

→ **SP2000**
Pre-installation Guide



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ENGLISH

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Technical
Changes

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1 General

1.1 Information about this manual

**PLEASE READ THIS MANUAL CAREFULLY BEFORE USE
 KEEP THE MANUAL FOR FURTHER CONSULTATION**

This manual describes how to operate the machine properly and safely. Be sure to follow the safety instructions given here, as well as any local accident prevention regulations and general safety regulations applicable to the field of usage.

1.1.1 Complementary documentation

Complementary documentation can be found on the supplied DVD.

Operation Manual	SP2000_Operationmanual_EN
Software Operation Manual Trotec JobControl®	JobControl_Operationmanual_x.x.x_Vx.x

1.2 Explanation of symbols

Important technical safety notes and instructions in this manual are marked with symbols. These instructions for workplace safety must be complied with and followed. Here special attention must be paid in order to avoid accidents, injury to persons or material damage.



DANGER

This symbol indicates information noncompliance wherewith result in death or serious injury.



WARNING

This symbol indicates information noncompliance wherewith may result in death or serious injury.



WARNING

This symbol warns of potentially dangerous situations related to electric voltage. Failure to observe the safety instructions leads to risk of serious injury or death. Care is to be taken in particular during maintenance and repair work.



WARNING

This symbol warns of potentially dangerous situations related to the laser beam. Failure to observe the safety instructions leads to risk of serious injury.

Notice

Material damage

This symbol indicates information noncompliance wherewith may lead to material damage, functional failures and/or machine breakdown.

Info

Info

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

2 Safety

2.1 Laser classification

The here described machine is equipped with an enclosed laser pointer and a sealed carbon dioxide laser source that emits invisible and intense laser radiation with a wavelength of 10.6 microns.

Laser classification according to DIN EN 60825-1 "Safety of Laser Products":

- SP2000 laser machine Class 2 (US: Class II) due to the key safety devices and enclosed laser pointer
- Laser source Class 4 (US: Class IV)
- Enclosed laser pointer Class 2 (US: Class II)



WARNING

Laser radiation of Class 2 (US: class II)

Lasers of Class 2 (US: Class II) are safe, but can cause irritation of the eyes if the natural avoidance reaction (staring into the beam deliberately) or eyelid closure reflex is suppressed.

- Do not suppress the eyelid closure reflex.
- Do not stare directly into the beam.
- Close eyes, turn away.
- Never look at the laser beam directly with an optical instrument, e.g. a lens.



WARNING

Laser radiation of Class 4 (US: class IV)

Exposure to laser radiation of Class 4 (US: Class IV) can cause injury to the eyes and skin.

- The skin and eyes must not be exposed to direct or reflected or scattered radiation.
- Wear suitable laser safety protection glasses.
- When dealing with Class 4 (US: Class IV) laser machines, it is necessary to appoint a trained laser safety officer to evaluate potential hazards and to ensure that appropriate control measures are implemented.

Info

It is the responsibility of the operator to comply with the national official and statutory regulations for the operation of a class 4 (US: class IV) laser system or laser system with a build in laser source of class 4 (US: class IV).

2.2 Responsibilities of the operator

The operator has the following responsibilities:

- It is the responsibility of the operator to comply with the national official and statutory regulations for the operation of a class 4 (US: class IV) laser system or laser system with a built in laser source of class 4 (US: class IV).
- In addition to the safety notes and instructions stated in this manual, consider and observe the local accident prevention regulations and general safety regulations that apply at the operation site of the machine.
- A **CO₂ fire extinguisher** must always be at hand, as the laser beam can ignite flammable materials.
- If the machine is used industrially, the operator is subject to the legal obligations concerning industrial safety.
- All personnel involved in installation, set-up, operation, maintenance and repair of the machine must have read and understood this Manual and in particular the "Safety" section. The personnel must be trained and informed about all the functions and potential dangers of the machine.
- The user is recommended to prepare company internal instructions considering the occupational qualifications of the personnel employed in each case, and the receipt of the instruction/Manual or the participation in the introduction/training should in each case be acknowledged in writing.
- Keep the manual in the immediate vicinity of the machine so that it is accessible at all times to all persons working on or with the machine.
- Authority for the individual activities relating to the application of the machine (e.g. installation, operation, maintenance and cleaning) must be clearly defined and observed, so that no unclear competencies result under the aspect of safety. This applies in particular to work to be performed on the electrical equipment that may only be performed by qualified specialists.
- Maintenance and repair work as specified in the present manual must be carried out regularly.
- 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 Manual must be observed.
- Provide appropriate personal protection equipment (e.g. protective goggles according to wavelength and laser power).
- The operator is responsible for the safety-related state of the machine.
- Do not store any flammable materials in the working area or in the immediate vicinity of the device. Particularly, residues of processed materials have to be removed to prevent any fire hazard.
- The operator must ensure cleanliness and accessibility at and around the machine by corresponding instructions and controls.

3 Side preparation

3.1 Packaging

3.1.1 Packaging Version 1

No	Machine parts	Packaging (L x W x H) /mm (inch)	Weight / kg (pound)	Type
1	Machine with cover	3340 x 2620 x 1220 (131.5 x 103.1 x 48)	2500 (5511.6)	wooden crate
2	Operating console	990 x 810 x 1425 (38.9 x 31.8 x 56.1)	200 (440.9)	wooden crate
3	Laser tube	1470 x 400 x 500 (57.8 x 15.7 x 19.7)	250 (551)	wooden crate
4	Table system (for each table)	1890 x 965 x 690 (74.4 x 37.9 x 27.2)	250 (551)	wooden crate
5	Cooling system	800 x 1000 x 1100 (31.5 x 39.4 x 43.3)	150 (330,7)	wooden crate
6	Traveling exhaust	600 x 800 x 144 (23.6 x 31.5 x 5.7)	50 (110,2)	pallet

3.1.2 Packaging Version 2

No	Machine parts	Packaging (L x W x H) /mm (inch)	Weight / kg (pound)	Type
1	Machine and x-axis	3190 x 2270 x 1510 (125.6 x 89.4 x 59.4)	1360 (53.5)	wooden crate
2	Cover and traveling exhaust	3390 x 1160 x 955 (133.5 x 45.7 x 37.6)	575 (22.7)	wooden crate
2	Laser tube	1560 x 540 x 680 (61.4 x 21.3 x 26.8)	145 (5.7)	wooden crate
3	Table system (for each table)	1890 x 965 x 690 (74.4 x 38 x 27.2)	200 (7.9)	wooden crate
4	Operating console	990 x 810 x 1425 (39 x 31.9 x 56.1)	150 (6)	wooden crate

3.1.3 Cooling system

No	Cooling system (according laser power)	Dimension (L x W x H) / mm (inch)	Weight / kg (pound)	Weight / (parts) kg (pound)	Type
1	400 W	1000 x 800 x 600 (39.37 x 31.49 x 23.6)	220 (485)	190 (419)	palette / carton box
2	200 W	760 x 610 x 500 (29.92 x 24 x 19.68)	110 (242.5)	90 (198.4)	palette / carton box
3	100 W	710 x 545 x 455 (27.95 x 21.45 x 17.91)	85 (187.4)	65 (143.3)	palette / carton box

3.1.4 Exhaust (optional)

No	Machine	Dimension (L x W x H) / mm (inch)	Weight / kg	Weight / (machine) kg (pound)	Type
1	VENT 3000 Set (with sound- insulating enclo- sure)	1200 x 800 x 700 (47.24 x 31.49 x 27.56)	212 (467.4)	170 (375)	transport box
2	Piping	1200 x 800 x 1450 (47.24 x 31.49 x 57.08)	84 (185.2)	47 (103.6)	transport box

3.2 Delivery

3.2.1 Delivery state and transport

Unless otherwise agreed, the machine/machine parts and additional accessories get delivered in wooden crates.

Store the machine/machine parts sealed in the original packaging and shortly before installation transport the sealed packaging units to the production site.

Unpacking the machine/machine parts is carried out by a **Trotec technician** at the productions site.

If it is not possible to transport the sealed packaging units to the production site due to confined space conditions, a **Trotec technician** will unpack the machine parts at the storage place and will then transport the parts to the production site.

3.2.2 Transport inspection and reporting of defects

Upon receipt, immediately 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 accept it only with reservation. Record the scope of the damage on the transport documents/delivery note. Initiate the complaint process. For all defects that are not discovered upon delivery, be sure to report them as soon as they are detected, since damage claims must be filed within a certain period, as mandated by law.

3.2.3 Temperature and humidity

Ambient temperature for transportation	-10 °C to 40 °C (-50 °F to 104 °F)
Humidity	max. 85% (non-condensing)





3.2.4 Required tools for unloading and transport

	Unloading the packaged machine parts	Transport the unpacked machine parts
Type	forklift	pallet truck
Weight	weight \geq 1.5 t	weight \leq 1.5 t
Fork extension	approx. 2 m (78.74 inch)	approx. 2 m (78.74 inch)

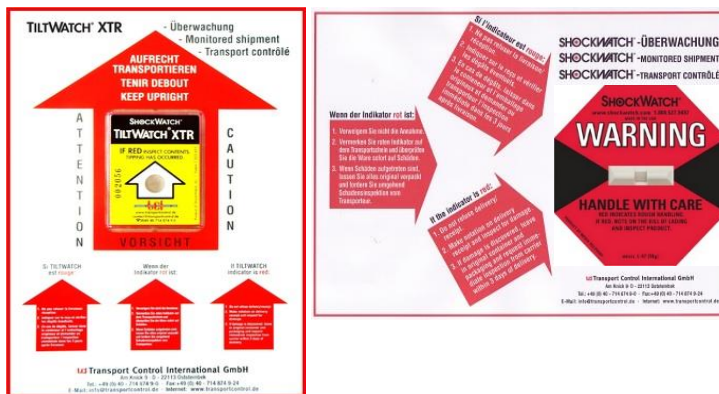
3.2.5 Transport conditions

Conditions:

- Observe the packaging symbols:

Symbol	Meaning according to ISO/DIN	Symbol	Meaning according to ISO/DIN
	vor Nässe schützen/ <i>keep dry</i>		oben/ <i>this way up</i>
	zerbrechliches Packgut/ <i>fragile, handle with care</i>		nicht stapeln/ <i>do not stack</i>

- Note the shock watch sign



3.3 Storage

3.3.1 Temperature and humidity

Storage temperature:	0 °C to 30 °C (32 °F to 86 °F)
Relative humidity:	max. 60%

3.3.2 Storage conditions

Conditions:

- Keep the machine sealed in its original packaging until it is assembled/installed.
- Do not stack the wooden crates or boxes.
- Keep the storage location dry, free of dust, caustic materials, vapors and combustible materials.
- Store in a storage room or packaged with adequate weather protection.
- Avoid exposure of the machine to shocks or vibrations.
- Avoid extreme temperature fluctuations.
- Take particular care when packing away electronic components.
- Apply a coat of oil to all bare-metal machine parts, when storing for a longer period.
- Regularly check the overall condition of all parts and of the packaging.

3.4 Operating environment

3.4.1 Temperature and humidity

Operating temperature:	15 °C to 25 °C (59 °F to 77 °F)
Air humidity:	40% – 70% (non-condensing)

3.4.2 Subsoil conditions

Conditions:

- Planarity ± 5 mm (± 0.1969 inches)
- Solid, firm and vibration-free soil
- Easy-care and clean floor
- Bearing capacity of the subsoil ≥ 1000 kg/m² / 10 kN/m² (208.85 psf)
- Machine point load 500kg/m² / 5 kN/m² (102.4 psf)
- Monolithic subsoil conditions underneath the laser machine
- No special substrate preparation required

3.4.3 Environmental conditions

Conditions:

- Provide sufficient illumination at the workplace
- Ensure a dust-free environment (II° according to IEC60947-1)
- Shielding from EMC
- Freedom of interfering electrical installations, hoses and pipe lines
- Power supply free of fluctuations

3.5 Space requirement

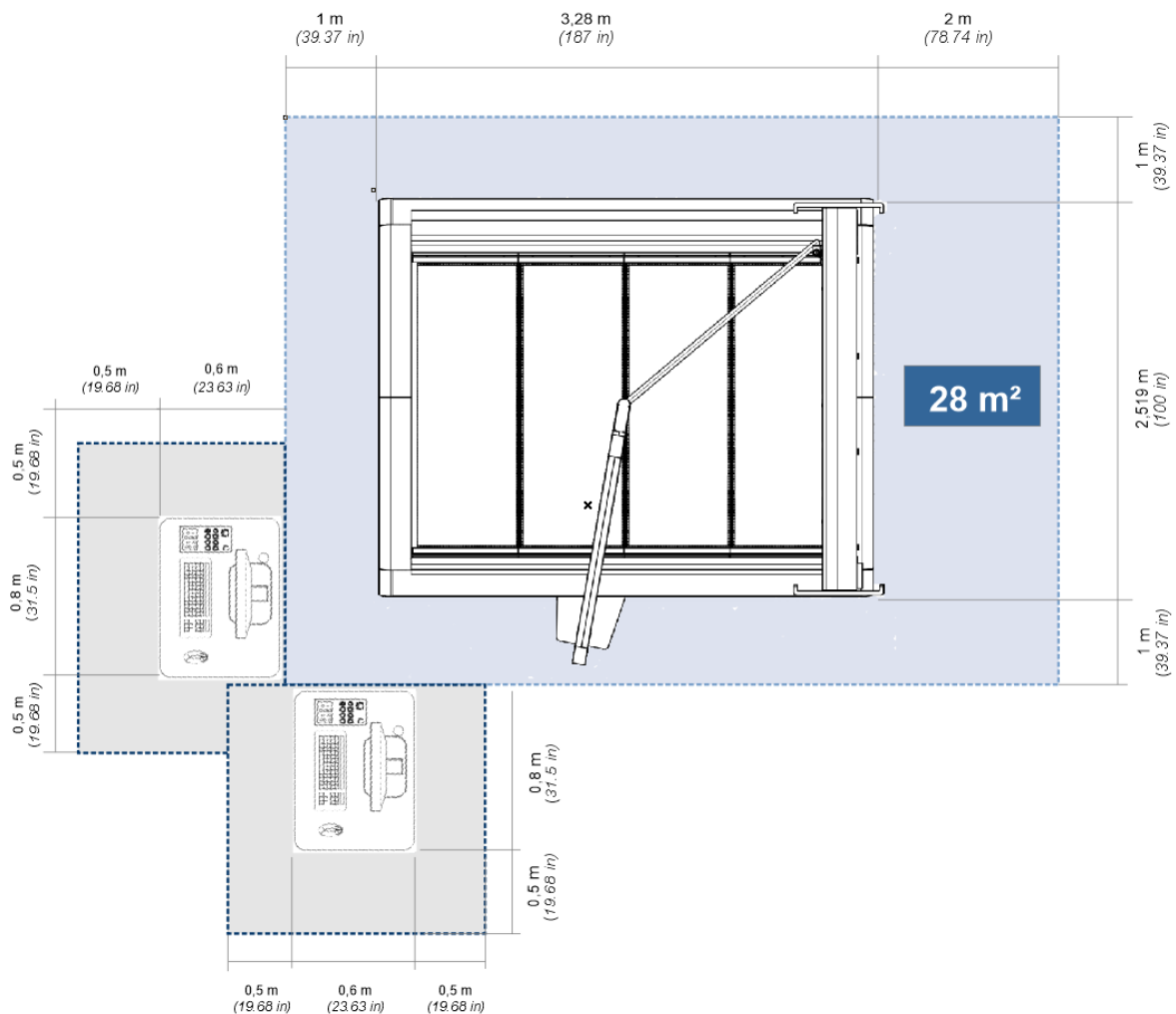
Ensure there is shielding or sufficient clearance to or from the wall and neighboring objects.

3.5.1 Space requirement for installation

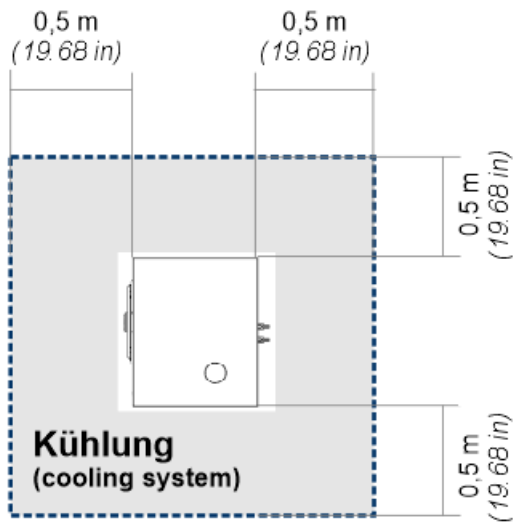
Space required	Area
Total	60m² (645 square feet)

3.5.2 Space requirement of the machine

Space required	Area
Maschine incl. safety distance (excluding operating panel, exhaust and loading/unloading area)	28 m ² (302 square feet)



3.5.3 Space requirement of the cooling system



Objects	Distance
Laser	1 m (39.4 in)
Neighboring objects/wall	0,5 m (19.68 in)

3.5.3.1 Dimensions of the water cooling systems

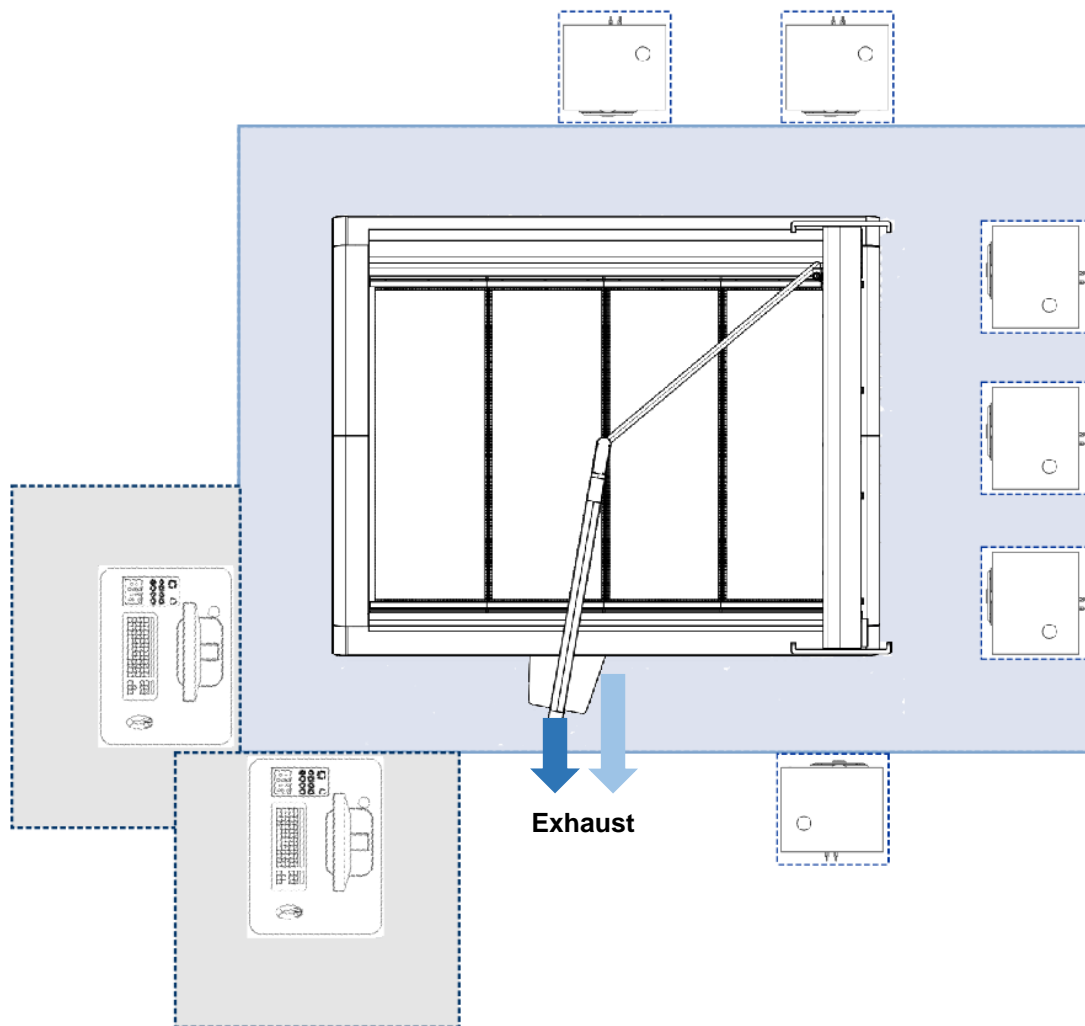
Laser power	60 W WC *	100 W WC *	200 W WC *	400 W WC *
L x B x H [mm]	710 x 545 x 455	710 x 545 x 455	760 x 610 x 500	715 x 715 x 1545
(L x B x H [inch])	(27.9 x 21.5 x 17.9)	(27.9 x 21.5 x 17.9)	(29.9 x 24.0 x 19.7)	(28.2 x 28.2 x 60.8)

* WC = Wassergekühlt

3.5.4 Machine and component layout

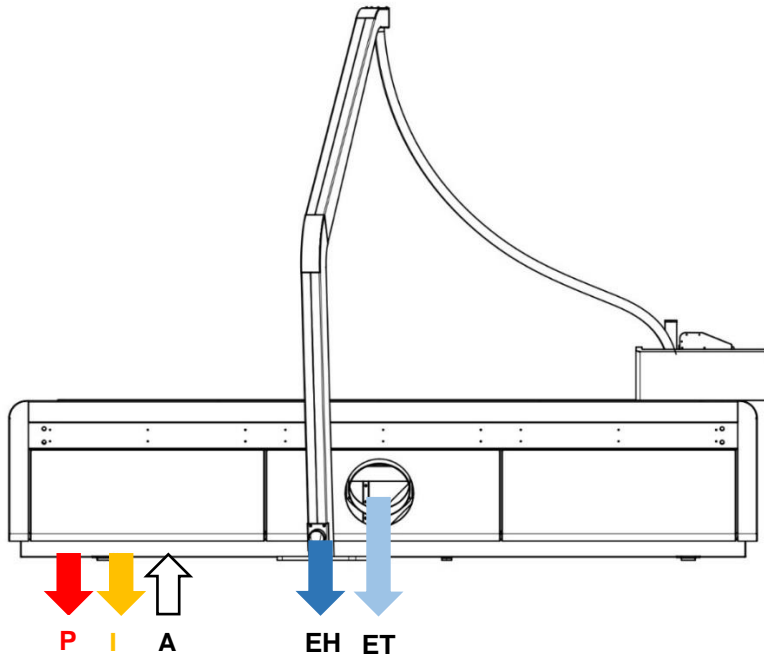
Ensure there is shielding or sufficient clearance to or from the wall and neighboring objects.

Layout	
Cooling system	Note cable length of 4 m.
Operation panel	Note cable length of 2 m. Due to the length of the console cable set the console can only be placed as shown in the graph below.



4 Requirements

4.1 Supply connections



Abbr.	Connection	Dimension	Cable/hose	Info	Volume
P	Power supply		Flexible cable	3 m	See chapter "Electrical requirement"
I	Operating console interface		Flexible cables (compiled)	2 m	
A	Compressed air (3 one hand universal quick-lock coupling included)	Couplings for hose Ø 6 mm Ø 9 mm Ø 10 mm	Flexible hose)*	-	>240 l/min at 6 bar
EH	Exhaust laserhead	Inner Ø 76 mm (laser side) Outer Ø 80 mm (exhaust side)	Flexible hose	3 m	100 m ³ /h at 4450 Pa
ET	Exhaust table	Outer Ø 200 mm (both sides)	Flexible hose	3 m	2500 m ³ /h at 800 Pa
C	Cooling system (not included in the drawing -can be placed anywhere but not higher as machine level)	½" < 200W 1" 200-400W	Flexible hose	4 m	Depending on cooling system

* Item NOT included in scope of delivery, OPTIONAL

4.1.1 Plug type



4.2 requirements of the machine

Laser power	60 W WC *	100 W WC *	200 W WC *	400 W WC *
Voltage	380/400 VAC 3 phase	380/400 VAC 3 phase	380/400 VAC 3 phase	380/400 VAC 3 phase
Fuse	3 x 16A (slow-blow)	3 x 16A (slow-blow)	3 x 16A (slow-blow)	3 x 16A (slow-blow)
Power consumption	1600 W	3100 W	4500 W	8400 W
Ground fault circuit interrupter	necessary	necessary	necessary	necessary

* WC = water cooled

Notice Inadequate or inappropriate power sources can lead to machine damage and are not covered by any liability.

Verify that the electrical outlet is capable of providing the proper voltage, frequency and amperage required by the laser machine described in this manual.

Notice Electrical noise, unstable power supply as well as voltage spikes in power supply can cause interference and possible damage to the electronics of the laser machine.

Info Use an individual circuit for the laser machine and the PC and an individual circuit for the exhaust system. Install your computer on the same circuit as the laser machine to prevent electromagnetic interactions.

Furthermore it is highly recommended that you use a surge suppression plug to protect your computer equipment.

If electrical power fluctuations, brownouts or power outages are a problem in your area, an electrical line stabilizer, UPS (Uninterruptible Power Supply) or backup generator are required. When installing any of these devices, ensure that they meet the electrical requirements of the laser machine.

4.3 Water cooling system requirements

4.3.1 Electrical requirements of the water cooling systems

Laser power	60 W WC *		100 W WC *		200 W WC *		400 W WC *	
	EU	US	EU	US	EU	US	EU	US
Voltage	230V	-	230V	115V	230V	230V	400V	400V
Fuse	16A (slow-blow)	-	16A (slow-blow)	16A (slow-blow)	16A (slow-blow)	16A (slow-blow)	16A (slow-blow)	16A (slow-blow)
Power consumption	1900 W	-	1900 W	1900 W	2700 W	2700 W	6600 W	6600 W
Frequency	50/60Hz	-	50/60Hz	60Hz	50Hz	60HZ	50/60Hz	50/60Hz

* WC = Wassergekühlt

4.3.2 Ideal water quality

pH-value:	7-9	Alkalinity (°dH):	<1
Conductivity:	<300 µS/cm	Chloride content:	<20 mg/L
Hardness (°dH):	7,5-8,5	Organic germs:	<1000 KBE/ml

4.4 Exhaust system requirements



DANGER

Physical damage through toxic aerosols

During laser operation, toxic aerosols can be produced, which can lead to breathing difficulties, choking, poisoning and subsequently to cancer.

- The laser may be operated only with properly installed and operating exhaust system.

Notice

The machine may be operated only with properly installed and operating exhaust system. Damage to the system caused by the use of no or improper extraction equipment will not be covered by any liability.

A powerful exhaust system keeps the life time of optics and mechanical components, the cutting quality and the laser power interacting with the workpiece from being impaired by fumes and dust accumulating in the machine.

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

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

Applications generating large amounts of dust or fumes may require a stronger exhaust system.

Info

When selecting an exhaust system it is absolutely necessary to consult your distributor.

4.4.1 Electrical requirements of the exhaust system

VENT 3000 (with noise reduction cabin)	Table exhaust	Laserhead exhaust
Voltage	400 VAC 3 phase	400 VAC 3 phase
Fuse	3 x 16A (slow-blow)	3 x 16A (slow-blow)
Power consumption	5500 W	1500 W
Frequency	50/60Hz	50/60Hz

4.4.2 Table and laserhead exhaust system

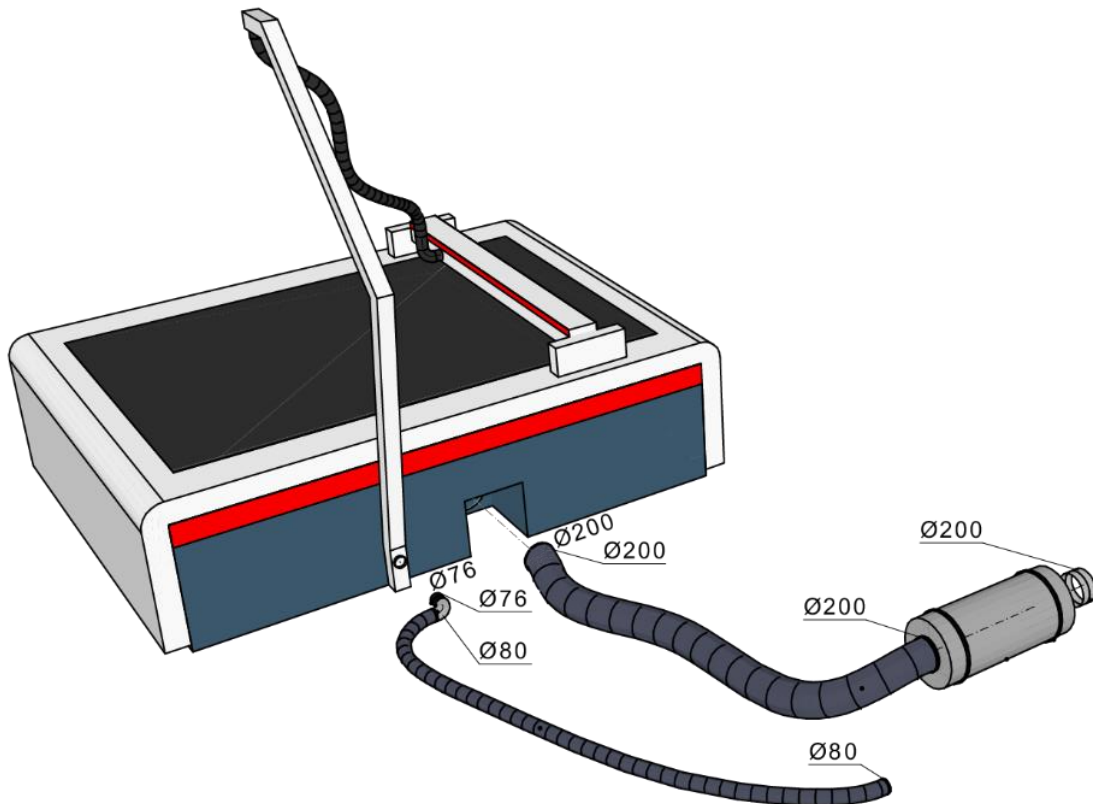


	Table exhaust system	Laserhead exhaust system
Hose connection ø (Laser)	Outer diameter 200 mm (7.87 inch)	Inner diameter 76 mm (2.99 inch)
Hose connection ø (Exhaust)	Outer diameter 200 mm (7.87 inch)	Outer diameter 80 mm (3.15 inch)
Working point	2500 m ³ /h at 800 Pa	100 m ³ /h at 4450 Pa

4.5 Compressed air requirements

Compressed air connection	Hose	Volume	Compressed air supply
One hand universal quick-lock coupling (Eurokupplung) *	Flexible hose direction towards machine	>240 L/min	Dry and oil-free supply, 6 bar According ISO 8573-1:2010

* Item included in scope of delivery

- Notice** If the pressure of the compressed air is set too high, it can cause damage to the machine.
- The supplied pressure of the extern connected compressed air must not exceed 10 bar.
 - The maximum compressed air pressure during operation must not exceed 6 bar.

4.6 Computer requirements

When using a more powerful computer, the graphics are generated and displayed faster, and the computing times and the times for data transfer to the laser are reduced.

The following recommendation represents the minimum requirements:

1. Operating systems
 - Windows 10[®] 32/64 bit
 - Windows 8[®] 32/64 bit
 - Windows 7[®] 32/64 bit
 - Windows Vista[®] 32/64 bit (with Service Pack 1 or later)
2. Microsoft[®] .NET framework 3.5
3. Adobe[®] Reader 9.0 or later
4. Local administrator privileges (for required software installations)
5. 2 GHz processor or faster
6. 2 GB RAM or greater (Windows Vista[®], Windows 7 / 8 / 10)
7. 80 GB hard drive or larger
8. 1024 × 768 resolution monitor or greater
9. True-color graphics card (24-bit color depth)
10. 2 free USB interfaces
11. DVD-ROM drive

5 Setup and installation

5.1 Required personnel

Please ensure the following group of persons are available on customer side:

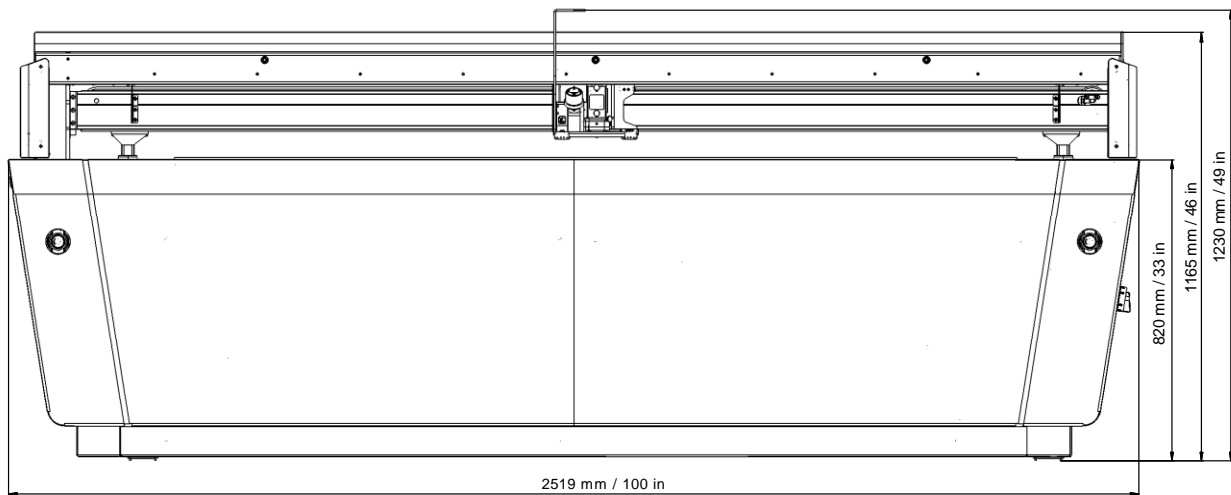
Person	Project manager	IT Administrator	Industrial electrician	Safety officer	Operating personal
Description	An authorized signatory and decision-maker with authority to issue directives	An IT administrator with network access	An electrician	A safety officer responsible for industrial safety regulation. If available a laser safety office	Future operating staff

The installation and setup of the machine will be carried out by a Trotec technician.

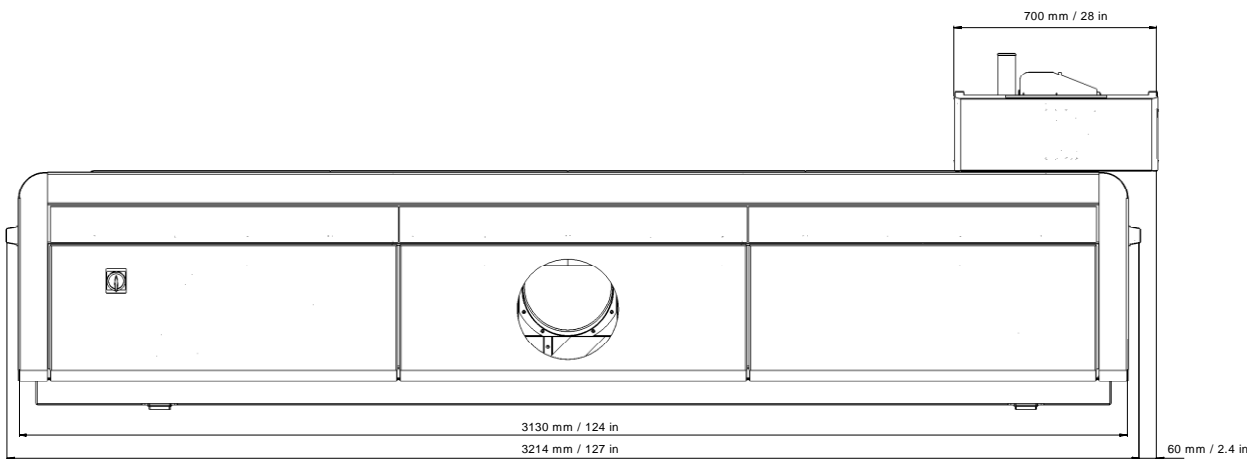
6 Technical Data

6.1 Machine dimensions and weight

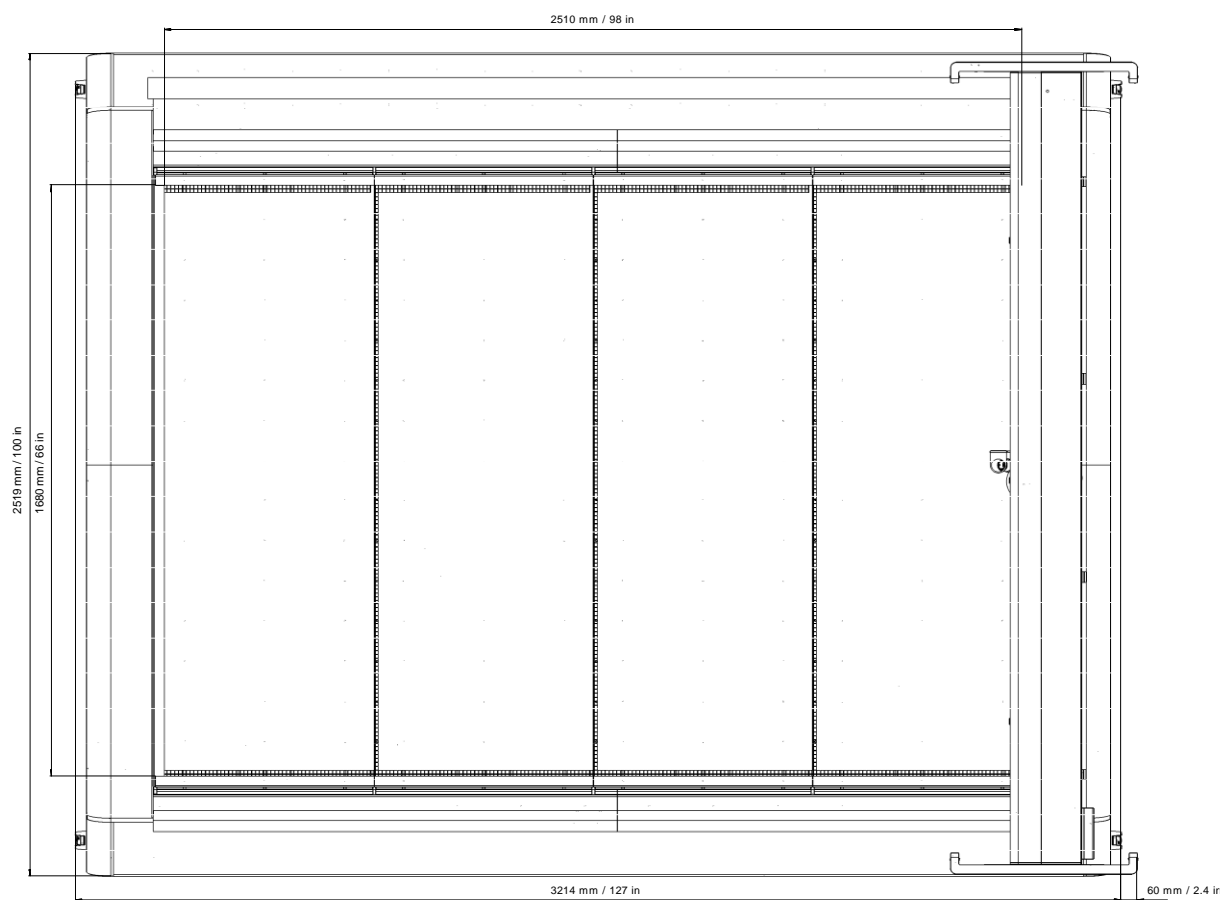
6.1.1 Front view



6.1.2 Side view



6.1.3 Top view

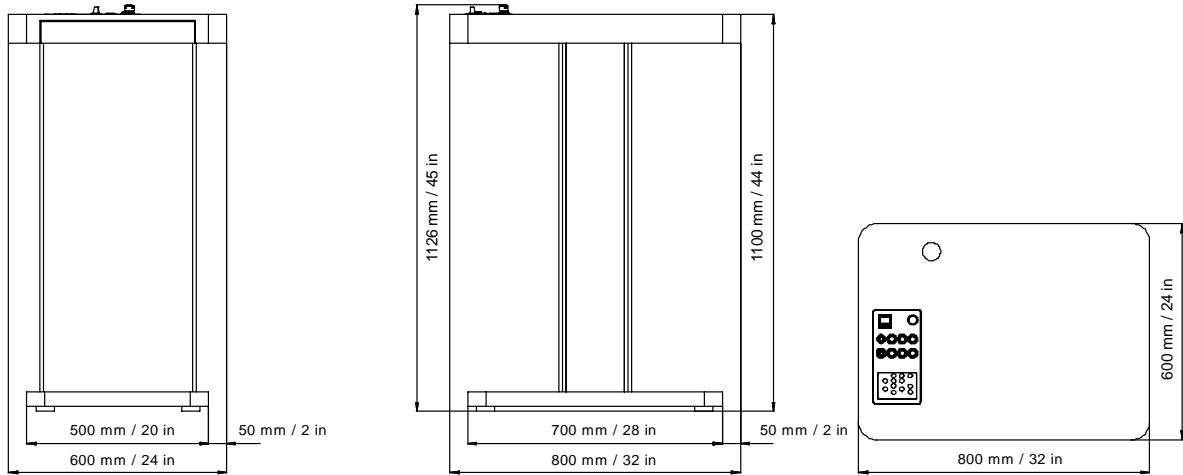


6.1.4 Maschine weight

The weight of the laser machine is 1.400 kg (3.086lbs).

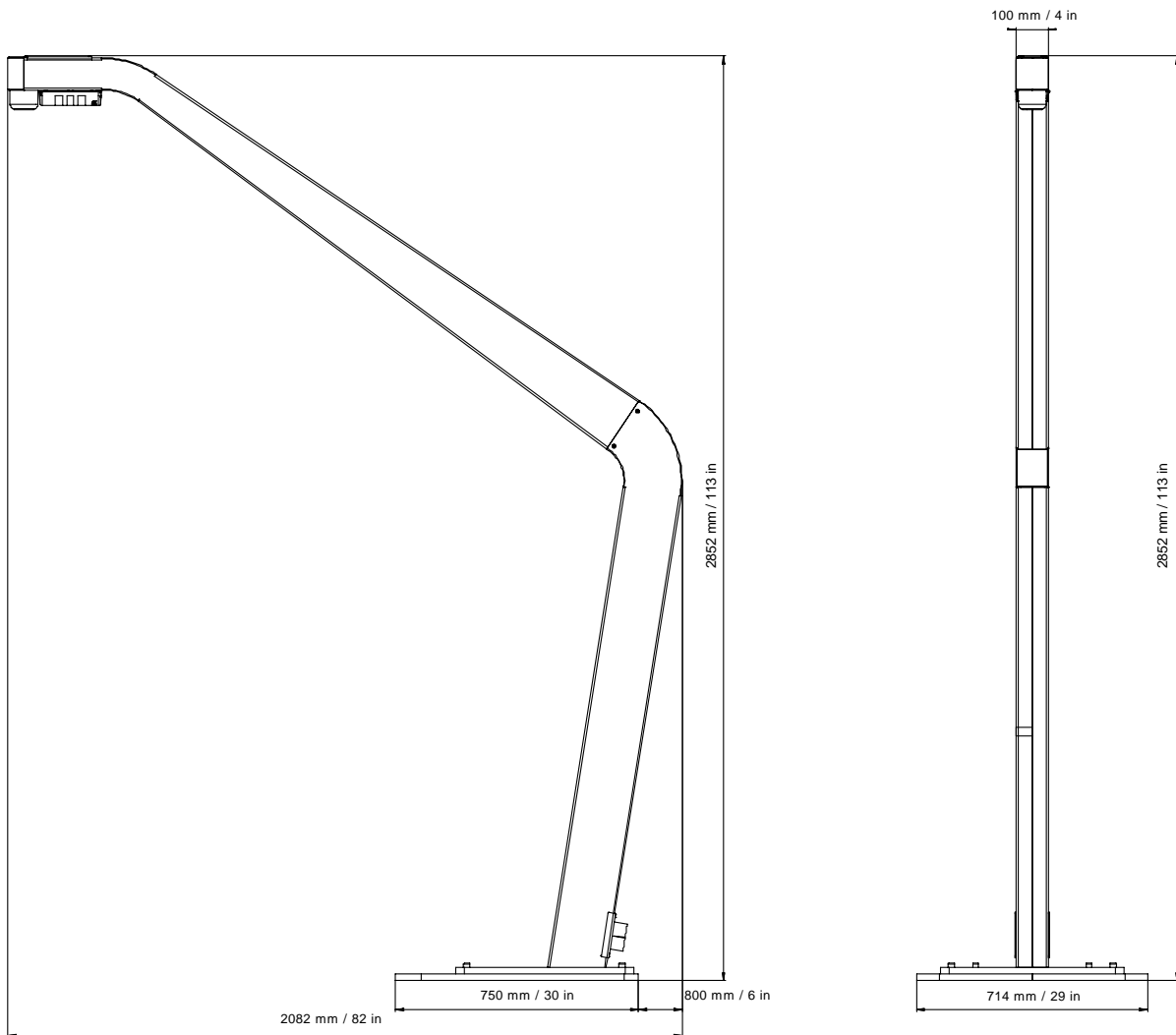
6.2 Operation panel exterior dimension

6.2.1 Side, front and top view

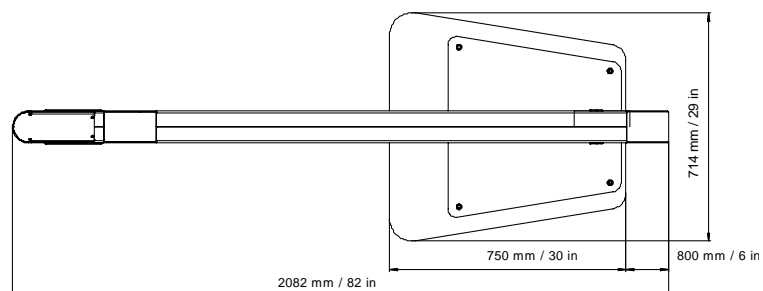


6.3 Travelling exhaust exterior dimensions

6.3.1 Front –and side view



6.3.2 Top view



6.4 Exhaust with sound-insulating enclosure (optional)

	Außenabmessung
VENT 3000 Set:	
VENT 100 (l x b x h) (without sound-insulating enclosure)	363 x 371 x 357 mm (14,29 x 14,60 x 14,06 inch)
VENT 1500 (l x b x h) (with sound-insulating enclosure):	969 x 754 (with rotary handle) x 1076 mm (38,15 x 29,69 (with rotary handle) x 42,36 inch)

7 Appendix

7.1 Acceptance form

Pre-installation Guide

Dear customer!

By signing this form, you acknowledge receipt of the

_____ **Pre-installation Guide**

from Trotec Laser GmbH. The pre-installation guide provides information about safety, side preparation, requirements and technical data.

We encourage you to review it carefully and take all appropriate measures necessary to setup and install the machine. The pre-installation guide is subject to change.

I acknowledge receipt of the _____ pre-installation guide from Trotec Laser GmbH.

City, Date

Company stamp/ Signature