Operation Manual

Lasebox

5, 10, 20 W Laser Marking system

ÖSTLING
Marking Systems GmbH

Broßhauser Str. 27
42697 Solingen
Germany

Tel.: +49 (0) 212 - 26 96 0
Fax.: +49 (0) 212 - 26 96 199

www.ostling.com

TÜVRheinland® CERT ISO 9001

Edition: 01/2015 (V1.32)

Version Overview

Date	***Rev***	***Who***	***Comments***
07/08/2012	0.9	TK	Draft
08/08/2012	1.0	FW(TK)	Corrections
21/05/2013	1.1	PK	Change of the company's name, general revision
04/06/2013	1.2	PK	Chap. 14 "Connection Overview"
17/09/2013	1.3	PK	Chap. 6.4 "Packaging Contents"; revision of Chap. 8
19/09/2013	1.31	FD	Revision of Chap. 8.1 and 8.2; revision of Chap. 13
28/01/2015	1.32	PK	Picture P.39 correction of position CON3+4

All rights pertaining to this documentation, including the right to duplicate or distribute it and the right to have it translated, are reserved by ÖSTLING Marking Systems GmbH, including in the event of applications for industrial property rights. No part of this document may be reproduced in any form or processed using electronic systems, nor duplicated or distributed without the prior written permission of the company ÖSTLING Marking Systems GmbH. All rights are reserved in the event of any errors or technical changes.

© ÖSTLING Marking Systems GmbH

ÖSTLING Marking Systems GmbH cannot accept liability for any errors in this documentation. Liability for direct or indirect damage occurring in relation to the delivery or the use of this documentation is excluded insofar as this is legally permissible.

Table of Contents

1 Service Address and Hotline 1

2 Introduction 2
2.1 Foreword 2
2.2 Manufacturer 2
2.3 Explanation of Symbols and Instructions 3
2.4 Scope of Delivery 3
2.5 Warranty 3

3 Safety 4
3.1 Intended Operation 4
3.2 Qualification of Personnel 5
3.3 Safe Operation of the Marking System 5

4 Laser-related Safety Instructions 7
4.1 Definition of Laser Protection Classes 7
4.2 Laws, Standards, Directives and Regulations 8
4.3 Precautionary Measures 9
4.4 Warning, Information und Type Labels 10

5 Transport, Storage and Unpacking 11
5.1 Packaging and Transport 11
5.2 Storage 11
5.3 Unpacking the System 11

6 Connection and Commissioning 13
6.1 General Operating Conditions 13
6.2 Electrical Connection Values 14
6.3 Information about the EMC 14
6.4 Packaging Contents 14
6.5 Control Elements 15
6.6 Status LEDs (10) 16
6.7 Color Status Display (9) 16
6.8 Start-up Sequence 17

7 Software and Drivers 18
7.1 Installation 18
7.2 Registration 22

8 Z-Axis, Laser Focus und Focusing Aid 24
8.1 Controlling the Z Axis Manually and Searching the Reference Point 24
8.2 Finding the Focus Point Manually 24
8.3 Adjusting the Focusing Aid (optional) 25

9 Function Description Display (9) 26
9.1 Status Display and Main Menu 27
9.2 Diagnose (Diagnostic) 28
9.3 Configuration 31

10 Error Analysis 32

11 Maintenance, Servicing, Return 34
11.1 Maintenance 34
11.2 Cleaning the F-Theta Lens 35
11.3 Return 35

12 Dismantling and Disposal 36

13 Technical Data 37
13.1 General Technical Data 37
13.2 Overall Dimensions 37

14 Connection Overview 38
14.1 CON3: Extraction 40
14.2 CON4: Foot Switch 40

15 EC Declaration of Conformity 41

16 Index 42

 © ÖSTLING Marking Systems GmbH

1 Service Address and Hotline

Östling Marking Systems GmbH
Broßhauser Straße 27
42697 Solingen
Germany

Tel: +49 (0) 212 2696 - 326
Fax: +49 (0) 212 2696 - 330
E-mail: service@ostling.com

ÖSTLING's service hotline is manned

Mon-Thu	from 8:30 am to 4:30 pm (CET)
Fri	from 8:30 am to 2:00 pm (CET).

So that your service enquiries can be dealt with quicker, please have the exact designation of the laser system being used as well as the correct serial number ready! The serial numbers can be found on the labels on the back of the resonator and the 19" rack.

If you require further service from the ÖSTLING service team, such as a 24 hour hotline or weekend service for example, then we can provide this by means of a service contract to be concluded separately. Please contact our service team regarding this.

2 Introduction

2.1 Foreword

This manual is an important component of the laser marking system supplied and should remain handy at all times. Adhering to the practices and safety instructions described in this document is fundamental to avoiding injuries to people or damage to equipment and the laser system itself.

All of the diagrams, specifications, tables and information contained herein have been created and compiled carefully and in accordance with the latest knowledge.

ÖSTLING Marking Systems GmbH reserves the right to update this document at any time in terms of content, technical data, appearance and scope of delivery.

In order to handle the machine correctly, the operation manual of the software “XS Designer” which is within the scope of supply is additionally required.

2.2 Manufacturer

Marking Systems GmbH
Broßhauser Straße 27
42697 Solingen
Germany
Tel.: +49 (0) 212 2696 - 0
Fax: +49 (0) 212 2696 - 199
http://www.ostling.com
Mail: info@ostling.com

 © ÖSTLING Marking Systems GmbH

2.3 Explanation of Symbols and Instructions

You will find these symbols next to all safety instructions in these operating instructions that refer to particular risks to people, equipment or the environment.
Please follow these instructions and be very careful in these circumstances. Ensure all safety instructions are also communicated to other users.

Hazard warning symbols	
	General warning DIN 4844-2-W00
	Electrical voltage/current DIN 4844-2-W08
	Laser radiation DIN 4844-2-W10

Information Symbols	
	Information
	Check
•	**List**

Please read the operating instructions carefully and observe the safety information.

2.4 Scope of Delivery

Please check the documents that accompany your shipment to see the scope of delivery relevant to you.

The delivery should be checked for completeness and defects immediately upon receipt and the deliverer should be informed of any discrepancies. Unfortunately, complaints relating to this are not able to be accepted at a later time.

It is imperative that the packaging is retained in case the goods must be returned or forwarded so that secure and damage-free transport can be guaranteed.

2.5 Warranty

The manufacturer, programmers and author have taken utmost care in the creation of the system, modules, software and manual. The manufacturer, programmers and author cannot accept any liability or responsibility, in any respect, for any direct or indirect damage, special kinds of damage or consequential damage, loss of profits and business information or interruption to business resulting from the use of the system other than as intended.

3 Safety

Using the laser marking system Lasebox XS outside of the operating limits set out below will be considered as not in accordance with the intended usage!
Usage of the incomplete machinery that is not as intended can lead to hazardous situations and the manufacturer's liability is excluded in this instance!

3.1 Intended Operation

The marking system Lasebox XS marks surfaces of suitable materials using invisible laser radiation (1064 nm). The system has been built in accordance with the latest technology and recognized safety rules. It corresponds to the requirements of laser class 1 in accordance with EN 60825-1.
However, during use there is a danger to life and limb and/or of damage occurring to the equipment and tangible assets if the system is used incorrectly.

The laser system is delivered as an operational system so that it can be taken into operation with minimal effort. The System must not be altered. More specifically, it is prohibited to remove parts of the protective housing or to deactivate any safety components. It is only allowed to use the connection cables that are supplied with the product. The marking system must not be utilized if any damages or malfunctions are noticeable.

The following information must be observed while using the laser system:

- The operator of this system undertakes to observe relevant safety guidelines and standards.
- In order to protect people from injury, the operator must take technical or organizational measures to ensure that radiation that is greater than the maximum permissible radiation, including from reflected or stray laser radiation, is prevented.
- Performance parameters must be adjusted to the properties of the materials to be marked as required.
- During operation it is to be ensured that no health risks arise as a result of the occurrence of potentially toxic products resulting from the laser treatment. Otherwise, appropriate extraction measures must be taken (see Chap. 6.1 “General Operating Conditions“). In case an exhaust extraction system is required, the operating personnel have to receive a safety briefing concerning this matter. In this instance the laser marking system may only be used when the exhaust extraction system, whose effectiveness needs to be checked regularly, is switched on.
- The system must only be operated as intended and when it has no defects.
- The suitability of the marking system for the relevant application is to be determined following consultation with the client. Its use for applications other than those specified shall be considered as not as intended and, in the event of damage, the manufacturer shall not be liable.
- This system is exclusively intended for laser inscriptions using the "XS Designer" software and processes approved by ÖSTLING.
- The operation of the marking system must also be consistent with the applicable national regulations in the country of use. Any other use shall be considered as not as intended. It is not permissible to make any unauthorized changes or conversions to the marking system without the agreement of the company ÖSTLING Marking Systems GmbH.
- The machine is to be made safe prior to maintenance works. This relates to the disconnection from power supply and other safety instructions contained in this manual.

 © ÖSTLING Marking Systems GmbH

3.2 Qualification of Personnel

The marking system may only be operated, maintained and repaired by authorized personnel who have been trained and instructed in how to do so.
The operator must have read and understood this manual. He must also be familiar with the applicable accident prevention regulations.

The operator must ensure that specially trained personnel are used for any activities going over and above normal operation.

The operator must ensure that all of the conditions for the safe operation of the machine are met. This includes the provision of the required personal protective equipment and the observation of regulations relating to the work place.

Safety briefings are to be carried out at regular intervals.

Work on the electrical equipment may only be carried out by specially trained personnel.

3.3 Safe Operation of the Marking System

The marking system must only be used when it is free from defects. In order to ensure this, the marking system, including the optical fibers, must be checked for externally visible defects and damage at least once per shift. In the event of damage or unusual operational performance, the system is to be turned off and checked by trained personnel.

The housing must be closed completely during the marking process. Otherwise invisible laser radiation could escape through any openings and cause severe eye injuries.

Maintenance and repair works must only be carried out when the marking system is switched off and has been secured against switching on again by trained personnel. In the event of disruptions that negatively affect safety, the laser system must not be operated. Any disruptions must be immediately remedied.
The Lasebox must not be used in locations where it is exposed to special mechanical hazards (e.g. near transport routes).

The use of the emergency stop button is not a suitable way to prevent the expected start-up of the system (EN 60204-1 5.4).

The instructions for maintenance and service set out in this operation manual must be observed under all circumstances.

The surface of the marked work piece may become very hot due to the laser radiation. The combustion residues (gas, dust or solids) may be toxic or harmful. The operator has to ensure a proper handling of the combustion residues, e.g. with an attachment of an exhaust unit that can be ordered optionally.

Only products approved and/or recommended by ÖSTLING may be used as replacement parts and operating materials. We recommend that you use one of our experienced service technicians for maintenance and repair work. ÖSTLING cannot accept liability for damage that occurs as a result of the use of products that have not been approved or as a result of improper work on the system.

Do not make any amendments, extensions or alterations to the Lasebox. Such changes can result in the laser safety and the functional safety of the device being compromised. If changes are made to the laser system, the warranty and the manufacturer's liability lapses for all damages resulting from this.

No changes are to be made to the programmed control systems (software).

 © ÖSTLING Marking Systems GmbH

4 Laser-related Safety Instructions

4.1 Definition of Laser Protection Classes

Lasers are sorted into hazard classes in accordance with their radiation properties. These range from "harmless" to "very harmful". The risk potential from the laser radiation is classified as follows:

Class	Description
1	The accessible laser radiation is not harmful under conditions of normal use. *Comment:* *The reasonable foreseeable conditions are observed during intended use.* *In the high performance range for lasers in class 1, glare, interference with color vision and annoyances for example cannot be excluded.*
1M	The accessible laser radiation has wavelengths of between 302.5 nm and 4000 nm. The accessible laser radiation is not harmful to the eyes as long as the cross section is not reduced by optical instruments (magnifiers, lenses, telescopes)! *Comment:* *As long as no optical collection instruments that reduce the radiation cross section are used, class 1M lasers pose a comparable risk to those in class 1. If optical collection instruments are used, risks are comparable to those for class 3R or 3B.*
2	The accessible laser radiation is in the visible spectral range (400 nm to 700 nm). If they are used for short periods of time (up to 0.25 s) these are not harmful to the eye. Additional radiation outside of the wavelength range of 400 - 700 nm meets the conditions for class 1. *Comment:* *With class 2 lasers, the eye is not at risk in the event of incidental, short-term exposure to the laser radiation, i.e. exposure of up to 0.25 s. Class 2 lasers may therefore be used without any additional protective measures being required as long as it is ensured that neither looking at the laser intentionally for longer than 0.25 s nor looking repeatedly into the laser radiation nor reflective laser radiation is required.* *In general, it should not be assumed that there is a blinking reflex to protect the eyes:* *For continuously emitting class 2 lasers, the accessible emission limit (AEL) is P_{limit}=1mW (at C6= 1).*
2M	The accessible laser radiation is in the visible spectral range of 400 nm to 700 nm. It is not harmful for the eyes when the exposure time is short as long as the cross section is not reduced by optical instruments (magnifiers, lenses, telescopes)! Additional radiation outside of the wavelength range of 400 - 700 nm meets the conditions for class 1M. *Comment:* *As long as no optical instruments that reduce the radiation cross section are used, class 2M lasers pose a comparable risk to those of class 2.* *If optical collection instruments are used, risks are comparable to those of class 3R or 3B.*
3R	The accessible laser radiation is in the wavelength range from 302.5 nm to 106 nm and is harmful to the eye. The performance and/or the energy are, at most, five times the accessible emission limit of class 2 in the wavelength range from 400 nm to 700 nm. *Comment:* *Class 3R lasers are just as potentially harmful for the eye as class 3B lasers. The risk of damaging the eye is reduced as the accessible emission limit (AEL) in the visible wavelength range is limited to five times the accessible emission limit for class 2 in the usual wavelength ranges at five times the accessible emission limit for class 1.*
3B	The accessible laser radiation is harmful to the eye and, in some cases, for skin too. *Comment:* *Looking directly into the ray of class 3B lasers is dangerous. A beam bundle can be viewed safely using a diffuse reflector if the following conditions are all met:* • *The minimum viewing distance between the visor and the cornea is 13 cm* • *The maximum viewing duration is 10 s* • *There are no stray beams that could enter the eye* *A beam bundle can only be viewed using a diffuser if there are no stray beams.* *There is a risk to skin from the accessible emission with class 3B lasers if the maximum permissible radiation (MPR) values are exceeded.*
4	The accessible laser radiation is harmful to the eye and for the skin. Even diffused, stray rays can be dangerous. The laser radiation can cause fire and explosions. *Comment:* *Class 4 lasers are high performance lasers whose output powers and energies exceed the accessible emission limit (AEL) for class 3B.* *The laser radiation of class 4 lasers is so intense that damage to the eyes or the skin is to be expected with any kind of exposure.* *In addition, when using class 4 lasers, it must also be ensured that sufficient measures are in place to minimise the risk of fire and explosion; please refer also the Sections 10 and 16 of the accident prevention regulation "laser radiation".*

It must be ensured that this classification for accessible laser radiation applies. During maintenance work in particular (e.g. opening the housing), the risk potential can increase meaning that the laser protection class must also be increased. That can mean that additional safety measures must be taken.

Further information on accident prevention regulations and implementation instructions concerning the laser protection class can be found in the applicable directives.

4.2 Laws, Standards, Directives and Regulations

Some important regulations are to be observed when operating laser equipment in order to prevent hazard potential. The most important regional and international directives are listed below (the list contains only source information and does not claim to be complete):

Europe

DI EG/2006/25	Minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (artificial optical radiation)
BGV B2	Laser radiation - accident prevention regulations
BGI 832	BG information: Operation of lasers - use of UVV "laser radiation" BGV B2
EN 60825-1	Safety of laser products part 1: Equipment classification and requirements
EN 60825-4	Safety of laser products part 4: Laser guards
EN ISO 11553-1	Safety of machinery - Laser processing machines
EN 12254	Screens for laser working places - Safety requirements and testing
EN 207	Personal eye-protection equipment - Filters and eye-protectors to protect against laser radiation (laser eye-protectors)
BGV A2	Electrical equipment and operating supplies
EN 61010	Safety requirements for electrical equipment for measurement, control, and laboratory use
EN 61040	Power and energy measuring detectors, instruments and equipment for laser radiation
EN 60204-1	Safety of machinery; electrical equipment of machines - part 1: General requirements
EN ISO 13849-1	Safety of machinery - safety-related parts of control systems - part 1: General principles for design
VDE 0100-100	Construction of low voltage equipment - part 100: Area of use, purpose and principles
VDE 0100-410	Construction of heavy current equipment with nominal voltages of up to 1000 V - part 4: Protective measures; chapter 41: Protection from electric shock
VDE 0100-430	Construction of heavy current equipment with nominal voltages of up to 1000 V; Protective measures; Protection of cables and wires in the event of over current
VDE 0100-540	Construction of heavy current equipment with nominal voltages of up to 1000 V; Selection and construction of electrical operating supplies; earthing, earth wire, potential equalization cable

Other Laws and Regulations

EMVG	Electromagnetic Compatibility Act
GPSG	Equipment and Product Safety Act
TRGS 900	Technical Regulations for Hazardous Materials - Maximum work place concentration, air limits
BGV A1	Prevention principles

© ÖSTLING Marking Systems GmbH

4.3 Precautionary Measures

The laser operator is responsible for observing protective measures!

The following protective measures must be taken or must already be in place when operating a laser system in the corresponding protection class:

Technical Protective Measures

	Class 1 - 2M	Class 4
Protective Housing	Present	Required
Safety Interlock	Present	Switch in the housing
Key Switch	Not required	Authorized persons
Emission Display	Not required	Warning light in the event of emission
Warning Sign - Laser Radiation	Not required	Required

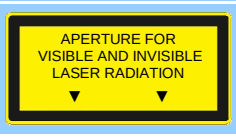
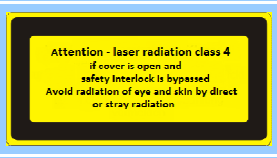
Organizational Protective Measures

	Class 1 - 2M	Class 4
Laser Protection Officer	Not required	Required
Laser Range / Area	Not required	Required
Eye Protection	Not required	Required
Safety Briefing	Not required	Required
Registration with the Responsible Occupational Insurance Association	Not required	Required

Before starting a laser marking system in automatic operation or markings/movements in hand operation, the operator must ensure that there are no people or obstacles within the operating area of the equipment.

4.4 Warning, Information und Type Labels

The following labels are affixed to the laser marking system:

No.	Warning Label/Type Label	Description
1		Laser warning symbol
2		Warning label, laser class 4 with technical data
3		Warning label for output opening of the laser radiation
4		Warning label, laser class 2M (pilot laser)
5		Warning label, optical fibers
6		Warning label, electricity
7		Warning label, cover/bypass
8		LasOnAll laser marking system type label (here: Example of type Lasebox XS10)

5 Transport, Storage and Unpacking

5.1 Packaging and Transport

Lasebox XS lasers are packed in the factory to be transported in the manner that has been approved. Always transport the laser system to its intended/installation destination in its original packaging.

- Check for any damage to the packaging or to the laser marking system and its components.
- Always check the weight information and the permissible load on the transportation.
- Avoid blows or impacts during transportation.
- Avoid extreme heat or cold (please refer to Chap. 13.1 “General Technical Data” for the correct temperature range for storage and transport).
- Fix packaging/pallets in place during transport.
- Do not stack pallets.
- Lift only using suitable lifting equipment.
- In the event of extreme temperature fluctuations between the transport temperature and the temperature at the intended destination, wait at least 1 hour before operating the laser in order to avoid condensation building up on optical and electronic components.

5.2 Storage

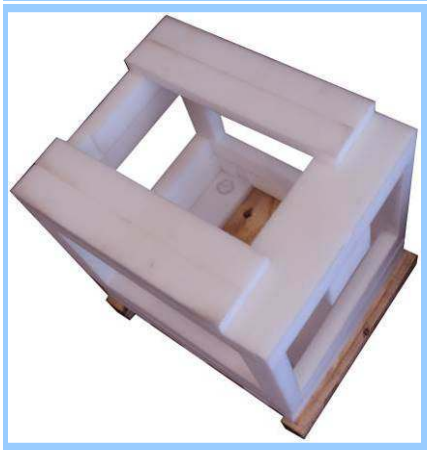
- Store the laser marking system in a dry place that is protected from the elements in its original packaging. Protect it from dirt and the elements until it is completely assembled.
- Avoid extreme heat or cold (please refer to Chap. 13.1 “General Technical Data“ for the correct temperature range for storage and transport).
- Do not stack packaging/pallets.
- Avoid storing for too long. We recommend one year at most (if being stored for longer, please consult with the manufacturer before commissioning).
- In the event of extreme temperature fluctuations between the storage temperature and the temperature at the intended destination, wait at least 1 hour before operating the laser in order to avoid condensation building up on optical and electronic components.

5.3 Unpacking the System

Before unpacking the laser system, please check immediately that the packaging is intact. If you notice any significant damages during unpacking, please contact the manufacturer as soon as possible.

Please unpack the system in accordance with the following instructions and retain the packaging material for future transportation. Immediately check if the contents are complete. If the delivery is not complete, please contact our service hotline immediately (see Chap. 1 “Service Address and Hotline”). Unfortunately if you make any complaints regarding incompleteness at a later date we will be unable to accept these.

Packaging of the Laser Marking System Lasebox XS:

	Step	Description
1.		Lasebox XS original packaging Special cardboard with pallet Measurements: 750 x 650 x 840 mm (LxWxH) Weight: <50 kg
2.		Pallet with base frame
3.		Transport frame
4.		It is imperative that you retain the original packing in case the laser system (or parts thereof) has to be sent back. Only the original packaging should be used for the transport or return of the system. In the event that this is lost, it can be obtained from ÖSTLING separately.

© ÖSTLING Marking Systems GmbH

6 Connection and Commissioning

6.1 General Operating Conditions

Environmental Conditions	
Operating Temperature:	15°C to 35°C (unless otherwise specified)
Storage Temperature:	0°C to 60°C
Relative Humidity:	max 90% (non-condensing)
Operating Height above SL:	Max 1000 m

Avoid large temperature deviations! Before commissioning, the whole laser system must have adapted to the room temperature; otherwise there is a risk of condensation build-up.
This can cause damage to the system!

Mechanical loads, vibrations and impacts must be avoided under all circumstances. The laser system should be arranged on a solid ground in order to prevent vibrations of the system.

Care is to be taken to ensure that the supply of fresh air is sufficient. There must be at least 10 cm of clear space around the Lasebox to guarantee sufficient air circulation. Heat build-up caused by the ventilation slots being covered up can result in damage to the system.

Avoid air pollution from dust, oil, chemicals, steam or dampness (e.g. from other machinery).

When the system is switched off it must be secured against unauthorized restart.

There has to be an exhaust system attached to the laser marking system, if toxic substances originate while marking in order to remove them from the interior of the Lasebox. For this purpose a double-sided pipe socket along with an exhaust system (order and assembly on request) can be affixed to the Lasebox at the left side of the system (see Figure in Chap. 14 “Connection Overview”).
The side of the socket that protrudes from the Lasebox functions as connecting point for a flexible tube.

In order to be operated safely, the laser system's beam must be enclosed by protection housing, completely and without gaps, so that it corresponds to laser protection class 1 (in accordance with EN 60825-1).

6.2 Electrical Connection Values

Continuous undervoltages and overvoltages are not permissible. Large voltage fluctuations pose a risk to the trouble-free operation of the laser system and reduce its performance.

Connection Values	
Nominal Voltage:	90 – 260 V AC single phase
Frequency:	50 – 60 Hz
Power Input:	max 400 W (Lasebox XS 20)

Fuse:
The electrical socket that is connected to the laser system should be fused with 16 A fuses:

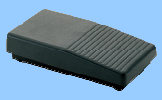
Rated Current	16 A
Rated Breaking Capacity	6000 A

6.3 Information about the EMC

In order to ensure an optimal electromagnetic immunity (both-sided connection of the shields) of the USB communication, you **ONLY** should use the USB cable that was included in delivery.

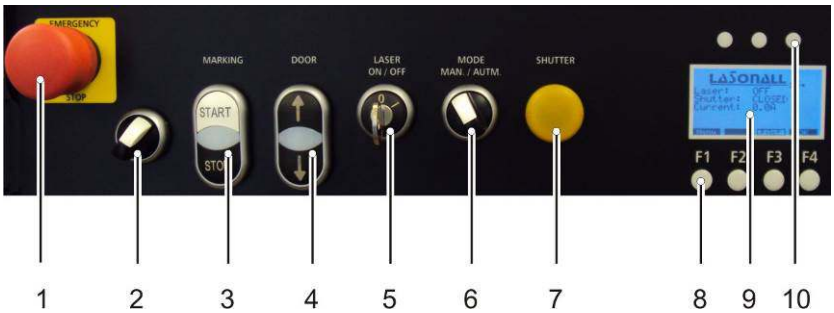
If there are intense electromagnetic issues at the place of destination, a WE Ferrite (Nr. 742 727 33) should be added to the power cable.

6.4 Packaging Contents

	Components	Description		Components	Description
1		**USB unit cable** Connection between the PC and the laser rack	2		**Main cable** Supplies the Lasebox with current
3		**USB flash drive** Contains: • XS Designer software • Documentation • File Laser.ini with a set of laser parameters	4		**Key** Secures the Lasebox against unauthorized power-up and confirms error messages
(5)		**Foot switch** Starts and stops the marking process in the automatic operation mode by foot (optional)			

© ÖSTLING Marking Systems GmbH

6.5 Control Elements



	Designation	Description
1	Emergency stop button	Pressing this in the event of a hazard or for the prevention of a potential hazard will stop the system by interrupting the internal supply voltage. To reverse this, the button must be pulled out into its initial position again.
2	Light	Turns on/off the interior light of the machine.
3	Start/Stop	In case the automatic system operation is activated, you can start and stop the marking process with these keys.
4	Door	Opening and closing of the door.
5	Key switch	Activates and deactivates the laser system and can be used to acknowledge the emergency stop breaker (Turning of the key from position “ON” to “OFF” and back again). In the "OFF" position, the key can be pulled out to secure the system against restarting.
6	Mode	Switches between manual und automatic system operation.
7	Shutter light	Displays that the laser system's shutter is enabled when it is lit, i.e. the cover is closed completely. If this is the case then laser radiation can escape!
8	Functional keys	Keys F1 - F4 navigate through the display system menu according to the above displayed functions
9	Display	Displays status, warning and error notifications using plain text and color status
10	Status LEDs	These provide information on the general status of the built-in USB laser control card "LazeCard"
-	Foot switch	In case the automatic system operation is activated, you can start and stop the marking process with the foot switch (not illustrated).

6.6 Status LEDs (10)

The three status LEDs are located on the front of the laser rack, directly above the display. These show the current status of the built-in USB laser control card "LazeCard". The "LazeCard" prepares the marking data for the laser system that is created in the laser software "XS Designer" and controls the required laser parameters and the reflection of the deflector unit during the marking process.

During the "LazeCard's" boot-up process (~ 6 s), the green and red status LEDs are on and the yellow one is off. Afterwards, the following description is applicable:

LED	Description	Status	
	Green status LED "Work processor alive"	Flashing: On:	Status OK – XS Designer parameters are received XS Designer software has not yet started
	Yellow status LED "Communication processor alive"	Flashing: On/off:	Status OK USB communication defective, Laser rack needs to be restarted
	Red status LED "Watchdog"	Off: On:	Status OK Watchdog has been triggered and has interrupted the marking process for safety reasons

6.7 Color Status Display (9)

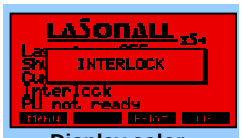
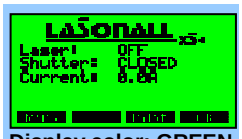
The current status of the laser system is displayed by the background color of the display. Use the table below to find out the meaning of the relevant color status:

Display	Description
BLUE	The main switch on the back is switched on and the supply voltage is connected. However, the laser system still needs to be started using the key switch.
GREEN	The laser rack was started with the key switch in the "ON" position and is ready for operation. As the shutter circuit is not yet closed, laser radiation cannot escape. The cover is not closed.
YELLOW	The laser system is ready to mark. The laser rack has started and the shutter circuit is closed. LASER RADIATION IS POSSIBLE AT THE BEAM EXIT!
RED	Error/alarm! All supply voltages for the laser module are switched off. **This status must be acknowledged using the key switch!** (Turn the key from “OFF” to “ON”)

© ÖSTLING Marking Systems GmbH

6.8 Start-up Sequence

Requirement:
The Software “XS Designer” has already been installed on this Computer and this PC is connected with the Lasebox via the included USB cable. If that does not apply, please read Chap. 7 “

	Description	Result	Display Status
1.	Put the mains switch on the right side of the Lasebox into position "I" (ON) and wait ca. 5 seconds	The display switches on and shows the red status with notification "INTERLOCK"	 **Display color: RED**
2.	Start the PC software “XS-Designer“ and load or generate marking data. Please refer to the appropriate manual for further details on the software	Software is started	No change
3. a)	Put the key switch (5) into the "ON" position to activate the laser system and reverse the emergency stop breaker. ***The "E-shutter" safety circuit (CON3: Interlock) is open.***	The laser rack is activated and goes into standby. The display color changes to status green.	 **Display color: GREEN**
b)	Put the key switch (5) into the "ON" position to activate the laser system and reverse the emergency stop breaker. ***The "E-shutter" safety circuit (CON3: Interlock) is closed.***	Laser radiation is enabled. Display color changes to yellow.	**Display color: YELLOW**

7 Software and Drivers

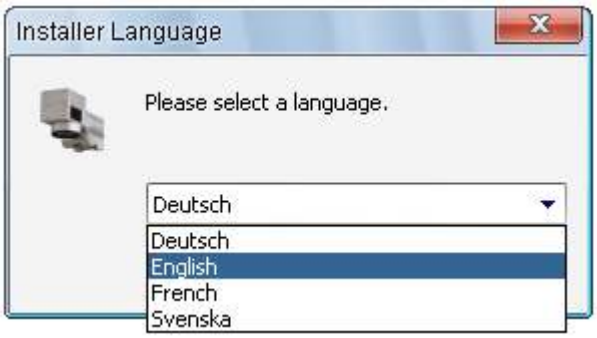
7.1 Installation

In order to use the Lasebox, you need a connected computer with the operating system Microsoft Windows XP, Vista or 7.

For a successful activation of the Lasebox please follow the below-mentioned instructions:

Note
You need administrator rights for an installation of the software in Windows 7.

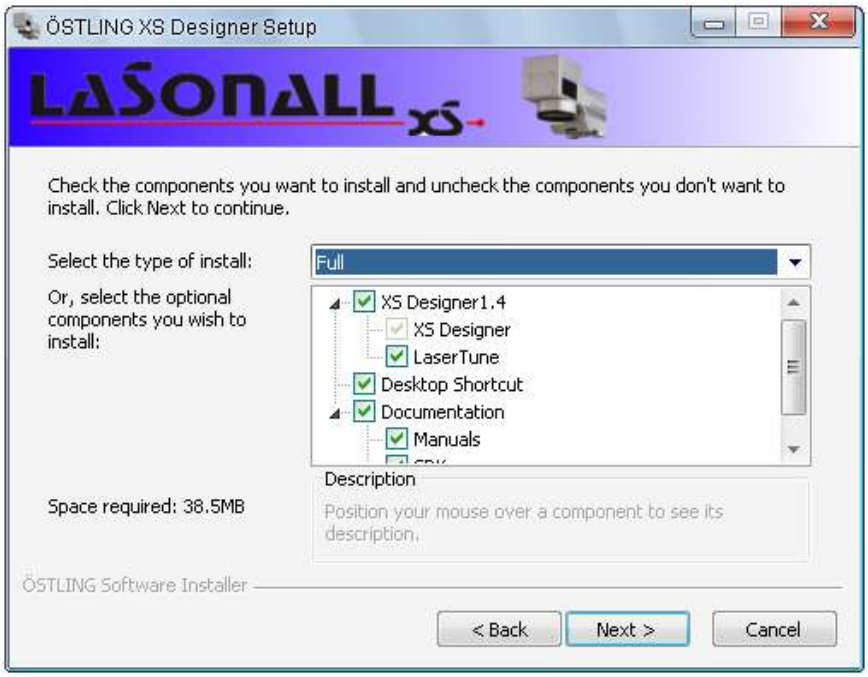
1. You start the installation of the software “XS Designer” by double-clicking on the .exe-file in the root folder of the provided USB flash drive.
2. Afterwards you choose the requested language from the dropdown list and confirm the selection with *Ok*.



3. Please read the license agreements (only in English available) carefully. As soon as you go on with the installation you accept the conditions that are therein specified.
   In order to continue with the installation, you have to click on the button *I Agree*.

© ÖSTLING Marking Systems GmbH

4. During the next step you can choose which components of the program are installed so that a specific installation according to your requirements is guaranteed. The required storage volume varies between 38.5 MB for a “Full” installation and 33.1 MB for “Minimal”.

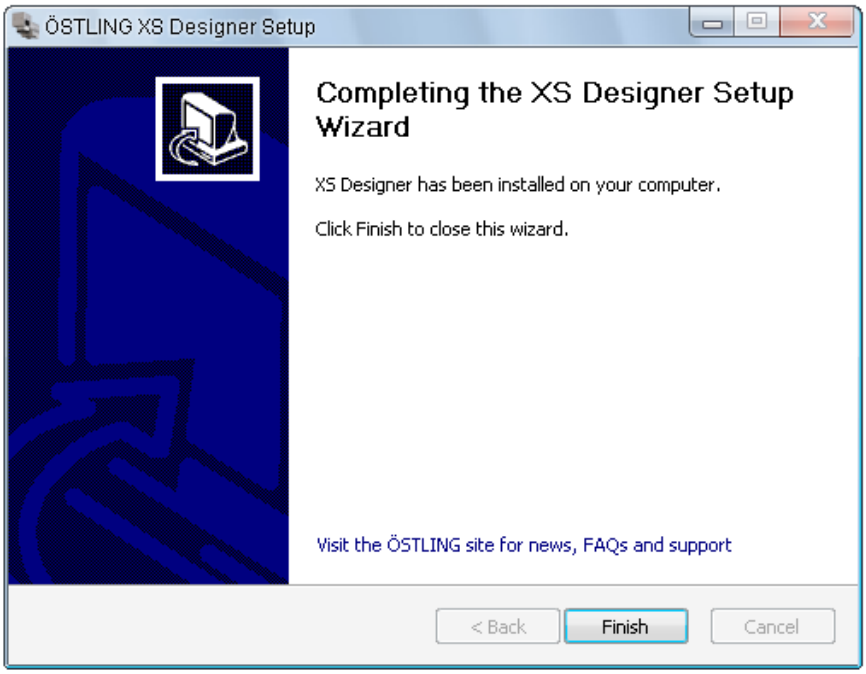


To get details about a particular installation option, move the cursor over one of the components. That information is shown in the field “Description”.
Click on the button *Next* > in order to continue with the installation.

5. Type in the favored destination folder either by hand or choose it with the help of the button *Browse…*.
The standard destination folder in Windows 7 is “C:\Program Files\XS Designer1.XX“n in the 32-Bit version and „C:\Program Files(x86)\XS Designer1.XX“ in the 64-Bit version, respectively.

Now click on *Install* to start the actual installation process.

6. The installation was completed successfully when the following window appears. Now you have to click on Finish.

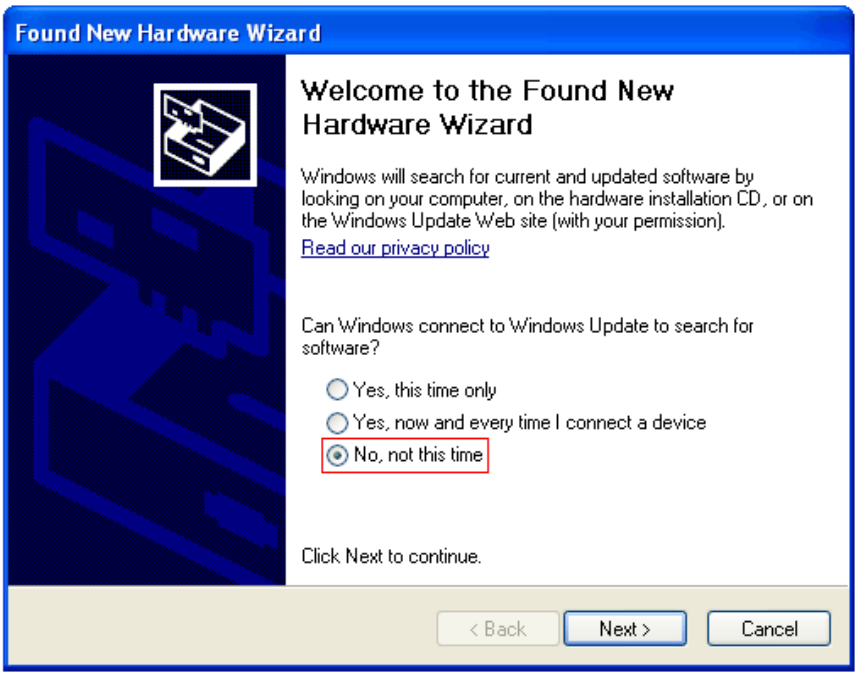


7. Link the off-state Lasebox to the computer after the installation. Use the included USB cable only.

8. Following this, you can turn the Lasebox on. After a few seconds you receive a message that the computer identified and installed the drivers of a new USB device.

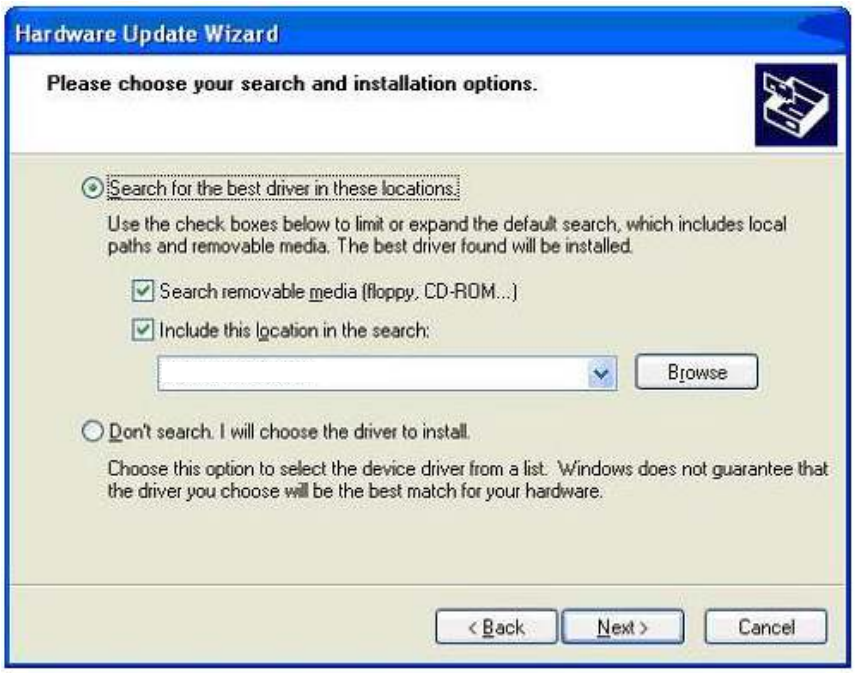
Note
If you use the operating software Windows XP you have to look for and install the driver manually as follows.

a) Once the „Hardware Wizard" has been opened up you choose the option "No, not this time".



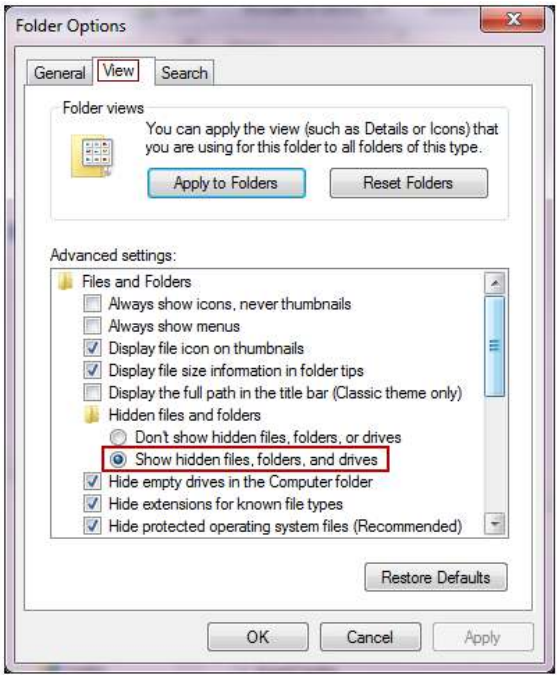
 © ÖSTLING Marking Systems GmbH

b) The required driver can be found in that directory where the “XS Designer” has been installed. It is installed in the destination directory “C:\Program Files\XS Designer1.XX\DRIVERS“ as standard. Afterwards click on *Next >* repeatedly until the driver has been installed.



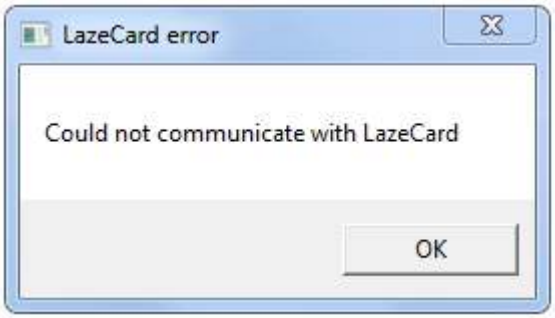
9. Once the driver has been installed you can start the “XS Designer”.

10. In order that the “XS Designer” is able to access the laser parameters of the specific connected laser, you have to copy the file “Laser.ini” which is located on the USB flash drive into the folder “C:\ProgramData\XS Designer“. However, this folder is hidden in the standard settings of Windows. In order to change the status, open the window “Folder Options” in the control panel. Then switch over to the tab “View“ (edged in red), scroll down until the option “Show hidden files and folders“ (edged in red) appears and select it.



Now the folder “ProgramData“ appears in device “(C:)”. Open the folder by double-click and copy the file “Laser.ini” into the folder “XS Designer”.

If for example the driver has not been installed correctly, the computer is not connected to the Lasebox or another problem occurs with the identification of the device, you will receive this error notification.

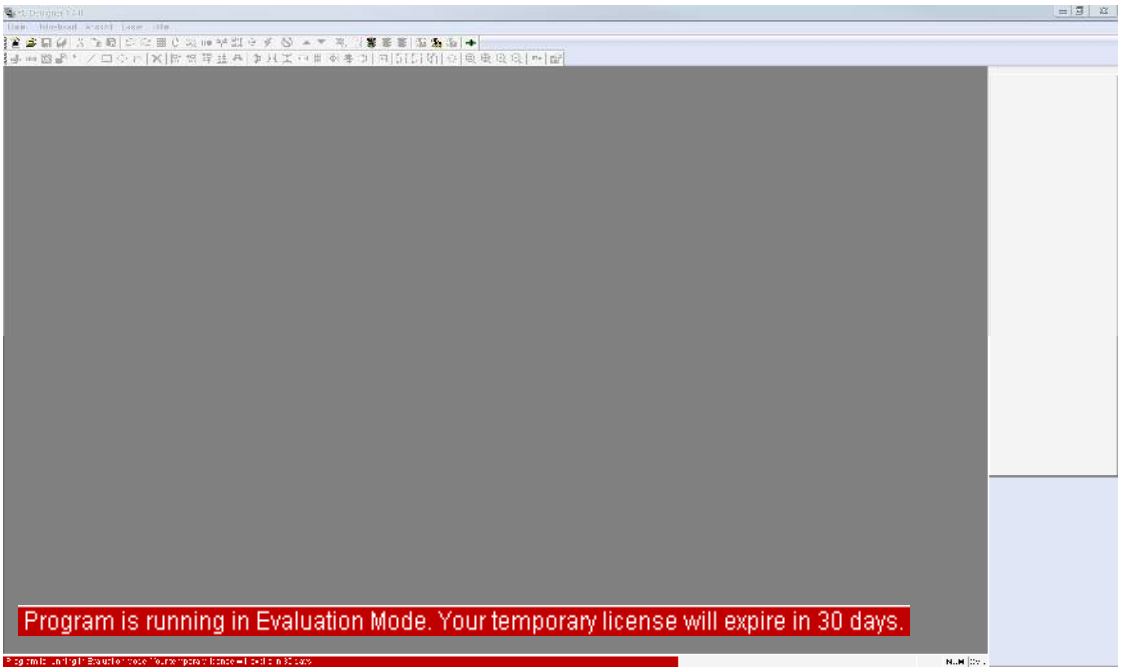


After you have confirmed this notification by clicking on *OK* you are still able to use the “XS Designer” in the simulation mode and edit your markings. Nevertheless the start of a marking process is only possible if the LazeCard which is integrated in the Lasebox is able to make a functioning connection to the computer.

If there are any problems with the installation of the software or the driver, please call our support (+49 (0)212 2696 – 0) or ask your system administrator.

7.2 Registration

The test license of the software “XS Designer” expires after 30 days. After expiration of the time only a few program features are available. In order to use this program completely after this deadline has passed by, it has to be registered with ÖSTLING.



 © ÖSTLING Marking Systems GmbH

Therefore you have to send an email to service@ostling.com with the respective serial number of your version (edged in red) of the “XS Designer”. You can find this number if you click on *Help* → *About…* in the menu bar of the program.

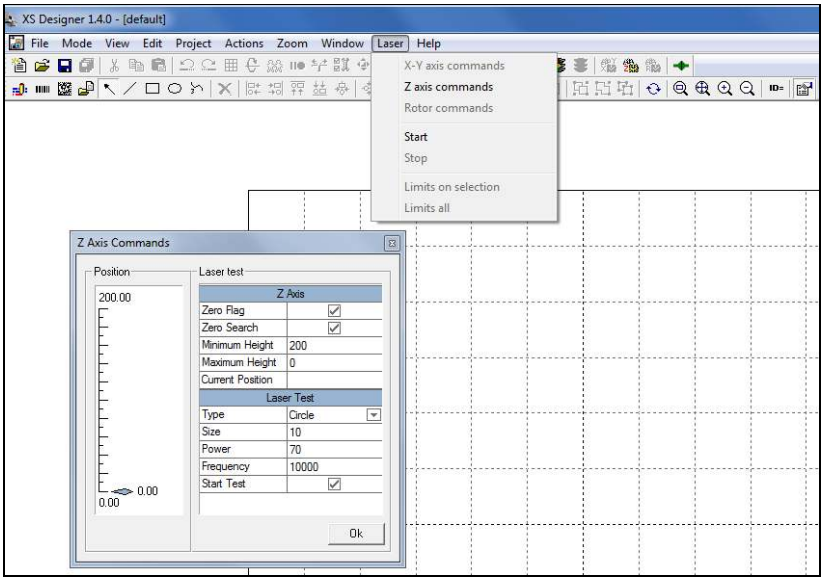
You will receive the file “License.dat” by email. This file has to be saved into the destination directory “C:\Program Files\XS Designer1.XX\Bin“ or into the directory that was chosen during the installation. To do that you need administrator rights as well.

8 Z-Axis, Laser Focus und Focusing Aid

8.1 Controlling the Z Axis Manually and Searching the Reference Point

The lens of the laser has to be located in a certain distance to the marking surface in order to get an optimal marking result. This particular distance is e.g. 181 mm ± 1 mm in the standard version (lens 163 mm SILL). The adjustment of the distance happens by altering the height of the z-axis.
For that purpose you choose the action ***Laser → Z axis commands*** in the laser software XS-Designer***.*** Then you can move the z-axis by using the arrow keys “up/down“ on the connected keyboard.

The z-axis **has to** be referenced again after each power-up of the machine. To achieve this the sensor at the top end of the axis is approached. The altitude above the t-slot plate is 300 mm in the standard version. In order to reference the laser, you have to place a checkmark at the field “Zero Search”. The z-axis moves up until it reaches the sensor.



8.2 Finding the Focus Point Manually

The z-axis is so adjusted for shipment that the laser focus is in the lowest position right on the t-slot plate. Furthermore an aiming diode can be applied optionally which forms an intersection in the focus point with the pilot laser. The pilot laser shows the direction of the working laser. If the aiming laser was ordered, it would normally be enough to correlate both laser spots with each other at the workpiece surface by moving of the z-axis.

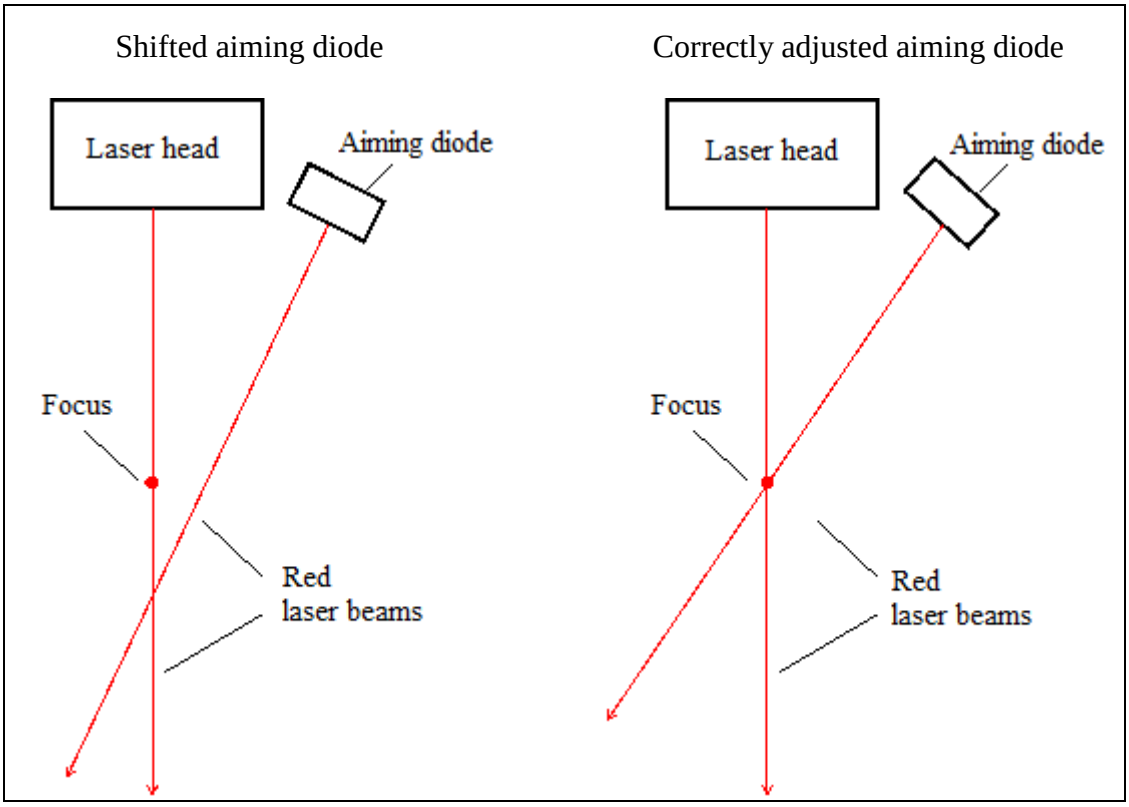
The focus can also be detected by conducting a test marking. Therefore you have to insert a test workpiece and afterwards you have to choose the action ***Laser → Z Axis Commands*** (see picture above) in the software XS-Designer. After that you enter the same values for the parameters *size*, *power* and *frequency* as shown in the figure above. Orientate the workpiece in such a manner that the selected figure, e.g. a circle, is shown on the workpiece and close the cover of the machine. As soon as you place the check mark under ***Start Test*** a test marking is going to start if the shutter circuit is closed.

Now you can move the laser along the Z axis with the help of the arrow keys “up” and “down“ on your keyboard. The focus point is attained when the impact of the laser beam at the surface reaches its maximum. This can be identified by a maximum generation of noise, light and smoke.

You end the test by removing the check mark under ***Start Test*** or by closing the window Z axis commands.

© ÖSTLING Marking Systems GmbH

8.3 Adjusting the Focusing Aid (optional)



The aiming diode (optional) is located next to the lens and it forms an intersection with the built-in pilot laser (figure to the right). This spot is the required focus spot in the factory setting. If the aiming diode is shifted (picture to the left), you have to search for the focus point as described in Chap. 8.2 “Finding the Focus Point Manually” at first. After that adjust the aiming diode so that it correlates with the focus point.

9 Function Description Display (9)

The display at the front of the machine provides the user with a quick overview of the:

- Configuration und parameters of the laser system
- Version of the currently used firmware
- Current through the pump diodes
- Status of the shutter
- Information about alarms and errors

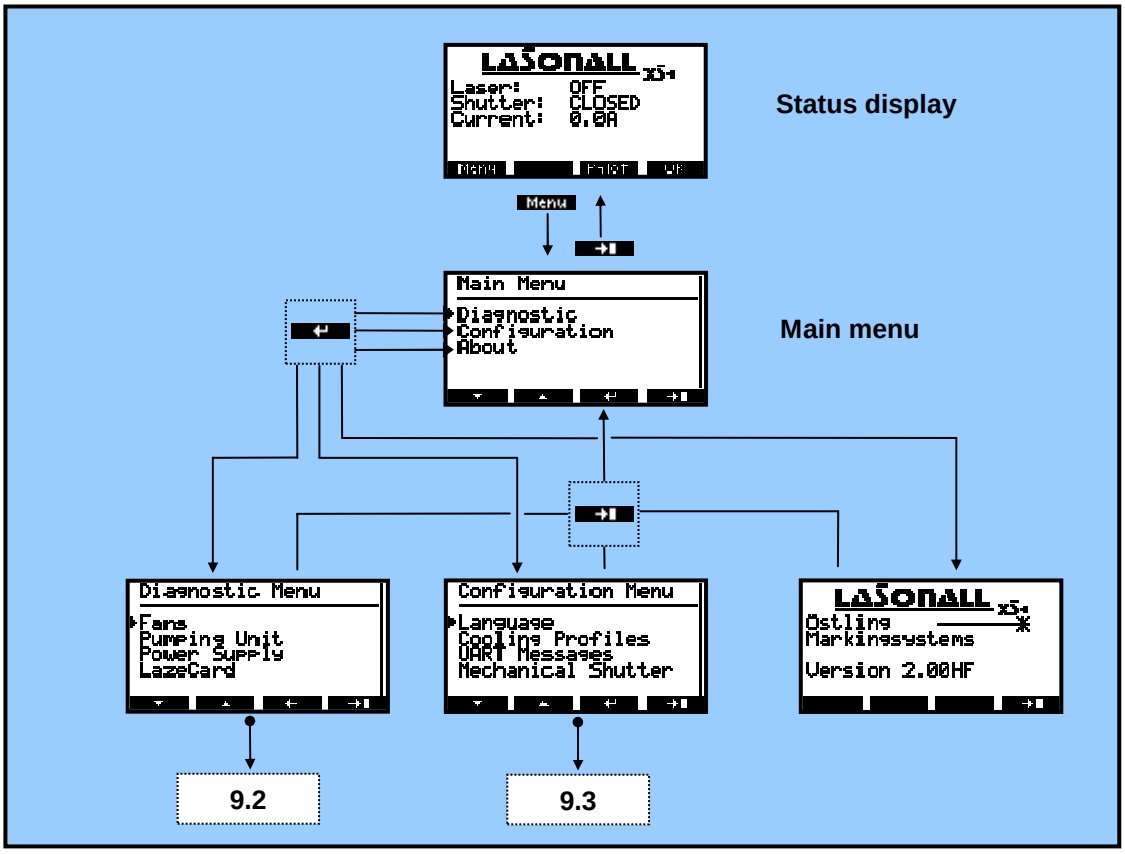
Suceeding it is described how you can navigate through the display menu by using the function keys [F1] … [F4] (8). These function keys may be associated with different functions depending on the menu. Those so-called “soft keys“ cause the corresponding action when the subjacent [F …] key is pushed.

The soft keys in particular with its actual function:

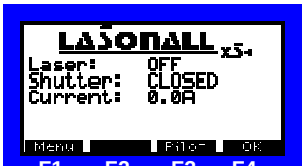
Soft key	Function
Menu	Switches from the status display to the main menu
Pilot	Switches the pilot laser on/off, if the status display is shown
OK	Acknowledges error notifications in the status display
⇥	Exit: Return to previous menu level
↵	Confirms a selection in a list box and takes you to the selected function
▲ ▼	Moves the cursor in list boxes up/down

© ÖSTLING Marking Systems GmbH

9.1 Status Display and Main Menu



Status display



F1 F2 F3 F4

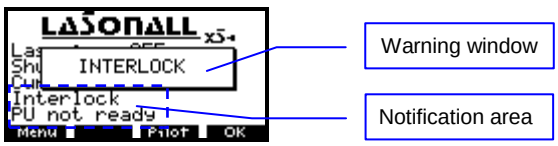
Laser: OFF/ON
Shows if the laser system has already been started via keyswitch (ON) or if it is still OFF

Shutter: CLOSED/OPEN
Shows the status of the shutter: Closed or open.

Current: … A
Latest current of the pump diodes in Ampere

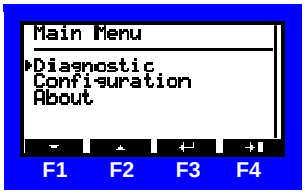
F1: Goes back to the main menu
F3: Switches the red pilot laser on/off
F4: Acknowledges alarm and error messages

In addition to that the status display shows more information about errors or warnings when they occur. In case of urgent problems a warning window will appear showing the corresponding notification. This window can be closed every time with the function key **[F4]**. The notification itself nevertheless stays in the notification area of the status display until the malfunction is remedied.



Main Menu

Main Menu



F1: Moves the cursor in the list down
F2: Moves the cursor in the list up
F3: Confirms the selection und goes to the corresponding menu
F4: Returns to the status display

Main Menu → About

About

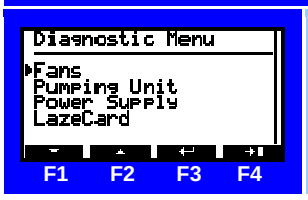
- Product name and manufacturer
- Software version of the RC1 card

F4: Returns to the main menu

9.2 Diagnose (Diagnostic)

Diagnostic

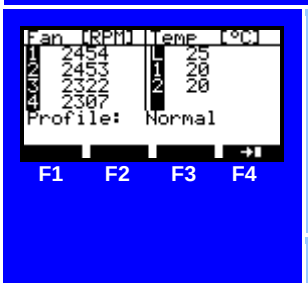
Diagnostic Menu



F1: Moves the cursor in the list down
F2: Moves the cursor in the list up
F3: Confirms the selection und goes to the corresponding menu
F4: Returns to the main menu

Diagnostic → Fans:

Fans



Fan 1-4: Current rotational speed of the four fans in the cooling tunnel in rpm

Temp L: Interior temperature of the Lasebox in °C
Temp 1: Current temperature of the pump unit in °C
Temp 2: Current temperature DC/DC in °C

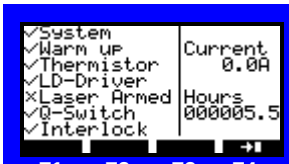
Profile: Currently selected cooling profile

F4: Returns to the diagnostic menu

© ÖSTLING Marking Systems GmbH

Diagnostic → Pumping Unit:

Pumping Unit



System:	No errors; pump unit can be activated
Warm up:	Operating temperature reached after warm up phase
Thermistor:	Operating temperature is in the operating range
LD-Driver:	Diode current driver IO
Laser Armed:	Pump unit activated; diodes emitting radiation
Q-Switch:	Q-Switch-Driver IO
Interlock:	Emergency stop circuit closed and acknowledged
Current:	Latest current of the pump diodes in Ampere
Hours:	Time counter of the time the pump diodes are active

F4: Returns to the diagnostic menu

Diagnostic → Power Supply → F1:

Power Supply – Status Page 1

BUSY:	Mains adaptor in use
OFF:	At least one output voltage is at 0 V
Vout_0V:	Output overvoltage error
Iout_0C:	Output overcurrent error
Vin_UV:	Input undervoltage error
TEMP:	Temperature error
CML:	Communication, memory or logical error
OTHER:	Other error

F1: Switches between status page 1 and 2
F2: Switches to the power supply modules 1 to 5
F4: Returns to the diagnostic menu

Diagnostic → Power Supply → F1 → F1:

Power Supply – Status Page 2

Tcase:	Temperature of the mains adaptor housing
Tprimary:	Temperature at the mains adaptor‘s air inlet
Vin:	Input voltage
Iin:	Input current
Pin:	Total input power (overall system)
Fan 1:	Rotational speed of the mains adaptor fan

F1: Switches between status page 1 and 2
F2: Switches to mains adaptor modules 1 to 5
F4: Returns to the diagnostic menu

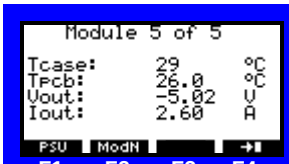
Diagnostic → Power Supply → F2 → …:

Power Supply – Module 1 to 4 (of 5)

Output:	Output voltage is activated (0 V if inactive)
UVP:	Output undervoltage error
DC:	Output voltage is not within the regulated values
OCP:	Overcurrent error
OTP:	Temperature error
OTP warn:	Temperature is just under the limit
OVP:	Overvoltage error
System:	General mains adaptor module error
Voltage:	Output voltage on selected module in V
Current:	Output current on selected module in A
Tm:	Module temperature in °C

F1: Switches between status page 1 and 2
F2: Switches to mains adaptor modules 1 to 5
F4: Returns to the diagnostic menu

Power Supply – Module 5 of 5

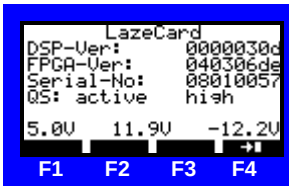


Tcase:	Module temperature in °C
Tpcb:	Module electronics temperature in °C
Vout:	Output voltage of the module in V
Iout:	Output current of the module in A

F1: Switches between status page 1 and 2
F2: Switches to mains adaptor modules 1 to 5
F4: Returns to the diagnostic menu

Diagnostic → LazeCard:

LazeCard



DSPVer:	Version of the DSP firmware
FPGA-Ver:	Version of the FPGA firmware
Serial-No:	Serial number of the LazeCard
QS active:	High/low; operating type for Q-switch driver
Voltages:	Output voltage LazeCard (+5V, +12V, -12V)

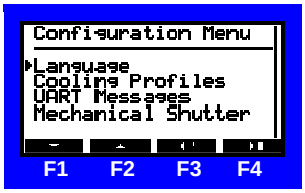
F4: Returns to the diagnostic menu

© ÖSTLING Marking Systems GmbH

9.3 Configuration

Configuration

Configuration Menu



F1: Moves the cursor in the list down
F2: Moves the cursor in the list up
F3: Confirms the selection und goes to the corresponding menu
F4: Returns to the main menu

Configuration → Language

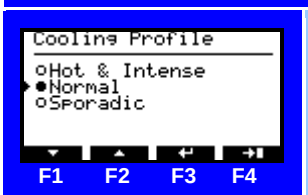
Language

Currently only available in English

F4: Returns to the configuration menu

Configuration → Cooling Profiles

Cooling Profiles

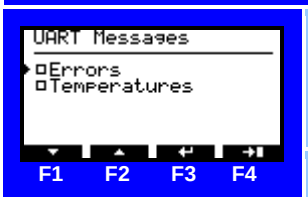


Hot & Intense: For warmer environmental conditions; the fans are not regulated and work with max. speed
Normal: Standard operation; fans are regulated according to the diode temperature
Sporadic: For cold environmental conditions with minimal noise conditions

F1: Moves the cursor in the list down
F2: Moves the cursor in the list up
F3: Confirms the selection und marks it
F4: Returns to the configuration menu

Configuration → UART Messages

UART Messages

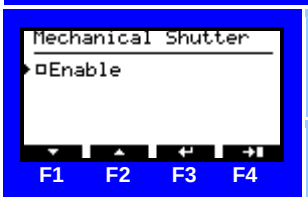


Errors: Activates the serial output of error messages via jack CON4 at the laser rack
Temperatures: Activates the serial output of temperature values via jack CON4 at the laser rack

F1: Moves the cursor in the list down
F2: Moves the cursor in the list up
F3: Confirms the selection und marks it
F4: Returns to the configuration menu

Configuration → Mechanical Shutter

Mechanical Shutter



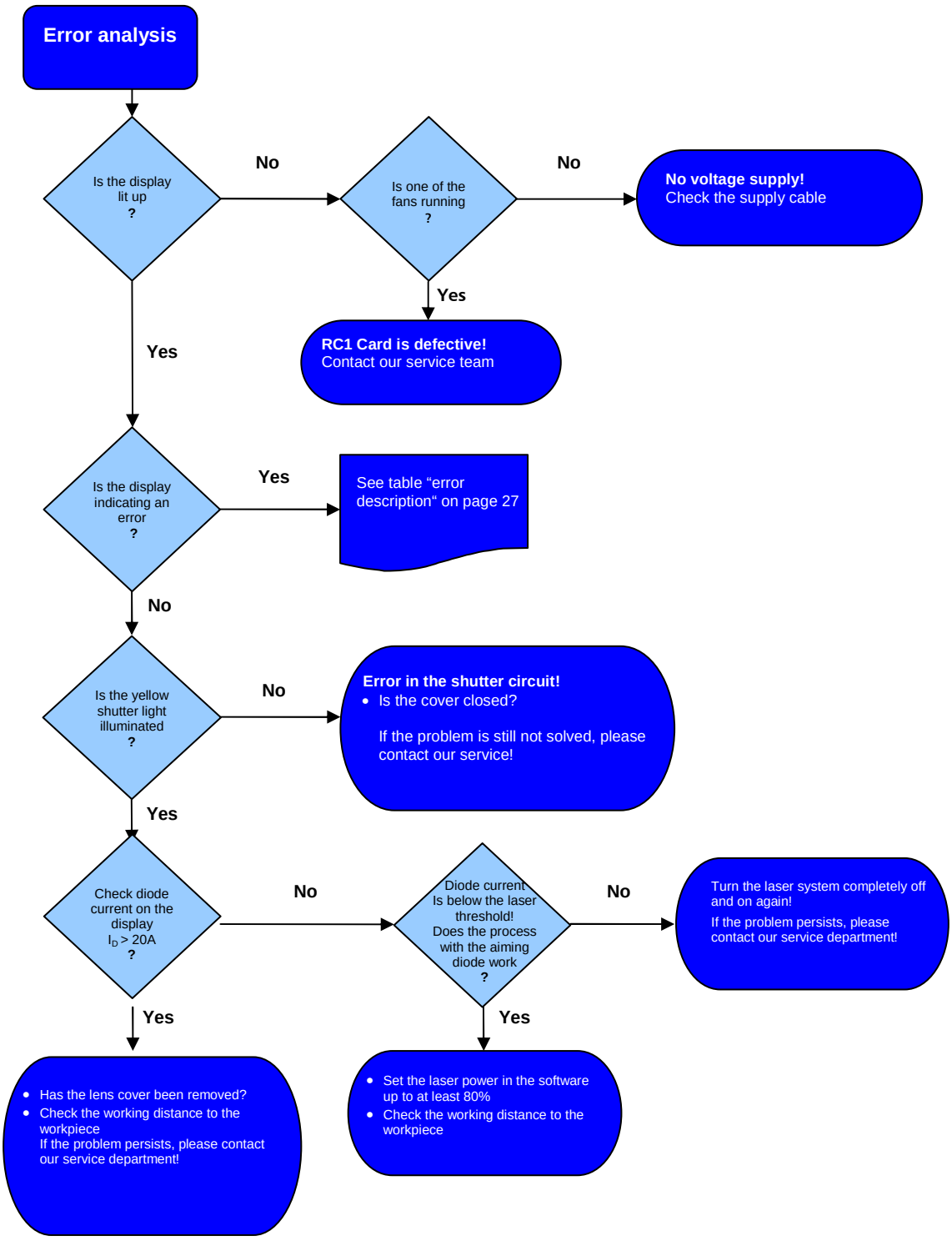
Enable: Activates the selection of the optional mechanical Shutter. The shutter has to be attached to the resonator and linked electrically to jack CON2!

F3: Confirms the selection und marks it
F4: Returns to the configuration menu

10 Error Analysis

This section should help you with the initial analysis and with remedying some basic errors. If you are not sure how to implement the suggested solutions or if the problem cannot be solved with the help below, please contact our technical service department (see Chap. 1 “Service Address and Hotline”).

No laser emission, even though the shutter is open:



© ÖSTLING Marking Systems GmbH

Description of the error notifications in the status display:

Error Notification	Reason	Suggested Solution
Interlock	The external interlock current circuit is not closed or the emergency stop button has been pushed	Close the shutter at first and fix the corresponding interlock/emergency stop issue after that. Afterwards you have to acknowledge by turning the keyswitch to the “ON” position.
PU Not Ready	The diode pump source is not ready	Check the signals of the pumping unit, except for “Laser Armed“ und “System OK“, in the diagnostic menu with the aid of the following table items.
PU Not Ready + Thermistor OK X	Temperature monitoring has been triggered	Check if the fans at the side of the machine work and if the environmental temperature is within the operating range. Turn the laser off, wait 60 s and start the laser system again.
PU Not Ready + Q-switch ON X	Q-switch is defective	Ensure that the marking frequency is within a range of 10 to 150 kHz. Check mains adaptor module 2 in *Diagnostic Menu → Power Supply*.
PU Not Ready + LD Driver OK X	Diode current driver defective	Check the mains adaptor modules 1 & 2 in the *Diagnostic Menu → Power Supply*.

11 Maintenance, Servicing, Return

11.1 Maintenance

This laser marking system was developed using maintenance-free components.

All maintenance and repair work is to be done exclusively by ÖSTLING Marking Systems GmbH and authorized distributors.

Interventions or changes to the system made by third parties will lead to the warranty being voided.

Before all servicing/maintenance work, it must be guaranteed that the electricity supply is turned off and that the system is at zero potential and is secured against being restarted.

The safety regulations set out in Chap. 3 “Safety” and manufacturer information on cleaning materials used must be observed! If necessary, personal protective equipment is to be worn.

The following maintenance work should be carried out at regular intervals in order to guarantee that the laser marking system functions optimally and without any defects:

- Visual check of the visual and mechanical components before the system is switched on each time
- Check and clean the F-Theta lens as required
- Check and clean the side fan openings and all side fans of the Lasebox
- Check and clean the filter mat of the laser electronics’ fan as required (black air filter housing has to be pulled off forward)
- Check and clean the fan in the laser resonator
- Clean the remaining surfaces (except the F-Theta lens) with a slightly damp cloth only

© ÖSTLING Marking Systems GmbH

11.2 Cleaning the F-Theta Lens

Optical components should not be touched with fingers! Greasy, oily or dirty hands can damage the surface coating.

Tools or hard objects are not suitable for cleaning the lenses. Any damage caused to the surface cannot be repaired.

A small foot pump or non-flammable compressed air spray should be used to remove any dust particles! Under no circumstances should compressed air be used!

Use only suitable lens cleaning paper/cloths and ethanol with optical purity of 99% to remove heavier dirt or greasy films.

Do not immerse the cleaning paper/cloth in the cleaning solution as this will make contaminate it and render it unusable.

- Drip ethanol on the cleaning paper/cloth and then do not touch the dampened side again.
- Wipe the dampened paper/cloth slowly over the surface of the lens in one direction and put as little pressure on it as possible.
- Check the result by looking at the surface from a very flat angle.
- Repeat with new paper/cloth until the surface is completely cleaned.

11.3 Return

It is imperative that the original packaging is used for sending the laser marking system back or for the transport thereof. This can be obtained separately from the manufacturer.

Check before sending that all protective caps on the optical fibers and their connection nozzles have been refastened. The sender will be charged for any damages resulting from protective caps not being present.

Pack the laser system up in the original packing.

Contact ÖSTLING Marking Systems GmbH for an RMA number before returning the system.

Returns that have not been authorized by ÖSTLING will not be accepted.

12 Dismantling and Disposal

Work on the electrical equipment may only be carried out by specially trained personnel. Before dismantling, the equipment is to be fully disconnected from the mains, secured against being restarted and it is to be checked that voltage is zero.

The system is to be stored in the original packaging.

ÖSTLING Marking Systems GmbH provides a professional, environmentally friendly disposal service for a fee. It must be ensured, however, that the laser marking system is not contaminated by hazardous materials.

Dispose of the product properly and in an environmentally friendly manner in accordance with the applicable regional statutory regulations and laws.

© ÖSTLING Marking Systems GmbH

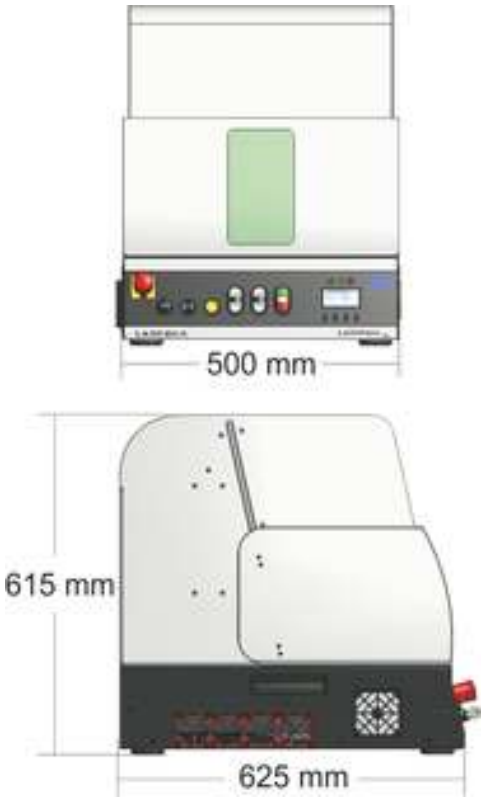
13 Technical Data

13.1 General Technical Data

Radiation Source	XS 5	XS 10	XS 20
Laser Source	Solid state laser Nd:YVO_4 (1064 nm), diode-pumped, actively Q-switched		
Nominal CW Laser Power	5 W	10 W	20 W
Beam Quality M²	< 1.5	< 2	< 2.2
Beam Diameter	5 mm	6 mm	6 mm
Pulse Width	4 - 40 ns	5 - 20 ns	5 - 20 ns
Pulse Width @ 20 kHz	4 ns	5 ns	5 ns
Pulse Energy @ 20 kHz	0.3 mJ	0.5 mJ	0.8 mJ
Pulse peak power @ 20 kHz	20 kW	60 kW	90 kW
Long-Term Power Instability	< 5%	< 5%	< 5%
Cooling System	Integrated thermo-electrical ventilation		
Aiming Diode	Integrated red laser diode λ=635 nm 3 mW (class 2M)		
General			
Electrical Connection Values	90 to 264 VAC, 50/60 Hz, < 600 W @ XS 40		
Operating Temperature	+10 to +35 °C (46 to 95 °F)		
Humidity	< 90% non-condensing		
Deflector Unit		**Standard**	
F-Theta Lens	**FL 100**	**FL 163**	**FL 254B**
Inscription Area	65x65 mm	**130x130 mm**	200x200 mm
Spot Size in Focus	< 40 µm	**< 65 µm**	< 100 µm
Deflection Speed	Up to 5000 mm/s		

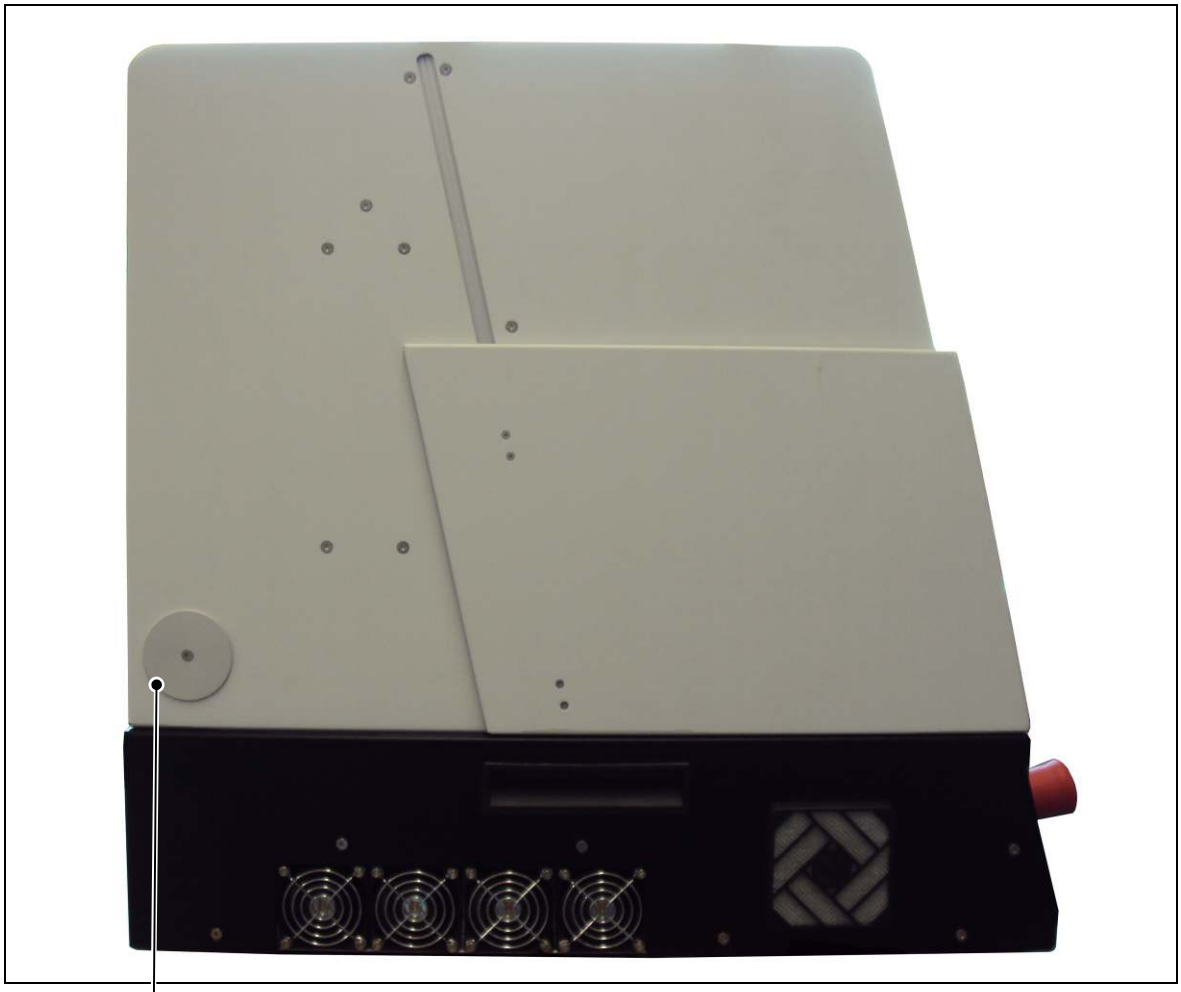
This data corresponds to the available knowledge at the time of printing.
Subject to changes.

13.2 Overall Dimensions



14 Connection Overview

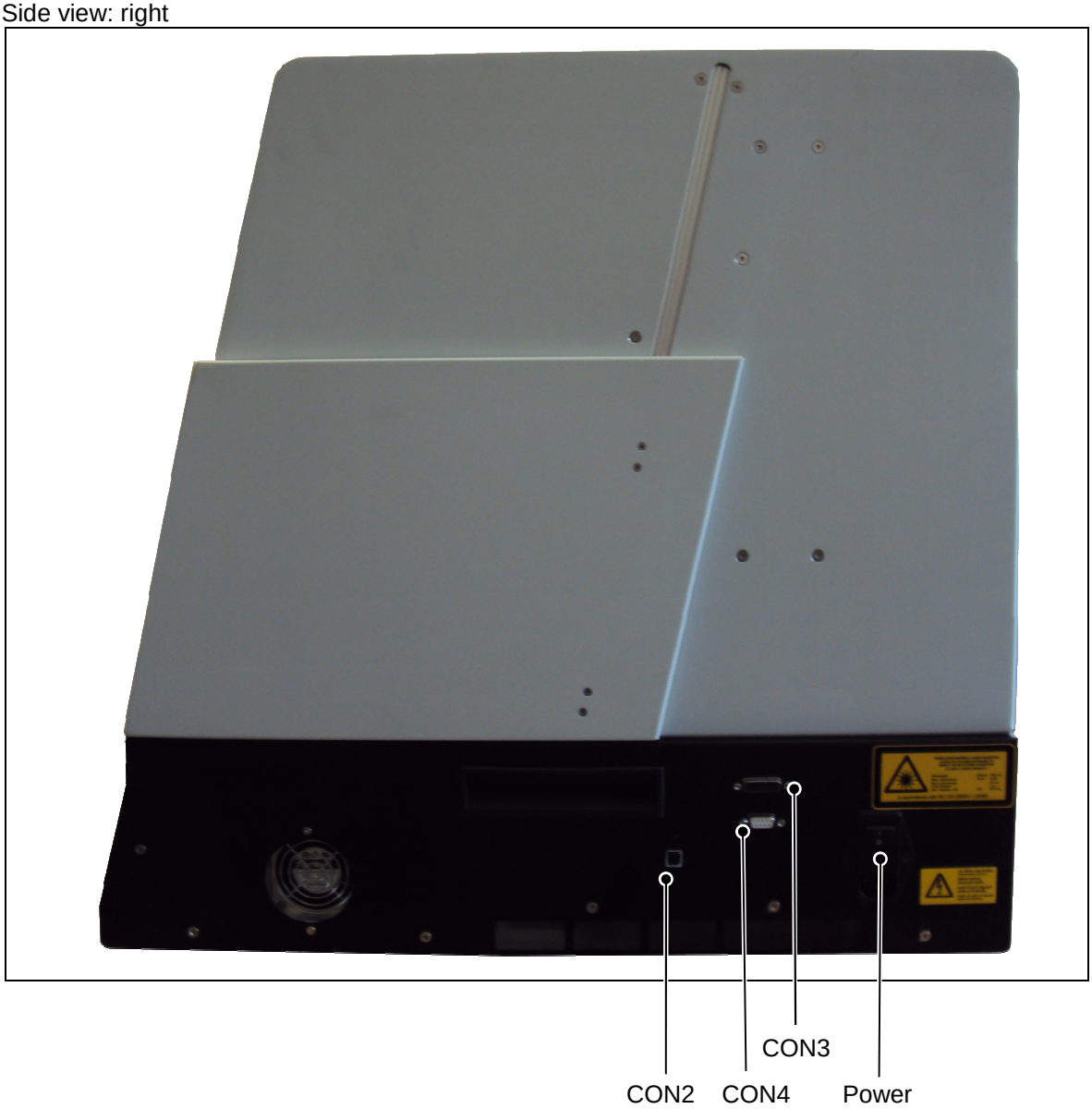
Side view: left



Connection	Designation	Description
EXH	Connection for exhauster	

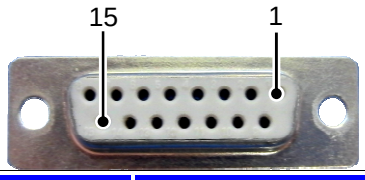
© ÖSTLING Marking Systems GmbH

Side view: right



Connection	Designation	Description
Power	Power	Single phase mains connection 90–264V AC 50-60Hz max. 6A
CON2	USB	Connection for PC with XS Designer software
CON3	Extraction	Connection for external extraction
CON4	Foot Switch	Connection for a separate foot switch

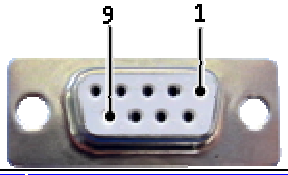
14.1 CON3: Extraction



Sub-D jack 15 pin

Pin	Designation	Description
1	+24V	Start external exhausting
2	GND	Ground supply voltage
3	N.C.	
4	N.C.	
5	N.C.	
6	N.C.	
7	N.C.	
8	N.C.	
9	N.C.	
10	N.C.	
11	N.C.	
12	N.C.	
13	N.C.	
14	N.C.	
15	N.C.	

14.2 CON4: Foot Switch



Sub-D jack 9 pin

Pin	Designation	Description
1		
2		
3		
4		
5		
6	Ext. Start	
7	+24V	
8		
9		

© ÖSTLING Marking Systems GmbH

15 EC Declaration of Conformity

The manufacturer

Östling Marking Systems GmbH
Broßhauser Straße 27
D-42697 Solingen

Declares hereby that the marking system

Designation	Laser marking system Lasebox XS
Type	Lasebox XS 5W / 10W / 20W
Build year	from 2012

Conforms with the fundamental requirements of the following guidelines:

- Guideline 2006/42/EC 'Machinery Directive'
- Guideline 2006/95/EC 'Electrical Equipment'
- Guideline 2004/108/EC 'Electromagnetic Compatibility'

The following fundamental harmonized norms have been applied:

- DIN EN ISO 12100 Safety of machinery - Basic concepts, general principles for design
- DIN EN 60204-1; VDE 0113-1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements
- DIN EN 60825 Safety of laser products - Part 1: Equipment classification and requirements and user guidelines

This declaration of conformity is only effective for the system that is described above.

Solingen, 08.08.2012
.....
Place, date

Rolf Östling
……
Signed by Östling GmbH -Geschäftsführer-

16 Index

A

Aiming Diode 25

C

Cleaning.....35
Configuration Menu 31
Connection Overview 38
Control Elements 15

D

Declaration of Conformity.....41
Destination Folder 19
Diagnostic Menu.....28
Dimensions.....37
Directives.....8
Dismantling.....36
Display
- Color Status 16
- Configuration.....31
- Diagnostic 28
- Functions.....26
- Main Menu 28
- Status Display 27

Disposal.....36
Driver 18

E

Electrical Connection Values.....14
Error Analysis 32
Exhaust System.....13

F

Finding the Focus Point.....24
Focus.....24
Focusing Aid.....25
F-Theta Lens 35

H

Hotline.....1

I

Installation.....18

L

Laser Focus.....24
Laser Protection Information..... 7
Laws..... 8
LazeCard Error 22
LEDs 16

M

Main Menu 28
Maintenance 34

O

Operating Conditions 13

P

Packaging 11, 12, 14
Personal..... 5
Protective Measures 9

R

Reference Point 24
Registration..... 22
Regulations 8
Return 35

S

Safety Instructions 4, 5
Scope of Delivery..... 3, 14
Service 1
Servicing 35
Setup..... 18
Software..... 18
Standards..... 8
Start-up 17
Status LEDs 16
Storage 11

T

Technical Data 37
Transport..... 11
Troubleshooting 33

W

Warning Labels 10
Warranty 3

© ÖSTLING Marking Systems GmbH