Videojet 7810

Operating Instructions

Translation of the original instructions

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1 Preface

This manual...

...contains all information required for the safe operation, remedy of minor malfunctions and maintenance of the laser system. The operation manual is always enclosed on the CD to every laser system. This operation manual is intended for the **trained operation personnel** of the laser system.

This operation manual is subject to technical modifications for improvement or technical progress without notice.

Before starting your work carefully read the chapter »Safety Instructions«!

NOTICE

The printed safety instructions must be stored near the laser system, easily accessible for the operator!

Make sure that you have understood all notes. In case of any questions please contact Videojet Technologies Inc. directly.

Strictly follow the instructions!

If you need help...

...please contact Videojet Technologies Inc. at 1-800-843-3610 (for all customers within the United States). Outside the U.S., customers should contact their Videojet Technologies Inc. distributor or subsidiary for assistance.

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Caution Laser Radiation!

With open delivery system dangerous laser radiation of class 4 might be released!

This might cause severe burns of the eyes and the skin as well as damage to objects!

Thoroughly read this operation manual and strictly follow the safety instructions!

2 Safety Instructions

2.1 Symbols Used

⚠ DANGER

refers to an immediately impending danger. If the danger is not avoided, it could result in death or severe (crippling) injury.

⚠ WARNING

refers to a possibly dangerous situation. If it is not avoided, it could result in death or severe injury.

⚠ CAUTION

refers to a possibly dangerous situation. If it is not avoided, it could result in slight or minor injury. May also be used to warn of damage to property.

NOTICE

refers to handling tips and other particularly useful information. This does not signify a dangerous or harmful situation.

⚠ WARNING

refers to the emission of laser radiation and therefore to a possibly dangerous situation. Please comply exactly with the safety instructions! Failure to comply with the instructions could result in minor or major injuries to the eyes (blindness) or to the skin, together with damage to property.

2.2 Laser Classes

The Complete Laser System

The laser itself is classified as class 4 laser system according to EN 60825. Up to the beam outlet the **closed** laser system acts as a **class 1 laser system** in **normal operation**[1].

If the beam outlet including the object to be marked is shielded appropriately, the **complete, closed** laser system acts as a **class 1 laser system** in **normal operation**[1] and no additional protection is required for operation. The shielding prevents emerging of laser radiation or laser beam reflections.

NOTICE

The shielding is not included in the scope of delivery!

⚠ WARNING

The beam path must always be closed also if there is no product in front of the laser lens.

[1.] Normal operation does not include service, maintenance nor repairs.

The Laser Source

The Nd:YVO_4 laser - hereinafter called laser - is operated in pulsed operation. The laser itself is classified as class 4. It produces invisible (ultraviolet) radiation which is extremely dangerous for the eye and dangerous for the skin.

The following values can be reached (no specification):

	W	max. average power density	max. energy density
at the beam outlet	2	up to 10^9 W/mm^2	10^4 J/mm^2
in focus	2	up to 5 x 10^{11} kW/mm^2	5 x 10^6 J/mm^2

⚠ WARNING

As soon as the closed shielding or the housing of the laser are opened anywhere the complete laser system is set to class 4.

In that case appropriate measures have to be taken in order to protect people working in the laser area against too high radiation! For being able to take appropriate measures we offer special training seminars, see also section »Maintenance and Service«.

⚠ CAUTION

... with modifications!

EN 60825, part 1, »Radiation safety of laser systems«, section 4.1.1 says:

If a modification by the user to a laser system previously classified in accordance with this standard leads to a change of its performance data and/or its intended use that person or organization performing the modification is responsible for a new classification and labeling of the laser system

2.3 Intended Use

The laser system must **only be used for the treatment of material surfaces**. Due to locally intensive class 4 laser radiation the material surfaces are photochemically modified. These systems are mainly applied for marking of product surfaces (dates, batch printing, serial numbers, etc.).

The radiation produced by the laser system is of high energy and therefore improper use represents a danger to persons or objects!

The laser system must only be installed in production sites with restricted access.

Examples for Improper Use and the Resulting Risks

⚠ WARNING

Laser Radiation!

- **Never expose human beings or animals to laser radiation!**
  This might result in severe burns of eyes or skin.
- **Never expose flammable materials to laser radiation!**
  Always ensure appropriate shielding of the laser beam! Errors during markingon flammable materials (e.g. paper) might cause fires. Take suitable safetymeasures by installing e.g. smoke or fire detectors, extinguishers, or similar!
- **Never expose reflecting surfaces to laser radiation!**
  The reflected laser beam may cause the same dangers - in individual cases even greater dangers - as the original laser beam. See also section "Marking of Highly Reflective Material [⟩ 9]".
- **Never expose unknown materials to laser radiation!**
  Some materials are easily penetrated by the laser beam, although they seem to be opaque for the human eye.
- **Danger of explosion!**
  Make sure that the laser area is free of explosive materials or vapors!
- **For safety reasons arbitrary modifications or changes to the laser marking machine are forbidden and result in loss of warranty!**
  If a modification made by the user to a previously classified laser systemleads to a change of its performance data and/or its intended use that person or organization performing the modification is responsible for a new classification and labeling of the laser system. The person or organization is then regarded as »manufacturer«.
  In this case a new risk assessment is required.

2.3.1 Marking of Highly Reflective Material

When marking highly reflective material there might be a feedback of radiation into the laser. In this case the system switches to fatal error mode. Especially if the working distance was not set correctly this may lead to irreversible damage of the system.

Observe the following when marking highly reflective materials:

- Make sure that the working distance is set correctly before marking any reflecting material. Use a weakly reflecting material for testing, e.g. laminated paper.
- When marking reflecting material try not to mark in the center of the marking field. Position the product so that the marking is in the edge of the marking field.
- When setting the laser power start with the maximum value and reduce the power until the marking result is satisfying. If no marking is visible at maximum power the material cannot be marked using this laser.

If the laser system has switched to fatal error mode, a reset is required: Switch the laser system off and on again and observe the above mentioned notes.

2.4 Maintenance and Service

The maintenance tasks described hereinafter should only be carried out by especially trained personnel.

The service tasks are exclusively to be carried out by service personnel of Videojet Technologies Inc. or one of their representatives. During these works the laser system has to be operated in **class 4**. In Germany, the Unfallverhütungsvorschrift (Accident Prevention Regulations) 46.0 »Laser Radiation« (BGV B2) says that the responsible trade cooperative association and the authority responsible for occupational safety (Trade Supervisory Office) have to be given notice of class 3B or 4 laser systems before initial operation. Please make sure to comply with your local regulations.

NOTICE

Give notice of the laser system to the responsible trade cooperative association and the Trade Supervisory Office before initial operation.

Have a person responsible for the safety of the laser system trained as laser safety officer and inform the trade cooperative association in writing about this person if the system is operated in class 4 for maintenance purposes.

In order to facilitate safe performance of all necessary maintenance and service tasks without assistance and to ensure highest safety for the operating and maintenance personnel we offer special training seminars.

- **Training for technicians:**
  The trainee gains the knowledge required to perform all maintenance and service tasks at the laser system safely and professionally without assistance.
- **Combined training:**
  In addition to the knowledge gained during the training for technicians the person is trained as laser safety officer. This training is accepted by the trade cooperative association (see above).

Ask for free information material!

Please be aware that (in Germany) the personnel operating the laser system must be instructed according to §12 of the Health and Safety at Work Act and §4 BGV A1 (Prevention Principles) at least once a year.

2.5 Safety Devices and Warning Lights

The complete laser system includes various safety devices and warning lights which shall prevent damages to people or objects. There must not be any alterations to safety devices nor warning lamps (see section "Laser Classes")!

Safety Devices

Key-switch	The key-switch prevents operation of the laser system by unauthorized people. Make sure that the key is withdrawn and available to authorized personnel only!

Beam shutter	The beam shutter is located within the laser head and prevents the emission of laser radiation.
Laser safety circuit (short: Door circuit)	The door circuit monitors the safety housing of the system. If the door circuit is opened, the beam shutter is closed. The safety controller monitors the beam shutter. If the shutter does not close, the beam source is switched off. Thus the system remains in laser class 1 even if the housing is open.
Emergency stop circuit	The emergency stop circuit directly deactivates the power supply module and thus eliminates any danger.

Warning lights

Red light	The red light on the marking head lights up when the emission of laser radiation is possible.
Red light "Laser emission"	The red light on the control panel of the supply unit lights up when the emission of laser radiation is possible. The functioning of this light is monitored. In case of malfunction the system cannot start the laser.
Additional warning lights	Additional lights can be connected as external emission displays (system-specific).

NOTICE

When installing the laser make sure that at least one of the the warning lights is always visible.

2.6 Dangers to Eyes and Skin

The laser system produces **class 4** laser radiation. The **ultraviolet** laser radiation is **not visible** for the human eye.

Effects on the eye

Laser radiation in the invisible, short wave UV-A range (wavelength 315 nm - 380 nm) of low intensity can cause inflammation of the cornea (photokeratitis) or of the conjunctiva (photoconjunctivitis) as well as cataract (clouding of the eye lens). In case of higher radiation intensity it can cause reversible corneal opacity, irreversible corneal opacity and cataracts.

⚠ WARNING

People within the area of the laser must wear suitable safety goggles against laser radiation while carrying out maintenance, adjustment or service work at the open laser housing and/or open beam delivery system!

Never look directly into the laser beam!

Suitable safety goggles provide protection against direct, specularly reflected or diffusely scattered laser radiation.

Use suitable safety goggles. Observe the warning and information labels.

Effects on the skin

Depending on the radiation intensity or focusing of the laser beam the radiation can penetrate the skin deeply and damage the skin cells and nuclei. The damages can also occur after some time. Short wave UV-A light (315 nm - 380 nm) penetrates the skin several millimeters. Thus it can cause reddening of the skin, sunburn and skin cancer.

Therefore protect your skin by wearing adequate protective clothing. Avoid any exposure of your skin to the laser radiation. Avoid the laser beam to get in contact with your clothing.

2.7 Adjustment/Modification of the Marking Field

Via the software the marking field of the laser can be modified in such a way thatthe laser beam can possibly be directed to the shielding or onto other components or parts. Thus, surfaces exposed to irradiation can be damaged or destroyed.

⚠ WARNING

If, as a result of the modification, the laser beam gets accessible the complete laser system is set to class 4 (see section "Laser Classes").

⚠ WARNING

Fire and explosion hazard if there are flammable materials or explosive atmospheres within the area of the laser beam.

Appropriate safety measures must be taken if the laser is to be operated in explosive atmospheres.

A password is required for changing the marking field (if the password protectionhas been activated in the software). The password can be changed subsequentlyby a user authorized for the corresponding user level.

We explicitly point out that the person who will fulfil a modification of the marking field, will assume the full responsibility for any consequential damages and problems!

2.8 Noise Hazard

During the marking process high-frequency noises are produced.

NOTICE

Protect your ears and wear a suitable hearing protection.

2.9 Fire and Explosion Hazard

⚠ WARNING

The high output power of a class 4 laser can inflame various materials. Therefore, while performing maintenance and service work at the open laser housing and/or open beam delivery system, make sure that fire protection measures were taken before starting the works!

Paper (circuit diagrams, leaflets, posters on the walls, etc.), curtains which are not impregnated fire retardantly, wooden boards or similar flammable materials can easily be inflamed by **direct or reflected** laser radiation.

Make sure that the working area of the laser system is **free from containers with flammable or explosive solvents or cleaning agents!** Unintended exposure of a container to intensive invisible laser radiation might easily cause fires or explosions.

2.10 Elektrische Sicherheit

The laser system was designed in accordance with the general rules of technology including regulations EN 60950-1 and EN 60825-1.

⚠ DANGER

During works at the open laser housing alive components are accessible.

Make sure that rules and regulations for works on alive components are always observed!!

All works at the open laser housing, especially at electrical components, must only be performed by specially trained personnel!

For electrical safety the laser system is equipped with protective grounding labeled with the grounding symbol according to DIN VDE 0100-200:2006-06 (protection class I).

2.11 Decomposition Products

⚠ WARNING

When treating materials with laser radiation decomposition products are produced which are dangerous to health!

Through vaporization of materials fine dust and vapors are produced which might include hazardous decomposition products depending on type and composition of the respective materials.

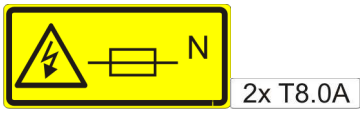
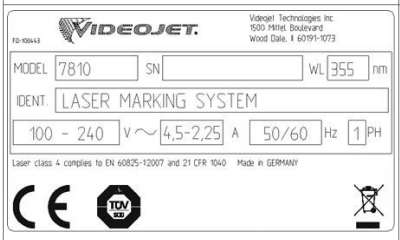
A fume extractor according to the respective requirements which is equipped with special dust and activated charcoal filters **must** be installed to ensure that the decomposition products are sucked off where they are produced.

Protect yourself and your colleagues against hazardous decomposition products!

A fume extractor also prevents contamination and gradual destruction of optical elements of the beam delivery system by dust particles. We offer different fume extractors as accessories.

2.12 Warning and Information Labels

Label/Symbol	Position
	on the marking head (vorne)
	on the interface unit

Label/Symbol	Position
	on the cover inside the supply unit
	on the back of the supply unit and on the marking unit (next to the supply line)
	on the fuse insert
	on the fans
	on the supply unit

3 Installation

3.1 Installation and Start-Up

Installation and start-up of the laser system require profound knowledge and experience. Therefore it should be accomplished by personnel of Videojet Technologies Inc. or one of their representatives only.

In order to facilitate quick and easy start-up please prepare the place of installation such that the system can be installed:

- Proceed as described in section "Unpacking [} 17]".
- Please provide all connections - as described in section "Installation Conditions" and in the documents you received upon order handling - in time.

In case of questions please contact Videojet Technologies Inc..

NOTICE

The company operating the laser system is responsible for the safe use of the laser system, especially for meeting the local codes and regulations regarding the operation of laser systems and their components (beam protection, fume extractor, cooling, etc.).

Videojet Technologies Inc. does not accept responsibility for any damages due to misuse of equipment, incorrect operation or negligence.

3.2 Transport and Storage

The laser system is a precision-made instrument and includes numerous electronic and optical components. Please avoid any mechanical stress (shock, vibrations, etc.) on the laser system! In case of questions concerning transport and storage please contact Videojet Technologies Inc..

Transport

⚠ CAUTION

Switch off the laser system before transport and disconnect mains connection!

Please make sure that the supply line ("umbilical") connecting marking unit and supply unit is not bent!

Do not use the umbilical to carry the laser system!

Wear safety shoes!

Storage

Store the laser system in a horizontal position and protected against dust and humidity. The storage temperature must be between -10 °C and +70 °C. The air humidity must be between 10 % to 90 %.

3.3 Unpacking

1. Open the packaging and remove the filling material.
2. Remove the individually packed components.
3. Check all parts for damage during transport.
   In case of damage please inform the forwarding agent and Videojet Technologies Inc. or their representative immediately in writing. Keep the packaging material and note damages on the inside and outside. Take pictures, if possible.
4. Transport the laser system and the components to the intended place of installation.
5. Protect the laser system and all components from dust and humidity until installation.

Protect the environment!

Separate packging material for recycling.

3.4 Installation Conditions

⚠ CAUTION

The laser system must not be subject to any mechanical stress (shock, vibrations, etc.) since this reduces the marking quality and can result in damaging the system.

Please consider upon installation that the supply line between supply unit and marking unit is not designed for continuous alternating bending.

When installing the system the regulations of DIN EN 60950 must be observed.

Space Required

The standard dimensions of the laser system can be found in the drawings in the chapter "Appendix".

For systems manufactured according to special customer requirements this information can be found in the erection plan or the dimension and data sheets you received upon order handling.

Connections

The laser system requires a mains connection. Information on the type, number and reference values of the connections can be found in the terminal diagrams you have received upon order handling.

⚠ WARNING

Only the delivered power connection cable must be used!

Check the cable regularly for damages. If the cable is damaged it must be exchanged.

The power connection cable of the laser system is 2 m long. Make sure that the adequate power sockets are in range.

Ambient Conditions

Temperature range:	10 - 40 °C
Air humidity:	10 - 90 %, non condensing

NOTICE

To avoid condensation wait one hour before starting the system if the system was brought from a cold to a warm environment.

Make sure that there is no condensed water in the system.

The venting slots of the supply unit and of the marking unit must not be covered. Make sure that there is sufficient air supply (see also section "Cooling").

The sealing IP21 is only applicable if the supply unit is installed horizontally.

Mounting

For proper mounting of the marking unit there is a T-slot at the bottom of the interface unit.

3.5 Cooling

The laser system is cooled by air. The internal cooling system is designed to supply sufficient cooling.

Make sure that the cooling air can be sucked in and blown out freely and that there is sufficient air exchange at the installation site to ensure heat dissipation.

3.6 Fume Extractor

In order to remove marking residues which might be dangerous to health a fume extractor must be installed.

The fume extractor is to be installed such that marking particles are sucked off directly at the place of the formation to prevent that dust particles accumulate which gradually destroy optical components of the laser system. Make sure that there are no air leaks.

We offer fume extractors as accessories. If a fume extractor is part of the complete delivery please find further information in the enclosed operation manual of the fume extractor

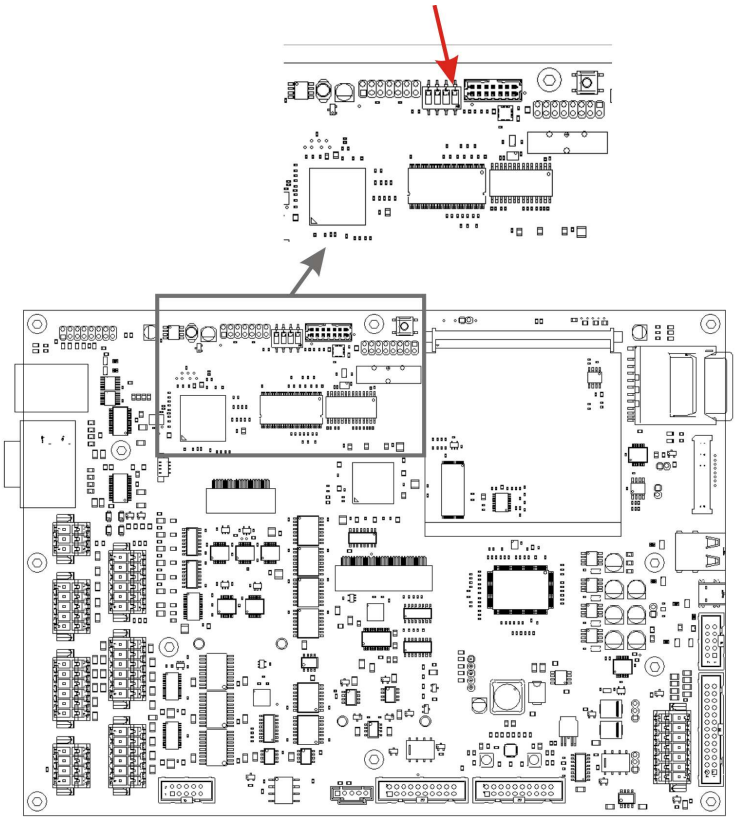
3.7 Interfaces of the Laser System

Network interface	Connection of a PC for controlling via the marking software.

Customer interface	The general assignment of the customer interface can be found in chapter "Appendix". The customer-specific assignment of the customer interface can be found in the data sheets you received upon order handling. **Note: All cables connected to the system must be shielded.**

3.8 Definition of the IP Address

On the control board there is a DIP switch:



Using the DIP switch you can set the IP address as follows:

DIP switch 1 ON:	If the DIP switch is in position ON when starting the laser system the IP address from the system database will be ignored. The standard IP address is configured. The settings in the system database are preserved. The standard IP address is: 192.168.1.1 Subnet mask: 255.255.255.0
DIP switch 1 OFF:	The settings can be configured from the system database.

When the laser system is delivered the DIP switch 1 is set to OFF and the standard IP address is saved in the system database. The other DIP switches are reserved for the internal use.

3.9 Shutdown

3.9.1 Temporary Shutdown

If the laser system is shut down temporarily (e.g. for the duration of a works holiday), the following work is to be carried out:

1. Save the data on the computer before switching the laser system off. A detailed description can be found in the manual of the marking software.
2. Switch the laser system off after the data backup, (see chapter »Operation of the Laser System«).
3. Secure the laser system against unauthorized startup by removing the key (key switch).
4. Clean the laser scan lens (see section »Cleaning the Laser Scan Lens [} 33]).

3.9.2 Final Shutdown

⚠ WARNING

Ensure that all live parts are switched off and that work can be carried out safely on these parts.

If the laser marking machine is shut down permanently (e.g. for selling or disposal), the following work is to be carried out:

1. Carry out all work listed in section "Temporary Shutdown".
2. Disconnect the machine from the electric power supply.

In case of selling and transport

Package the machine according to the instructions in section "Transport and Storage".

In case of disposal

Dispose of the components of the laser system in a manner that is safe and environmentally compatible. Observe all applicable legal and local regulations.

Please dispose of the components of the laser system separated for recycling of raw materials.

4 Description of the Laser System

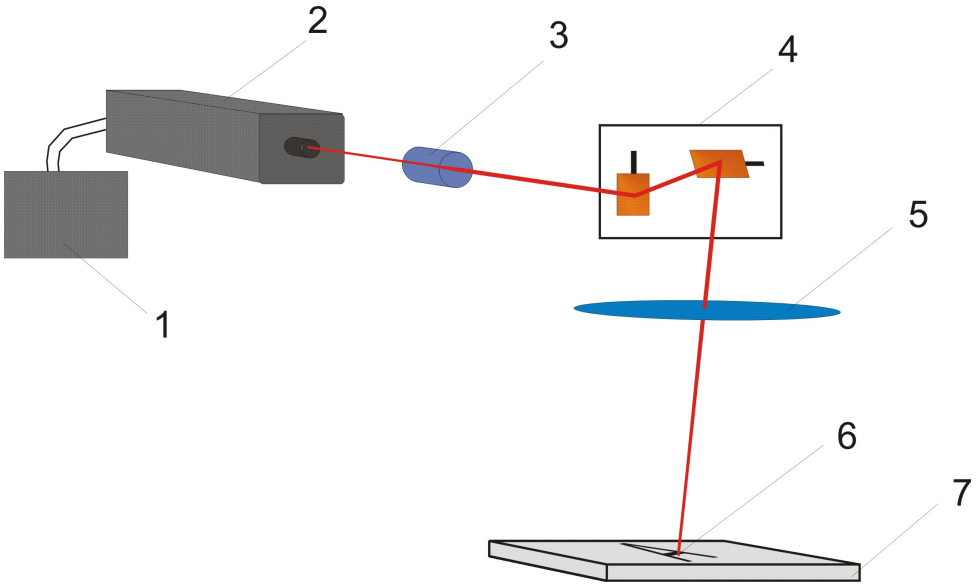
4.1 Function Principle of a Vector-Scanning Laser System

The laser (2) working in pulsed or continuous operation produces an infrared invisible laser beam with small diameter. The laser beam is expanded by means of two-lens telescope (3).

The expanded beam reaches the marking head (4) where two movable mirrors deflect it such that it passes over the lines of the opened template on the product. The lines are divided into vectors (X and Y coordinates). The line up of vectors produces a marking on the product, the laser »writes« on the product surface.

The calculation of vectors and the control of the laser is performed by the controller card in the supply unit (1).

The deflected laser beam is focussed onto the product surface (7) by a laser scan lens (5). Generally the marking is produced at the focus of the lens (6).



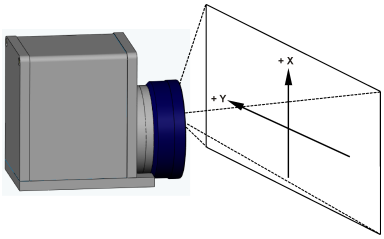
4.2 The Laser Beam Source

The beam generation is based on an Yttrium orthovanadate crystal doted with neodymium. Using a frequency tripling the base wave of the Nd:YVO_4 laser is changed to an ultraviolet laser with a wavelength of 355 nm and a power range of up to 2 W.

4.3 The Marking Head

Two movable mirrors are located inside the marking head which deflect the laser beam vertically and horizontally

The X and Y axes of the coordinate system of the marking field are defined by the position of the marking head. A translation or rotation of the marking head also translates or rotates the axes of the coordinate system. X and Y axes in relation to the marking head are defined as displayed in the following figure:



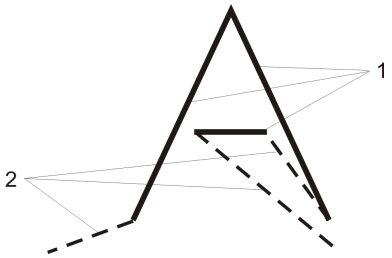
4.4 The Marking of the Product Surface

The marking of the product surface is performed by the effect of intense laser radiation on the product material.

The laser beam is focussed onto the product surface and heats up the topmost layer of the material, which causes a color change or a vaporization of the topmost dye layer.

The symbols and characters which shall be marked on the product are subdivided into vector strokes (1). Each vector stroke is again subdivided into smaller vectors.

When the laser beam jumps from one stroke to the next (2) the laser is switched off and the product is not marked.



4.5 The Laser Parameters

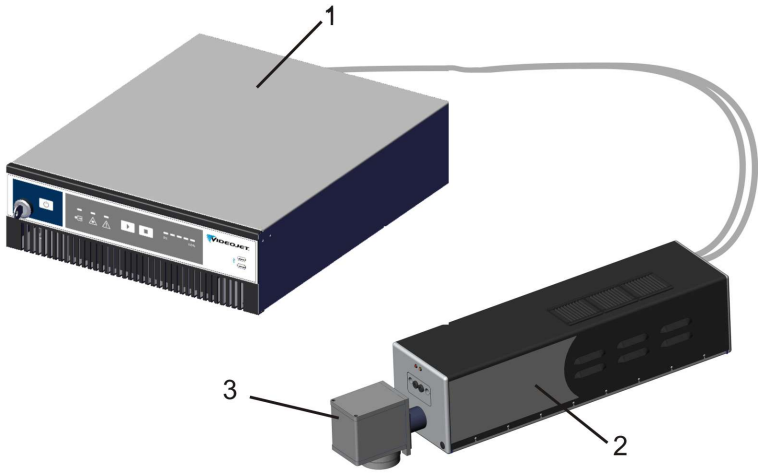
Parameters are used to adapt the laser system to different materials. These parameters have to be determined and adjusted for each application in order to achieve the best possible marking quality.

Determining the correct parameters requires profound knowledge and experience, because the parameters highly depend on the application and the material which shall be marked. In case of questions please contact us.

The parameters for individual materials are combined in parameter sets. Parameter sets can be generated and altered using the software. For detailed information on the parameters please refer to the manual of the marking software.

4.6 The Structure of the Laser System

The laser system consists of the supply unit (1) and the marking unit comprising the interface unit (2) and the marking head (3). The supply unit is controlled via the software on a PC.



4.7 Technical Data

	Unit	
Laser type		Nd:YVO_4 laser
Wavelength	nm	355
Laser class		4
Operating mode		pulsed
Max. pulse energy	mJ (ns)	1 (4)
Pulse width	ns	< 25
Pulse frequency	kHz	20 - 100
Beam divergence	mrad	< 2.8
Max. laser power	W	2.2
Max. power consumption	VA	540
Supply voltage	VAC	100 to 240 (autorange); 1-phase
Mains frequency	Hz	50 - 60
Ambient temperature	°C	10 - 40 (typical, depending on operation)
Rel. humidity	%	10 - 90; non-condensing
Dimensions of supply unit	mm	544 x 436 x 141
Weight (typical) • Supply unit • Marking unit	kg	 20 25
Sealing • Supply unit • Marking unit		 IP 21 IP 20
Marking speed[a]	mm/s	1 - 6000
Speed of production line	m/s	0 - 10
Characters/Second[a]		700
Focal length of focussing lens Marking heads: • SS10 TY/SS7 TY	mm	 100, 160, 214, 511
Focus diameter	µm	15 (depending on the installed optics)
Line width		depending on the material and the laser parameters
Fonts		any standard font (special characters on demand for additional charge)
Cooling		internal air-cooling
Max. distance marking unit - supply unit	m	4
Min. bending radius of supply line	mm	140

	Unit	
Control		Windows-compatible PC with marking software under Windows
Interfaces		Network interfaces

[a.] Any statements referring to marked characters or actual markings are derived from possible scanning speeds. These values highly depend on the material and laser power and may only be taken as a guideline. These are no specifications!

Due to Videojet Technologies Inc. 's policy of continuous improvement, technical data is subject to change without notice.

NOTICE

Additionally to the UV laser light of 355 nm it is possible that residual radiation in the range of 532 nm, 800 nm and 1064 nm at a max. power of 1 mW, 5 mW and 1 mW is emitted.
The values of pulse width and pulse frequency as well as the beam divergence correspond to those of the laser of 355 nm, except for the laser of 800 nm with a divergence of approx. 10° and operated in continuous wave mode.

4.8 Working Distance and Marking Field

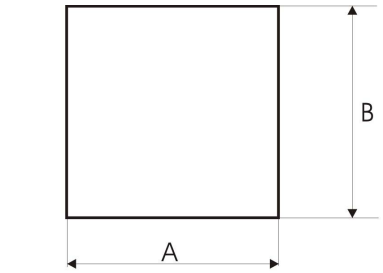
Marking Head Raylase SS10 TY (all values in mm)

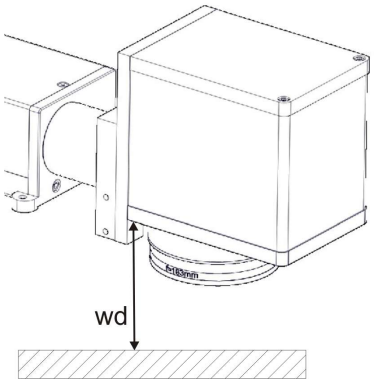
Laser scan lens: Focal length f	**103 (D34)**	**160 (D32)**	**214 (D53)**	**511 (D41)**
Working distance (wd)	193	227	303	650
max. width (A)	63.6	118.0	156.9	374.6
max. height (B)	75.7	118.0	156.9	374.6

Marking Head Raylase SS7 TY (all values in mm)

Laser scan lens: Focal length f	**103 (D34)**	**160 (D32)**	**214 (D53)**	**511 (D41)**
Working distance (wd)	209.5	253	316	668
max. width (A)	65.1	110.6	156.9	374.6
max. height (B)	75.7	118.0	156.9	374.6

See figure below.


B
A


wd

5 Operating the Laser System

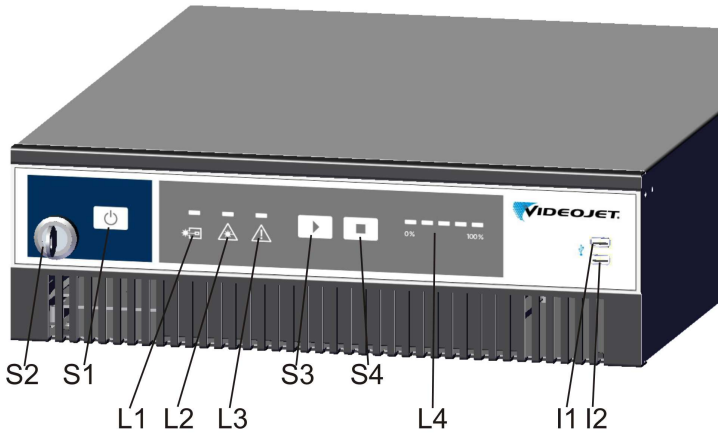
5.1 Operation of the Laser System

The laser system is operated using the marking software.

The software runs on a PC under Windows. With the software you can access the full range of fonts, logos and tools to create layouts and preview the marking on the screen. In addition you can access all laser parameters and system settings.

A detailed description can be found in the manual of the marking software or in the online help.

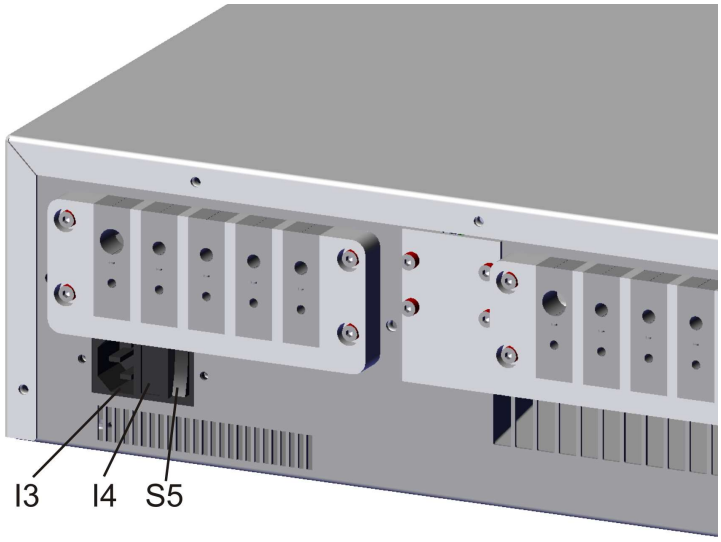
5.2 Elements on the Supply Unit



No.	Type	Function
S1	Push button POWER/STANDBY	switches the supply unit on. If the supply unit is on this button switches the laser beam source an the control electronics off. **Attention:** The system is not separated completely from the power supply. For complete separation the main power switch must be used.

No.	Type	Function
S2	Key switch	applies the power supply for the laser beam source (position »I«). The marking process can be started. **Note:** Remove the key switch if switched off (position »0«) to protect the system from unauthorized operation!
S3	Push button START	With »START« the currently selected template can be marked. **Laser radiation is emitted!** **Make sure the safety instructions are observed.**
S4	Push button STOP	With »STOP« a marking process can be stopped.
	LED status indicators	
L1	Beam shutter open -red-	is on when the shutter is open.
L2	Emission -red-	is on when the key switch is in position »I « and the power is applied to the laser source. Simultaneously the red LED on the marking head lights up.
L3	Error -yellow-	flashes in case of malfunction.
	LED system indicators	
L4	System -green-	This system indicator consists of five LEDs. They display the progress and the status • during initialization of the laser system and • of the marking process.
I1	Socket	USB connection
I2	Socket	USB connection

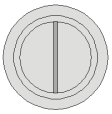
Backview of the supply unit



No.	Type	Function
S5	Main power switch	switches the mains of the laser system on and off.
I3	Socket	mains cable connection
I4	Fuse insert	two fuses (T8A)

5.3 Switch-On/Off of the Supply Unit

5.3.1 Switch-On

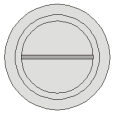
1. Make sure that the safety instructions are observed.
2. Switch on the fume extractor or use the possibility to let the system switch on the fume extractor by using a signal (see Inputs and Outputs (Galvanically Separated)).
3.  Make sure that the key switch is in the vertical position »0«.

    Switch the main switch (S5) at the back of the supply unit to position »I«.

   The blue LED on the push button »POWER/STANDBY « (S1) is on.
4.  Press push button »POWER/STANDBY« (S1).

   After approx. 10 seconds the white LED on the push button flashes. The flashing frequency and the brightness of the LED increases.

The LED system indicators (L4) are on successively indicating the initialization of the laser system. After that the system is ready for operation the white LED is on and all LED system indicators are on.

5. 

Switch on the key switch by turning it to the horizontal position »I«.

All LED system indicators are turned off.

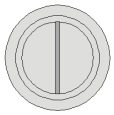
The red LED »Emission« (L2) on the supply unit and the red LED on the marking unit are on. The laser is ready.

6. 

The marking process can be started by pressing the push button »START« (S3) or via the user interface of the software.

The LED system indicators display the progress and the status of the marking process.

5.3.2 Swith-Off

1. Stop the marking process.
2. 

Switch off the key switch by turning it to the vertical position »0«.

The red LED »Emission« (L2) on the supply unit and the red LED on the marking unit are off.

The white LED on the push button »POWER/STANDBY« (S1) is on.

3. 

Press push button »POWER/STANDBY« (S1).

The yellow LED »Error« (L3) flashes.

Then the blue LED on the push button »POWER/STANDBY« is on.

4.  Switch the main switch (S5) at the back of the supply unit to position »0«.

5. Switch off the fume extractor.

6 Maintenance

6.1 General Notes Concerning Maintenance

The time for maintenance of the laser system is very short. Please carry out maintenance works in the stated intervals.

The laser system is designed such that maintenance can be performed safely.

⚠ CAUTION

Maintenance has to be performed by instructed operating and maintenance personnel only!

For reasons of safety make sure that the main key-switch is turned to '0', the key is withdrawn and the mains is disconnected!!

Before cleaning the laser system and its environment, the laser system must be disconnected from the mains power supply.

Document the regular maintenance in the maintenance protocols in this chapter! Non-conformance with the maintenance plan might result in limitations of warranty!

NOTICE

Before carrying out the maintenance works at the optics, please note the following:

Acetone is not included upon delivery and has to be purchased via other companies. Open the following Internet page to order acetone in a quick and uncomplicated way: www.vwr.com/index.htm

When purchasing acetone make sure that you order acetone pro analysi (p.a. = highest purity grade).

6.2 Maintenance Plan

The maintenance intervals are laid out considering laser system use of approximately 10 hours of daily operation on a normal working environment.

If the time of daily use exceeds 10 hours of continuous operation or in case of above normal dusty/dirty environment please shorten the maintenance intervals accordingly. In case of questions please contact Videojet Technologies Inc. or one of their representatives.

All maintenance works are described in the following sections.

Maintenance Interval	Measures
Monthly (more frequently when operated in dirty ambient conditions)	Check the laser scan lens for dust and dirt. Clean the laser scan lens in case of dust or stains.
Monthly or when control lamp lights up	If installed: Exchange the filter bag inside the fume extractor (refer to manual of the fume extractor).
Every three months (more frequently when operated in dirty ambient conditions)	Carry out a visual inspection of the laser system including the warning labels. They must be readable and positioned correctly. Check the product detector (light barrier). Clean or readjust if necessary. Check the fume extractor for air leaks.
Every six months	If installed: Exchange the charcoal filter inside the fume extractor (refer to manual of the fume extractor).

NOTICE

We recommend a professional check by our service engineers once a year (more often in a very dusty environment).

We offer special training seminars for maintenance and service personnel. In case of questions please contact Videojet Technologies Inc. one of their representatives.

6.3 Cleaning the Laser Scan Lens

The laser scan lens is located at the marking head. It may be contaminated by dust or floating particles. Contamination of the laser scan lens can lead to damages of the laser scan lens and gradually reduce the quality of the marking. Therefore the lens has to be cleaned regularly.

Generally just the outwardly facing side of the laser scan lens has to be cleaned, but check both sides for contamination and clean them, if necessary.

⚠ CAUTION

As with all optical components the laser scan lens is an object of highest precision and sophisticated design!

Slightest damages of the surface might (in the long term) result in unusability of the component or reduction of marking quality. Any contaminants must only be removed by means of a cotton tip and acetone.

Make sure that no contaminants enter the marking head while cleaning the laser scan lens!!

To clean the laser scan lens you need:

- Optics cleaning paper
- Acetone
- Protective gloves

NOTICE

Wear protective gloves during the complete procedure!

6.3.1 Disassembly of the Laser Scan Lens

⚠ DANGER

Before starting any work the laser system must be completely switched off.

1. Turn the key switch to position »0«. Remove the key to ensure that the laser system cannot be switched on.
2. Switch off the laser system (push button »POWER/STANDBY«).
3. Disconnect the mains connector.
4. Firmly grip the laser scan lens with both hands and turn it clokwise carefully until it is released from the thread.
   Do not touch the lens surface!
5. Remove the laser scan lens from the marking head and place it on a clean surface.

NOTICE

The fine thread requires several turns before the scan lens is released. Make sure that you are holding the lens firmly with both hands.

6.3.2 Cleaning the Laser Scan Lens

⚠ CAUTION

Never use polishing agents! Polishing agents destroy the laser scan lens

Never use contaminated optics cleaning paper.

Make sure that the optics cleaning paper is stored in a clean place.

1. Place the laser scan lens onto a clean surface. Fold a sheet of optics cleaning paper (at least 5 times) creating a flat cushion.
2. Hold the optics cleaning paper between thumb and index finger and put some drops of acetone onto the optics cleaning paper.
3. Carefully and slowly pull the optics cleaning paper across the surface to be cleaned. Make sure that you do not touch the surface with the gloves. **Apply only very light pressure onto the paper!**
4. If necessary repeat the procedure with a new sheet of optics cleaning paper.
5. Check the surface of the lens side located in the marking head for contamination. If necessary, clean it as described above.

If the lens cannot be cleaned or the surface of the protective glass is severely scratched: Fit a new protective glass.

6.3.3 Mounting the Laser Scan Lens

1. Position the thread of the laser scan lens straight onto the laser beam outlet of the marking head.
2. Carefully screw in the laser scan lens anti-clockwise until the fine thread has caught and tighten it by hand only. Do not use any tools!

If the fine thread jams during screwing proceed as follows:

1. Place the laser scan lens straight onto the laser beam outlet and turn it in the wrong direction until you hear the clear click as the first thread engages.
2. The screw in the laser scan lens slowly and straight in the right direction, handtight.

6.4 Protocols for Maintenance, Repair and Replacement

It is strongly recommended that records are kept of maintenance, repair and replacement procedures.

The maintenance protocols specify the tasks and their intervals. The correct and timely maintenance can help to minimize malfunctions of the laser system.

You will also find forms to record the repairs and replacements. Copies can be made and used to keep an ongoing record of the procedures recommended throughout the life of the laser marking system.

Inspection and Cleaning of the Laser Scan Lens

Maintenance interval: **Monthly**

Carried out on: Date	**Carried out by:** Name

Exchange of the Filter of the Fume Extractor

(if installed)

Maintenance interval: **Monthly or when control lamp lights up**

Carried out on: Date	**Carried out by:** Name

Exchange of the Charcoal Filter of the Fume Extractor

(if installed)

Maintenance interval: **Every six months**

Carried out on: Date	**Carried out by:** Name

Visual Inspection

Maintenance interval: **Every three months**

Carried out on: Date	**Carried out by:** Name

Update of the Software

Version:	**Carried out on:** Date	**Carried out by:** Name

Update of the CMark Software

Version:	**Carried out on:** Date	**Carried out by:** Name

Repair and Replacement Protocol

Laser model: **Serial number:**

Date: **Carried out by:**	**Repair or Replacement**	**Comments (faults, etc.)**
Date: **Carried out by:**	**Repair or Replacement**	**Comments (faults, etc.)**
Date: **Carried out by:**	**Repair or Replacement**	**Comments (faults, etc.)**
Date: **Carried out by:**	**Repair or Replacement**	**Comments (faults, etc.)**

7 Malfunctions

7.1 Notes

In this chapter you will find a description of possible malfunctions, their possible causes and suitable measures for troubleshooting. The measures stated must be performed by trained and qualified operation and maintenance personnel only.

⚠ CAUTION

Tasks for troubleshooting going beyond the ones mentioned here must be performed by **specially trained personnel** only! Strictly follow the safety instructions!

7.2 Malfunctions Descriptions

Symptom	Causes/Measures
The laser system cannot be switched on.	• Check the plug. • Check the main switch. • Check the power supply, e.g. RCD (residual current protective device) • Check the fuse (for this remove the sealing on the rear of the supply unit, see section "Elements on the Supply Unit").
The system does not boot or booting takes very long.	• Please note that the booting process can take several minutes. • Check the size of the database, the booting time depends on that. • Note the booting time and report it to the service helpdesk.
The laser cannot be started.	• Check the interlock (must be closed). • Check for error messages. • Check the key switch (must be closed). • Check for an external STOP signal.

Symptom	Causes/Measures
No marking, although START has been pressed.	• Check the encoder. • Check the product detection. • Check the working distance. • Check the lens. Clean if necessary. • Check the power setting of the parameter set. • Is the correct product registration selected? • Check the total working time of the laser beam source. • Check the external STOP signal (if existing). • Error message "Shutter defect", exchange the shutter.
Lopsided marking.	• Check the laser position. • Check the template.
Shifted marking.	• Check the sensor position. • Check the product carrier for accuracy.
Stretched/shrunk marking.	• Check the encoder setting.
Faint marking.	• Has the product been changed (e.g. dimensions, material)? • Check the lens. Clean it if necessary. • Check the working distance. • Check the parameter set (power too low, speed to high). • Check the product (must be free from dirt, water, dust, oil, etc.). • Check the fume extractor (must be on and suitable for the application).
Incomplete marking.	• Check the product speed. • Check the lens. Clean or exchange if necessary. • Check the product (must be free from dirt, water, dust, oil, etc.). • Check the encoder. If it is slipping increase the press-on force of the roll.

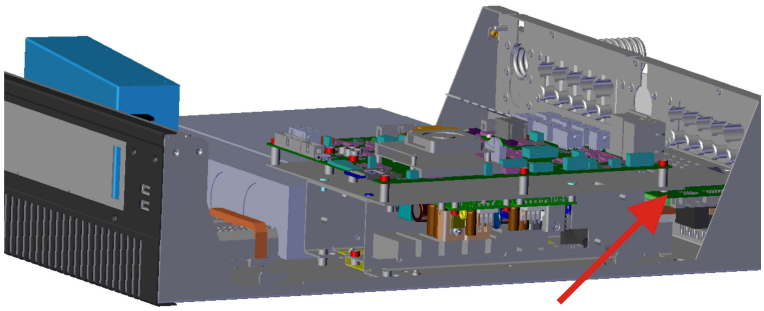
Symptom	Causes/Measures
Poor marking quality.	• Check for product or laser vibration. • Has the product been changed (e.g. dimensions, material)? • Check the lens. Clean it if necessary. • Check the working distance. • Check the parameter set (power too low, speed to high). • Check the product (must be free from dirt, water, dust, oil, etc.). • Check the fume extractor (must be on and suitable for the application). • Check the encoder. If it is slipping increase the press-on force of the roll.
Laser stops due to overtemperature.	• Clean filter(s) and system. • Is the ambient temperature within the specified limits (see product documentation)? • Is there enough space for the air intake? • Check the cooling system (if existing).

8 Appendix

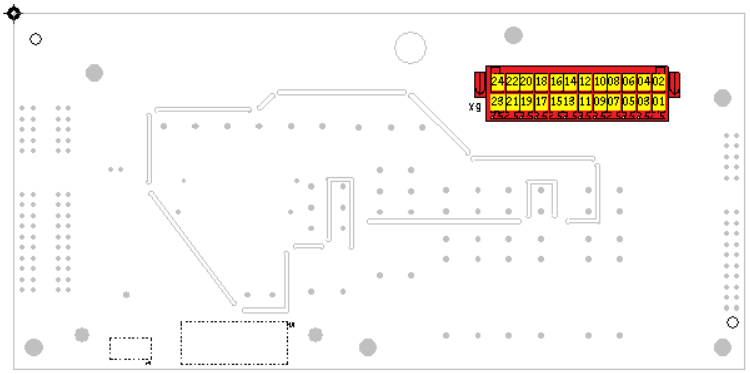
8.1 Safety Circuit of the Laser System

The saftety circuit is realized via conntector X9 on the CPD board.

Position of the board in the laser system:



Position X9:



The laser system can be ordered in 2 variants:

1. With safety circuit according to EN 13849-1, achieving performance level "d" for the door circuit and performance level "e" for the emergency stop circuit.
2. Without safety circuit as a system without performance level (non-EU).

Assignment Variant 1

NOTICE

When using the safety circuit please observe that the door cicuit as well as the emergency stop circuit must be connected with a double-pole switch.

Terminal	Signal	In/Output	Description
X9.1	24V_INT	Output	-
X9.2	GND_INT	Output	-
X9.3	-	Input	-
X9.4	GND_INT	Output	-
X9.5	24V_INT	Output	-
X9.6	RELEASE DOOR RELAY 1	Output	Extension to switch off additional relays if door circuit is opened.
X9.7	24V_INT	Output	-
X9.8	RELEASE DOOR RELAY 2	Output	Extension to switch off additional relays if door circuit is opened.
X9.9	GND_INT	Output	-
X9.10	DOOR FEEDBACK IN	Input	Feedback input for forceguided contacts of the extension relays. Default: Bridge to X9.12
X9.11	GND_INT	Output	
X9.12	DOOR FEEDBACK OUT	Output	Feedback output for forceguided contacts of the extension relays. Bridge to X9.10
X9.13	-	Input	
X9.14	DOOR 1 IN	Input	If one of the door circuits is opened, the beam shutter of the laser is closed immediately. Connect to X9.7 to close the door circuit. Default: Bridge to X9.7
X9.15	EMERGENCY 2 IN	Input	If the emergency stop circuit is opened, the laser power supply is switched off immediately. Connect to X9.19 to close the emergency stop circuit and apply reset pulse to X9.23. Default: Bridge to X9.19
X9.16	DOOR 2 IN	Input	If one of the door circuits is opened, the beam shutter of the laser is closed immediately Connect to X9.5 to close the shut-terlock. Default: Bridge to X9.5

Terminal	Signal	In/Output	Description
X9.17	EMERGENCY 1 IN	Input	If the emergency stop circuit is opened, the laser power supply is switched off immediately. Connect to X9.21 to close the interlock and apply reset pulse to X9.23. Default: Bridge to X9.21
X9.18	RELEASE EMERGENCY RELAY 1	Output	Extension to switch off additional relays if door circuit is opened.
X9.19	EMERGENCY 2 OUT	Output	Connect to X9.15 to close the emergency stop circuit.
X9.20	RELEASE EMERGENCY RELAY 2	Output	Extension to switch off additional relays if door circuit is opened.
X9.21	EMERGENCY 1 OUT	Output	Connect to X9.17 to close the emergency stop circuit.
X9.22	EMERGENCY FEEDBACK IN	Input	Feedback input for forceguided contacts of the extension relays. Default: Bridge to X9.24
X9.23	EMERGENCY RESET IN	Input	Connection to external reset for resetting the emergency stop when the safe state has been restored.
X9.24	EMERGENCY FEEDBACK OUT	Output	Feedback output for forceguided contacts of the extension relays. Default: Bridge to X9.22

Wiring see Safety Circuit [} 63].

Assignment Variant 2

Terminal	Signal	In/Output	Description
X9.1	24V_INT	Output	-
X9.2	GND_INT	Output	-
X9.3	24V_LAS	Input	-
X9.4	GND_INT	Output	-
X9.5	24V_INT	Output	-
X9.6	-	Output	reserved
X9.7	24V_INT	Output	-
X9.8	-	Output	reserved
X9.9	GND_INT	Output	-
X9.10	-	Input	Bridge to X9.12
X9.11	GND_INT	Output	
X9.12	-	Output	Bridge to X9.10
X9.13	GND_LAS	Input	

Terminal	Signal	In/Output	Description
X9.14	SHUTTERLOCK 1	Input	If one of the shutterlock circuits is opened, the beam shutter of the laser is closed immediately. Connect to X9.7 to close the shutterlock. Default: Bridge to X9.7
X9.15	INTERLOCK 2	Input	If one of the interlock circuits is opened, the laser power supply is switched off immediately. Connect to X9.19 to close the interlock. Default: Bridge to X9.19
X9.16	SHUTTERLOCK 2	Input	If one of the shutterlock circuits is opened, the beam shutter of the laser is closed immediately. Connect to X9.5 to close the shutterlock Default: Bridge to X9.5
X9.17	INTERLOCK 1	Input	If one of the interlock circuits is opened, the laser power supply is switched off immediately. Connect to X9.21 to close the interlock. Default: Bridge to X9.21
X9.18	-	Output	
X9.19	INTERLOCK 2	Output	Connect to X9.15 to close the interlock.
X9.20	-	Output	
X9.21	INTERLOCK 1	Output	Connect to X9.17 to close the interlock.
X9.22	-	Input	Bridge to X9.24
X9.23	-	Input	
X9.24	-	Output	Bridge to X9.22

Wiring see Without Safety Circuit [} 64].

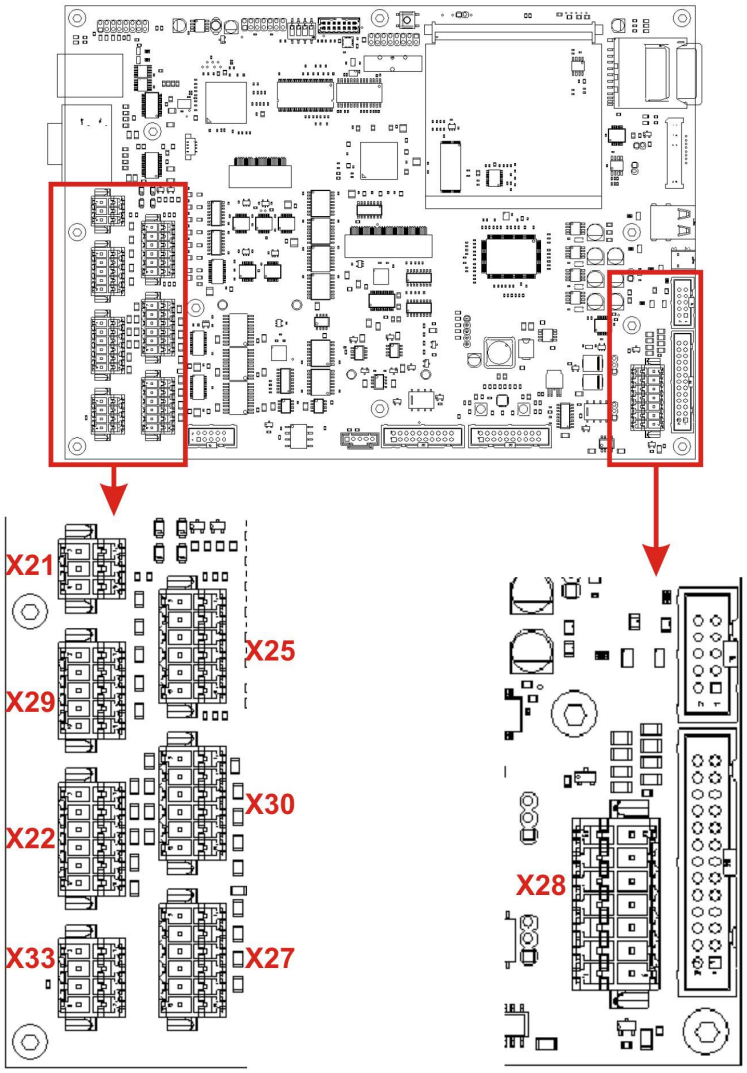
8.2 Assignment of the Customer Interface

NOTICE

All cables connected to the system must be shielded.

The shielding should be connected to the provided grounding rail.

The terminals of the customer interface are located on the control board in the supply unit of the laser system.



Description of the connectors

Connector	Description
X28	Power supply

Connector	Description
X21	Fume extractor
X29	Laser control
X22	Laser control
X33	Internal signals
X25	Encoder/Product detector interface
X30	External job selection
X27	Laser control

Description of the bridges for the operation without external wiring

The following terminals are to be connected to 24 V for operation:

Bridge	Description
X29. 1-7	Input customer error
X27.7 - X33.3	reserved
X21. 1-2	Exhaust error
X21. 3-5	Filter full
X22. 3-11	reserved
X22. 7-9	Stop marking
X22. 9-11	reserved
X33. 1-8	External key switch
X33. 2-6	reserved
X33. 3-4	reserved

Specification of the 12 outputs:

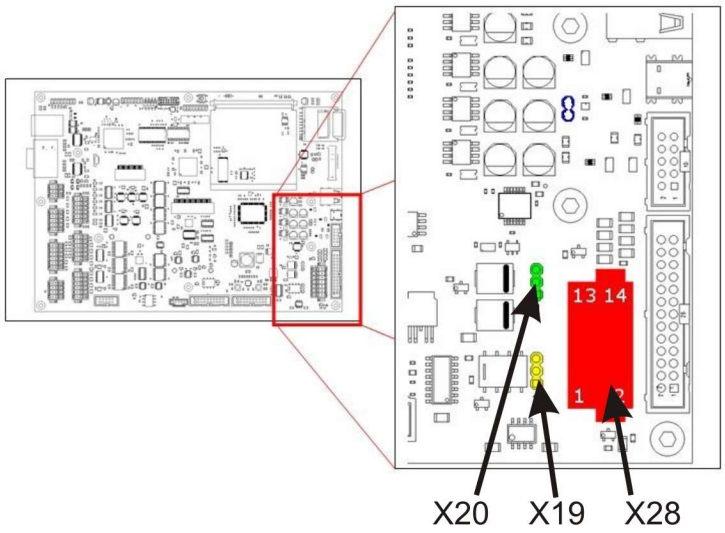
Rated voltage:	24 V/Push Pull (high and low activated)
Max. output current:	50 mA max. (short-circuit proof)

Specification of the 24 inputs:

Rated voltage:	24 V
Current input:	2.5 mA
Current threshold for LOW level:	<= 8.4 V
Current threshold for HIGH level:	>= 9.4 V
Max. frequency:	200 Hz (except interface for encoder/product detector)

8.2.1 Power Supply Connector for the Customer Interface (Connector X28)

The power supply of the customer interface can be realized by the customer (op-to-decoupled potential-free connection) or internally with 24 V (non-isolated).



The jumpers X19 (red) and X20 (green) are used for configuration.

Potential-free configuration

For the potential-free configuration (power supply by the customer) the jumpers must be set as follows:

X19	1	2 - 3
X20	1	2 - 3

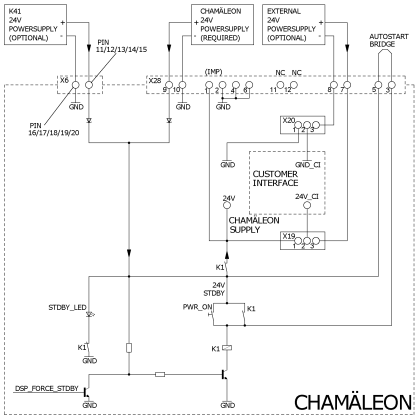
The external supply of 24 V +/- 10 % max. 50 W is to be connected to X28.7 (+) and X28.8 (-).

Non-isolated configuration

For the non-isolated Konfiguration (internal power supply) the jumpers must be set as follows:

X19	1 - 2	3
X20	1 - 2	3

In this case X28.7 and X28.8 are not connected.



⚠ CAUTION

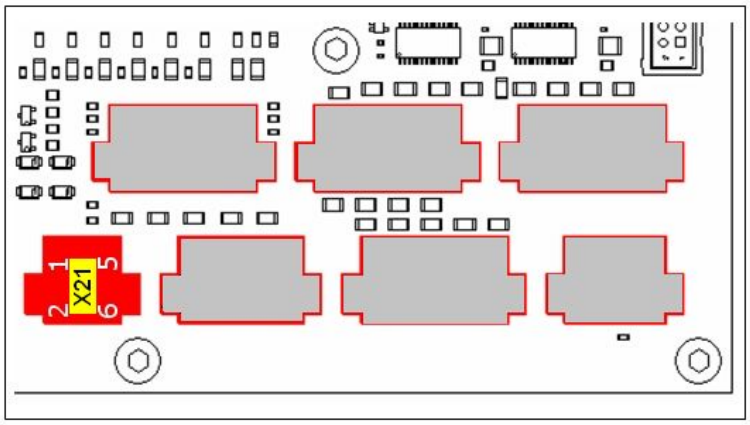
If the customer interface is supplied internally, the load must not exceed 250 mA.

Connector X28: Power Supply

Terminal	Signal	Description
X28.1	RESERVED	reserved for internal purposes
X28.2	RESERVED	reserved for internal purposes
X28.3	EXT_STARTUP	The system can be booted remotely by applying here a pulse of X28.5 (24V_STDBY). No connection to 24V_EXT (X28.7) allowed! If X28.3 and X28.5 are bridged permanently the system boots automatically after switching mains on.
X28.4	GND	GND
X28.5	24V_STDBY	24 V output of standby supply. No connection to X28.7 (24V_EXT) allowed if the customer interface is to be supplied potential-free.
X28.6	GND	GND
X28.7	EXTERNAL_POWER_SUPPLY +	24 V customer
X28.8	EXTERNAL_POWER_SUPPLY -	GND customer
X28.9	EXTERNAL_POWER_SUPPLY +	24 V
X28.10	EXTERNAL_POWER_SUPPLY -	GND
X28.11	NC	not connected

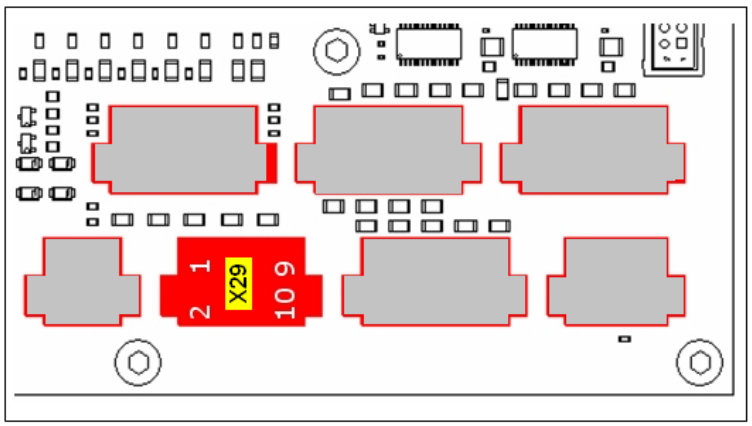
Terminal	Signal	Description
X28.12	NC	not connected
X28.13	RESERVED	reserved for internal purposes
X28.14	RESERVED	reserved for internal purposes

8.2.2 Assignment of Connector X21 Fume Extractor



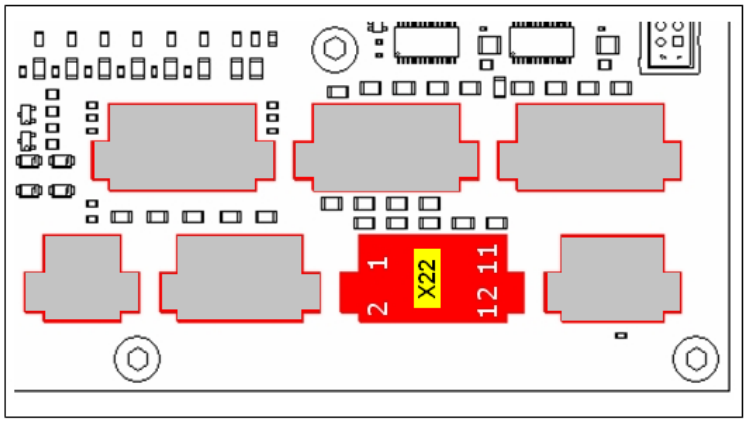
Terminal	Signal	In/Output	high/low	Description
X21.1	EX-HAUST_ER-ROR	Input	low	The system is stopped immediately if an error of the fume extractor oc-curs during the marking process.
X21.2	EXHAUST_ON	Output	high	This signal is set if the fume extractor is to be switched on.
X21.3	FILTER_FULL	Input	low	The system is stopped immediately if the filter of the fume extractor is full during the marking process.
X21.4	GND_CI	Output		
X21.5	24 V_CI	Output		Power supply
X21.6	GND_CI	Output		

8.2.3 Assignment of Connector X29 Laser Control



Terminal	Signal	In/Output	high/low	Description
X29.1	ERROR_STATUS_CUSTOMER	Input	low	Connected to 24V. The signal is used to evaluate error conditions.
X29.2	ERROR	Output	high	The system is stopped immediately if an error occurs during the marking process.
X29.3	ERROR_CONFIRM	Input	high	Input for external error confirmation.
X29.4	reserved	Output		
X29.5	reserved	Input		
X29.6	ACK_JOB_SELECTION	Output	high	High: Job selection complete. Low: Job selection not completed yet.
X29.7	+24V_CI	Output		
X29.8	GND_CI	Output		
X29.9	+24V_CI	Output		
X29.10	GND_CI	Output		

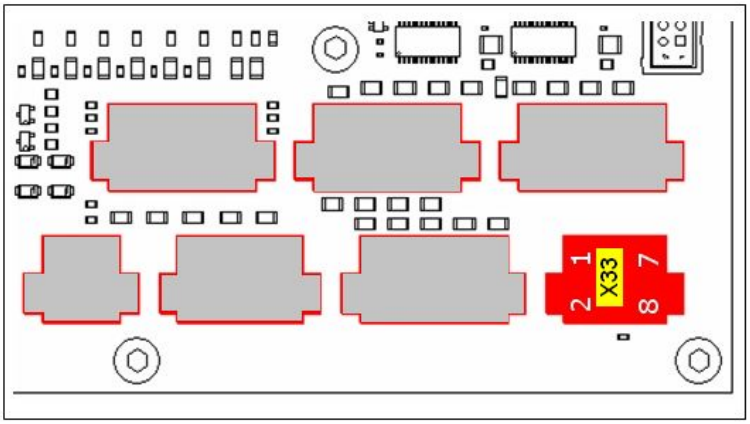
8.2.4 Assignment of Connector X22 Laser Control



Terminal	Signal	In/Output	high/low	Description
X22.1	reserved	Input		reserved for internal purposes.
X22.2	LASER_READY	Output	high	This signal is set if the system is ready.
X22.3	reserved	Input	falling edge	reserved for internal purposes.
X22.4	MARKING	Output	high	This signal is set during the marking process.

Terminal	Signal	In/Output	high/low	Description
X22.5	START_MARKING	Input	high	This signal starts the marking process, if STOP_MARKING is not active.
X22.6	READY_TO_MARK	Output	high	This signal is set if the system is ready to mark (waiting for trigger).
X22.7	STOP_MARK-ING	Input	low	This signal stops the marking process and prevents START_MARKING if active.
X22.8	SHUT-TER_CLOSED	Output	high	This signal is set if the beam shutter is closed.
X22.9	reserved	Input		reserved for internal purposes
X22.10	GND_CI	Output		
X22.11	+24V_CI	Output		
X22.12	GND_CI	Output		

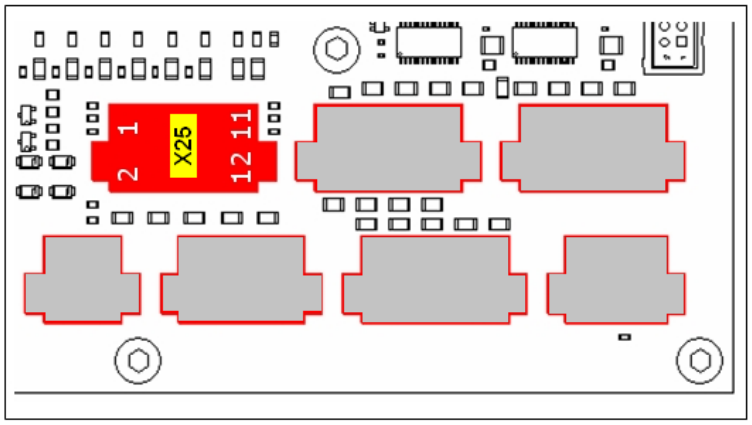
8.2.5 Assignment of Connector X33 Internal Signals



Terminal	Signal	In/Output	Description
X33.1	EXT_KEY	Input	External input for key switch
X33.2	reserved	Output	
X33.3	reserved	Output	
X33.4	reserved	Input	
X33.5	NC		-
X33.6	reserved	Input	
X33.7	NC		-
X33.8	EXT_KEY	Output	External output for key switch

Input X33.1 must be potential-free from output X33.8.

8.2.6 Assignment of Connector X25 Encoder/Product Detector



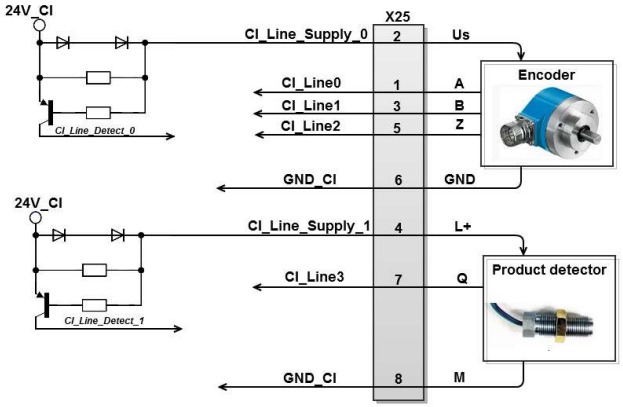
Terminal	Signal	In/Output	Description
X25.1	CHA	Input	Input for track 1 of encoder
X25.2	CI line supply 0	Output	24 V for encoder
X25.3	CHB	Input	Input for track 2 of encoder
X25.4	CI line supply 1	Output	24 V for trigger
X25.5	IN_ENC_IDX	Input	Input for index track of encoder
X25.6	GNC_CI	Output	GND
X25.7	TRG	Input	Input trigger (product detection)
X25.8	GND_CI	Output	GND
X25.9	reserved	Output	
X25.10	GND_CI	Output	GND
X25.11	reserved	Output	
X25.12	GND_CI	Output	Voltage supply 24 V

The encoder and the product detector are to be connected as shown in the figure below.

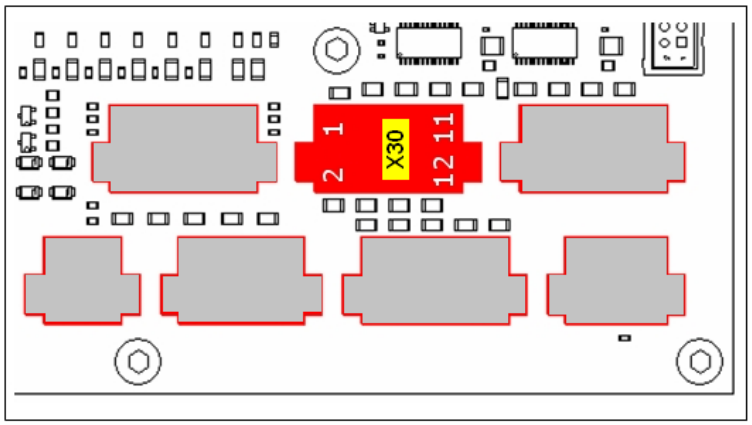
min. pulse length	300 µs
min. load	20 mA

NOTICE

If both tracks of the encoder are used the value for pulses per rotation must be doubled in the product registration.

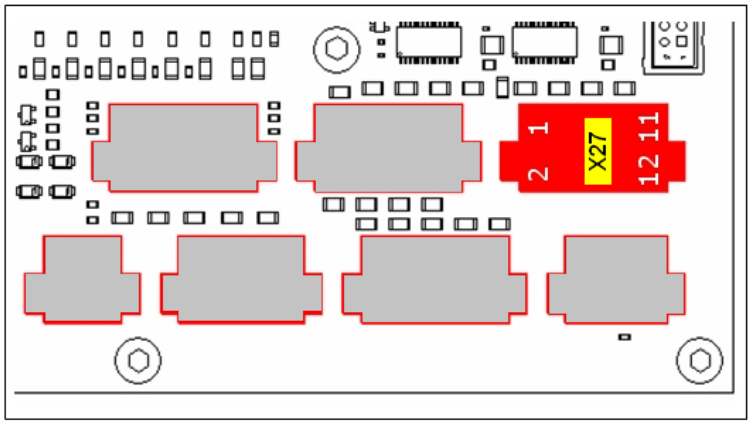

24V_CI
X25
CI_Line_Supply_0
2
Us
Encoder
CI_Line0
1
A
CI_Line1
3
B
CI_Line2
5
Z
CI_Line_Detect_0
GND_CI
6
GND
24V_CI
CI_Line_Supply_1
4
L+
Product detector
CI_Line3
7
Q
CI_Line_Detect_1
GND_CI
8
M

8.2.7 Assignment of Connector X30 External Job Selection



Terminal	Signal	In/Output	high/low	Description
X30.1	JOB_SE-LECT_BIT_0	Input	high	Input for bitmask Bit 0
X30.2	JOB_SE-LECT_BIT_1	Input	high	Input for bitmask Bit 1
X30.3	JOB_SE-LECT_BIT_2	Input	high	Input for bitmask Bit 2
X30.4	JOB_SE-LECT_BIT_3	Input	high	Input for bitmask Bit 3
X30.5	JOB_SE-LECT_BIT_4	Input	high	Input for bitmask Bit 4
X30.6	JOB_SE-LECT_BIT_5	Input	high	Input for bitmask Bit 5
X30.7	JOB_SE-LECT_BIT_6	Input	high	Input for bitmask Bit 6
X30.8	JOB_SE-LECT_BIT_7	Input	high	Input for bitmask Bit 7
X30.9	JOB_SE-LECT_STROBE	Input	rising edge	Strobe signal "read bit-mask"
X30.10	GND_CI	Output		
X30.11	24V_CI	Output		
X30.12	GND_CI	Output		

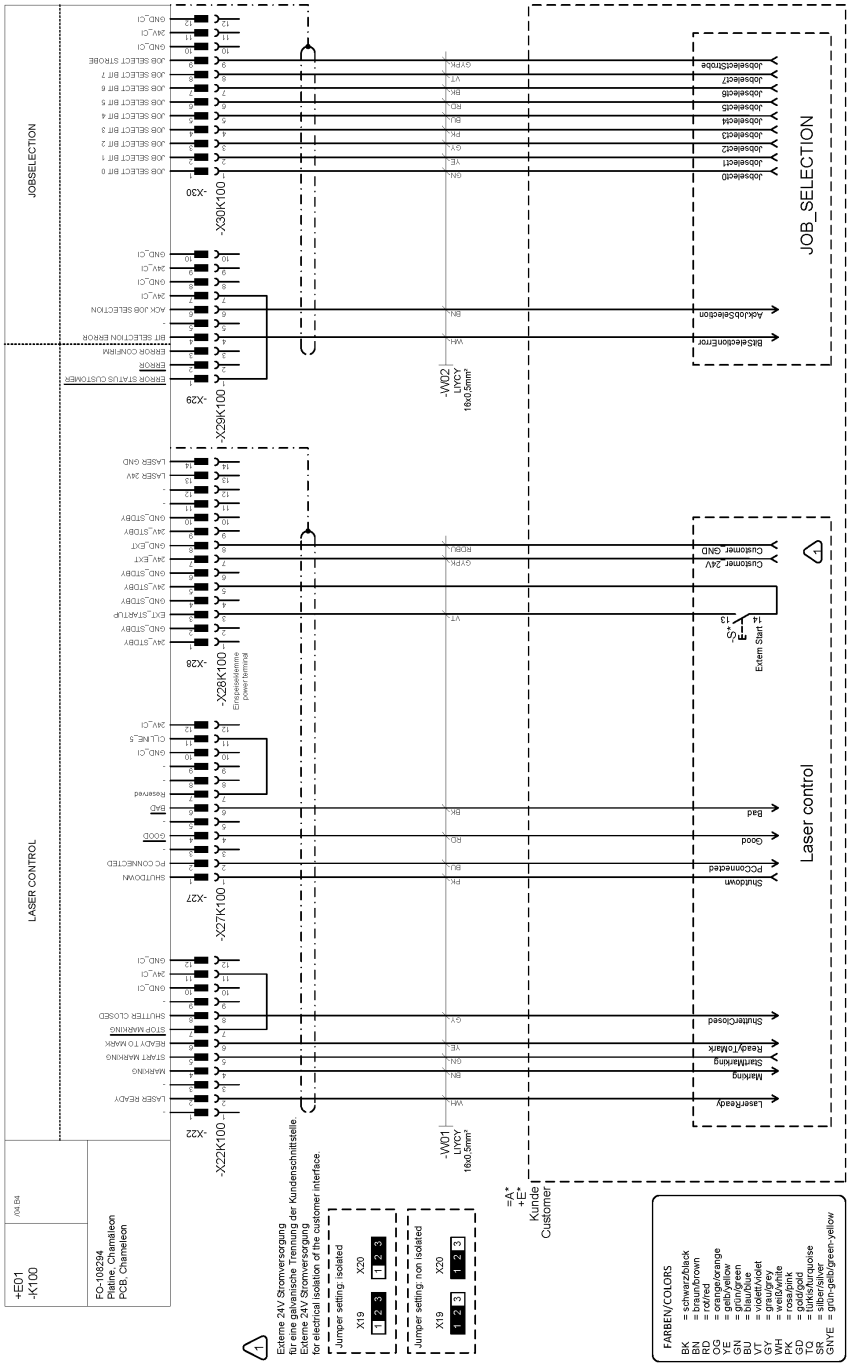
8.2.8 Assignment of Connector X27 Laser Control



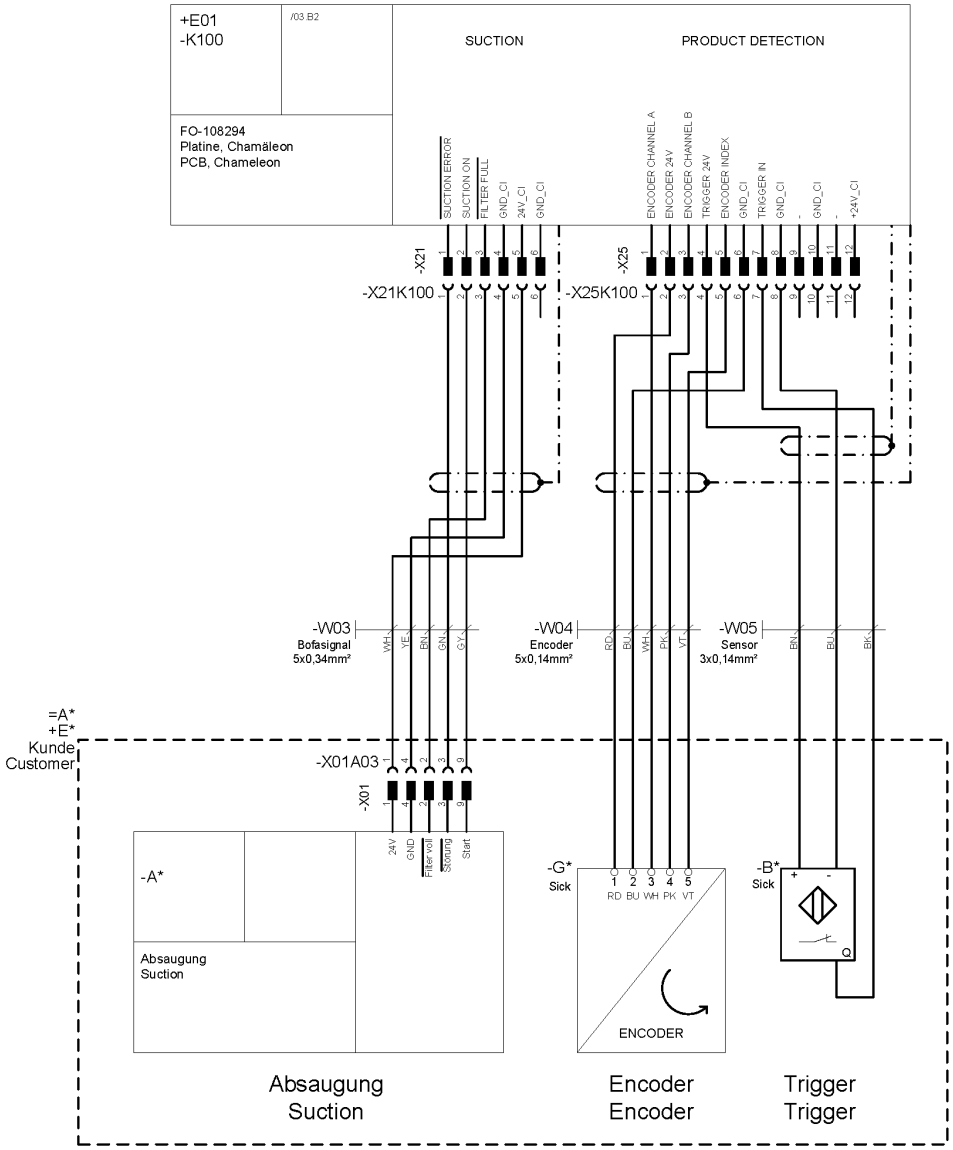
Terminal	Signal	In/Output	high/low	Description
X27.1	SHUTDOWN	Input	high	If this input is set to "high" the system is shut down.
X27.2	PC_CON-NECTED	Output	high	Is set as soon as a PC is connected.
X27.3	reserved	Input	high	
X27.4	GOOD	Output	high	Indicates that the last marking has been car-ried out without warning or error message. This output is reset by the next trigger signal.
X27.5	reserved	Input	high	
X27.6	BAD	Output	high	Indicates that the last marking was not com-pleted due to a warning or error message. This output is reset by the next trigger signal.
X27.7	reserved	Input	low	Connected to X33.3
X27.8	reserved	Output	high	
X27.9	reserved	Input	high	
X27.10	GND_CI			
X27.11	24V_CI			
X27.12	GND_CI			

8.3 Wiring Examples

8.3.1 Laser Control/Job Selection



8.3.2 Fume Extractor/Encoder/Trigger



8.3.3 Safety Circuit

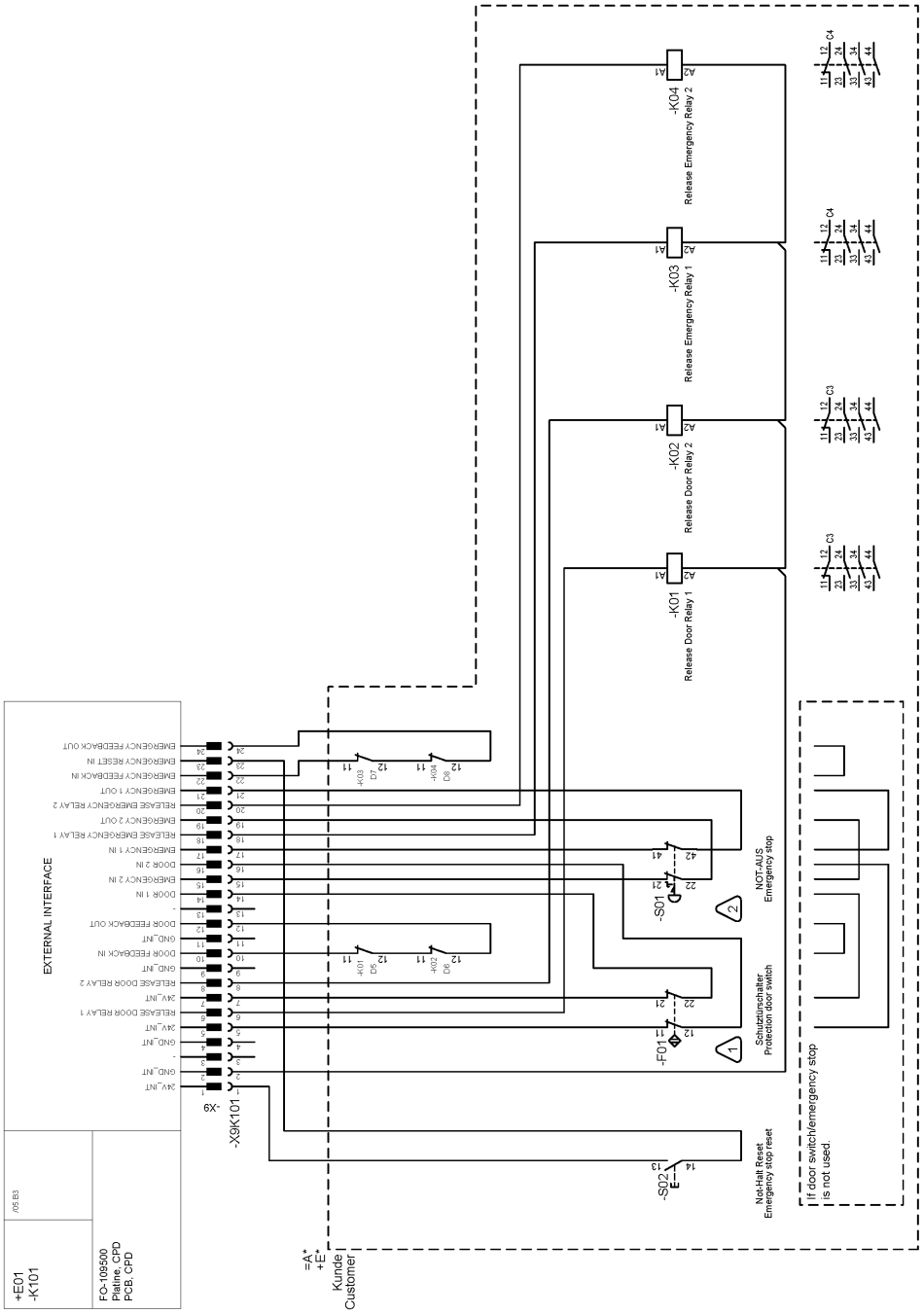
1. Door circuit performance level "d".

   System response: Shutterlock open. Message: Door circuit open.

2. Emergency stop performance level "e".

   System response: Interlock open. Message: Emergency stop open.

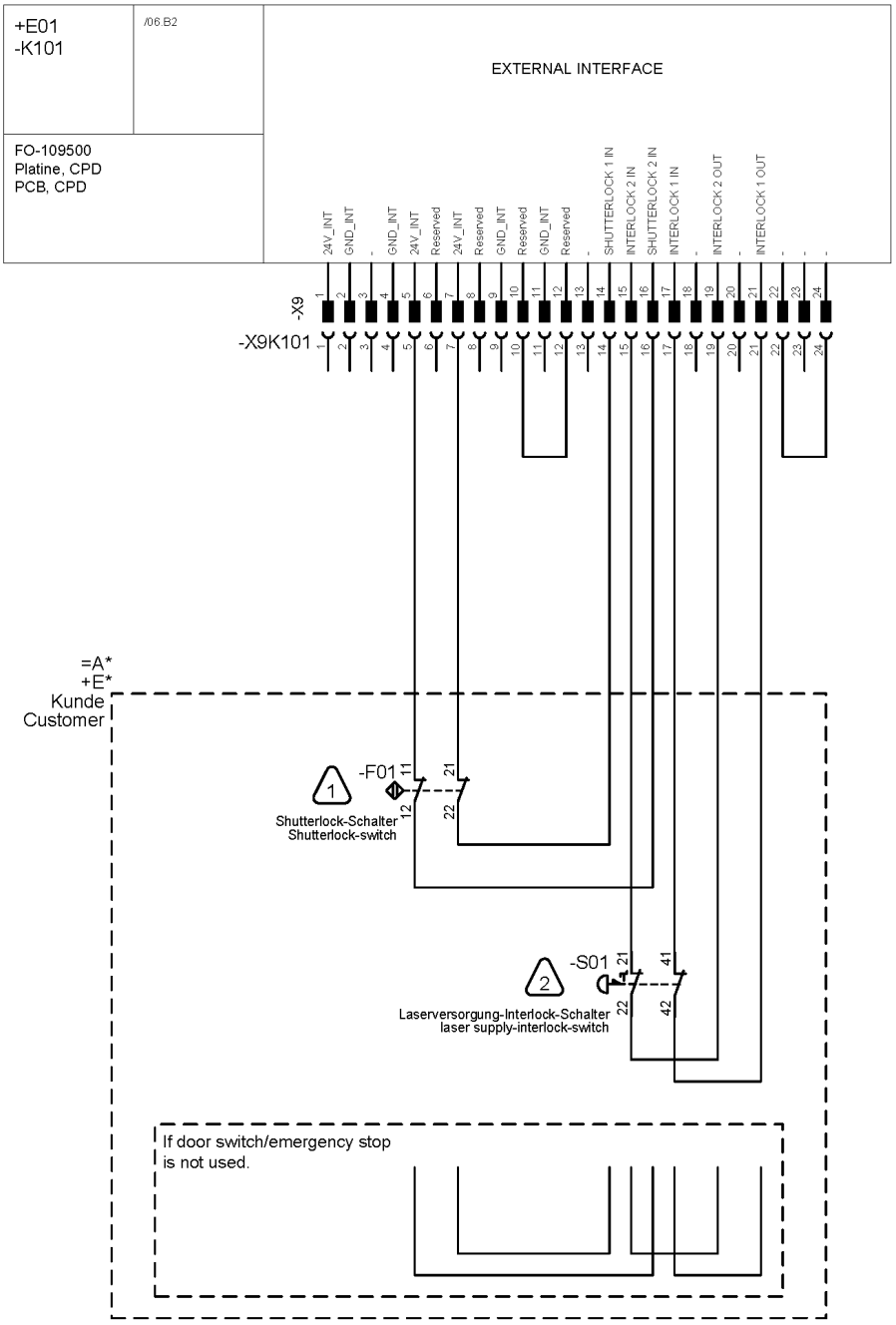
   Emergency stop must be reset with S02 after the safe state has been restored.



8.3.4 Without Safety Circuit

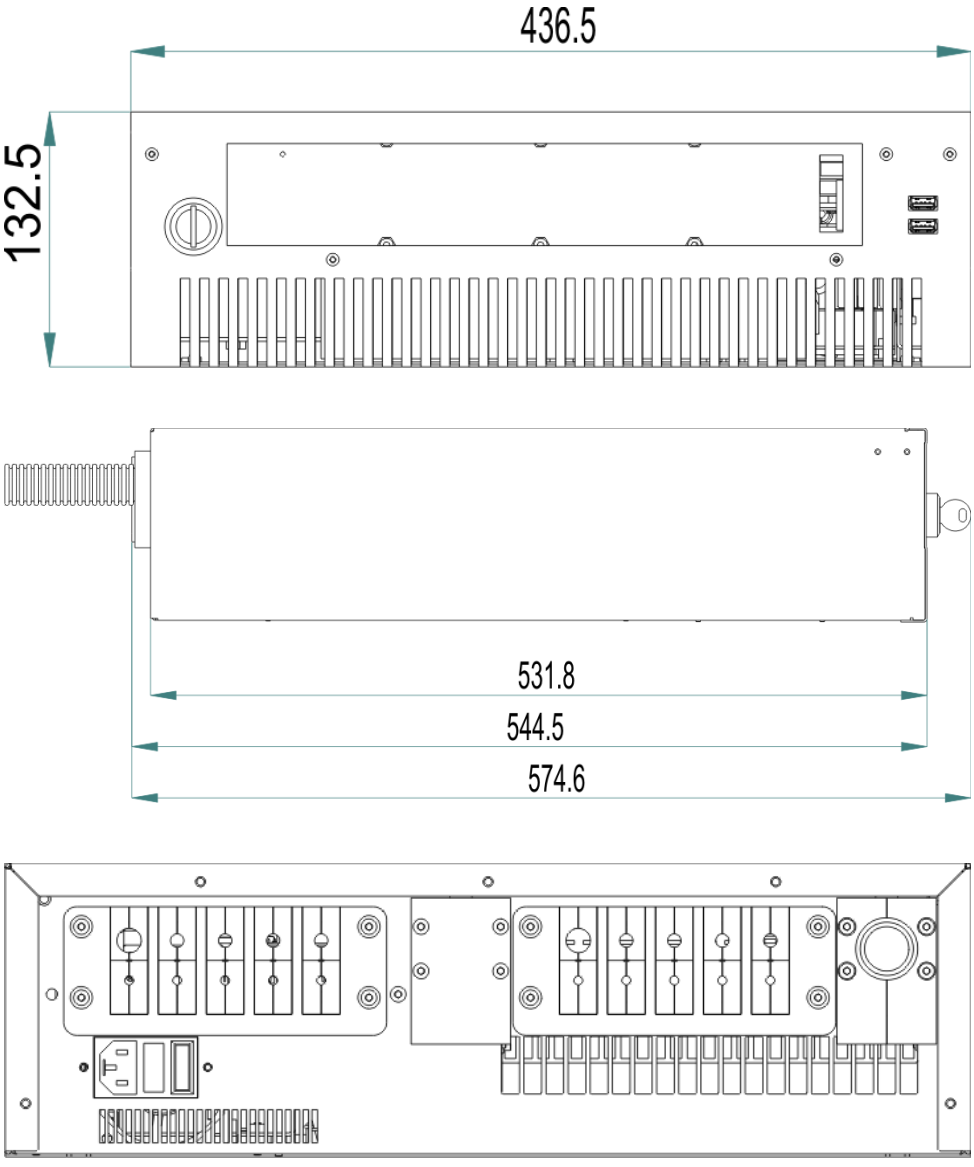
System response:

1. Shutterlock open.
2. Interlock open.

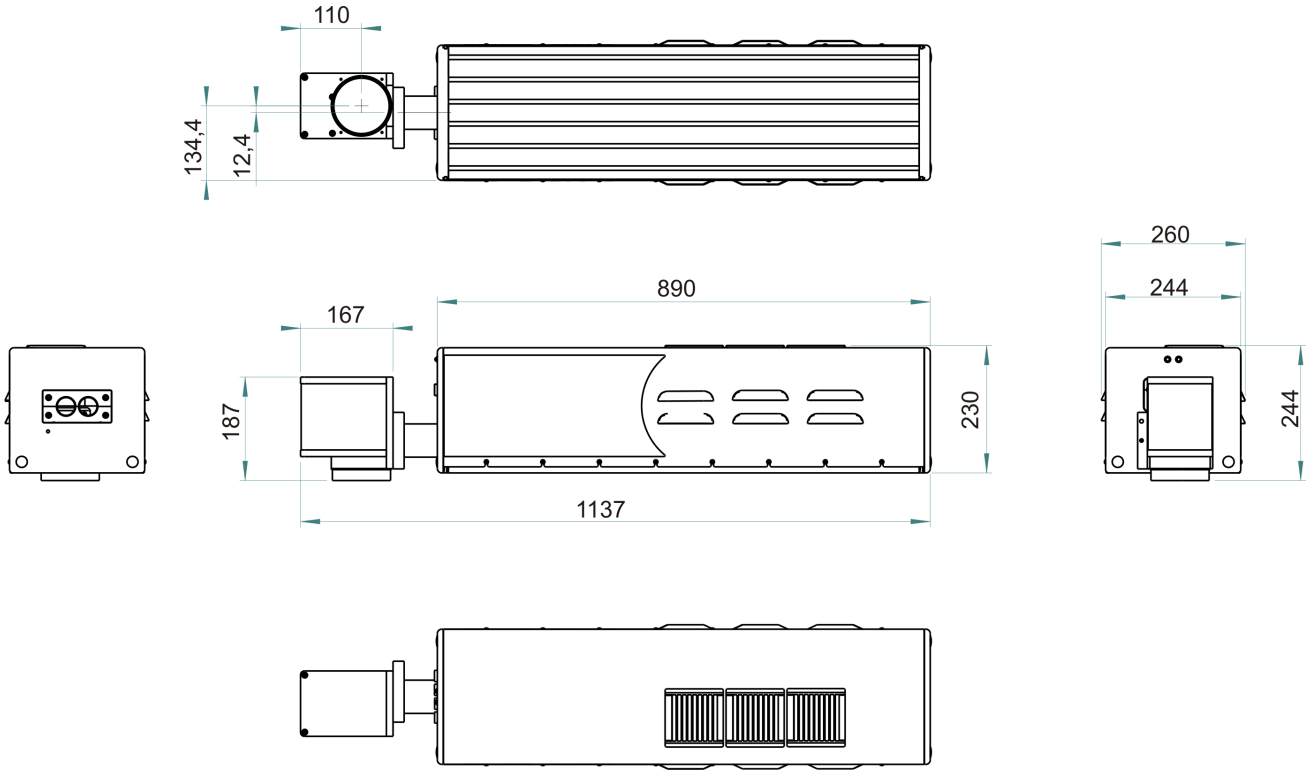


8.4 Drawings

Supply Unit



Interface Unit with Marking Head



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