

Assembly Instructions



Marking Laser

FL+

Made in Germany

Family	Type	
Marking Laser	FL+10R	FL+10T
	FL+20R	FL+20T
	FL+30R	FL+30T
	FL+50R	FL+50T

Edition: 04/2015 - Art.-No. 9009647

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1.1 Notes

Important information and instructions are designated as follows:



Danger!

Draws attention to an exceptionally great, imminent danger to your health or life due to hazardous voltages.



Danger!

Draws attention to a danger with high risk which, if not avoided, may result in death or serious injury.



Warning!

Draws attention to a danger with medium risk which, if not avoided, may result in death or serious injury.



Caution!

Draws attention to a danger with low risk which, if not avoided, may result in minor or moderate injury.



Attention!

Draws attention to potential risks of property damage or loss of quality.



Note!

Advices to make work routine easier or on important steps to be carried out.



Environment!

Advices on protecting the environment.



Handling instructions



Reference to chapter, position, picture number or document.



Option (accessories, peripherals, extras).

Time Viewed in the display / monitor.

1.2 Intended Use

- The device is solely intended to be used for marking suitable materials that have been approved by the manufacturer using the software „cablase“.
With it, the following operating conditions are exclusively permitted:
 - Using the device in laser marking systems complying with the conditions of laser class 1.
 - Using the device as laser marking system according to class 4. To operate lasers of laser class 4 is subject to declaration and requires the appointment of a laser protection officer in the company. Machine operators need to be instructed with regard to safety. This has to be documented and, on presentation, proof provided.
- The performance parameters have to be adapted to the properties of the materials to be marked.
- The device has to be operated with a certified extraction and filtering device designed for the respective application.
- The device is manufactured in accordance with the state of the art and certified safety regulations. However, danger to the life and limb of the user or third parties and/or damage to the device and other tangible assets can arise during use.
- The device may only be used for its intended purpose, in technically perfect order, being conscious of safety and danger with regard to the installation instructions..
- Any other use or use going beyond this shall be regarded as improper use. The user shall solely be liable for any damages resulting from unauthorized use.
- Intended use also includes observing the installation as well as maintenance instructions.

1.3 Safety Instructions

General

- The operator of the device shall ensure that the user has read and understood the installation instructions before the initial operation.
- The operator of the device is obliged to comply with the safety regulations and standards.
- Only perform the actions described in this installation instructions.
Further work may only be carried out by qualified staff or service technicians.
- Improperly performed work or modifications to the device endanger the operational safety.
- Maintenance and repair work must solely be carried out by the manufacturer or skilled staff.
- The operating and maintenance instructions for the device must be strictly observed.
- It must be ensured that general maintenance work is solely carried out by staff having been instructed and being familiar with electrical hazards and protection against laser radiation.

Transport and Installation

- Transport of the device has solely to be carried out in its original packaging resp. an appropriate packaging that sufficiently protects the device.
- It is necessary to provide convenient protection against tipping over of the device or any other damage.
- Place of installation must be resilient and easily accessible according to the technical requirements.



Attention!

- **Mechanical loads, vibrations and shocks may result in damages of the device or its components.**
- **Improperly installed devices may result in damages and the loss of guaranteed quality.**

General Operating Conditions

- Only operate the device stationary and inside buildings.
- Only operate the device in a dry and dust-free environment and keep away from moisture (splashed water, fog, etc.).
- Do not operate the device near high-voltage lines.
- Loss of operational safety due to condensation.
Avoid strongly fluctuating temperatures. The device has to be adapted to room temperature before putting into operation.
- Damages of the device due to heat accumulation.
Provide sufficient supply of fresh air. Do not cover the ventilation slots.



Warning!

Harmful effects on physical health and environment due to by-products set free in the laser processing

▷ **Environment and health.**

- ▶ **Only operate the device with correctly installed extraction and filtering device.**

Electrical Safety

- The device is configured with a power supply for AC voltage from 100 V up to 240 V and have to be connected to power sockets with protective earth contact..
- Only connect the device to systems with protective extra-low voltage
- Switch off the device before disconnecting electrical connections to peripherals (PC, accessories).
- Only carry out actions described in this installation instructions.
- Improper interventions at electronic components and software may result in malfunctions.
- Maintenance and repair work must solely be carried out by the manufacturer or by skilled staff or service engineers having been authorized by the manufacturer.
- Parts of the housing and covers have solely to be disassembled by skilled staff.
- The operating and maintenance instructions for the device must be strictly observed.
- Standard operating procedures, regulations for electrical safety and local regulations at the place of installation must be strictly observed.
- Completely disconnect the device from the mains before starting maintenance work.
- Avoid touching electrical / electronic components. Capacitors may be charged and energized. Electrostatic charge may result in damages at circuits and electronic boards.
- Always switch off the device at the power switch.
- The device must in no case be operated in case of damaged components opened covers.

**Danger!**

Danger of life due to mains voltage.

- **Do not open or remove parts of the housing and covers.**

Laser Safety

The potential danger originating from accessible laser radiation is defined by the classification into laser classes.



Warning!

Hazards arise during operation of the marking laser due to laser radiation of class 4.

Laser radiation of Class 4 is very dangerous for the eye and skin. This also applies for even diffusely scattered laser radiation. The laser radiation may cause danger of fire and explosion.

- The laser area shall be clearly identifiable and separated. Warning lights at the accesses of the area must be switched on during operation.
- Unauthorized persons must not have the possibility to get unintentional access to the laser area.
- The device is only allowed to be operated inside a closed room to prevent leakage of scattered radiation. Only authorized persons which are protected against radiation are allowed to stay in the area during operation.
- Secure access of the area by security gates or door contacts / safety switches (Laser shut down).
- Escape routes and emergency exits shall be provided and always be kept free.
- The laser shall only be operated in the presence of a laser safety officer.
- The laser must have an Emergency Stop button.



Caution!

Hazards arise during the operation of the pilot laser due to laser radiation of class 2.

- Accessible laser radiation is within the visible spectral range (400 nm up to 700 nm). In the case of class 2 laser devices, the eye is not endangered if the impact of the laser radiation is limited to a maximum period of 0.25 s.
- Do not look directly into the laser beam.



Note!

For further information, accident prevention regulations and operating directives about all laser classes please refer to the valid guidelines.

Precautions	Laser class 1	Laser class 4
Technical precautions		
Safety housing	required	protected area
Safety interlock	at laser housing	Switch at access door of the protected area
Key switch	not required	required
Emission indicator	not required	required
Warning sign beam output aperture	not required	required
Organizational precautions		
Laser safety officer	not required	required
Protected laser area (room)	not required	required
Eye protection	not required	required
Instructions in safety precautions	not required	required

Table 1 Precautions for laser safety

1.4 Safety Signs

Different warning labels are attached to the device to make aware of potential hazards.



Note!

To identify potential hazards it is in no case allowed to remove or damage warning labels!

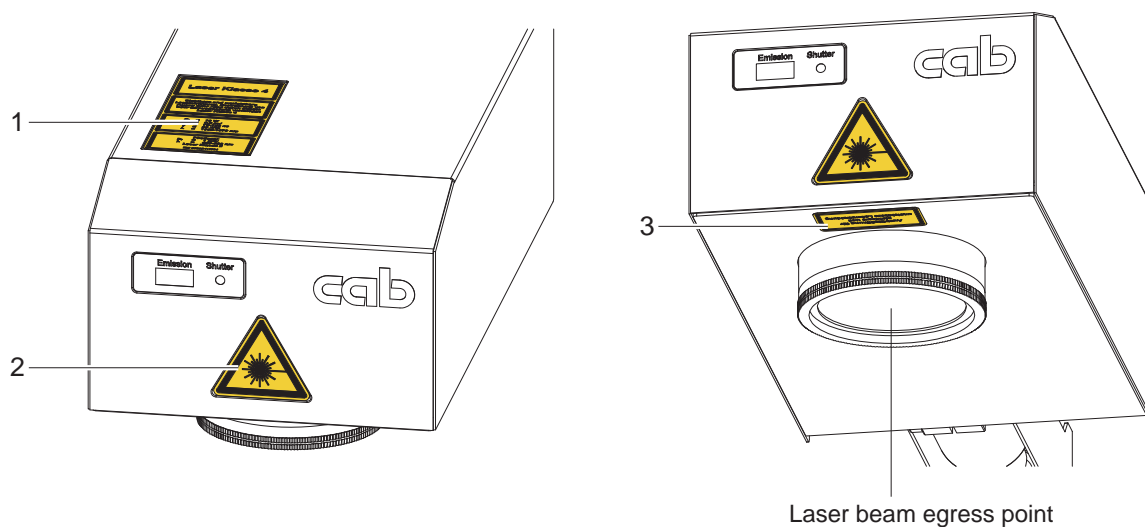


Figure 1 Safety signs







1	   	<p>Class 4</p> <p>Laser radiation of Class 4 is very dangerous for the eye and skin. This also applies for even diffusely scattered laser radiation. The laser radiation may cause danger of fire and explosion.</p> <p>► Safety regulations for Class 4 must be strictly observed</p>
		<p>Pilot laser, Class 2</p> <p>In the case of class 2 laser devices, the eye is not endangered if the impact of the laser radiation is limited to a maximum period of 0.25 s.</p> <p>► Do not look directly into the laser beam.</p>
2		<p>Laser radiation warning</p>
3		<p>Aperture for visible and invisible laser radiation emission</p>

Table 2 Safety signs

1.5 Environment and Health

**Warning!**

Harmful effects on physical health and environment due to by-products set free in the laser processing. Laser processing produces by-products being harmful to the environment and health. These hazardous substances may be carcinogenic and have effects that are damaging to the lung.

The hazardous substances are particulate (dust / fine dust) or gaseous (smoke, gases).

- ▶ Only operate the device with a suitable, certified extraction and filtering device.
- ▶ Observe operator's manual for the extraction and filtering device.
- ▶ Check regularly the effectiveness of the extraction and filtering device.
- ▶ Correctly dispose of spent filters.

Examples :

Processing of	Hazardous substances	Potential hazard
Ceramic	Aluminum oxide Magnesium oxide Calcium oxide Silicon oxide	Harmful to lungs
	Beryllium oxide	Highly toxic, carcinogenic
Silicon	Silicon and Silicon Oxide fragments	Harmful to lungs Risk of silicosis
Metal	Manganese (Mn) Lead (Pb)	Toxic
	Zinc (Zn) Copper (Cu)	Toxic (allergies)
	Chromium, (Cr) Nickel (Ni) Cobalt (Co)	Carcinogenic
	Aluminum (Al)	Harmful to lungs
	Beryllium (Be)	Risk of pulmonary fibrosis
Plastic	Cyanides Chlorine compounds	Toxic
	Polyvinyl chloride Formaldehyde	Carcinogenic, irritating to respiratory tract
	Benzenes	Carcinogenic
	Amines	Irritating to respiratory tract
	Isocyanate Acrylate	Irritating to skin (Allergies)
Paper and wood	Benzenes	Carcinogenic
	Esters Acids Alcohol	Irritating to respiratory tract

Table 3 Potential hazards due to laser processing

1.6 Decommissioning and Return

- ▶ For decommissioning the device has to be disconnected from the mains and peripherals and be secured against unauthorized switching-on.
- ▶ Housing components and assemblies being contaminated with harmful substances must be cleaned by expert staff.
- ▶ Keep the device in the original packaging according to the general storage conditions.



Danger!

- ▶ **For decommissioning the device must be secured against unauthorized switching-on.**



Danger!

- ▶ **For the return it must be ensured that the device is not contaminated with by-products, i.e. substances being hazardous to health or environment.**



Note!

Use the original packaging for return or transport of the device. The original packaging may be obtained from the manufacturer.

1.7 Disposal



Devices not being used any more and ready for disposal have valuable and recyclable material that may be consigned to recovery.

- ▶ Make the parts available for recycling.
- ▶ According to legal regulations, assemblies being contaminated with hazardous substances shall be disposed of separately at suitable collection points.



The circuit board of the device is equipped with a lithium battery.

- ▶ Used batteries shall be disposed of at an appropriate battery collection point or at the public waste management organizations.

2.1 Scope of Delivery

The scope of delivery is described in the shipping documents of the consignment.

- Marking laser FL+ with lens
- Four feet including screws for mounting the control on a plane surface (only with rack version)
- Power cable
- Patch cable
- CD cabLase Editor 5
- Software-Dongle USB cabLase Editor 5
- Assembly instructions
- Lens cover input side Ø47 or Ø75 (depending on the delivered lens)
- Lens cover output side Ø90 or Ø120 (depending on the delivered lens)
- Check delivery for completeness and faultless condition. Immediately contact the supplier in the event of discrepancies.

2.2 Overview Rack Version

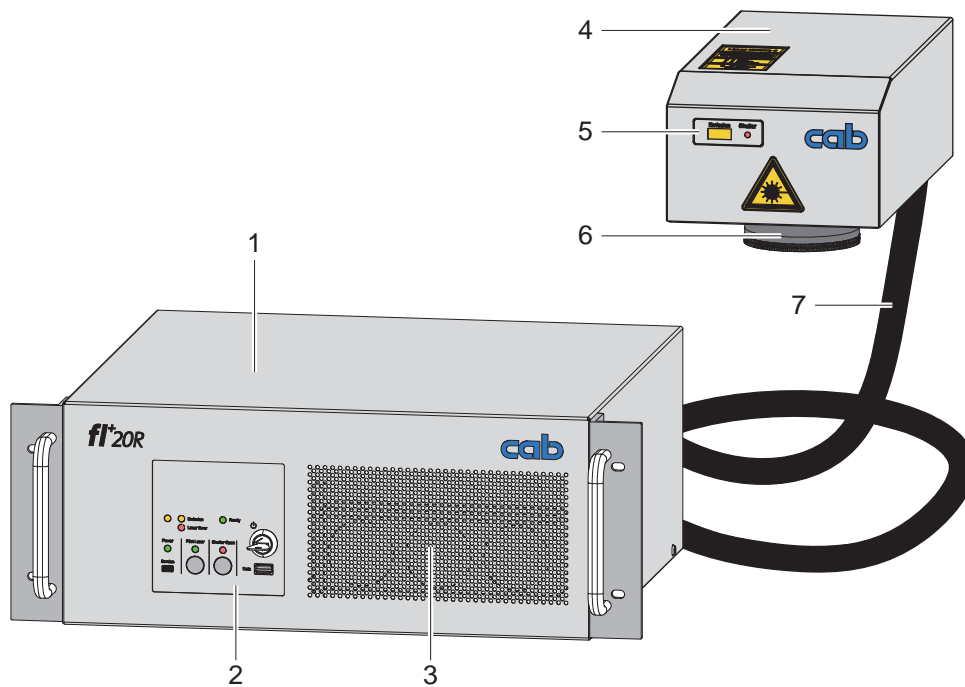


Figure 2 Overview FL+ Rack version

- | | |
|--------------------------------|--------------------|
| 1 Control | 4 Scan head |
| 2 Operator control panel | 5 Status display |
| 3 Ventilation grill air supply | 6 Lens |
| | 7 Connecting cable |

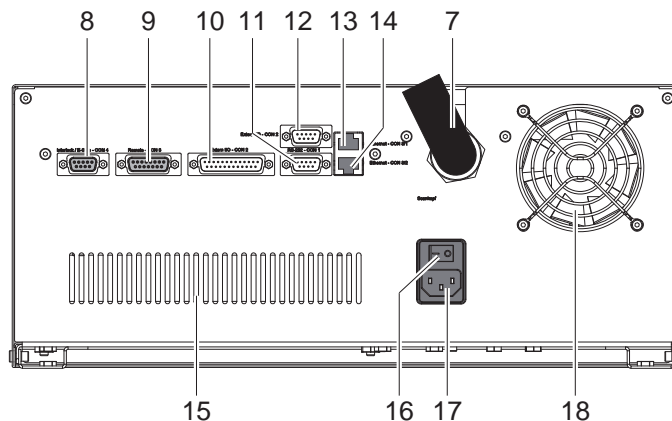


Figure 3 Back side of control - Rack version

- | |
|--|
| 7 Connecting cable |
| 8 Connection safety circuit and Emergency Stop (Interlock / E-Stop - CON4) |
| 9 Digital interface hardware control (Remote - CON3) |
| 10 Digital interface process control (External I/O - CON2) |
| 11 Serial interface for connecting controlled axes, barcode scanner and the like (RS-232 - CON1) |
| 12 Serial interface for connecting controlled axes, barcode scanner and the like (RS-232 - CON5) |
| 13 Ethernet connection to network or local PC (Ethernet - CON8/1) |
| 14 Ethernet connection for controlled axes, barcode scanner and the like (Ethernet - CON8/2) |
| 15 Ventilation grill exhaust air |
| 16 Power switch |
| 17 Power supply jack |
| 18 Ventilator |

2.3 Overview Tower Version

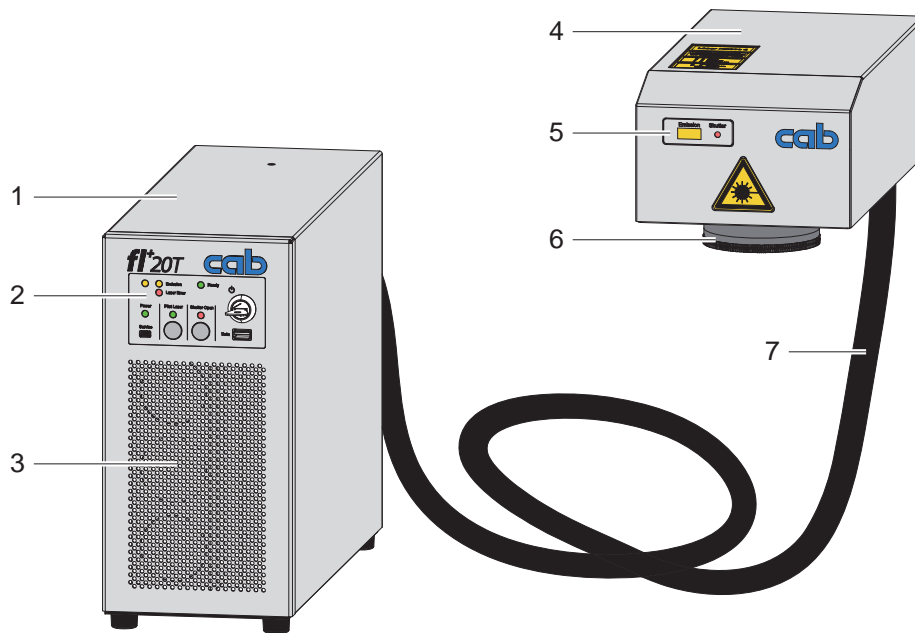


Figure 4 Overview FL+ Tower version

- | | |
|--------------------------------|--------------------|
| 1 Control | 4 Scan head |
| 2 Operator control panel | 5 Status display |
| 3 Ventilation grill supply air | 6 Lens |
| | 7 Connecting cable |

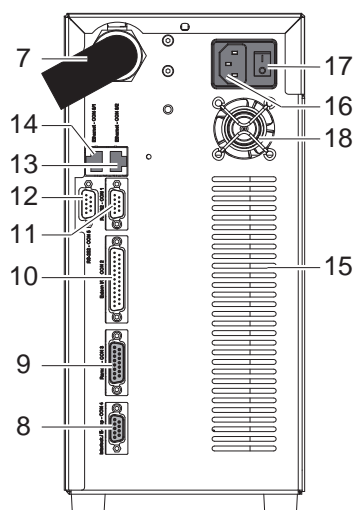


Figure 5 Back side of control - Tower version

- | |
|--|
| 7 Connecting cable |
| 8 Connection safety circuit and Emergency Stop (Interlock / E-Stop - CON4) |
| 9 Digital interface hardware control (Remote - CON3) |
| 10 Digital interface process control (Extern I/O - CON2) |
| 11 Serial interface for connecting controlled axes, barcode scanner and the like (RS-232 - CON1) |
| 12 Serial interface for connecting controlled axes, barcode scanner and the like (RS-232 - CON5) |
| 13 Ethernet connection to network or local PC (Ethernet - CON8/1) |
| 14 Ethernet connection for controlled axes, barcode scanner and the like (Ethernet - CON8/2) |
| 15 Ventilation grill exhaust air |
| 16 Power switch |
| 17 Power supply jack |
| 18 Ventilator |

2.4 Unpacking and Setting-up

When delivered, the marking laser is fully assembled, i.e. control and scan head are linked with each other.



Attention!

Potential damage of the device.

- ▶ Do not bend the connecting cable, be aware of the minimum bending radius of 80 mm
- ▶ Consider the limited length of the connecting cable
- ▶ Do not pull at the connection of the connecting cable
- ▶ Do not place the scan head on the lens

- ▶ Unpack the device and set it up.
 - Scope of delivery (with rack version) includes four feet to set up the device on a plane surface. The feet can be screwed on the bottom side of the control.
 - Set-up control of the tower version in an upright position on a plane surface.
 - The scan head has bores for the assembly on for example a stand.



Warning!

Danger of unfocused and hazardous laser radiation exposure without having assembled the scan head.

- ▶ Only operate the device with the scan head assembled on a fixed bracket.

- ▶ After the scan head has been assembled remove the lens cover and keep it safe.
- ▶ Keep the packaging for a safe return in the event of repair or forward dispatch.

2.5 Integration and Assembly of Marking Laser

**Attention!**

- ▶ To assemble the marking laser be aware of the maximum screw lengths and minimum bending radius of 80 mm ▷ Dimension drawings.
Disregarding may result in destroying the device and shall entail the loss of warranty.

**Attention!**

The connecting cable is not specified to be used in cable chain systems.

Integrating the device into plants requires checking the assembly on the basis of the following criteria:

- Sufficient ventilation in assembled condition.
- Sufficient ventilation or cooling in case of integration into sealed control cabinets
- Tower version exclusively designed for upright installation
- Easy access to the marking laser for service/maintenance
- Safe and vibration-free mounting
- Height adjustment of scan head to adapt to the material to be marked
- Do not install movable axes in the area of the marking laser that may result in damages at the device (protection against collision)
- Compliance with all conditions that apply to the operating environment ▷ Safety instructions, technical data.

**Note!**

Depending on the used lens, the application and tolerances, vary the focal length and, accordingly, the necessary position of the scan head.

- ▶ Provide for a jig to adjust the correct focal distance.
Adjusting range min. +/-10 mm.

**Note!**

For an easier integration the scan head may be separated from the control.

2.6 Separation and Connection of Scan Head



Attention!

- Before separating the connecting cable disconnect the device from the mains and make sure the device is placed in a clean, dry and dust-free environment.

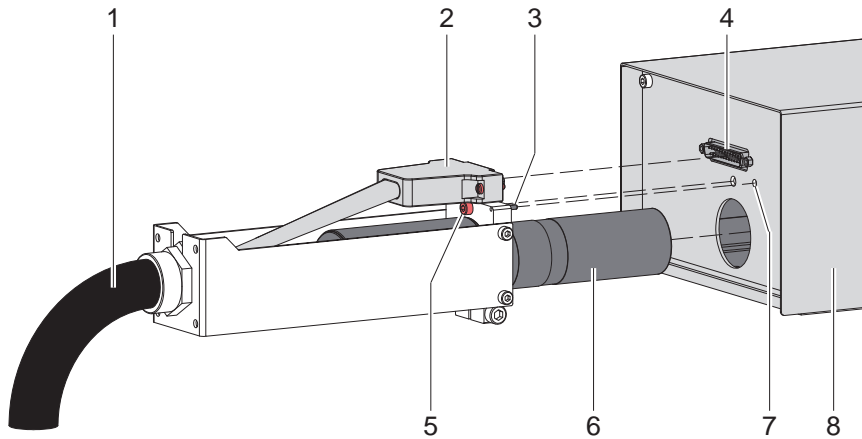


Figure 6 Separation and connection of scan head

Separation

- Release screw connections of connectors (2) and disconnect the plug (4).
- Release screw (5).
- Carefully draw collimator (6) with connecting cable (1) out of the scan head housing (8).



Attention!

- Protect collimator and components being accessible by opening the scan head against dust, dirt, moisture and mechanical damage.

Connection

- Proceed in reversed order for connection. Insert pin (3) into the bore (7).

2.7 Connection Mains Voltage Supply

Supply Voltage from the mains has to correspond to the specifications on the typeplate.

- Make sure the device is switched off.
- Plug power cable in grounded socket.



Note!

- **Be aware of country-specific plug**
- **If necessary, exchange power cable with country-specific plug!**

2.8 Connection PC/Network

- Connect marking laser FL+ by means of the patch cable included in the scope of delivery to the PC or network.



Note!

When delivered, the device is configured with the fixed IP address 192.168.1.11. A functional network connection is essential for all settings of the device.

After being switched on, the device, depending on the current configuration, connects as follows:

	Direct connection to local PC	Connection in a network (LAN)
Configured with fixed IP address: (when delivered)	The marking laser FL+ is immediately ready for a connection with cabLase Editor 5.	The marking laser FL+ is immediately ready for a connection with cabLase Editor 5, provided there is no address conflict. ► In the event of an address conflict establish direct connection to local PC and change IP address or switch to DHCP.
Configured for DHCP:	The marking laser FL+ is waiting for the assignment of an IP address via the DHCP server of the local PC. If no DHCP server is found and after a waiting time of up to 90 seconds an "automatic private network address" will be assigned. In this case, the address range 169.254.xxx.xxx. is used	PC and marking laser FL+ are waiting for the assignment of an IP address via the DHCP server.

Table 4 Possibilities of network connection



Note!

Also refer to chapter "Change IP Address Settings".

2.9 Connection Safety Circuit and Emergency Stop

For the operation of the marking laser FL+ special safety installations are necessary whose extend depend on the specific use. The following conditions must be fulfilled:

- Connection of a safety interlock according to DIN EN 60825-1 at the ► Interface Interlock / E-Stop - CON4.
- Connection of an Emergency Stop at the ► Interface Interlock / E-Stop - CON4.



Note!

Operation of the marking laser is only possible with activated safety interlock and not activated Emergency Stop.

3.1 Control Panel

The control panel allows to manually operate the device and informs about the device's status.

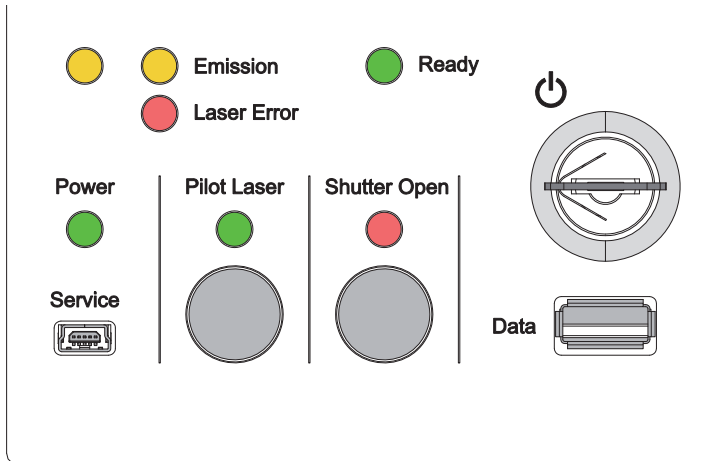


Figure 7 Control panel

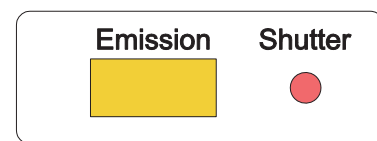


Figure 8 Display scan head


Switch	Function	Remark
Key	Switch on/off laser source.	Turn key to position  to switch on/off. Key afterwards returns to initial position. ► Remove key to secure against unauthorized commissioning and to operate via Remote Interface CON3.
Button	Function	Remark
Pilot Laser	Switch on/off pilot laser.	The pilot laser can only be switched on, if the mechanical safety lock (shutter) in the laser's optical path is closed. The pilot laser is automatically switched off in the active laser operation.
Shutter Open	Switch on/off the mechanical safety lock in the laser's optical path.	The safety lock can only be opened with deactivated Emergency Stop and activated safety circuit.
LED	Function	
Emission	Laser source switched on and ready for marking	
Laser Error	Error function of laser source	
Ready	Complete device including laser source ready for marking After being switched on or reset the LED flashes as long as the device is not yet ready.	
Power	Mains voltage applied	
Pilot Laser	Pilot laser switched on	
Shutter Open	Safety lock opened Attention ! - Possible laser radiation exposure out of the scan head	
Connection	Function	
Service	Interface for system diagnosis via a cab remote service program. Note : Only persons being trained and authorized by cab are allowed to use this interface.	
Data	Interface for removable media (max. 4 GB) with marking layouts / orders and is used as an extension of the laser's internal memory.	

Table 5 Function of elements on the control panel

3.2 Marking Laser

Switch on

	Via control panel	Via CON3
Switch on voltage	Switch on power switch on the back of the control	
Switch on laser source	Activate key switch	Activate signal "Laser On/Off"
Open shutter	Press button "Shutter Open"	Activate signal "Open Shutter"

Table 6 Switch on marking laser

Reset in the event of an error


	Via control panel	Via CON3
Carry out reset	Press buttons "Pilot Laser" and "Shutter Open" for about 5 seconds, then turn key switch to  . After a Reset the device is restarted and the laser control initialized. This may take up to 30 seconds!	Activate signal "Reset"

Table 7 Reset marking laser

Switch off marking laser

	Via control panel	via CON3
Close shutter	Press button "Shutter Open"	Deactivate signal "Open Shutter"
Switch off laser source	Deactivate key switch	Deactivate signal "Laser On/Off"
Switch off voltage	Switch off power switch on the back of the control	

Table 8 Switch off marking laser

Switch off laser source

	Via control panel	via CON3
Close shutter	Press button "Shutter Open"	Deactivate signal "Open Shutter"
Switch off laser source	Deactivate key switch	Deactivate signal "Laser On/Off"

Table 9 Switch off laser source

3.3 Pilot Laser

To simulate the marking process the scan head has integrated a pilot laser creating visible light with low intensity (laser class 2). For adjustments, the visible light can be projected into the marking plane, similarly to the beam of the marking laser, by using the optics of the scan head.

	Via control panel	Via CON3
Switch on pilot laser	Press button "Pilot Laser"	Activate signal "Pilot Laser On/Off"
Switch off pilot laser	Press button "Pilot Laser" again	Deactivate signal "Pilot Laser On/Off"

Table 10 Switch on and switch off pilot laser

3.4 PC and Software



Note!

To ensure the correct connection of the marking laser to the control program the device must be switched on at the power switch.

- Switch on PC
- Start marking software "cabLase Editor 5"

4.1 Recommended System Requirements PC



Note!

To setup and change device-specific settings a PC providing a valid network connection and a licensed installation of cabLase Editor 5 is required.

PC	IBM PC/AT compatible PC
Operating system	Microsoft Windows XP® Professional SP3 (32/64 bit) Microsoft Windows 7® Professional SP1 (32/64 Bit)
Processor	Intel Core i3-540, or higher
RAM	Min. 1 GB RAM, recommended > 2 GB
Hard disc	Memory requirements software 1 GB Recommended size of hard disc > 40 GB
Drives	CD ROM or DVD drive for software installation
Interfaces	Network card 10/100 MBit for connection laser PS2 / USB interfaces for mouse / keyboard USB 2.0 connection for dongle Optionally: USB 2.0 connection for storage medium Optionally: RS-232 interface for cab axis systems or cab LabelMarker
Software	cabLase Editor 5 Version 5.1.9.11 and higher
Monitor	SVGA, recommended resolution 1280 x 1024

Table 11 System requirements PC



Note!

To be able to carry out device-specific settings it is necessary to have a basic knowledge of how to work with the marking program cabLase Editor 5.

4.2 Installation of cabLase Editor 5



Note!

To be able to do the installation of the software it is necessary to have an advanced knowledge in working with the operating system and cabLase Editor.

For detailed information and instructions how to create marking programs ► refer to the enclosed software documentation



Attention!

- To enable full function of the software cabLase Editor 5 requires an HASP-Dongle (licence). There is not connection to the marking laser possible without that dongle.
- The HASP dongle must not be connected to the USB interface at the time of installation.

- Start PC.
- Log in as administrator. The user needs to have local administrator rights to carry out the installation.
- Insert CD "cabLase Editor 5" into CD drive.
- Start CD.
- Open menu "Installation".
- Start installation of cabLase Editor 5.
- Follow instructions on the screen.
- Connect the dongle to a free USB interface after having installed the software successfully. The dongle is automatically recognized. All software functions are available.

4.3 Starting cabLase Editor 5

- Start cabLase Editor 5.



Figure 9 Icon cabLase Editor 5

After the start of the program the following message may appear:

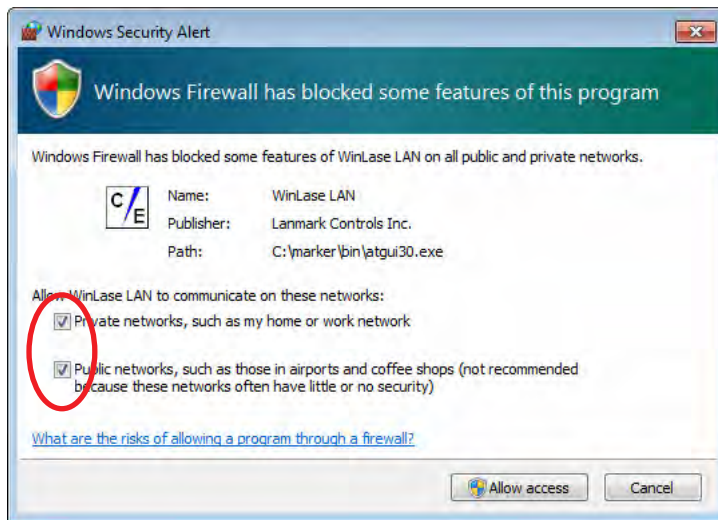


Figure 10 Windows security alert



Attention!

For cabLase Editor 5 laser access the communication with all networks must be allowed.

- Enable access in all check boxes.
- Click "Allow access".

The main window which is displayed after having started the marking program cabLase Editor 5 is divided into the following areas:

- 1 - Laser devices and currently opened layouts
- 2 - Object list
- 3 - Layout
- 4 - Profiles with marking parameters
- 5 - Motor manager

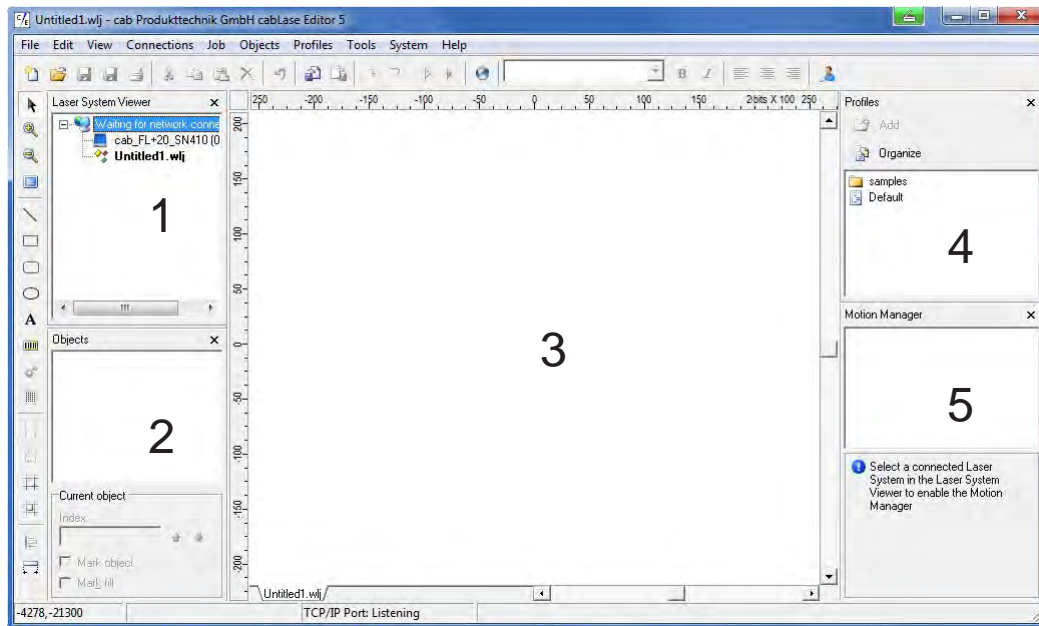


Figure 11 Main window cabLase Editor 5



Note!

The layout of the main window shown above may differ from that of the screen and depends on the settings in the menu "View".

4.4 Selection of Network Adapter

cabLase Editor 5 supports several network adapters installed in the local PC.

**Note!**

In the event that there are more network adapters available, connection sequence for the network adapter under Windows shall be so that the laser marker FL+ is the first to be connected! [➤ Documentation Windows](#)

Example Windows 7

- ▶ Select "Control panel > Network and sharing center > Change adapter settings".
- ▶ Select menu "Advanced > Advanced settings".
- ▶ Select under "Connections" the connection that is used for connecting the FL+.
- ▶ Use the arrow keys next to the window to move the connection selected to the top line.
- ▶ Click on "OK".

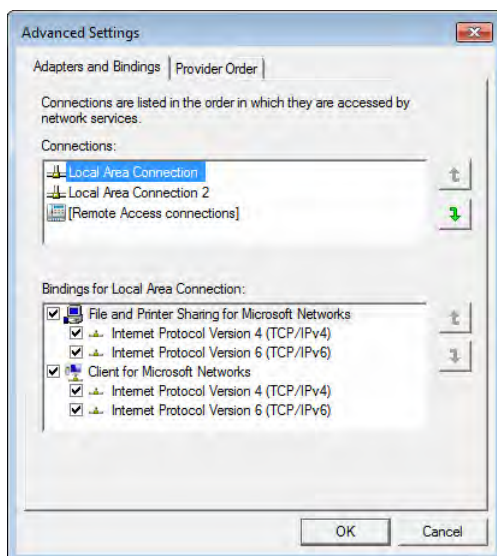


Figure 12 Priority setting of the network adapter

The network connection connected to the device must be set as default in cabLase Editor 5.

- Select "Connections > Manage" in the main menu bar.
- Select the tab "Network adapters".

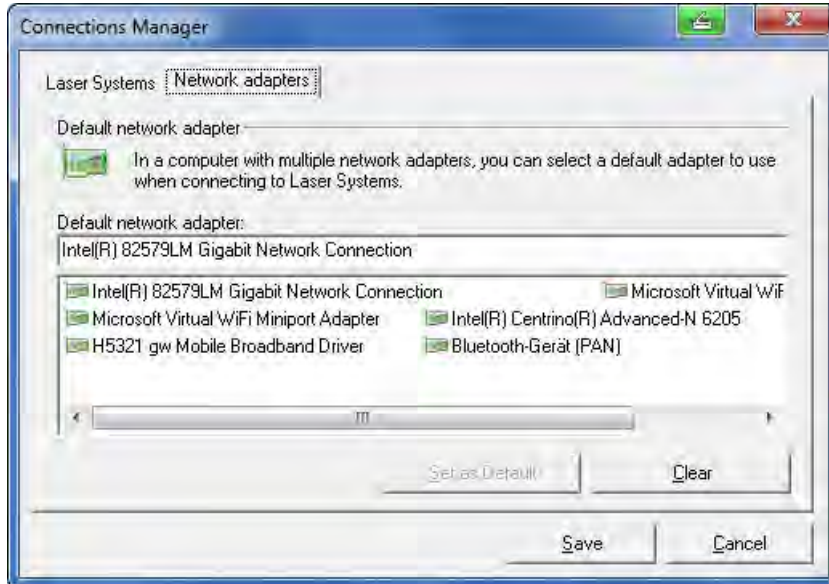


Figure 13 Selection of network adapter

- Select the network adapter to which the FL+ is connected.
- Click on "Set as default".



Note!

If the subnets are incompatible the marking laser FL+ adds an temporary IP address to the default PC network adapter. Once the PC is restarted this temporary address will be deleted.

4.5 Set up Manual Connection of the FL+ with cabLase Editor 5


Note!

Before connecting cabLase Editor 5 with the marking laser FL+ a network connection must be created.


Note!

Make sure that the marking laser FL+ has been switched on at the power switch!

After having started the software the message "Searching for laser devices" under the window "Laser System Viewer" is displayed.

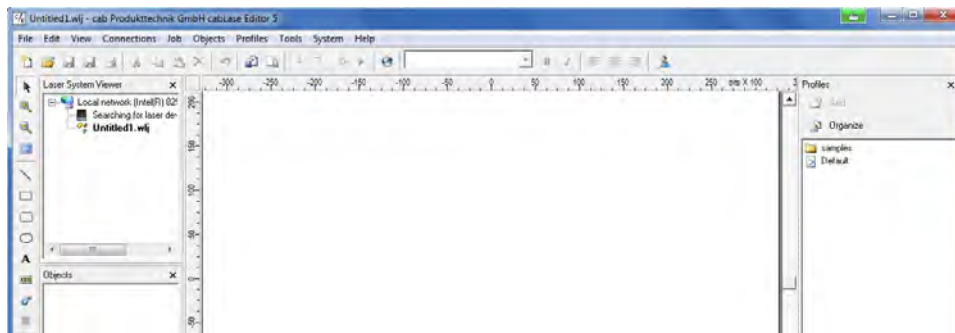


Figure 14 Search for laser devices

- Right-click within the window "Laser System Viewer", select the marking laser FL+ detected in the network and click on "Connect".

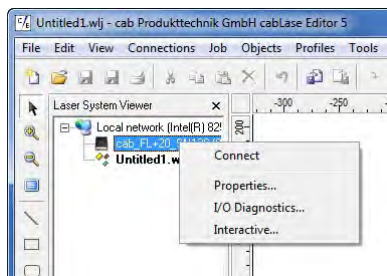


Figure 15 Connecting the laser device

This is followed by a query to set up an automatic connection:

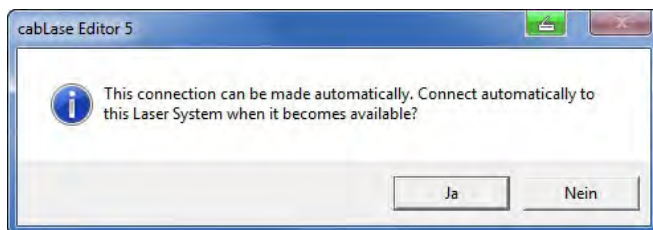


Figure 16 Query automatic connection

- Select the method to connect required.


Note!

Setting up the automatic connection can be carried out even later.

This is followed by transmitting the configuration settings of the marking laser FL+ to the local PC. The downloading status is shown in the "Pending connections viewer".

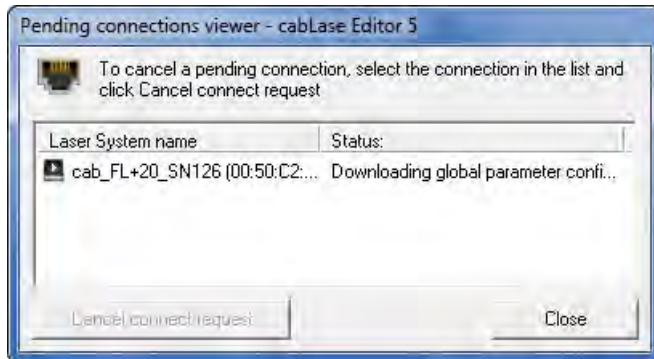


Figure 17 Pending connections viewer

The following icons are used to show different states of connection:

Symbol	Status
	Available in the network
	Not available in the network
	Connected to local installation cabLase Editor 5
	Invalid firmware or license
	PC software incompatible

Table 12 States of connection

Moving the mouse cursor over the laser device detected shows its status of connection:

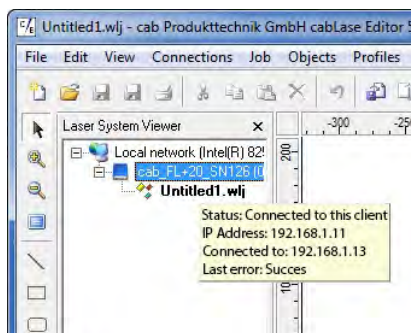


Figure 18 Display status of connection



Note!

Click on "Disconnect" to close an active connection.

4.6 Set up Automatic Connection of the FL+ with cabLase Editor 5

- Select menu "Connections" > Manage". This is followed by the input/output window:

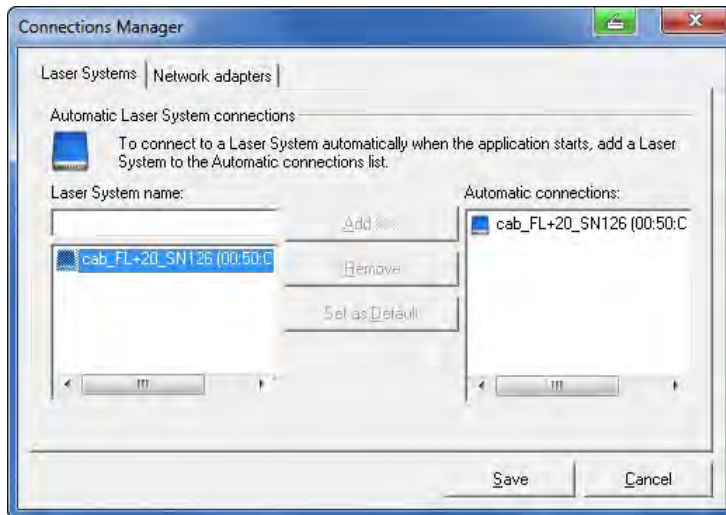


Figure 19 Set up automatic connection

The left windows shows all marking lasers FL+ available in the network, each with their respective MAC addresses.

- Click on the marking laser FL+ to be connected:
The marking laser selected is highlighted in blue.
- Click on "Add".
The marking laser is added to the list "Automatic connections".

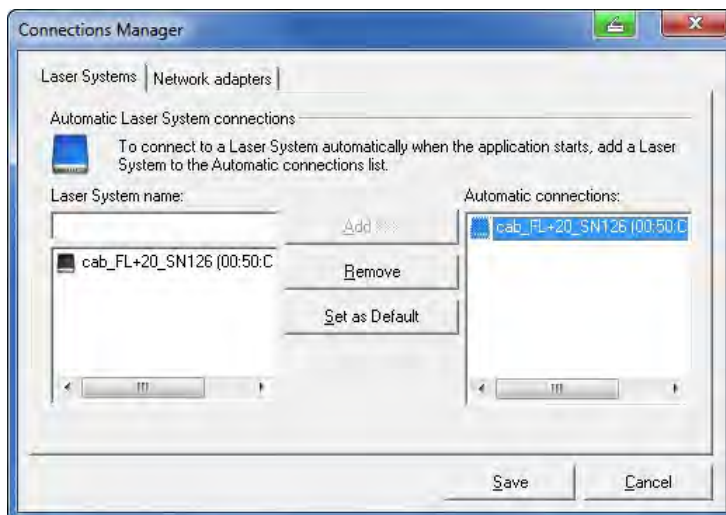


Figure 20 Set marking laser as default

- Select the marking laser required in the list "Automatic connections" and confirm by clicking on "Set as default".
Selection is confirmed by a check mark in the PC icon.
- Click on "Save" to confirm the settings selected.



Note!

When starting the software, cabLase Editor 5 now always set up automatically connection with the marking laser FL+ selected.

4.7 Changing the IP Address



Attention!

Incorrect settings of the IP address may result in losing connection and only might be restored by changing the settings at the local PC

- Select and right-click within the window on the marking laser FL+ detected and click on "Default settings".
- Select "Network".

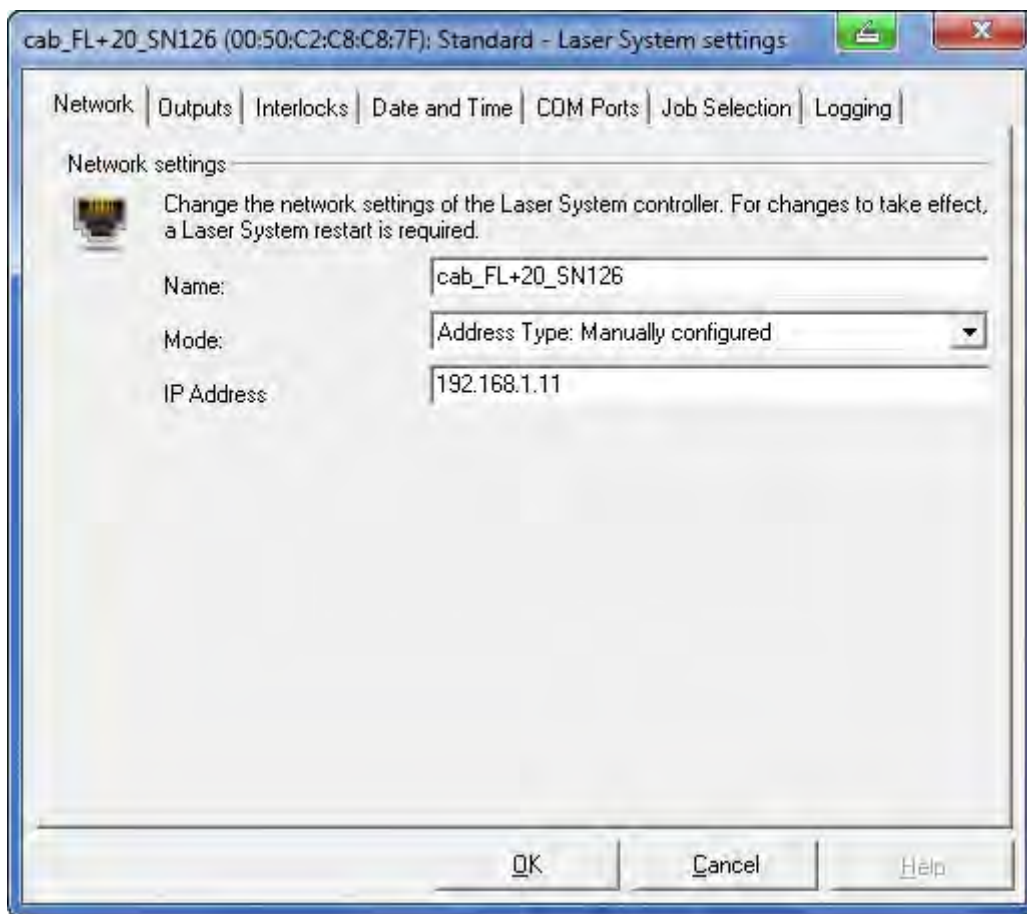


Figure 21 Setting the IP address

- Select under mode "Address type: Manually configured" and enter the IP address to be used.

4.8 Configuration Marking Laser and Lens



Note!

To carry out configuration and calibration of the marking laser the user has to be logged in with local administrator rights.

cabLase Editor 5 supports two kinds of configuration:

- **Active configuration**

Applies laser and lens configurations from the active, connected marking laser

- **OFFLINE configuration**

Provides all necessary laser and lens configurations to cabLase Editor 5, if there is no active connection to the device.



Attention!

For a proper function, all configurations for the active and OFFLINE configuration must be identical.

Selecting the configuration

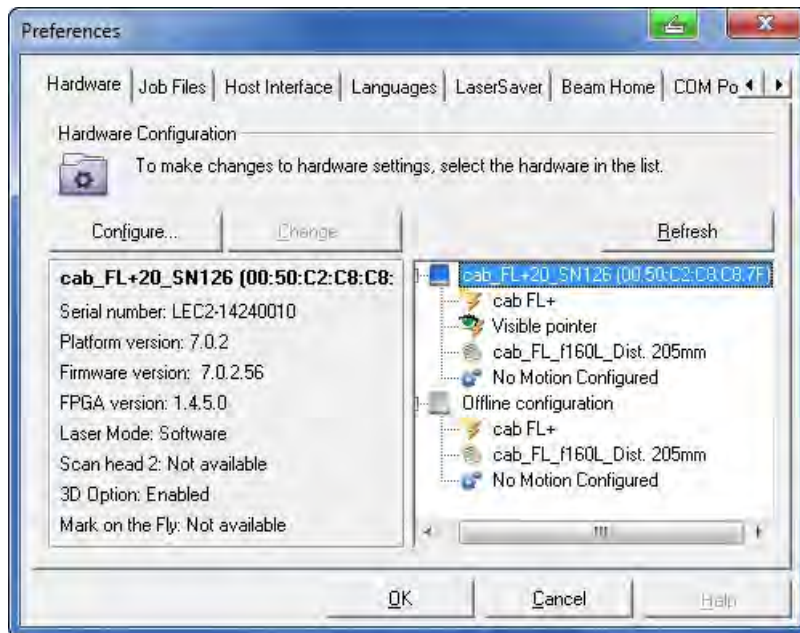


Figure 22 Configuration window

- Select in the main menu bar "System > Preferences".
- Select "Hardware".
- Select either the active or OFFLINE configuration in the right window.
- Adapt both of the configurations in the same way to the hardware.



Note!

Lens configuration depends on the plano-spherical lens used. When generating layouts, especially in the OFFLINE mode, particular care shall be taken to use in each case the correct laser and lens configuration. The wrong selection may result in a wrong scaling and distortion of the print image.



Note!

In general, correct marking laser default configuration does not need to be changed.



Note!

All lens configurations marked with (*) show that a default configuration has been changed. This can also be shown after the calibration of the marking field.

- Documentation Software "Correction of Mechanical Alignment Tolerances".

4.9 Settings for Stand-Alone Operation

The marking laser FL+ provides the ability to mark jobs without data transmission from the PC (stand-alone operation). In this case, a higher-level control (e.g. PLC) completely handles the operation of the marking laser FL+. For this purpose, the "Remote Command API" (Application Programming Interface) and "COM Automation Server" (▷ Scope of delivery software) are available and additionally allow access to stored data via the "Job Select" signal. To operate the marking laser FL+ in the stand-alone operation job files and laser character fonts need to be saved in binary format in the memory of the FL+ controller and called via subroutine or system explorer.



Note!

Editing and modifying is only possible with *.wlj files.

When transmitting data into the memory of the marking laser FL+, these are automatically converted via cabLase Editor 5 into binary *.dat job files.

The laser system explorer can be used to copy available *.dat files from the marking laser FL+ to a local PC.

4.9.1 Storing *.wlj files to the Memory of the Laser

The example requires two job files on the PC, named 1.wlj and 2.wlj.

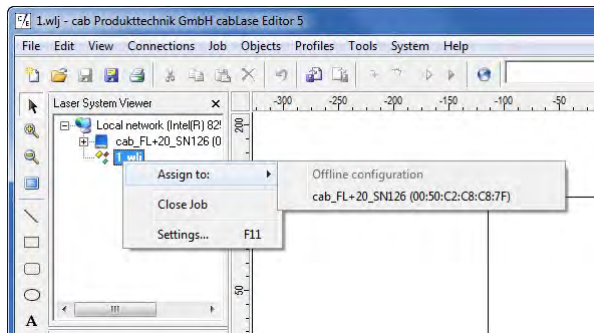


Figure 23 Selection destination data storage

- ▶ Right-click within the window "Laser System Viewer" on an opened job.
- ▶ Select via "Assign to" the active marking laser FL+ as destination for data storage.
- ▶ Copy the job via "Save to marking laser" Job into the memory of the marking laser.

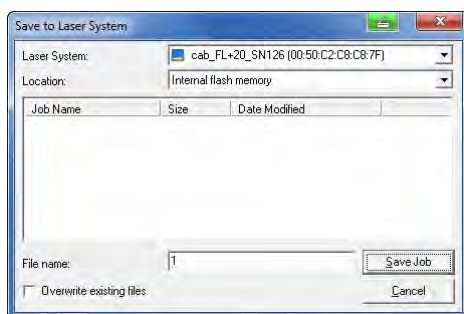


Figure 24 Setting file name

- ▶ Fix a name for the file and click on "Save job".
The example files are converted into binary *.dat job files and stored as 1.dat, respectively 2.dat in the memory of the marking laser. However, these data are a lot larger than the original *.wlj files.



Note!

To call marking layouts stored in the internal memory via digital coding, the input "Job Select" on CON2 of the marking laser FL+ needs to be activated!

Access via "Remote Command API" and "COM Automation Server" is always possible.

4.9.2 Managing *.dat files

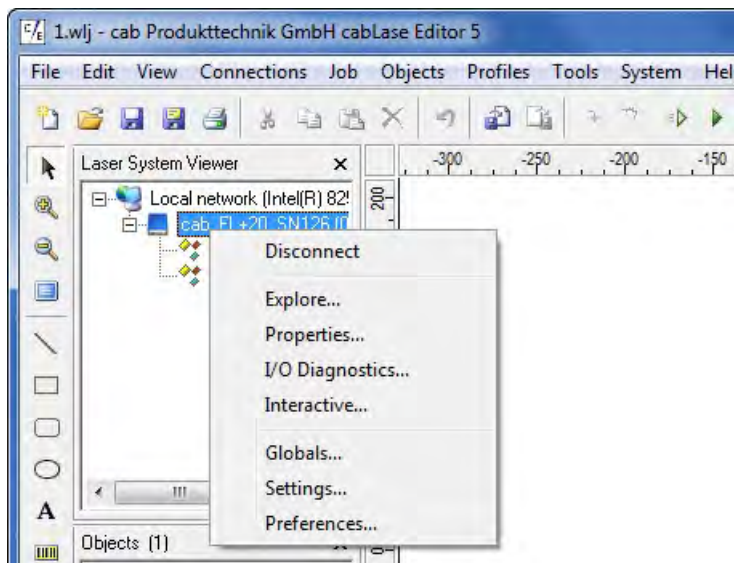


Figure 25 Calling the system explorer

- Click within the window "Laser System Viewer" on active device and select "Explore..."

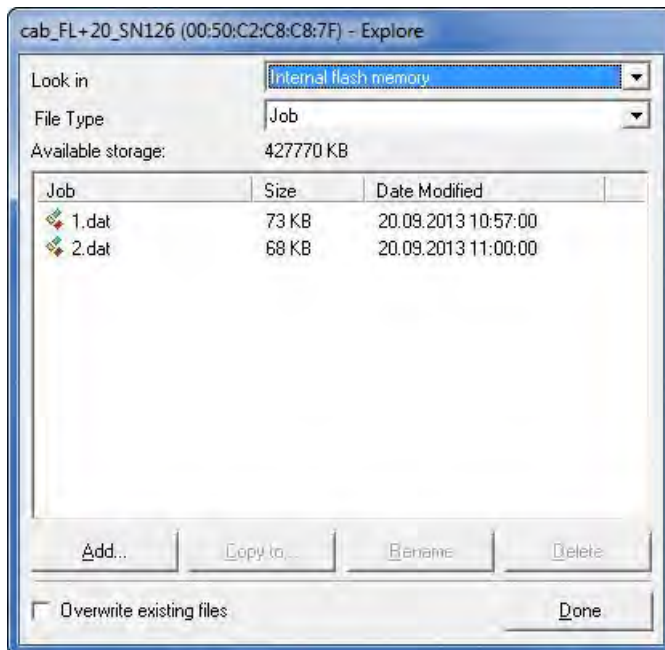


Figure 26 Display list job files

- Select "Internal flash memory" and type of file "Job" to show stored .dat files.
- Select "Copy to..." to copy files from the marking laser FL+ to the local PC.
- Select "Add.." to copy .dat files already available on the local PC to the marking laser FL+.

4.9.3 Storing Laser Font files

The following example uses text objects in the job files called 1.wlj and 2.wlj, respectively 1.dat and 2.dat created with the with the Arial font type. This font type needs to be loaded into the memory of the laser.

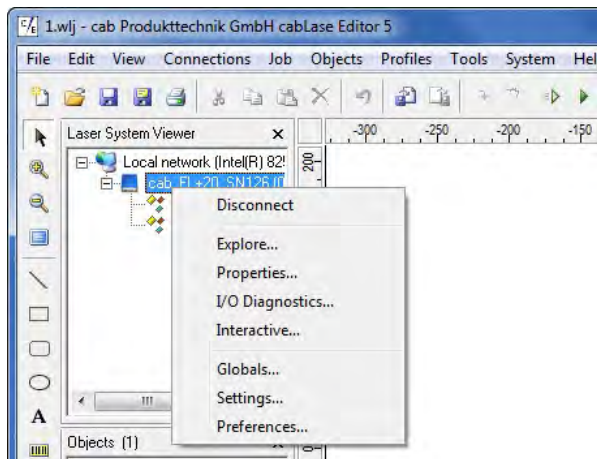


Figure 27 Calling the system explorer

- Click within the window "Laser System Viewer" on active device and select "Explore..."

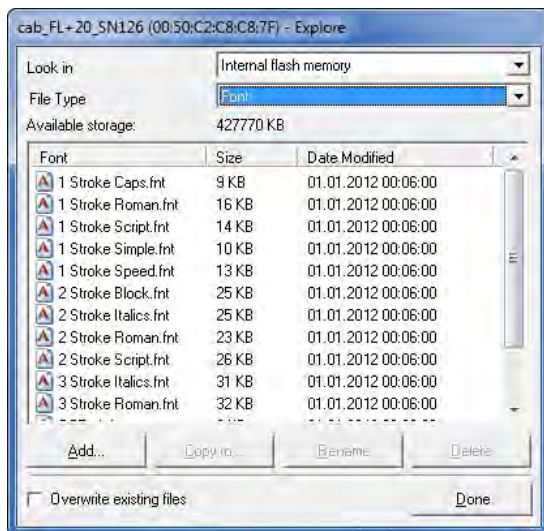


Figure 28 Display list font files

- Select "Internal flash memory" and type of file "Font" to show laser fonts available.
- Select "Add..." to copy laser font from the local PC to the marking laser FL+.
- Select "Copy to..." to copy laser front from the marking laser FL+ to the local PC.



Note!

Default directory for laser font files installed on the local PC is: c:\marker\marker\fonts.
Further information about converting TrueType fonts into laser fonts ► Documentation software.

4.10 Automation with cabLase Editor 5


Note!

To create the below showcase program it is necessary to have a basic knowledge in the marking software cabLase Editor 5.


Note!

Refer to the enclosed software documentation for detailed descriptions about programming and creating marking programs.


Note!

Refer to the description of interfaces for more information about automation and use of interfaces.

For the automation of marking applications (integration into automation systems) each job to be handled can be initialized for a correct communication.

- ▶ Select and right click on the layout to set the automation parameters and then open "Default settings".
- ▶ Carry out settings under "External start" and "Repeat process".

4.10.1 Settings "External Start"

- ▶ Select between "Mark immediately" and "Wait for an external start signal".


Note!

Setting "Wait for and external start signal" activates the query of the input signal "Start Process" at the external interface I/O (CON2 - Pin14).

When selecting "Wait for external start signal" a window opens to set the parameters for the start signal.

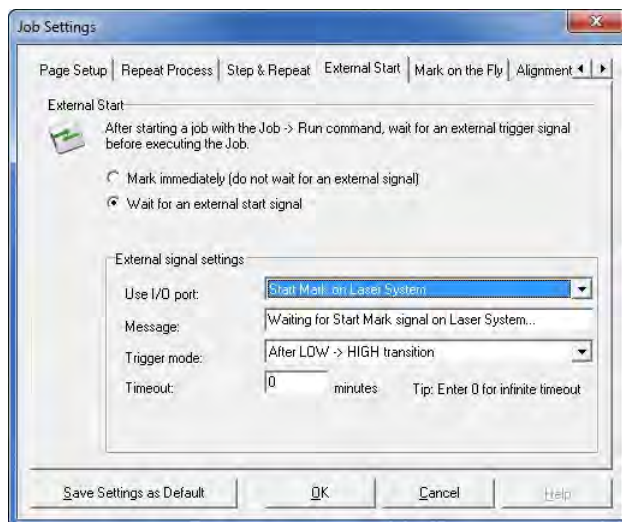


Figure 29 Settings "External start"

- Use I/O port : Remains unchangeable on „Start process on I/O port“
- Message : Freely definable
- Trigger mode : Set to "After LOW -> HIGH transition".
- Timeout : Delay between start signal and execution of the marking job

4.10.2 Settings "Repeat Process"

This window is used to set the process flow in the cyclic operation mode.



Figure 30 Settings "Repeat process"

Setting		Description	
FOR OPERATION FROM THE CONSOLE		Starting each cycle via software	
	Prompt operator between each cycle, and run indefinitely		Continuous operation
	Prompt operator between each cycle, and stop the process after ... cycle(s)		Operation with defined number of cycles
AUTOMATION ONLY		One single start of the job via software Start of every single cycle via automation control	
	Do not prompt between cycles, and run indefinitely		Continuous operation
	Do not prompt between cycles, but stop after ... cycle(s)		Operation with defined number of cycles
Save Job after every cycle		Saving jobs with current values of variable fields (counter or date fields) to be able to continue with updated values when calling again.	

Table 13 Settings "Repeat process"

- Select one of the setting under "AUTOMATION ONLY" for the automated operation.

5.1 RS-232 Interfaces CON1, CON5

The device is equipped with two serial interfaces.

The interfaces have each a SUB-D connector, 9 pole.



Note!

The interfaces can only be used via customer-specific programming with the "COM Automation Server" or "Remote Command API" (► Scope of delivery software) and are not supported in cabLase Editor 5. The interfaces are used for data transmission from and to peripherals such as turning axes, linear NC lifting axes or barcode scanners.

The devices are connected depending on the configuration of the periphery.



Attention!

Each of the serial interfaces provide a voltage of 5 VDC at pin 9 for external devices. Maximum current at both of the interfaces must not exceed a total of 500 mA.

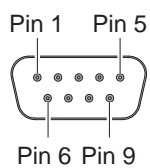


Figure 31 Serial interfaces CON1 and CON5

Pin	Signal CON1 / CON5
1	-
2	RxD
3	TxD
4	-
5	GND
6	-
7	-
8	-
9	5 VDC for external devices

Table 14 Pinout CON1 and CON5

Parameter	Values
Baud rate	110,300,600,1200,2400,4800,9600,19200,38400,56000,57600,115200
Data bits	8
Parity	no
Stop bits	1
Handshake	-

Table 15 Parameters CON1 and CON5



Note!

For programming with "COM Automation Server" and "Remote Command API" the serial interfaces are assigned the following names:

COM1 : CON5

COM2 : internal interface to access all data of the laser source

COM3 : CON1

5.2 External Interface I/O CON2

For the integration into higher-level control procedures the device is equipped with an I/O Interface allowing to individually program eight in- and outputs for example via cabLase Editor 5. The interface has a SUB-D connector, 25 pole.

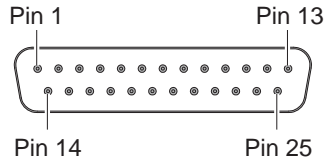


Figure 32 External interface I/O

Pin	Signal	Name	Description	Activation / active
1		FP24V	Internal operating voltage +24 V, Si T 500 mA to supply external devices	
2	⊕→	Ready to Mark	Marking job is loaded, device is waiting to start marking	Contact Pin 2 / Pin 12 closed
3	⊕→	Busy	Marking job is running	Contact Pin 3 / Pin 12 closed
4	⊕→	User Out1	Individually programmable	Contact Pin 4 / Pin 12 closed
5	⊕→	User Out2	Individually programmable	Contact Pin 5 / Pin 12 closed
6	⊕→	User Out3	Individually programmable	Contact Pin 6 / Pin 12 closed
7	⊕→	User Out4	Individually programmable	Contact Pin 7 / Pin 12 closed
8	⊕→	User Out5	Individually programmable	Contact Pin 8 / Pin 12 closed
9	⊕→	User Out6	Individually programmable	Contact Pin 9 / Pin 12 closed
10	⊕→	User Out7	Individually programmable	Contact Pin 10 / Pin 12 closed
11	⊕→	User Out8	Individually programmable	Contact Pin 11 / Pin 12 closed
12	⊕→	Common for Outputs	Common potential for all outputs	
13		GND	0 V internal	
14	⊖←	Start Process	Start of marking according to settings made in the software	Connect to +24V between Pin 14 and Pin 25
15	⊖←	Job Select	Active : Job data are loaded from an internal file and can be opened via binary coding by using the digital inputs ▷ Storing job files for the stand-alone operation Inactive : Job data are loaded from the PC	Connect to +24V between Pin 15 and Pin 25
16	⊕→	Error	Error message of the control	Contact Pin 16 / Pin 12 closed
17	⊖←	User In1	Individually programmable	+24V between Pin 17 and Pin 25
18	⊖←	User In2	Individually programmable	+24V between Pin 18 and Pin 25
19	⊖←	User In3	Individually programmable	+24V between Pin 19 and Pin 25
20	⊖←	User In4	Individually programmable	+24V between Pin 20 and Pin 25
21	⊖←	User In5	Individually programmable	+24V between Pin 21 and Pin 25
22	⊖←	User In6	Individually programmable	+24V between Pin 22 and Pin 25
23	⊖←	User In7	Individually programmable	+24V between Pin 23 and Pin 25
24	⊖←	User In8	Individually programmable	+24V between Pin 24 and Pin 25
25	⊖←	Common for Inputs	Common potential for all inputs, 0V external	Note : Using the internal +24V (Pin 1) Supplying the inputs requires to connect Pin 25 with Pin 13.

Table 16 Pinout external interface I/O

Connecting inputs and outputs

Configured as opto-couplers the **inputs** feature a current limiting resistor of 2,2 k Ω in the input circuit.

All inputs have the common reference potential **Common for Inputs**:

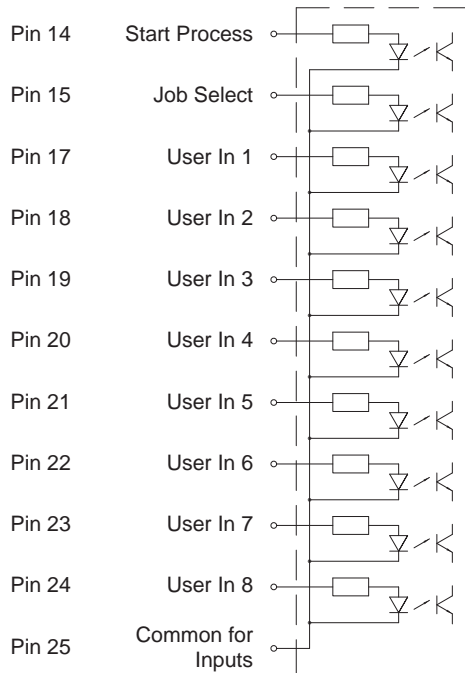


Figure 33 Connecting inputs

Connecting the inputs requires to apply or switch off voltage between the respective input and **Common for Inputs**.

Solid-state relays are used for the **outputs**

All outputs have the common reference potential

Common for Outputs:

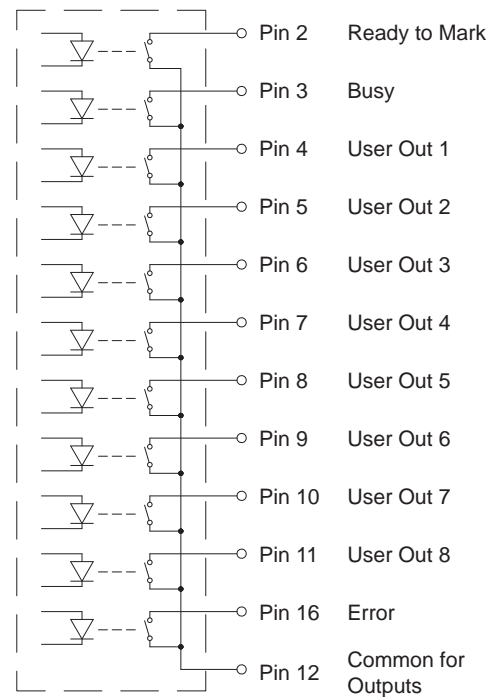


Figure 34 Connecting outputs

Connecting the inputs is realized by opening or closing a contact between **Common for Outputs** and the respective output.

Electrical conditions: $U_{\max} = 60 \text{ V}$, $I_{\max} = 500 \text{ mA}$

Signal diagram job control

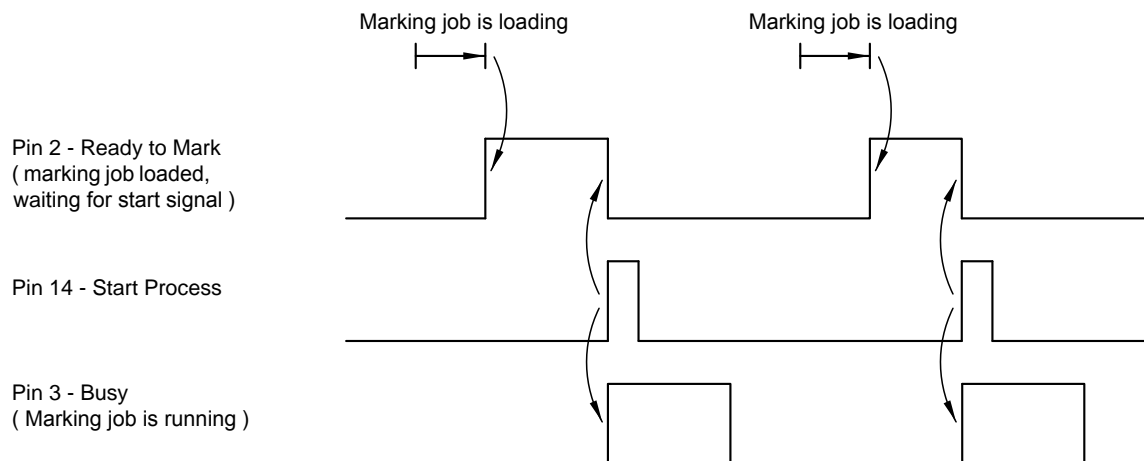


Figure 35 Signal diagram

5.3 Remote Interface CON3

The Remote Interface CON3 is used to control the hardware of the FL+.

The interface has a SUB-D connector, 15 pole.

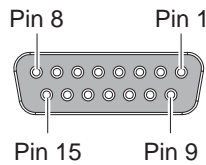


Figure 36 Remote Interface

Pin	Signal	Name	Description	Activation / active
1		FP24V	Internal operating voltage +24 V, max. 500 mA to supply external devices	
2	⊖→	Power	Mains voltage applied	Contact between Pin 2 and Pin 7 closed
3	⊖→	Shutter Open	Shutter is open	Contact between Pin 3 and Pin 7 closed
4	⊖→	Emission	Laser source is switched on and ready for marking ► Keep to the special safety instructions for the operation under laser class 4	Contact between Pin 4 and Pin 7 closed
5	⊖→	Error	Control is not yet ready after switching on or there is an error occurred in the control	Contact between Pin 5 and Pin 7 closed
6	⊖→	Laser Ready	Control and laser source are switched on and ready for marking	Contact between Pin 6 and Pin 7 closed
7	⊖→	Common for Outputs	Common potential for all outputs	
8		GND	0V internal	
9	⊖←	Job Select Register	active : User In/Out 1 to User In/Out 4 at CON2 are used as digital inputs/outputs 1 to 4 in cabLase inactive : User In/Out 1 to User In/Out 8 at CON2 are used as digital inputs/outputs 5 to 12 in cabLase Note: Supplying Pin 9 is only evaluated for the initialization of the marking laser (Switch on and Reset)! When the signal is inactive User in 1 to 8 can be used to select layouts but objects inside a layout cannot be selected.	Active, if supplied with +24V between Pin 9 and Pin 15
10	⊖←	Reset	Reset the marking laser Note : The restart after reset and initialization of the laser control may take up to 30 seconds!	Active, if supplied with +24V between Pin 10 and Pin 15
11	⊖←	Laser On/ Off	Active : Switch on laser source Conditions for switching on: Emergency Stop not active, shutter closed Inactive : Switch off laser source	Active, if supplied with +24V between Pin 11 and Pin 15
12	⊖→	Pilot Laser is On	Pilot laser is switched on	Contact between Pin 12 and Pin 7 closed
13	⊖←	Open Shutter	Requirements to open shutter Conditions for opening: Emergency Stop not active, interlock closed	Active, if supplied with +24V between Pin 13 and Pin 15



Pin	Signal	Name	Description	Activation / active
14		Pilot Laser On/Off	Active : Switch on pilot laser Conditions for opening: Emergency Stop not active, shutter closed Inactive : Switch off pilot laser	Active, if supplied with +24V between Pin 14 and Pin 15
15		Common for Inputs	Common potential for all inputs Note: Using the internal +24V (Pin 1) to supply the inputs requires the connection of Pin 15 with Pin 8 (GND).	

Table 17 Pinout Remote Interface

Connecting inputs and outputs

Configured as opto-couplers the **inputs** feature a current limiting resistor of 2,2 k Ω in the input circuit.

All inputs have the common reference potential **Common for Inputs**:

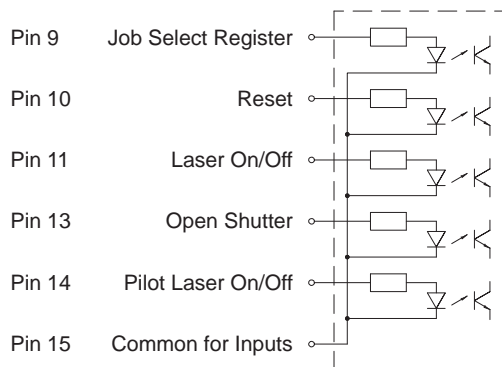


Figure 37 Connecting inputs

Connecting the inputs requires to apply or switch off voltage between the respective input and **Common for Inputs**.

Solid-state relays are used for the **outputs**

All outputs have the common reference potential

Common for Outputs:

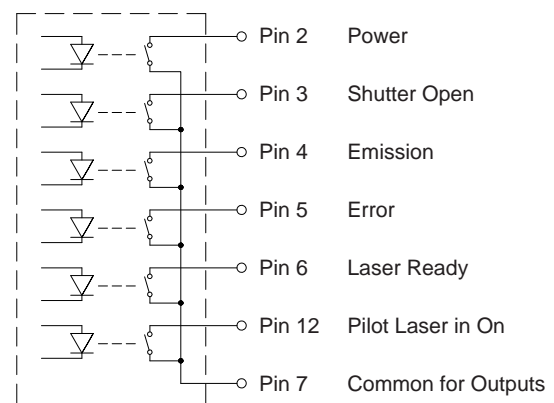


Figure 38 Connecting outputs

Connecting the inputs is realized by opening or closing a contact between **Common for Outputs** and the respective output.

Electrical conditions: $U_{\max} = 60 \text{ V}$, $I_{\max} = 500 \text{ mA}$

Signal diagram remote interface

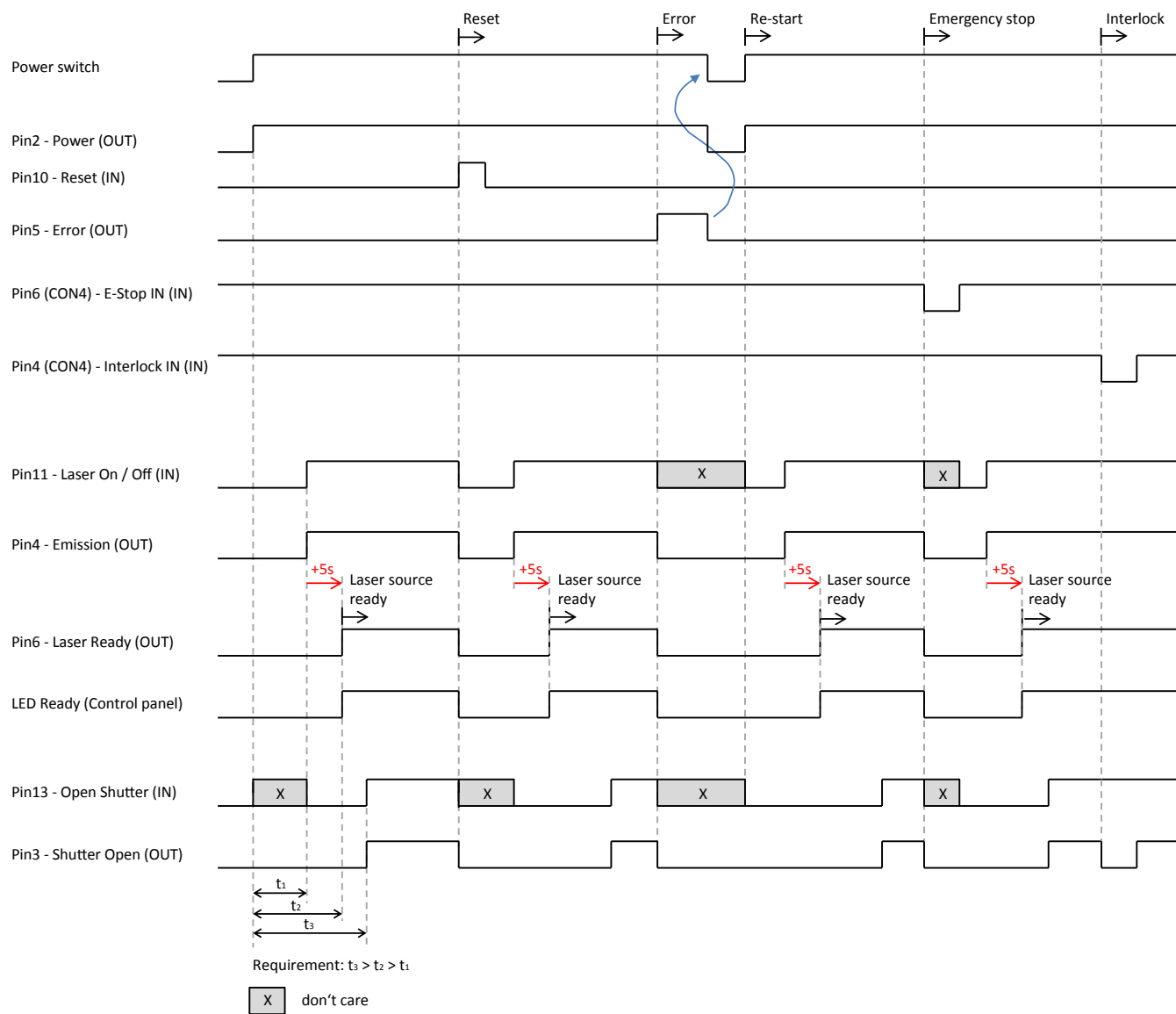


Figure 39 Signal diagram remote interface

5.4 Interlock / E-Stop Interface CON4

The Interlock / E-Stop interface is used to integrate the marking laser into external safety circuits and to connect an external Emergency Stop.

The interface has a SUB-D connector, 9 pole.

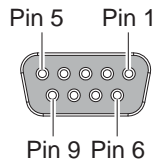


Figure 40 Interlock / E-Stop interface



Note!

There is no marking possible without having connected the inputs Interlock In (Pin 4) and E-Stop In (Pin 6).

Pin	Signal	Name	Description	Activation / active
1		FP24V	Internal operating voltage +24 V, max. 500 mA	
2	⊕→	E-Stop signaling contact connection A	Status of Emergency Stop relay' Device ready for operation when signal active	Contact between Pin 2 and Pin 7 is open, if the Emergency Stop is not activated, i.e. the Emergency Stop relay is not current fed
3	⊕→	Interlock Signaling contact connection A	Status of Interlock-Relay' Device ready for operation when signal active	Contact between Pin 3 and Pin 8 is open, if the safety circuit is closed, i.e. the Interlock relay is current fed
4	⊖←	Interlock IN	Interlock relay Connection for safety switch Device ready for operation when signal active	Active, if connected to +24V between Pin 4 and Pin 9
5		GND INT	0 V intern	
6	⊖←	E-Stop IN	Emergency Stop relay Connection for Emergency Stop Device ready for operation when signal active	Active, if connected to +24V between Pin 6 and Pin 9
7	⊕→	E-Stop signaling contact connection B	Status of Emergency Stop relay' (return circuit)	▷ Pin 2
8	⊕→	Interlock signaling contact connection B	Status of Interlock relay' (return circuit)	▷ Pin 3
9		GND EXT	Common GND potential for Interlock IN and E-Stop IN	

Table 18 Pinout Interlock / E-Stop interface

Functional description of Emergency Stop circuit

The laser source is switched off via Emergency Stop interface in the event of sudden danger.

- For switching on the laser source the Emergency Stop circuit must be closed. A voltage of +24V between PIN 6 PIN 9 must be applied.
- Opening the Emergency Stop circuit results in the laser source being switched off.
- The internal device control remains active at opened Emergency Stop circuit.
- When the Emergency Stop circuit is closed again the laser source remains switched off and has to be switched on again.
- To restart the laser source via remote interface the signal "Laser ON/OFF" (CON3 - PIN 11) must first be deactivated and then activated again.
- In the event of using the digital outputs User Out 1 to User Out 8 at CON2, their switching states remain unchanged after opening and closing the Emergency Stop Circuit again. Reset of the outputs is only made after the marking laser has been reset via interface CON3 or at the operating panel.

Example for an Emergency Stop circuit

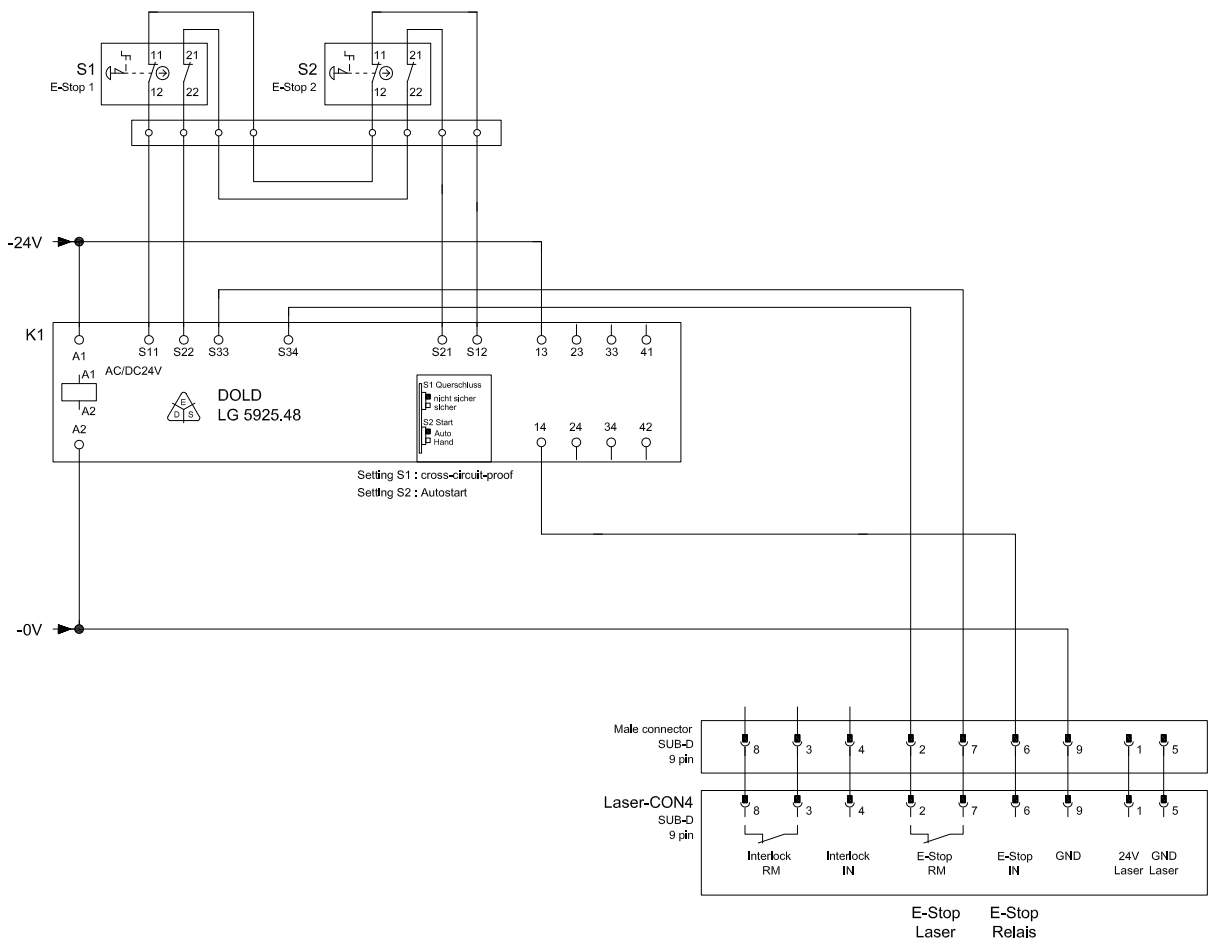


Figure 41 Example for an Emergency Stop circuit

Functional description of Interlock circuit

Via mechanical safety lock (shutter) in the marking laser the Interlock circuit allows to cut off the emission of laser radiation. Control is made via external safety switches monitoring covers, service and set-up.

- Laser source and pilot laser can be switched on regardless of the interlock circuit status.
- In the event of the interlock circuit not being closed (not connected to +24 VDC between PIN 4 and PIN 9), the shutter can not be opened. As a result there is no marking possible!

Example for an Interlock circuit

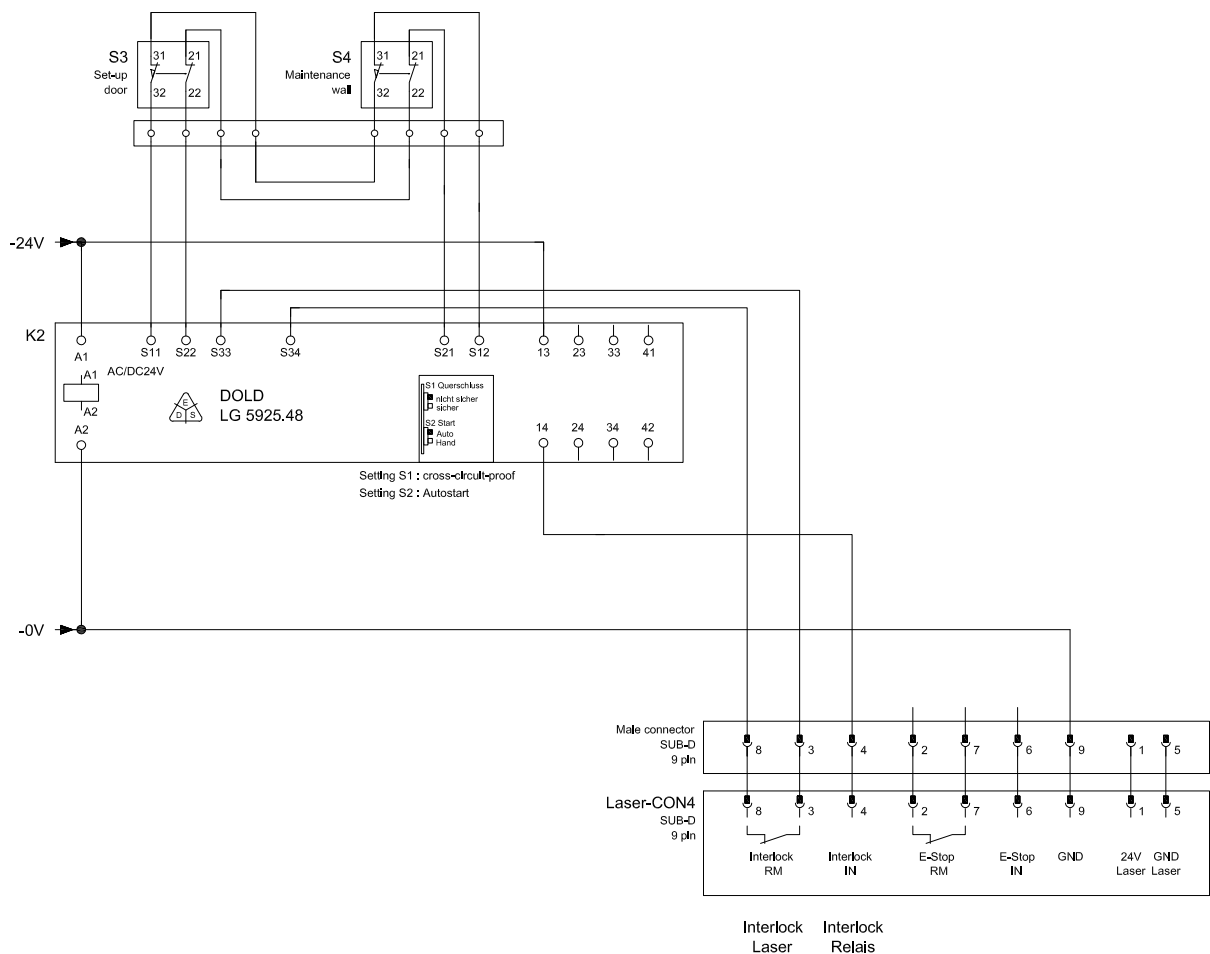


Figure 42 Example for an Interlock circuit

6.1 General Maintenance

The marking laser FL+ is very carefully developed and offers maintenance-free components. However, errors may occur as a result of external causes for reasons of normal wear.



Note!

All kind of repair and maintenance work shall solely be carried out by cab Produkttechnik GmbH & Co. KG or authorized staff.

Tampering or modifications of any kind to the device by a third party will render all warranty claims.



Danger!

Danger of life due to mains voltage.

- ▶ Completely disconnect the device from the mains before starting repair and maintenance work. However, excluded are all times when maintenance work is carried out such as inspection of the safety devices where the device needs to be switched on.



Note!

- ▶ Follow chapter on safety instructions.

Monthly maintenance works

Inspecting and cleaning the lens protective glass

Inspecting and cleaning the louvers

Inspecting the safety signs

Table 19 Repair and maintenance plan



Attention!

- ▶ Follow descriptions in the corresponding manuals for repair and maintenance work at devices necessary for operating the marking laser (such as extraction and filtering device).

6.2 Cleaning the Lens Protective Glass



Attention!

- ▶ Never touch glass surfaces with bare fingers.
- ▶ Never clean glass surfaces using tools or hard objects.
- ▶ Never remove dust and dirt particles from the surface compressed air.
- ▶ Never wipe on the glass surface using a dry cloth or paper.
- ▶ Remove dust using a small bellows.
- ▶ To remove coarse dirt solely use lens cleaning paper together with isopropanol with an optical cleanliness of 99 %.
- ▶ Drop some of the isopropanol on the lens cleaning paper, but do not touch the moistened side.
- ▶ Slowly move the lens cleaning paper towards one direction over the surface of the protective glass(1).
- ▶ Repeat this step using a new lens cleaning paper until the surface is completely cleaned.

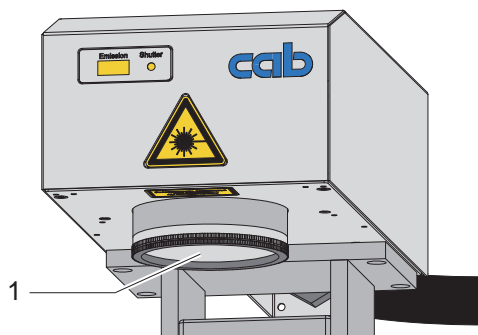


Figure 43 Cleaning the lens protective glass

6.3 Exchanging Lens and Lens Protective Glass

Lens	Name of item	Art.-No. protective glass
F-Theta 100.1	Protective glass	5525034.001
F-Theta 160.1		
F-Theta 254.1		
F-Theta 420.1	Protective glass	5527407.001

Table 20 Protective glass



Attention!

- ▶ Always use cotton gloves.
- ▶ Never touch surfaces of the objective lens.

Exchanging the protective glass

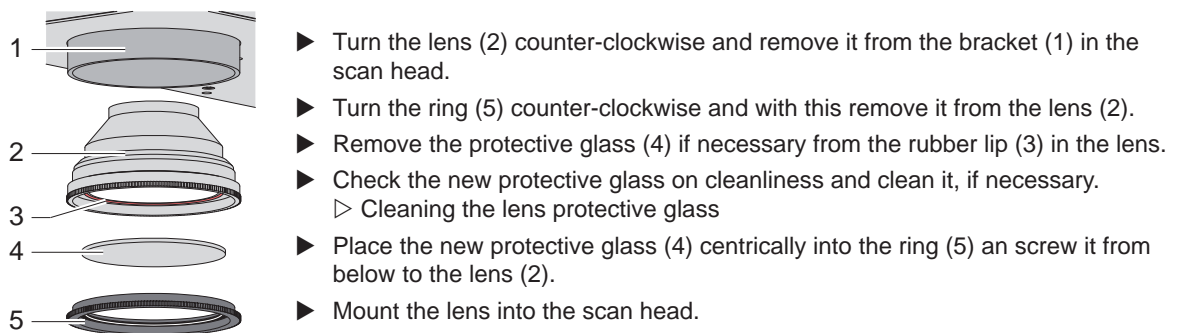


Figure 44 Exchanging the protective glass

Exchanging the lens

- ▶ Turn the lens (2) counter-clockwise and remove it from the bracket (1) in the scan head.
- ▶ Place the lens covers included in the scope of delivery of the FL+ on both sides of the lens that has been removed.
- ▶ Remove the lens covers from the new lens.
- ▶ Mount the new lens into the scan head.
- ▶ Adjust the settings to the new lens in cabLase Editor 5.

6.4 Troubleshooting

Error / error message	Possible cause	Elimination
Error message when loading marking program	Connecting cable not properly installed	Check cable connections and connectors on proper installation
	Control switched off	Switch on control
	Software not properly installed	Reinstall software
Device can not be started	Connecting cable is not properly installed	Check cable connections and connectors on proper installation
	Supply voltage is missing	Check supply voltage from the mains
No laser beam	Safety lock (Shutter) closed	Open, respectively release shutter Check safety circuit.
	Laser not in focal position	Check working distance
	Wrong laser parameters	Check laser parameters in the program on suitability
Insufficient laser power	Laser not in focal position	Check working distance
	Wrong laser parameters	Check laser parameters in the program on suitability
Missing characters	Dirty protective glass	Clean or replace protective glass
Status display Laser Error lights up	Malfunction or overheating of the device	Refer to cab customer service
No emission display after having switched on laser source	System failure	Restart the device (reset) Refer to cab customer service
No marking	Material not laser-markable	Use another kind of material

Table 21 Troubleshooting

6.5 Service



Attention!

- Refer to Chapter Troubleshooting in the event of an interruption of operations.
- In the event of not being able to eliminate the interruption of operations you are asked to refer to authorized service staff.



Note!

All kind of repair and maintenance work shall solely be carried out by cab Produkttechnik GmbH & Co. KG or authorized staff.



Note!

Tampering or modifications of any kind to the device by a third party will render all warranty claims.

6.6 Customer Service

For more information or for eliminating an interruption of operations the cab customer service is available. For addresses and local partners ► refer to page 2.



Note!

To give quick and expert support you are asked to keep ready type and serial number stated on the type plate of the control and scan head.

Beschriftungslaser		FL+10	FL+20	FL+30	FL+50
Strahlquelle		Ytterbium-Faserlaser, gepulst, luftgekühlt			
cw-Leistung	max. W	10	20	30	50
Pulsenergie	mJ	0,5	1	1	1
Wellenlänge	nm	1064			
Strahlqualität M²		<1,8			
Pulsbreite	ns	90-120			
Pulsfolgefrequenz	kHz	20-80	20-80	30-80	30-80
Verbindungsleitung	m	4,5	2,5	2,5	2,5
Scankopf					
Montage		Horizontal/vertikal			
Beschriftungs- geschwindigkeit	mm/s	ca. 5000			
Pilotlaser					
Wellenlänge	nm	650			
cw-Leistung	max. mW	<1			
Elektronik					
Prozessor 32 Bit Taktrate	MHz	600			
Arbeitsspeicher (RAM)	MB	256			
Datenspeicher (Flash)	MB	512			
Erweiterung (Flash)		USB Memory Stick			
Planfeldobjektiv		100.1	160.1	254.1	420.1
Arbeitsabstand	mm	141	202	302	541
Beschriftungsfeld	mm	69x69	112x112	180x180	290x290
Spotdurchmesser	µm	~25	~35	~50	~125
△ Auflösung	dpi	1000	725	500	500
Maße und Gewichte		Tower		Rack 4 HE 19“	
Steuerung HxBxT	mm	312x150x410		178x420x420	
Gewicht	kg	15		16	
Scankopf HxBxT	mm	110x170x330			
Gewicht	kg	7			
Schnittstellen					
Ethernet 10/100 Base		PC-Anschluss			
Ethernet 10/100 Base		Peripherie			
2x RS232 C		Peripherie			
Digitale I/O		8 Ein-/Ausgänge, Beschriftung, Start			
Remote		Betriebsbereit, Shutter Open, Emission, Pilot Laser			
Interlock		Externes Sicherheitsrelais, Not-Aus			
Bedienfeld					
Schlüsselschalter		Strahlquelle EIN/AUS			
Taster Pilot Laser		EIN/AUS			
Shutter Open		EIN/AUS			
Anzeige Emission		Strahlquelle aktiv			
Laser Error		Strahlquelle Störung			
Ready		Strahlquelle bereit			
Power		Netzspannung EIN			
Pilot Laser		EIN			
Shutter Open		Sicherheitsverschluss offen			
Anschluss Service		USB Micro			
Datenspeicher		USB Host			
Betriebsdaten					
Spannung		100-240 VAC ~ 50/60 Hz			
Leistungsaufnahme Standby	W	65			
max. W		150	175	200	250
Temp./Luftfeuchtigk. Betrieb		5-40 °C/10-85 % nicht kondensierend			
Lager		0-60 °C/20-80 % nicht kondensierend			
Transport		-25-60 °C/20-80 % nicht kondensierend			
Zulassungen		CE, FCC class A, ICE S3			
Performance Level		d			
Laserschutzklasse Steuerung		4			
Pilotlaser		2			

Beschriftungssoftware cabLase**Empfohlene Systemvoraussetzungen für den PC:**

Für die Gerätekonfiguration und die Änderung prozesstypischer Einstellungen werden ein PC mit funktionsfähiger Netzwerkeinrichtung und eine lizenzierte Installation von cabLase Editor 5 benötigt.

Computer	IBM PC/AT-kompatibel
Betriebssystem	Microsoft Windows XP® Professional SP3 (32/64 Bit) Microsoft Windows 7® Professional SP1 (32/64 Bit)
Prozessor	Intel Core i3-540 oder leistungsfähiger
Arbeitsspeicher	Min. 1 GB RAM, empfohlen >2 GB
Festplatte	Speicherbedarf Software 1 GB empfohlene Festplattengröße >40 GB
Laufwerke	CD-ROM- oder DVD-Laufwerk für Softwareinstallation
Schnittstellen	Netzwerkarte 10/100 Mbit für Anschluss Laser, PS2/USB-Anschlüsse für Maus/Tastatur, USB 2.0-Anschluss für Software-Dongle, optional: USB 2.0-Anschluss für Speichermedien, RS232-Schnittstellen für cab Achssysteme oder cab Label Marker
Software	cabLase Editor 5, Version 5.1.5.2 und höher
Monitor	SVGA, empfohlene Auflösung 1280x1024

Schriften

Schriftarten	Alle unter Windows installierte TrueType-Fonts, gefüllt oder als Outline, lasertypische Single-, Double-, Triple Line-Fonts. Alle Schriftarten können frei skaliert und „gewobbeln“ werden.
Ausrichtung	Beliebige Aus- und Drehrichtungen, Kreisbogenbeschriftung
Zeichenabstand	Stauen und dehnen

Grafiken

Grafikelemente	Linien, Kreise, Rechtecke, Polygone; Schraffur aller geschlossenen Flächenelemente
Grafikformate	PLT, DXF, BMP, JPG, PCX, WMF, EPS, TIF; Alle grafischen Elemente können skaliert, verschoben, rotiert, gruppiert und gespiegelt werden. Für das Ausrichten der Objekte stehen spezielle Werkzeuge zur Verfügung.

Barcodes

Lineare Barcodes	Interleaved 2/5 Code 39, Code 93 Code 128	Codabar EAN UPC
2D-Codes	Data Matrix, ECC200, QR-Code	
	Alle Codes sind in Höhe, Modulbreite und Ratio variabel. Wahlweise Generierung einer Prüfziffer oder invertierte Ausgabe des Codes	

Weitere Merkmale

Seriennummer, Uhrzeit, Datum
Variable Felder
Einfügen grafischer Daten aus Windows-Programmen
Programmierbare Laserparameter
Speichern von Prozess- und Parameterdateien
Ansteuern digitaler Ein- und Ausgänge
Steuerung und Überwachung zusätzlicher Achsen (z. B. Hub-, Dreh-Linearachsen)
COM Automation Server erlaubt es, den Laser von anderen Softwareoberflächen (Visual Basic, Borland Builder) zu steuern. Vorausgesetzt, die Programmiersprache verfügt über die Möglichkeit der Kommunikation zu COM-Objekten.

Die Angaben über Lieferumfang, Aussehen und technische Daten der Geräte entsprechen den zum Zeitpunkt der Drucklegung vorhandenen Kenntnissen. Änderungen sind vorbehalten. Aktuelle Daten finden Sie auf der Internetseite www.cab.de/beschriftungslaser.

Table 22 Technical data

8.1 Control Rack Version

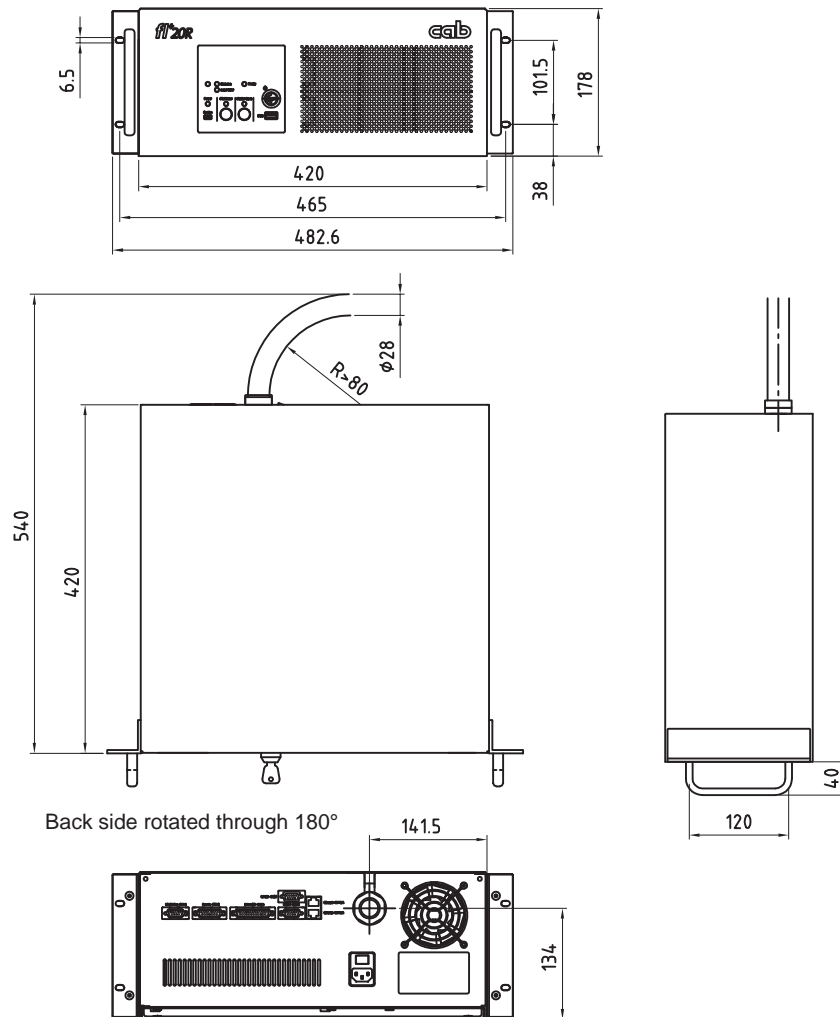
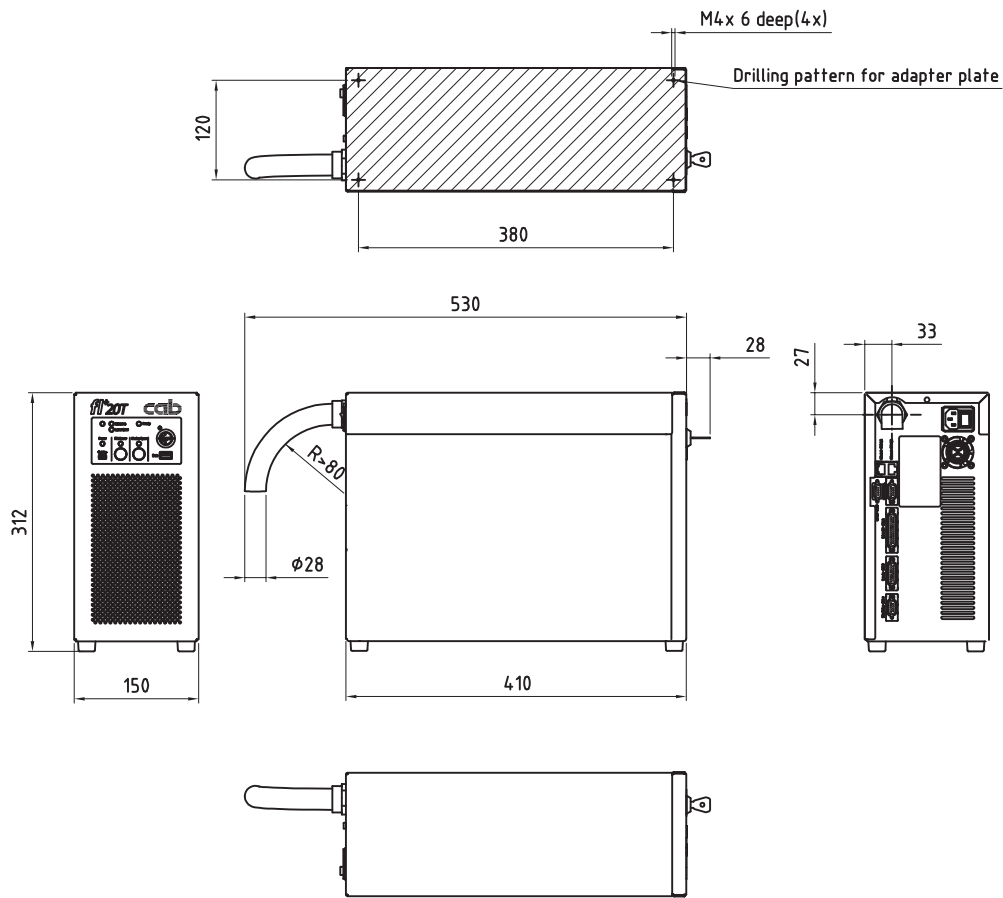


Figure 45 Dimensional drawing control rack version
Refer to the cab website for a 3D model as .stp file

8.2 Control Tower Version



Control Tower version with mounting plate (Option)

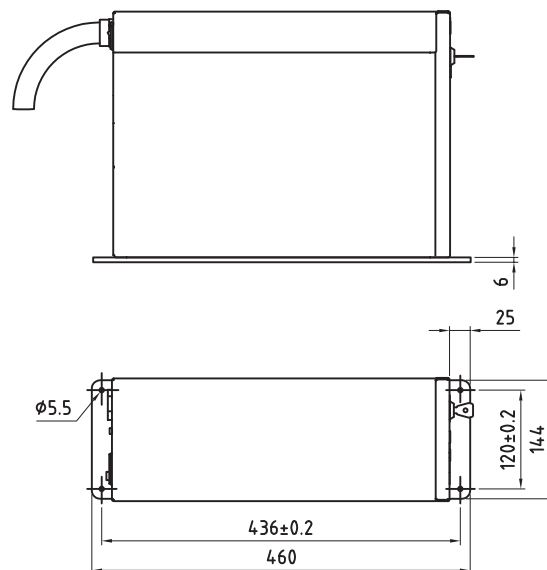


Figure 46 Dimensional drawing control tower version
Refer to the cab website for a 3D model as .stp file

8.3 Scan Head

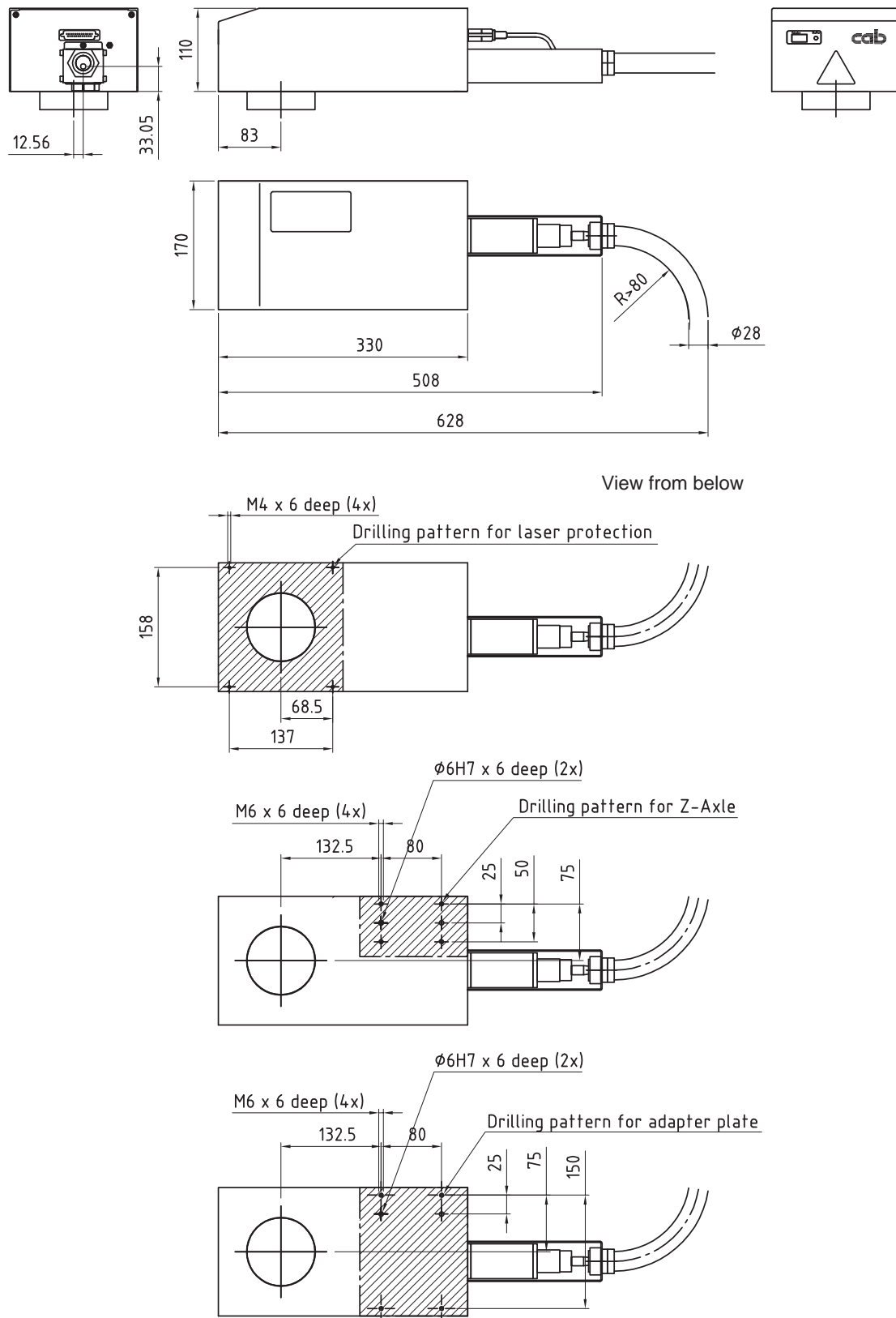


Figure 47 Dimensional drawing scan head
Refer to the cab website for a 3D model as .stp file

8.4 Lenses

The marking lasers of the FL+ series are available with different plano-spherical lenses.

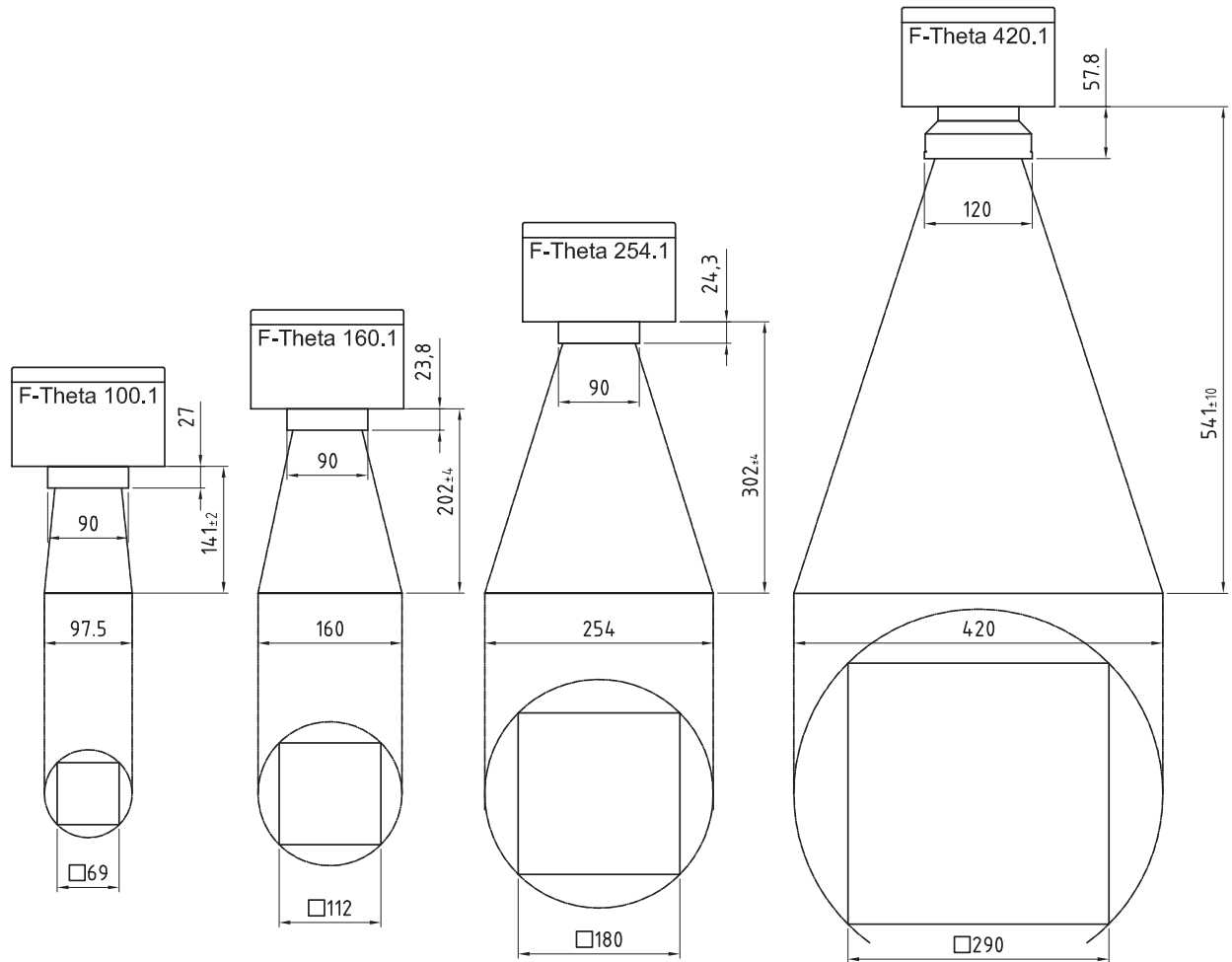


Figure 48 Lenses, working distances and marking field

9.1 EC Declaration of Incorporation



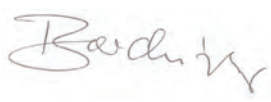
EC Declaration of Incorporation

We declare herewith that the following „partly completed machinery“ as a result of design, construction and the version put in circulation complies with the essential requirements of the **Directive 2006/42/EC on machinery** :

Annex I, Article 1.1.2, 1.1.3, 1.1.5, 1.2.1, 1.2.4.1, 1.2.4.3, 1.5.1, 1.5.8, 1.6.3, 1.7

The „partly completed machinery“ additionally complies with the Directive 2004/108/EC relating to electromagnetic compatibility.

In the event of any alteration which has not been approved by us being made to any device as designated below, this statement shall thereby be made invalid.

Device:	Marking Laser
Type:	FL+10R, FL+20R, FL+30R, FL+50R FL+10T, FL+20T, FL+30T, FL+50T
Applied EC Regulations	Applied Standards
Directive 2006/42/EC on machinery	<ul style="list-style-type: none"> • EN ISO 12100:2010 • EN ISO 13849-1:2008 • EN ISO 11553-1:2008 • EN 60825-1:2007 • EN 60950-1:2006 +A11:2009+A12:2011+A1:2010+A2:2013
Person authorised to compile the technical file :	Norbert Schulmeister cab Produkttechnik GmbH & Co KG Wilhelm-Schickard-Str. 14 D-76131 Karlsruhe
Signed for, and on behalf of the Manufacturer :	Karlsruhe, 19.02.2015  Klaus Bardutzky Company Management
cab Produkttechnik GmbH & Co KG Wilhelm-Schickard-Str. 14 D-76131 Karlsruhe	

The product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive on machinery

The documents according annex VII part B from the incomplete machinery are created and will commit to state agencies on request in electronic kinds.

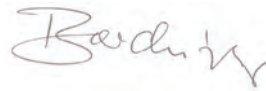
Declaration of Conformity according Directive 2004/108/EC relating to electromagnetic compatibility on the next page.

9.2 EC Declaration of Conformity



EC Declaration of Conformity

We declare herewith that as a result of the manner in which the device designated below was designed, the type of construction and the devices which, as a result have been brought on to the general market comply with the relevant fundamental regulations of the EC Rules for Safety and Health. In the event of any alteration which has not been approved by us being made to any device as designated below, this statement shall thereby be made invalid.

Device:	Marking Laser
Type:	FL+10R, FL+20R, FL+30R, FL+50R FL+10T, FL+20T, FL+30T, FL+50T
Applied EC Regulations	Applied Standards
Directive 2004/108/EC relating to electromagnetic compatibility	• EN 61000-3-2:2006+A1:2009+A2:2009
	• EN 61000-3-3:2008
	• EN 61000-6-2:2005
	• EN 61000-6-4:2007+A1:2011
Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment	• EN 50581:2012
Signed for, and on behalf of the Manufacturer :	Karlsruhe, 28.04.2015
cab Produkttechnik GmbH & Co KG Wilhelm-Schickard-Str. 14 D-76131 Karlsruhe	
	Klaus Bardutzky Company Management

9.3 FCC

NOTE : This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. The equipment generates, uses, and can radiate radio frequency and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user may be required to correct the interference at his own expense.

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