fuses are located behind the cover, immediately adjacent to the IEC connector. The same main fuse is used for all supply voltages on the PC.

8 Operation



WARNING

Improper operation may lead to severe physical injury or material damage. For this reason, work may only be carried out by authorised, trained personnel who are familiar with how to operate the machine and in strict observance of all safety instructions.

8.1 Before operation

Before commissioning, the following points should be checked:



- Check the electrical installation is complete and the input voltage is correct.
- Ensure that the optical components are free from dust and dirt.
- Have the protective covers been removed from the focusing objective lens?
- Check the environmental conditions against the technical specification.
- Are you familiar with the laser safety regulations?
- Have all laser safety measures been fulfilled?
- The system may then only be switched on once all provisions for complying with laser safety have been checked by an authorised individual and confirmed to have met the standards.

8.2 Marking software

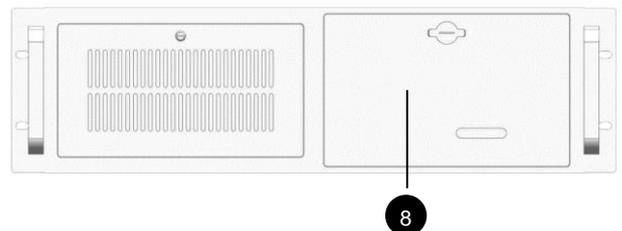
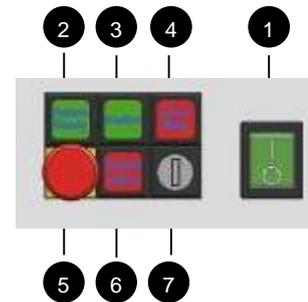
The marking software is already installed on the supplied PC. It is also included in the setup on the accompanying software CD.

For information on using the software, please read the accompanying software manual.

8.3 Power On/Off

Power ON the SpeedMarker 300

1. Press the master switch I/O (1) on the laser rack module.
The switch and the two status lamps on the marking head are now lit (shutter closed).
2. Put the key in the key switch (7) (vertically) and turn 90° to the right.
3. **By option pass-through:
If necessary unlock the emergency stop button. See chapter "Emergency Stop Device".**
4. Press the "System Alarm" button (6) to reset the system to its normal state.
5. As soon as the door is closed System Ready (2) , Shutter (3) and the two status lamps (red) on the marking head should now lighten up. The laser is now ready to start marking.
6. Start the industrial PC. The mains switch is located on the front behind the PC protective cover (8)



When operating the system for the first time it may be necessary to check the master switch (9) on the reverse side of the industrial-PC.
In its normal state the master switch (9) can remain in the "On" position.)



7. Now start the marking software on the PC.
8. The SpeedMarker 300 is ready for operation.



- If an error occurs, the "System Error" button (6) will illuminate. Press the button (6) to reset the error and continue working.
- Opening the door, while a marking process is running, will interrupt the laser beam immediately. The "System Error" button (6) will light up and must be reset before you can continue with your marking.
- We recommend using only the key switch (7) to pause the laser.

Power OFF the SpeedMarker 300

1. Close the software on the PC.
2. Shut down the PC.
3. Switch off the main switch "I/O" (1) situated on the laser rack.
4. The SpeedMarker 300 is now switched off.

8.4 Safety door

The door of the SpeedMarker 300 is directly connected to the Interlock circuit. Therefore starting a marking process is only possible with the door closed.



Simply use the black handle at the door to lift it and slide it down for opening and closing.

8.5 Focusing

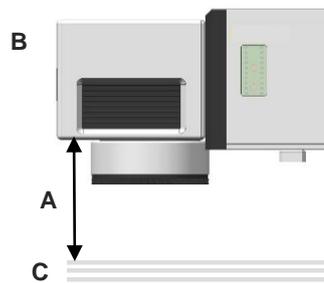


CAUTION
Risk of injury when working with mechanical components.



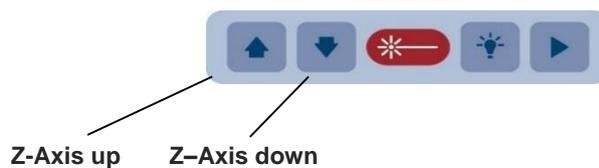
It is absolutely essential to maintain the correct focal distance for every laser marking process. Only when in focus will the laser beam achieve the power density necessary for permanent and clearly legible marking.

Prior to any marking it is therefore necessary to set the correct focal distance between the marking head and the workpiece. An incorrect focal distance is the most common cause of poor or even indistinguishable markings. Position the laser by moving the Z-axis until the ideal marking result has been reached. The focal distance (A) is measured between the lower edge of the galvo head (B) and the upper surface of the workpiece (C). The correct focal distance depends on the lens used (focal length).



| Lens | Focal distance (A) |
|-------|--------------------|
| F-100 | ~134,6 mm |
| F-160 | ~211,6 mm |
| F-254 | ~361,6 mm |
| F-330 | ~456,59 mm |
| F-420 | ~562,59 mm |

→ Use the manual Z-Axis handle or the up and down buttons on the Keypad to move the marking head in the correct position.



8.6 Positioning the workpiece



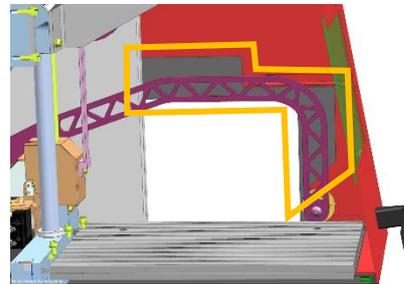
CAUTION
Risk of injury when working with mechanical components.

Use the “Border Mark” function in the marking software to indicate the marking field with the pilot laser. Move the workpiece under the laser until it is in the correct marking position.

8.7 Pass-Through Option

Using the Pass-Through Option allows you to mark work pieces longer than 350mm with a square of 200x165mm

1. Simply remove the side panels by unscrewing them from the outside.
2. Replace them with the additional weights (shown in dark grey). To do so place the weights inside and fixate them with screws from the outside.
3. The Interlock hatch must be installed to close the Interlock safety circuit.



Additional weights (dark grey)



9 Maintenance

9.1 Safety instructions



CAUTION

- **Improper maintenance can cause serious injury or damage. For this reason, this work may only be carried out by authorized, trained personnel who are familiar with how to operate the machine and in strict observance of all safety instructions.**
- Using explosive or flammable cleaning agents present a risk of fire or explosion:
- No flammable or explosive liquids are allowed to be stored near the machine.



CAUTION

- Before any maintenance work takes place, ensure that the power supply has been switched off and the system is de-energised.

9.2 Maintenance schedule

| | Daily | Weekly | Monthly | Annually |
|-----------------------------------------------------------|---------------------------------------------------------|--------|------------------------------------------------|----------|
| System Component | | | | |
| Lenses | Check If necessary clean | | | |
| Guide bar for door weights | | | | Clean |
| Entire working area – general cleaning | Clean | | | |
| Visual inspection of laser protection glass for integrity | Check if necessary replace | | | |
| Function check of every individual emergency stop devices | | | | Check |
| Visual inspection of the safety door cables for integrity | | | Every 6 month Check If necessary replace | |
| Filter mat of laser rack and industrial-PC | | | Check If necessary replace | |
| Exhaust System | | | | |
| Filter | According to the operation manual of the exhaust system | | | |
| Filter mat | | | | |
| Activated carbon filter | | | | |



INFO

In order to ensure the maximum availability and lifetime of the system, we recommend you regularly check the filter system and ventilation and keep the surrounding area clean. A visual inspection of the lenses is likewise recommended before switching on the system.

9.3 Maintenance work

9.3.1 Cleaning the lenses



INFO

Laser optics are highly sensitive and their surfaces are not as hard as traditional glass. They can also be easily damaged by cleaning. It is therefore necessary to ensure that any dirt is removed using a suitable suction device and that the surrounding area is cleaned regularly.



ATTENTION

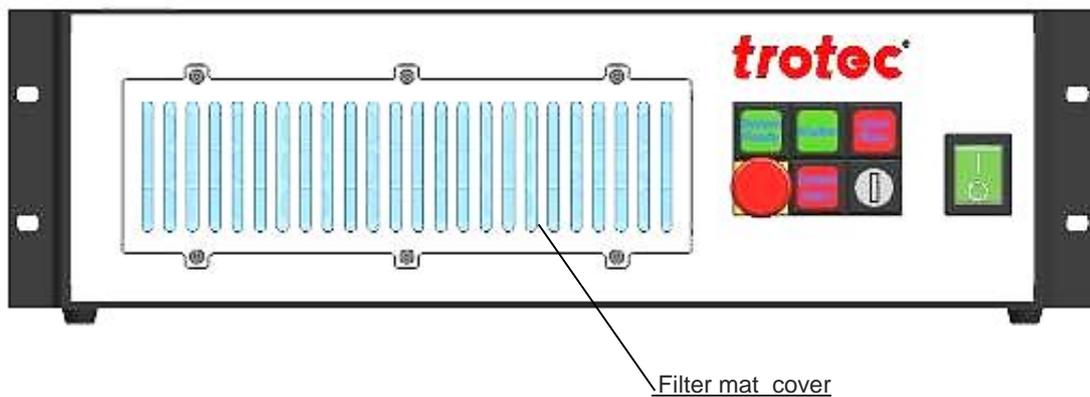
- Never touch the optical components with your fingers! Oily or dirty hands may damage the lens surfaces.
- To remove larger pieces of dirt, only use a soft lens cleaning cloth in conjunction with high proof (min. 98 %) alcohol or special lens cleaning liquid.
- Do not dip the cleaning cloth into the cleaning solution. This contaminates the solution and makes it unusable. Place drops of the solution on the cloth!
- Apply the cleaning solution carefully in order to avoid scratching the surface of the lens.
- Do not use any tools or hard objects to clean the surfaces. Scratches cannot be repaired.
- Small bellows should be used to remove dust.
- Do not use compressed air as it contains small quantities of oil and water.
- Distribute the cleaning fluid carefully using small circular motions. Start at the centre of the lens and move outwards to the edge. Keep moving the cloth until the entire surface is clean.
Do not exert any pressure on the lens.

9.3.2 Replacing the laser rack and industrial-PC filter mats

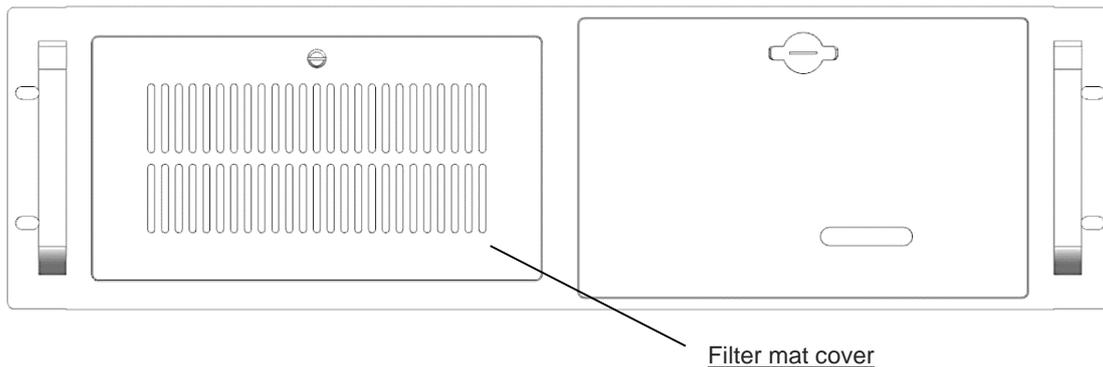
This laser system is fitted with a ventilation system. A filter mat is used to protect the electronic components from dust and dirt in the ambient air.

This filter mat should be checked and replaced at regular intervals in order to ensure optimum cooling. The filter mat is located behind the ventilation slots on the front of the laser rack or industrial-PC.

Filter mat laser rack



Filter mat industrial-PC



9.3.3 Observation window

The observation window is made of a special, coloured plastic. In order not to damage it, it should only be cleaned with clean water and possibly a little detergent if necessary. Use a soft cloth in order not to scratch the surface.



ATTENTION

Benzene, alcohol, acetone, solvent or similar cleaning agents will damage the laser protection glass, which must be replaced immediately.

Scratches must also be avoided. The laser protection glass must be replaced immediately if it becomes scratched.

10 Troubleshooting

This chapter should assist maintenance personnel with the identification and resolution of operational faults based on error messages and symptoms.



ATTENTION

Repairing faults incorrectly can cause serious injury or damage. For this reason, this work may only be carried out by authorized, trained personnel who are familiar with how to operate the machine and in strict observance of all safety instructions.



INFO

Movements and functions may only be performed when there are no errors and all devices are ready for operation. This state is prerequisite for starting the SpeedMarker 300. If this state changes during operation, the laser cell stops.

The error must be acknowledged using the "ON" button on the keypad.

10.1 Errors, cause and resolution

| Problem | Possible Cause | Resolution |
|-----------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Not possible to turn on laser rack | System switched off | Turn on main switch |
| | The key is missing from the key switch on the laser rack or is in the vertical position. | Place the key in the switch on the laser rack and turn to the horizontal position |
| | System power plug not installed correctly | Check the System power plug has been installed correctly |
| | Incorrect or no voltage supply to the System | Check the System 230/110V power supply |
| | Laser rack power plug not installed correctly | Check the laser rack power plug has been installed correctly |
| | Faulty fuse in laser power supply | Replace fuse |
| | When option pass-through: Emergency stop button has been activated | Release the emergency stop button |
| Not possible to turn on the SpeedMarker | Emergency stop button has been activated | Release the emergency stop button |
| | System power plug not installed correctly | Check the System power plug has been installed correctly |
| | Incorrect or no voltage supply to the System | Check the SpeedMarker 230/110V power supply |

| Problem | Possible Cause | Resolution |
|--------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Error message on loading the program | Plug or cable not installed correctly | Check the plug and cable are installed correctly Check the installation |
| | Laser power supply switched off | Turn on main switch |
| | Software not installed correctly | Re-install software |
| | Software terminated irregularly | Restart PC |
| No laser beam | Laser not in focus | Check working distance |
| | Shutter is closed | Open shutter - if not possible check interlock circuit |
| | Incorrect laser parameters | Check the parameters in the program. Use suitable parameters for the material and application |
| | Focussing lens dirty | Check the lens for dirt and clean as required. |
| Insufficient laser output | Laser not in focus | Check working distance |
| | Incorrect laser parameters | Check the parameters in the program. Use suitable parameters for the material and application |
| | Focussing lens dirty | Check the lens for dirt and clean as required. |
| Missing symbols | Focussing lens dirty | Check the lens for dirt and clean as required. |
| | Surface of the material dirty | Clean material surface |
| | The marking plane is not parallel to the focussing lens | Ensure that the entire marking surface is parallel to the focussing lens |
| Other faults | | Contact TROTEC Support |

10.2 System Errors

Below is a list of possible errors which may be detected by the system. These will appear in the software as messages on the display.



The Reset signal (X11) or the reset button on the laser module are used to acknowledge an error. In order for the system to be reset, the error or the corresponding input signal must be acknowledged. **System errors which cannot be reset or which indicate a hardware error should only be resolved by Trotec Produktions und Vertriebs Ges.m.b.H. trained service personnel.**

| Error message | Cause |
|---------------------------------------|----------------------------------------------------------|
| Card off line | Software has lost connection to the TLC2 controller |
| Scanner not connected | No connection to the galvo |
| Scanner X error | The galvo X-axis has identified an error |
| Scanner Y error | The galvo Y-axis has identified an error |
| Signal cable not connected | No connection to the marking head |
| External abort | External abort signal identified on X11 |
| External stop | External stop signal identified on X11 |
| Voltage error (15V) | +/- 15V power supply not functioning correctly |
| Voltage error (24V) | 24V power supply not functioning correctly |
| Laser power supply error | Faulty laser source power supply |
| Shutter error | Shutter has not reached intended position |
| Cover connector opened during marking | ICL1 and ICL2 were opened during the marking process |
| External sum alarm | External error signal identified on X11 |
| System locked by key switch | Key switch on laser module locked |
| Laser temperature | Laser source overheated |
| Laser power | 24 V power supply outside the permissible tolerance zone |
| Laser not ready for emission | e.g. key switch not activated |
| Laser back reflection | Back reflection of the laser beam |
| Laser system error | Laser power supply voltage is too high or too low |
| Emergency stop button | Emergency stop button activated |
| System Failurer | |

11 Disassembly



CAUTION

Injury may occur when disassembling the machine. Therefore always wear suitable protective clothing (Safety glasses, safety shoes, and so on).



CAUTION

The machine must be disconnected from the power supply.

11.1 Sequence

1. Remove all work pieces from the processing area.
2. Press the "Emergency stop" button.
3. Shut of the laser souce module
4. Switch off the main switch.
5. Remove the exhaust system.
6. Disconnect the power supply.



INFO

Always use suitable tools to disassembly the machine. Mind the springs!



Follow the special disposal instruction