UniQ™

PRODUCT REFERENCE GUIDE

InfraRed Fiber Laser Marker

DATALOGIC

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This manual refers only to UniQ™ models running Windows 10 operating system (1159-1X41).

ORIGINAL INSTRUCTIONS (ref. 2006/42/EC)

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PREFACE

ABOUT THIS MANUAL

This User Manual (UM) is provided for users seeking advanced technical information, including connection, programming, maintenance and specifications. The Quick Reference Guide (QRG) and other publications associated with this product can be downloaded free of charge from the website listed on the back cover of this manual.

Manual Conventions

The symbols listed below are used in this manual to notify the reader of key issues or procedures that must be observed when using the laser marker:

NOTE: Notes contain information necessary for properly diagnosing, repairing and operating the laser marker.

CAUTION: This symbol advises you of actions that could damage equipment or property.

WARNING: This symbol advises you of actions that could result in harm or injury to the person performing the task.

TECHNICAL SUPPORT

Support Through the Website

Datalogic provides several services as well as technical support through its website. Log on to (www.datalogic.com).

For quick access, from the home page click on the search icon 🔍, and type in the name of the product you're looking for. This allows you access to download Data Sheets, Manuals, Software & Utilities, and Drawings.

Hover over the Support & Service menu for access to Services and Technical Support.

WARRANTY

Datalogic warrants that the Products shall be free from defects in materials and workmanship under normal and proper use during the Warranty Period. Products are sold on the basis of specifications applicable at the time of manufacture and Datalogic has no obligation to modify or update Products once sold. The Warranty Period shall be **two years** from the date of shipment by Datalogic, unless otherwise agreed in an applicable writing by Datalogic.

Datalogic will not be liable under the warranty if the Product has been exposed or subjected to any: (1) maintenance, repair, installation, handling, packaging, transportation, storage, operation or use that is improper or otherwise not in compliance with Datalogic's instruction; (2) Product alteration, modification or repair by anyone other than Datalogic or those specifically authorized by Datalogic; (3) accident, contamination, foreign object damage, abuse, neglect or negligence after shipment to Buyer; (4) damage caused by failure of a Datalogic-supplied product not under warranty or by any hardware or software not supplied by Datalogic; (5)any device on which the warranty void seal has been altered, tampered with, or is missing; (6) any defect or damage caused by natural or man-made disaster such as but not limited to fire, water damage, floods, other natural disasters, vandalism or abusive events that would cause internal and external component damage or destruction of the whole unit, consumable items; (7) use of counterfeit or replacement parts that are neither manufactured nor approved by Datalogic for use in Datalogic-manufactured Products; (8) any damage or malfunctioning caused by non-restoring action as for example firmware or software upgrades, software or hardware reconfigurations etc.; (9) loss of data; (10) any consumable or equivalent (e.g. cables, power supply, batteries, etc.); or (11) any device on which the serial number is missing or not recognizable.

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CHAPTER 1
INTRODUCTION

GENERAL

Information included in this manual is intended for a qualified installer able to integrate the laser marker into a system, complying with all the protection features required by international rules and local legislations. Refer to the following sections for further information.

This manual refers to UNIQ™ laser markers, that is a Class 4 Laser Product.

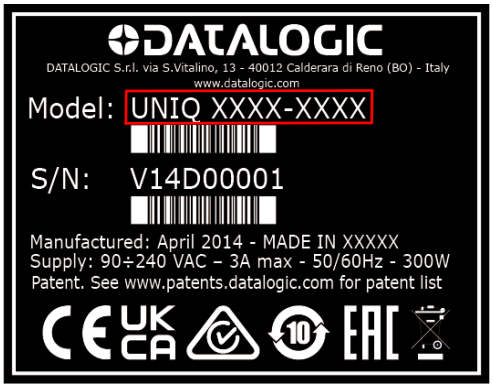
In addition to being professionally trained in their role, personnel assigned to work with laser marker must be informed and made acquainted with the risks inherent to invisible and visible laser radiation. The operator is required to carefully read the section of the manual concerning safety instructions as well as the sections related to matters falling under her/his responsibility.

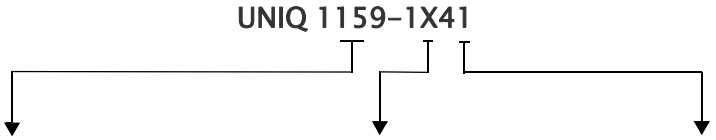
CAUTION: Datalogic shall not be held responsible for any non-conforming use of the laser marker of its manufacture.

NOTE: BEFORE INSTALLING AND USING THE LASER MARKER, CAREFULLY READ THIS MANUAL.

MODEL DESCRIPTION

UniQ™ laser markers are described by their model number which indicates the characteristics listed in the diagram below. Not all combinations are available. For a complete list of combinations see the Models tab on the Product page of the website.





Nominal Power	F-Theta scan lens	Operating System
15 = 15W	3 = 160S	1 = Windows™ 10
	6 = 254S	
	7 = 254L	
	9 = 100L	

PATENTS

This product is covered by one or more of the following patents:

Utility patents: US10193299

COMPLIANCE

European Declaration of Conformity

Hereby, Datalogic S.r.l. declares that the full text of the European Declaration of Conformity is available at: www.datalogic.com. Select the link from the downloads section of the product page.

UKCA Declaration of Conformity

Hereby, Datalogic S.r.l. declares that the full text of the UKCA Declaration of Conformity is available at: www.datalogic.com. Select the link from the downloads section of the product page.

FCC Compliance

Modifications or changes to this equipment without the expressed written approval of Datalogic could void the permission to use the equipment.

This laser marker complies with PART 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this laser marker may not cause harmful interference, and (2) this laser marker must accept any interference received, including interference which may cause undesired operation.

This laser marker 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. This laser marker generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this laser marker in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

EAC Compliance

Customs Union: this laser marker complies with CU Conformity certification; this allows the Product to bear the Eurasian Mark of conformity.

LASER STANDARDS

This laser marker is classified as Class 4 Laser Product according to the following:

EU: EN60825-1

USA: 21 CFR 1040.10

China: GB7247-1

Datalogic, as manufacturer of laser products, provides a laser marker which is NOT intended for immediate use, but it must be connected, by others, to other devices which have the final aim of creating a laser processing system.

The final system manufacturer MUST ensure the safety of the laser processing machine according to its standards including the risk-analysis, implementation of safety measures, certification and testing of safety measures and the production of adequate information for use of the machine.

Datalogic is available for providing to the customers all the information in its possession to help in complying with applicable standards.

WARNING: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

OVERVIEW

The new UniQ™ laser marker, with its extremely compact design, is studied to facilitate its integration into more complex systems, together with safety systems required by applicable regulations, the control of marking signals and other customer's complementary modules, if any.

All connections are found on the rear side of the product: power supply, safety, electrical signals, communication ports. The newly designed front cover houses the status LED, whose color relates to the laser status.

UniQ™ belongs to the family of Fiber laser sources in the “Q-Switched” configuration.

The mechanical and electrical characteristics satisfy standardization and connectivity needs of the industrial field, such as different solutions for laser system control.

The new control platform allows for an easy integration in industrial environments and complies with the standard of the other Datalogic laser markers, with the same philosophy implemented in Arex™.

Based on an improved optical layout with respect to the Datalogic Filos™ laser source, the UniQ™ family guarantees significant improvements in terms of performances thanks to the new laser controllers, developed in Datalogic laboratories, which reduces warm-up time and improves the stability of emitted laser power.

Main features:

- Highly Integrated Marking system
- 100 to 240 V AC @ 50/60 Hz Power Supply
- Operating Temperature Range from 5°C to 40°C
- New Marking control technology
- Integrated mechanical Shutter
- Integrated PC embedded and marking software for stand-alone operation
- Ease of integration in industrial environments and maximum control compatibility with other marking platforms (Arex™/Eox™/ Vlase™)
- Integrated photocell and encoder connectors for Marking On Fly (MOF) applications.
- Unattended control of the system by LAN network or serial communication (RS232 protocol)
- Fail-Safe, redundant interlock system, fully compliant with EN 60825-1
- Stable Marking process and high beam quality (M^2<2)
- Compact Design and reduced footprint
- High Protection level (IP54 category 1 degree)
- Fixing points compatible with Arex™ and Ulyxe™ family
- Possibility to install in any orientation (vertical, horizontal, etc.) and in side-by-side configuration
- Low power consumption
- Extremely Low noise level
- High center field precision and repeatability

Operation of a Laser Marker with Galvometric Scanning

During the marking the laser generates an invisible, high-energy infrared beam.

In order to obtain a more accurate focus, the laser beam is first enlarged using an optical expansion system and then deflected by a scanning system consisting of two mirrors mounted on galvanometric motors.

These mirrors deflect the beam in a controlled path along the X and Y axes; processing of the product surface occurs by coordinating the movement of the two mirrors and the turning on/off of the laser beam.

The deflected laser beam is focused by an F-Theta scan lens on the surface of the product.

Generally speaking, the marking is carried out within the focus plane of the F-Theta scan lens.

Marking Software

The Lighter™ marking software is pre-installed on the product.

NOTE: Consult Lighter™ software user's manual for a proper use of the same.

NOTE: If necessary, see "Marking Software Upgrade" on page 99**, to upgrade the pre-installed software.**

IMPORTANT WARNINGS

Access to the internal parts of the laser marker is allowed only to authorized personnel, duly qualified and trained with regards to risks of optical and electrical nature.

Datalogic declines any and all responsibility for work carried out on active parts by untrained or unauthorized personnel.

CAUTION: It is forbidden to change the intended use for which the product was designed and developed.

Datalogic declines any and all responsibility for improper use of its laser product.

CAUTION: The integration and use of this laser marker is customer responsibility.

CAUTION: Never expose reflecting surfaces to laser radiation!

The reflected laser beam may cause damage to laser marker.

CAUTION: Laser marking interacts with materials through, for example, a thermal carbonization process which may lead to the emission of fumes, dust and vapors.

Adequate fume/dust extractor and treatment must be provided by customer!

WARNING: Marking PVC (or other plastic material) can cause the release of chlorine gas which can be harmful to the laser operator and to the laser marker itself. Always use adequate fume extractor during PVC and plastic marking.

CAUTION: It is the responsibility of the customer to install the laser marker in proper safety condition!

CHAPTER 2
INSTALLATION

UNPACKING

CAUTION: The UniQ™ laser marker is a delicate optical device, that can be damaged by shock and vibrations.

Before installing or operating the laser marker, you should:

- Inspect the shipping container for damage
- Inspect the laser marker for signs of damage
- Confirm that the shipping box contains all items on the shipping inventory list including any accessories

When unpacking the laser marker from the shipping box you should:

- Remove the accessories and documentations
- Carefully remove the laser marker from the packaging using both hands

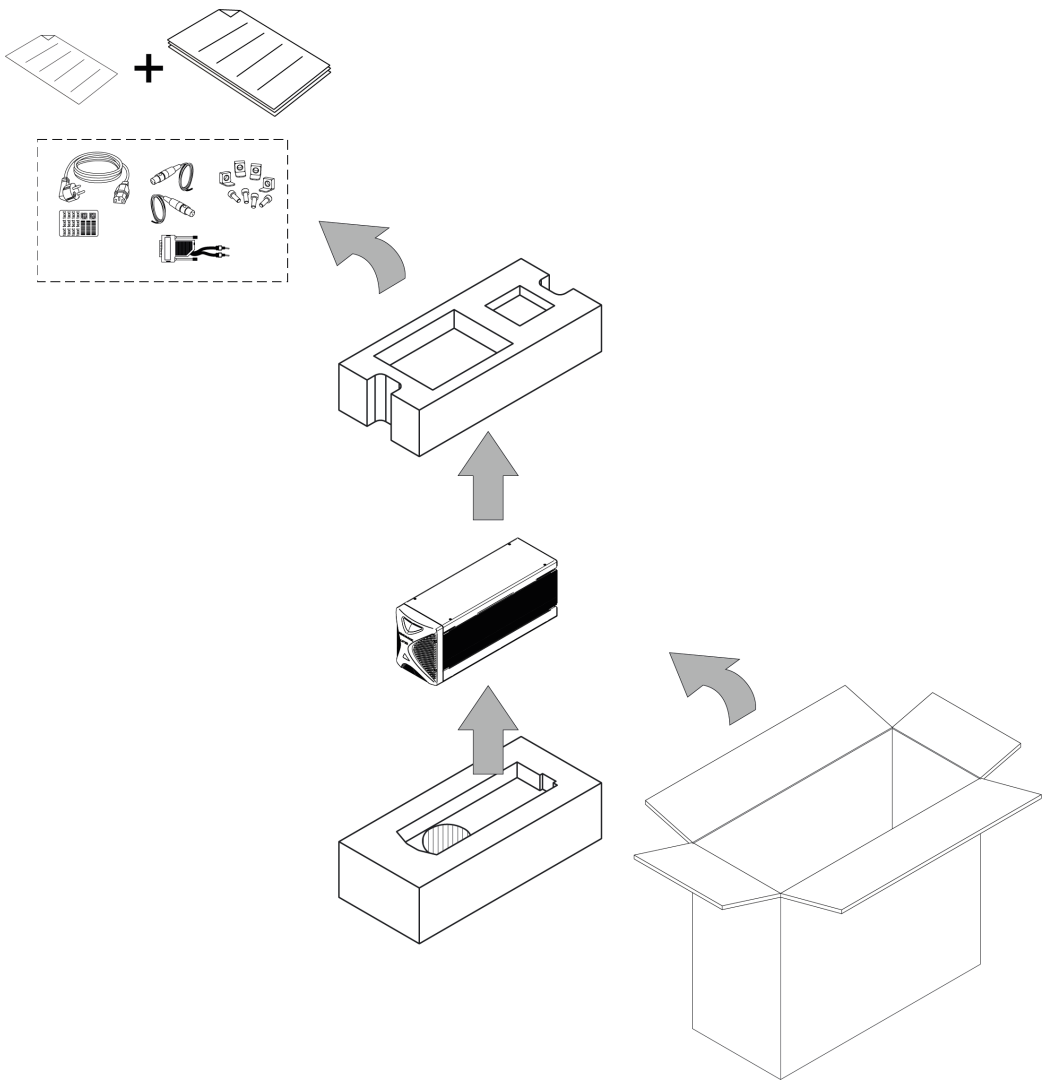
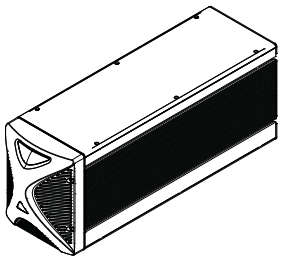
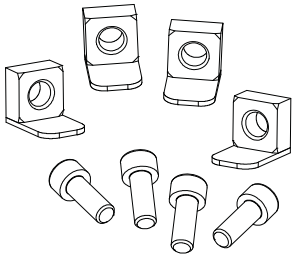
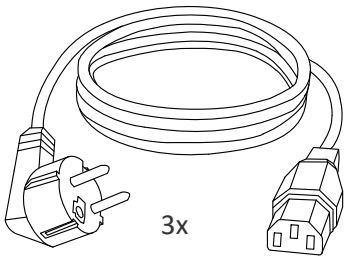
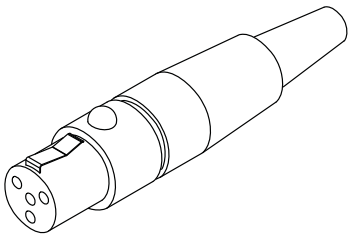
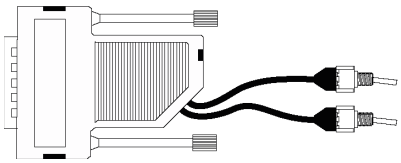
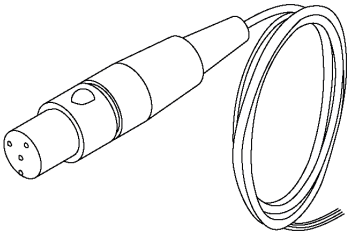
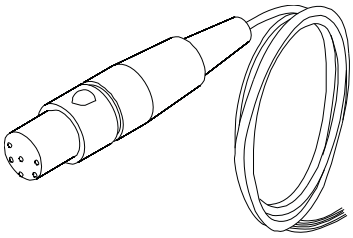
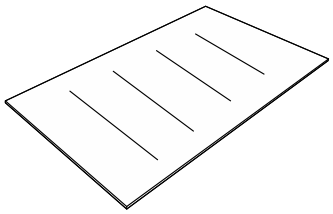
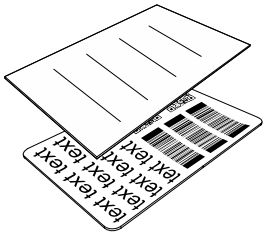
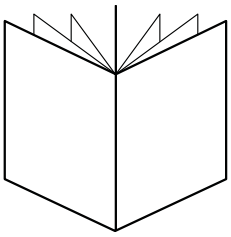


Figure 1: Unpacking

Keep all packing materials until the laser has been inspected for completeness and damage. If something is missing or defective, call Datalogic (see "Technical Support" on page vi for contact details).

Be sure to use the original packaging material for the transportation of this laser marker, otherwise transportation could cause malfunctions or damage. Keep the original packaging materials for future use. Be careful to ship the laser marker following the recommendations present in the packaging labels

CONTENTS OF THE PACKAGING

 Laser marker	 Sliding nuts	 Power Supply cables
 Interlock MUTING DEVICE	 Command Box MUTING DEVICE	 Interlock cable
 Shutter OUT cable	 EULA Windows	 Test report and sample test plate
 Quick Reference Guide		

ON MOISTURE CONDENSATION

If the laser marker is brought directly from a cold to a warm location, moisture may condense inside or outside the laser product. This moisture condensation may cause a malfunction of the laser marker.

Note on moisture condensation

Moisture may condense when you bring the laser marker from a cold place into a warm place (or vice versa) and when you use the laser marker in a humid place.

If moisture condensation occurs

Turn off the laser marker and wait about 1 hour for the moisture to evaporate.

How to avoid moisture condensation

Before moving the laser marker from a cold place into a warm place, put it in a plastic bag and seal it tightly. Remove the bag when the air temperature inside the plastic bag has reached the ambient temperature (after about 1 hour).

FIXING AND POSITIONING

CAUTION: Fix the laser marker according to instructions shown in the figures.

CAUTION: It is mandatory to secure the laser marker before you start marking, since improper securing or positioning may cause serious damage.

Do not secure the laser marker in a way other than the one described in the figure.

CAUTION: Introduction of optical or mechanical surfaces, such as mechanical shutters or additional protective glass, between F-Theta scan lens output and marking surface may case optical feedback into the laser marker.

Optical induced damage caused to laser marker by reflection from external surfaces is not covered by warranty.

NOTE: In order to prevent marking distortions, avoid vibrations and bumps during the marking process!

NOTE: It is recommended to install the scan head on a positioning Z-axis system for accurate mounting at focal distance!

The laser marker can be installed in any position: on his base plate it offers dedicated threaded holes designed to be fully compatible both with Arex™ and Ulyxe™ product families:

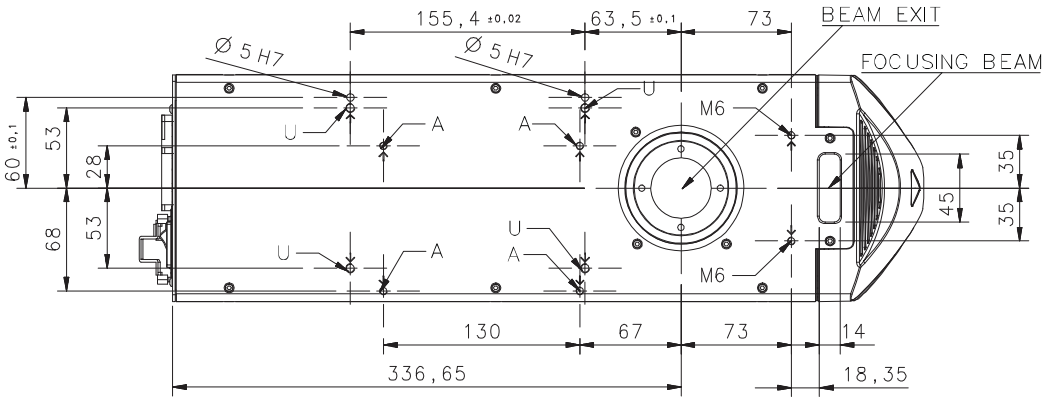


Figure 2: Fixing points

NOTE: All dimensions are in millimeters.

Mounting screws length

To determine the length of the mounting screws, consider the thickness of the mounting plate and the thickness of the washer.

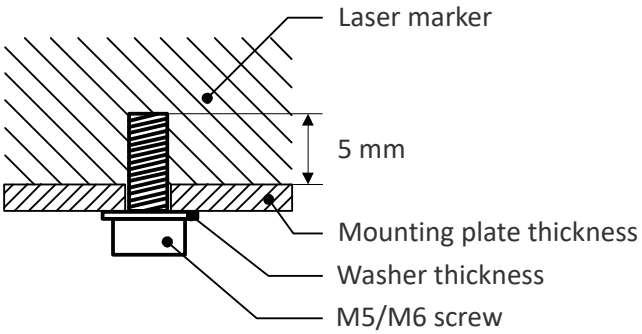


Figure 3: Length of mounting screws

NOTE: Mounting holes depth is max 5mm. Tightening torque = 2 Nm.

The laser marker can be also fixed by using side slots shown in picture:

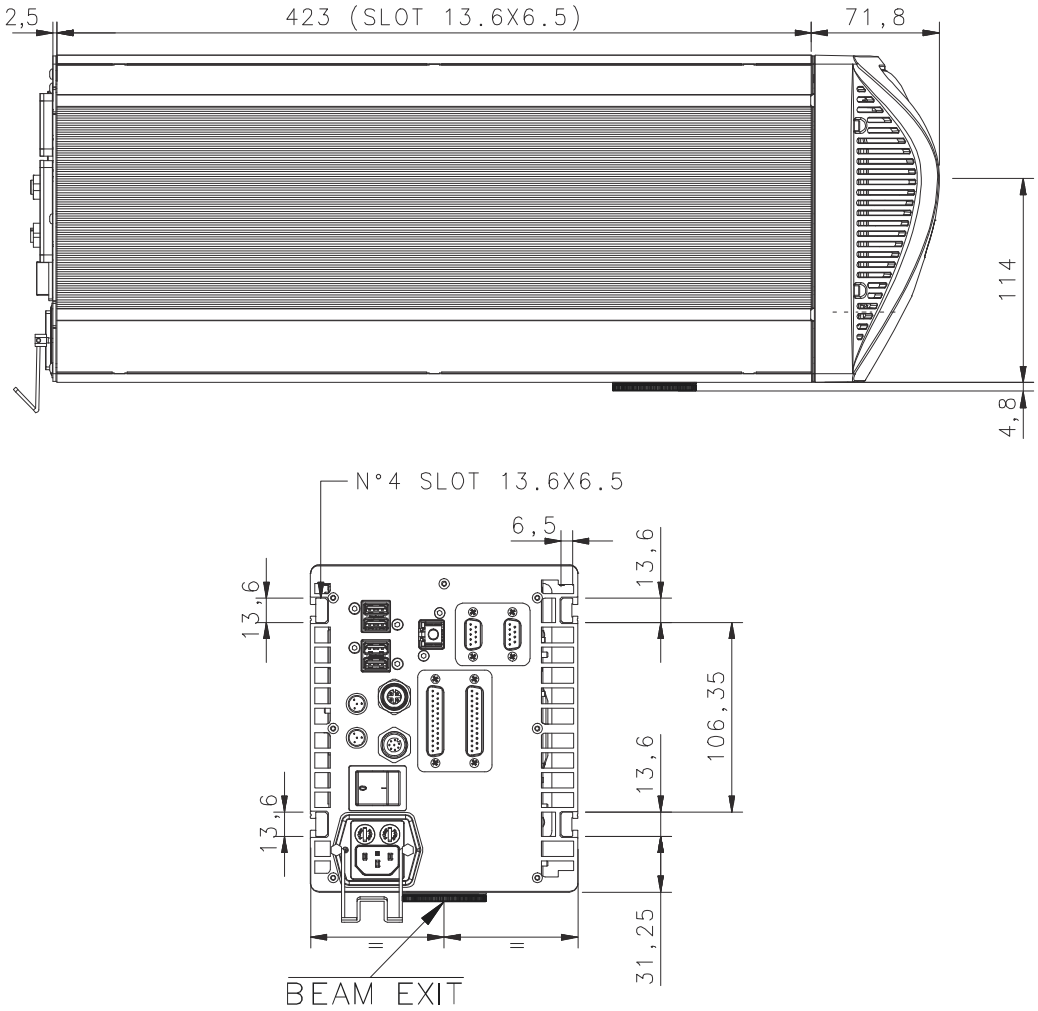


Figure 4: Lateral fixing points

NOTE: All dimensions are in millimeters.

INSTALLATION ENVIRONMENT

The laser marker must be installed in a suitable environment in order to allow proper air flow and correct housing of the cables.

The laser marker uses a forced air cooling system: an adequate air flow is necessary to guarantee its correct cooling. Install the laser marker so that air flow is not obstructed. Moreover, do not install it near a heat source.

CAUTION: If not enough space is provided, the temperature inside the laser marker could rise, causing temperature error.

Clean the main fan and the cover when they are dirty. If the main fan and the cover are dirty, insufficient air-flow might not ensure correct cooling and might stop the marking operation. Clean the main fan and the cover periodically.

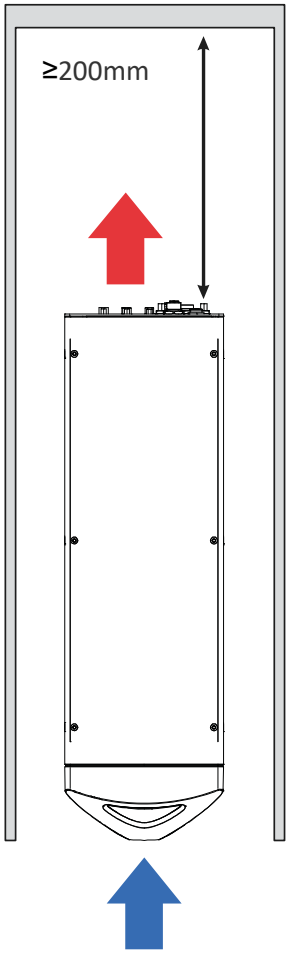


Figure 5: Installation environment

FUME / DUST EXTRACTOR

During the marking process, dust and/or fume may be produced. It is important to use an adequate fume/dust extractor and/or air filtration (see “Fume Extractor” on page 65).

CAUTION: Marking PVC (or other plastic material) can cause the release of chlorine gas which can be harmful to the laser operator and to the laser marker itself. Always use adequate fume extractor during PVC and plastic marking.

CHAPTER 3
TECHNICAL SPECIFICATIONS

TECHNICAL CHARACTERISTICS

UNIQ MODELS		1150-1X41
ELECTRICAL SPECIFICATIONS		
Input Voltage (main power supply)	V (AC)	100 to 240 @ 50-60 Hz
Max. Input Current (main power supply)	A	3
Max power	W	300
LASER SOURCE SPECIFICATIONS[1]		
Laser Type		Pulsed Fiber Laser
Average Power[2] @ reference Rep. Rate (100kHz)	W	15
Pulse Energy (max) @ reference Rep. Rate (15kHz)	mJ	≥ 0.75
Peak Power (max.) @ reference Rep. Rate (15kHz)	kW	≥ 10
Central Emission Wavelength	nm	1064
Repetition Rate	kHz	15 to 100
Laser Aiming Beam / Focus Beam		Class 2 <1mW @ 630-670 nm
ENVIRONMENTAL SPECIFICATIONS		
Operating Temperature	C (F)	5° to 40° (41° to 104°)
Storage Temperature	C (F)	-10° to 60° (14° to 140°)
Humidity	%	< 90 without condensation
Altitude	m	2000
Shock and Vibration		MIL 810E “CAT 1 Basic Transportation”
Vibration to EN60068-26		0.02 mm @ 10 to 55 Hz[3]
Package Drop Test	cm	76
Pollution Degree		2
Overvoltage Category		II

UNIQ MODELS		1150-1X41
PHYSICAL SPECIFICATIONS		
Dimensions (HxWxD)	mm in	183x150x497.3 72.2x59x195.8
Weight	Kg lbs	10.3 22.7
IP Rating		IP54 category 1 degree
Cooling		Forced Air Fan 60 mm: L10@40°C = 83000 h Fan 120 mm: L10@40°C = 68000 h
Noise	dB (A)	<70 at 1 meter
OTHER SPECIFICATIONS		
Marking speed[4]	mm/s	Up to 5000
Char Marking Speed[5]	char/s	Up to 670
MOF (marking on fly)		YES (constant speed or encoder)
Line speed - Productivity	m/min pcs/s	Up to 75 3
Marking Control and Software		EMC (Embedded Marking Control) and Lighter™ Suite
Communication		4x USB, RS232, Ethernet (TCP/IP 10,100 Mbit), EtherNet/IP, TcpServer Protocol, ProfiNet I/O, Digital I/O

1. Specification @ 25°C
2. With F-Theta scan lens 160S
3. Max vibration allowed for better quality
4. May vary: measured with f =160mm
5. Single line string, Roman-s font, h=1mm, Level 100% f=100kHz with F-Theta scan lens 160S on TESA label

PRODUCT DESCRIPTION

A description of the main parts of the laser marker is provided here below:

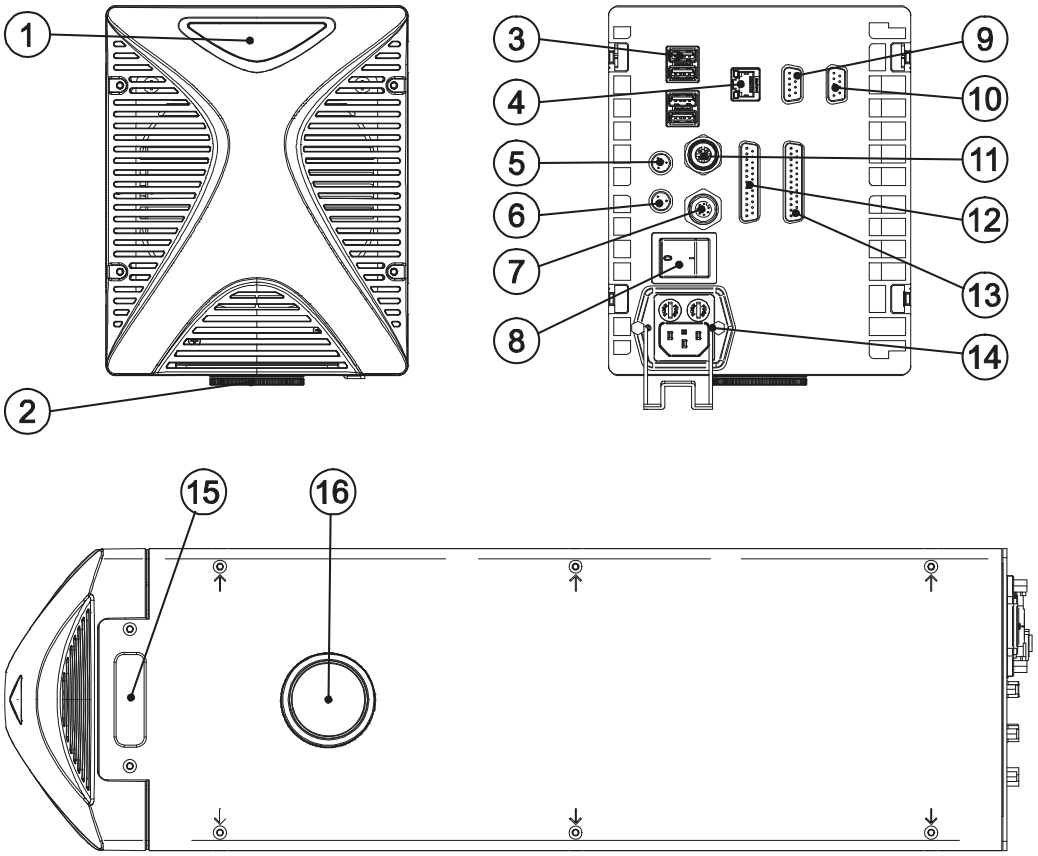


Figure 6: Laser marker overview

1. Status LED
2. F-Theta scan lens
3. 4x USB ports
4. LAN port
5. Interlock connector
6. Shutter OUT/Enable OUT connector
7. Encoder connector
8. Main Switch
9. VGA connector
10. RS232 port
11. Photocell connector
12. X1 - Command Box connector (Laser Control)
13. X2 - Axes connector (I/O Control)
14. Power entry module with fuse
15. Focus beam output
16. IR Laser beam output / Aiming laser beam output

MARKING AREA SPECIFICATION

Datalogic provides a wide range of laser marker models with different F-Theta scan lenses configurations.

These configurations are provided to best match customer needs regarding marking field size, working distance and power density.

NOTE: Contact Datalogic if other configurations are necessary.

NOTE: Definition of Marking Area: square marking field measured on black anodized aluminum plate.

CAUTION: This product was designed to use only certain configurations of F-Theta scan lens and marking field. If your needs are not satisfied by the currently available F-Theta scan lens configurations please contact Datalogic for a solution. The use of other F-Theta scan lenses or operation outside the specified marking field for a certain F-Theta scan lens configuration can lead to damage of the F-Theta scan lens, scan head or laser source. Such damage is not covered by warranty!

CAUTION: For each F-Theta scan lens configuration Datalogic provides a specific adapter. This adapter ensures that residual back reflections caused by the F-Theta scan lens do not damage the scanning head optics. The removal of such adapter or its incorrect use (for example incomplete threading, use of another F-Theta scan lens adapter, etc.) can lead to damage of the F-Theta scan lens, scan head or laser source. Such damage is not covered by warranty!

F-Theta Scan Lens

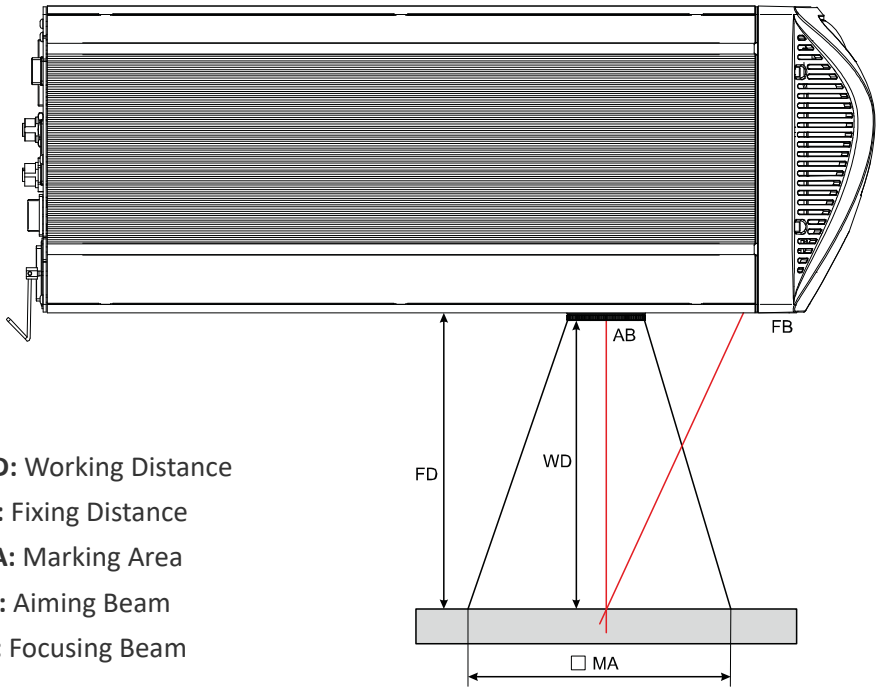
The table below lists the standard F-Theta scan lenses currently available:

F-Theta Scan Lens diameter M39			
F-THETA SCAN LENS		f = 160S	f = 254S
Working Distance (WD)	mm	183 ± 5	280 ± 4
Fixing Distance (FD)	mm	189 ± 6	292 ± 5
Marking Area (MA)	mm^2	100 x 100	140 x 140

F-Theta Scan Lens diameter M85			
F-THETA SCAN LENS		f = 100L	f = 254L
Working Distance (WD)	mm	99 ± 3	296 ± 5
Fixing Distance (FD)	mm	134 ± 4	359 ± 6
Marking Area (MA)	mm^2	50 x 50	180 x 180

NOTE: Working Distance is defined as the distance between the center of the marking area (defined in the focal plane) and the closest mechanical edge of the F-Theta scan lens. Refer to the following figure.

NOTE: Fixing Distance is defined as the distance between the base of the scan head and the marking area. Refer to the following figure.



WD: Working Distance
FD: Fixing Distance
MA: Marking Area
AB: Aiming Beam
FB: Focusing Beam

Figure 7: Marking Area

NOTE: For products equipped with 160S, 254S and 100L F-Theta scan lenses the focus position, defined at the point where the focus beam overlaps with the aiming beam, is preset at factory.

CONNECTORS SPECIFICATIONS

Interlock

Interlock **disables** the Class 4 laser source inside laser marker. Interlock internal circuit is designed to comply with the single fault condition.

Panel connector

Type SWITCHCRAFT TB Series male Tini Q-G (Mini XLR) panel mount connector, 4 positions.

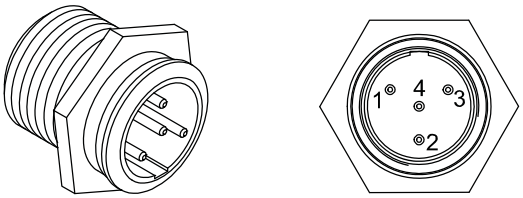


Figure 8: Male panel plug cod. TB4M (front view)

PIN	SIGNAL	TYPE	DESCRIPTION
1	VCC_INT_IN_A	Output	24 V DC reference for INTERLOCK_A signal
2	INTERLOCK_A	Input	INTERLOCK IN signal A
3	GND_INT_IN_B	GND	Ground reference for INTERLOCK_B signal
4	INTERLOCK_B	Input	INTERLOCK IN signal B

Table 1: Connector pinout

PIN1 - PIN2	PIN3 - PIN4	MARKING FUNCTIONALITY	CONDITION
CONTACT OPEN	CONTACT OPEN	NOT POSSIBLE	SAFE
CONTACT CLOSED	CONTACT OPEN	NOT POSSIBLE	DANGEROUS
CONTACT OPEN	CONTACT CLOSED	NOT POSSIBLE	DANGEROUS
CONTACT CLOSED	CONTACT CLOSED	POSSIBLE	DANGEROUS

Table 2: Table of conditions

Electric Diagram

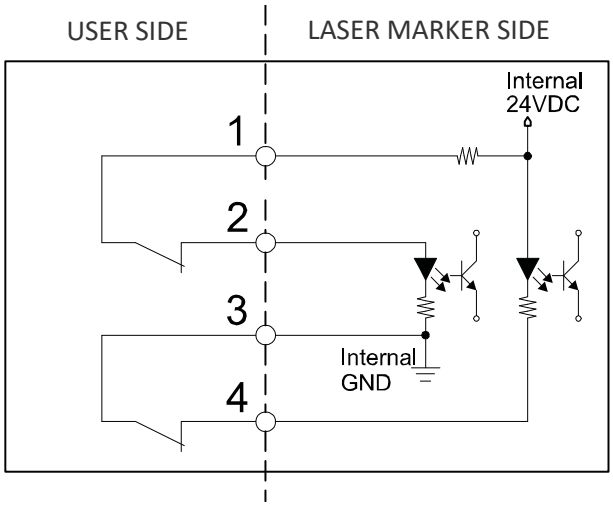


Figure 9: Interlock connector electric diagram

Interlock cable

Connector type SWITCHCRAFT TA Series Tini Q-G (Mini XLR) female pre-wired connector, 4 positions.

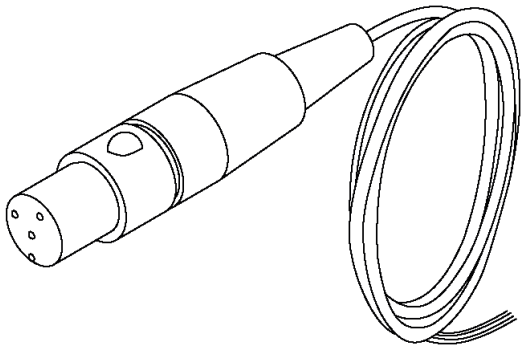


Figure 10: Pre-wired female plug connector cod. TA4FX

Muting Device

Connector type SWITCHCRAFT TA Series Tini Q-G (Mini XLR) female cable mount connector, 4 positions.

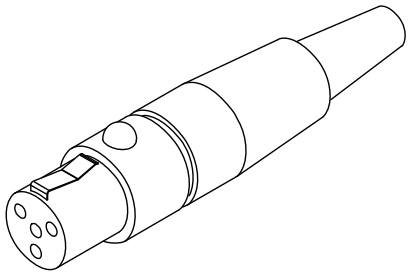


Figure 11: Interlock connector Muting Device provided

CAUTION: Do not use the Interlock Muting Device for external devices, since this will result in loss of the safety function of the machine to which this product is installed.

Do not use the Interlock Muting Device except for maintenance of this product.

CAUTION: It is the customer's responsibility to provide a correct integration of the safety signals according to applicable regulations.

Internal electric diagram

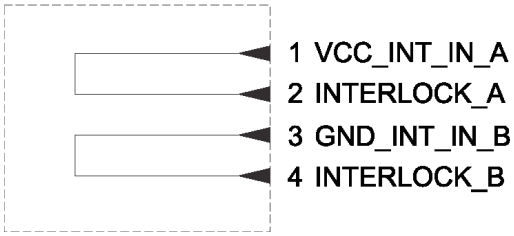


Figure 12: Interlock connector Muting Device electric diagram

Shutter OUT/Enable OUT

Panel connector

Connector type SWITCHCRAFT TA Series Tini Q-G (Mini XLR) male panel connector, 6 positions.

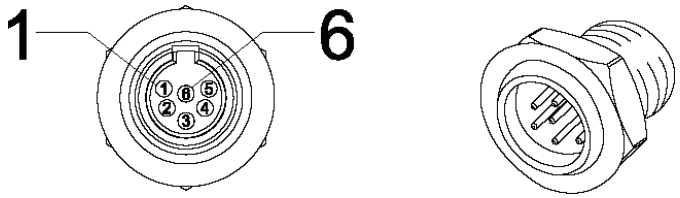


Figure 13: Male panel connector code TB6M (front view)

PIN	SIGNAL	TYPE	DESCRIPTION
1	SHUTTER_OUT_A_COM1	COMMON 1	SHUT_OUT_A shutter signal. Feedback of EXT_ENABLE_A
2	SHUTTER_OUT_A_NO1	NORMALLY OPEN 1 CONTACT	
3	SHUTTER_OUT_A_COM2	COMMON 2	SHUT_OUT_B shutter signal. Feedback of EXT_ENABLE_A
4	SHUTTER_OUT_A_NC2	NORMALLY CLOSED 2 CONTACT	
5	ENABLE_OUT_COM	COMMON ENABLE	ENABLE OUT signal. Feedback of EXT_ENABLE_B
6	ENABLE_OUT_NO	NORMALLY OPEN ENABLE	

Table 3: Connector pinout

SHUT_OUT_A	SHUT_OUT_B	ENABLE OUT	CONDITION
CLOSED	CLOSED	CLOSED	DANGEROUS
CLOSED	CLOSED	OPEN	DANGEROUS
CLOSED	OPEN	CLOSED	DANGEROUS
CLOSED	OPEN	OPEN	DANGEROUS
OPEN	CLOSED	CLOSED	DANGEROUS
OPEN	CLOSED	OPEN	SAFE
OPEN	OPEN	CLOSED	DANGEROUS
OPEN	OPEN	OPEN	DANGEROUS

Table 4: Table of conditions

SHUTTER_OUT signals behavior

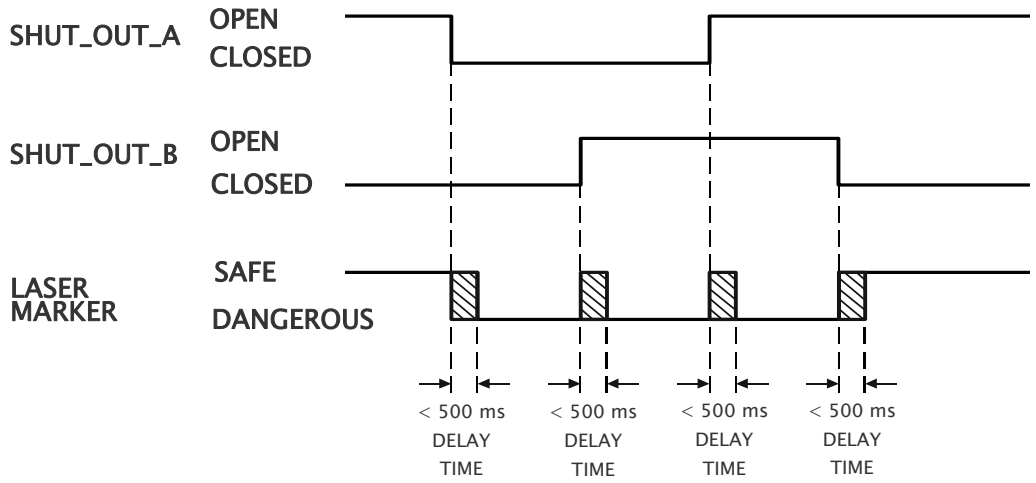


Figure 14: SHUTTER_OUT signals behavior

Electric diagram

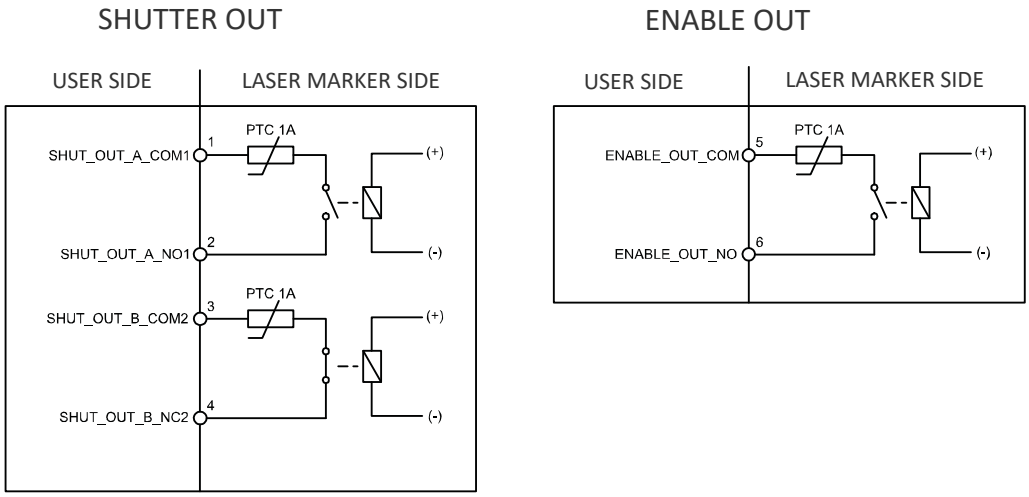


Figure 15: Shutter OUT/Enable OUT connector electric diagram

NOTE: The response time is 500ms from the input's switching.

Shutter OUT cable

Connector type SWITCHCRAFT TA Series Tini Q-G (Mini XLR) pre-wired female connector, 6 positions.

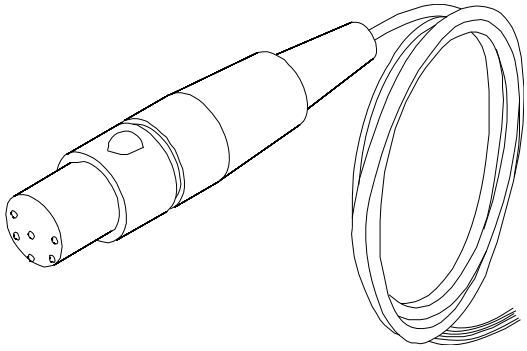


Figure 16: Pre-wired female plug connector code TA6FLX)

X1 - Command Box (Laser Control)

Panel connector

Socket Sub-D, 25 pins, female.

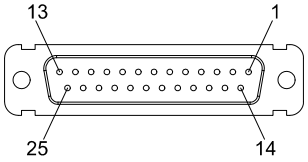


Figure 17: Female panel socket Sub-D 25 (front view)

PIN	SIGNAL	TYPE***	DESCRIPTION
X1.1	24V_ENABLE_B	Output power supply	Auxiliary 24V DC power supply available for EXT_ENABLE_B (max 125mA)
X1.2	EXT_ENABLE_B	Digital Input	Secondary external ENABLE signal: - HIGH level: contact closed - LOW level or disconnected: contact opened
X1.3	RESERVED	-	DO NOT CONNECT
X1.4	EXT_24V	Output power supply	Auxiliary 24V DC power supply available for drive input logical HIGH (max 125mA)
X1.5	EXT_24V	Output power supply	Auxiliary 24V DC power supply available for drive input logical HIGH (max 125mA)
X1.6	EXT_24V	Output power supply	Auxiliary 24V DC power supply available for drive input logical HIGH (max 125mA)
X1.7	24V_ENABLE_A	Output power supply	Auxiliary 24V DC power supply available for EXT_ENABLE_A (max 125mA)
X1.8	EXT_ENABLE_A	Digital Input	Primary external ENABLE signal: - HIGH level: contact closed - LOW level or disconnected: contact opened
X1.9	BUSY	Digital Output	This signal is used to know if the current spooler is executing (marking in progress): - ON during marking process
X1.10	CONNECTOR_PRES-ENCE	Digital Input	This signal is used to check the presence of the Command Box connector: - HIGH level: normal operation - LOW level or disconnected: laser marker faulty
X1.11	START_MARKING*	Digital Input	This signal is used to start to the marking process when a document or a sequence is running in AUTO MODE** or WORK MODE**: - HIGH level pulsed signal start the marking process
X1.12	EXT_KEY	Digital Input	External KEY signal: - HIGH level: contact closed - LOW level or disconnected: contact opened
X1.13	STOP_MARKING*	Digital Input	This signal is used to stop the marking process: - HIGH level pulsed signal stop the marking process
X1.14	RESERVED	-	DO NOT CONNECT
X1.15	RESERVED	-	DO NOT CONNECT
X1.16	RESERVED	-	DO NOT CONNECT
X1.17	END	Digital Output	This signal is used to know if the marking process is finished: - ON at the end of marking process
X1.18	POWER_ON	Digital Output	This signal is used to know if the laser marker is already warmed up: - ON when the laser is in STAND_BY or READY state
X1.19	GND	Ground	Ground reference
X1.20	SYSTEM_ALARM	Digital Output	This signal is used to know if the laser marker is in booting up state or in error state: - ON during BOOTING UP - ON in case of system error

PIN	SIGNAL	TYPE***	DESCRIPTION
X1.21	GND	Ground	Ground reference
X1.22	ENABLE_OUT	Digital Output	This signal is used to know if the laser marker is ready to emit laser radiation: - ON when the laser marker is in READY state
X1.23	SW_READY*	Digital Output	Depending on the configuration this signal can be used in different ways: - COMPATIBILITY: ON when a document or a sequence is running in AUTO MODE** or WORK MODE** independently from the laser marker state. The signal is ON regardless of whether the laser marker is ready to start a new marking - STANDARD: ON when a document or a sequence is running in AUTO MODE** or WORK MODE** and the laser marker state is READY. The signal is ON regardless of whether the laser marker is ready to start a new marking This signal can also be driven using Lighter™ Script engine "IoPort.setReady (true)" function
X1.24	GND	Ground	Ground reference
X1.25	GND	Ground	Ground reference

Table 5: Connector pinout

(*) refers to Lighter™ user's manual "Setting I/O parameters" paragraph to set the signal properties
(**) refers to Lighter™ user's manual
(***) see "Input/Output specifications" on page 31

X1.1 - X1.2	X1.7 - X1.8	MARKING FUNCTIONALITY	CONDITION
CONTACT OPEN	CONTACT OPEN	NOT POSSIBLE	SAFE
CONTACT CLOSED	CONTACT OPEN	NOT POSSIBLE	DANGEROUS
CONTACT OPEN	CONTACT CLOSED	NOT POSSIBLE	DANGEROUS
CONTACT CLOSED	CONTACT CLOSED	POSSIBLE	DANGEROUS

Table 6: Enable signals table of conditions

NOTE: The response time is 500ms from the input's switching.

FEEDBACK SAFETY ENABLE SIGNALS

Feedback of EXT_ENABLE_A: pin 1,2,3,4 of Shutter OUT/Enable OUT connector.

Feedback of EXT_ENABLE_B: pin 5,6 of Shutter OUT/Enable OUT connector.

Muting Device

Sub-D, 25 pins, male, with shell.

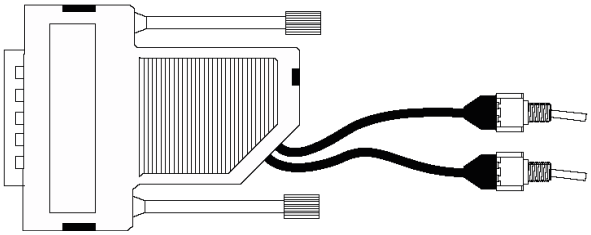


Figure 18: Command Box Muting Device provided

Internal electric diagram

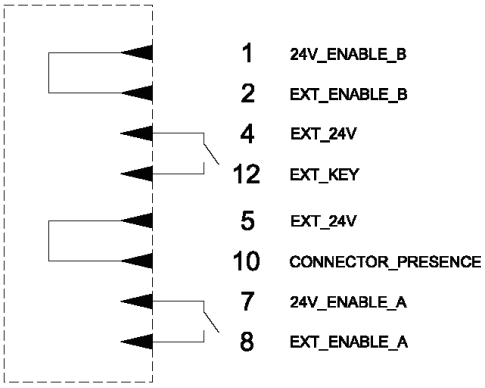


Figure 19: Command Box Muting Device electric diagram

X2 - Axes (I/O Control)

Back panel connector

Plug Sub-D, 25 pins, male.

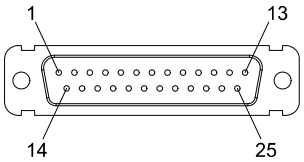


Figure 20: X2 - Axes connector, male panel plug (front view)

PIN	SIGNAL**	TYPE***	DESCRIPTION
X2.1	EXT_24V	Output Power supply	Auxiliary 24V DC power supply available for drive input logical HIGH (max 125mA)
X2.2	OUTPUT_0 (*) or STEP_Y	Digital Output	Generic output or Y-Axis drive step signal (Clock) for axis control (**)
X2.3	OUTPUT_2 (*) or STEP_Z	Digital Output	Generic output or Z-Axis drive step signal (Clock) for axis control (**)
X2.4	OUTPUT_4 (*) or BRAKE X	Digital Output	Generic output or X-Axis electromechanical brake release signal. ON during drive motion
X2.5	OUTPUT_6 (*) or BRAKE Y	Digital Output	Generic output or Y-Axis electromechanical brake release signal. ON during drive motion
X2.6	OUTPUT_8 (*) or BRAKE Z	Digital Output	Generic output or Z-Axis electromechanical brake release signal. ON during drive motion
X2.7	INPUT_0 (*) or ZERO X	Digital Input	Generic input or X-Axis home sensor input. The home search is stopped when this signal goes HIGH
X2.8	INPUT_1 (*) or ZERO Y	Digital Input	Generic input or Y-Axis home sensor input. The home search is stopped when this signal goes HIGH
X2.9	INPUT_2 (*) or ZERO Z	Digital Input	Generic input or Z-Axis home sensor input. The home search is stopped when this signal goes HIGH
X2.10	INPUT_3 (*) or DISABLE X	Digital Input	Generic input or X-Axis disable signal. When HIGH, the corresponding step signal remains in the state prior to activation
X2.11	INPUT_4 (*) or DISABLE Y	Digital Input	Generic input or Y-Axis disable signal. When HIGH, the corresponding step signal remains in the state prior to activation
X2.12	INPUT_5 (*) or DISABLE Z	Digital Input	Generic input or Z-Axis disable signal. When HIGH, the corresponding step signal remains in the state prior to activation
X2.13	GND	Ground	Ground reference
X2.14	OUTPUT_12 (*) or STEP R	Digital Output	Generic output or R-Axis drive step signal (Clock) for axis control
X2.15	OUTPUT_1 (*) or STEP X	Digital Output	Generic output or X-Axis drive step signal (Clock) for axis control
X2.16	OUTPUT_3 (*) or DIR Z	Digital Output	Generic output or Z-Axis drive direction signal
X2.17	OUTPUT_5 (*) or DIR Y	Digital Output	Generic output or Y-Axis drive direction signal
X2.18	OUTPUT_7 (*) or DIR X	Digital Output	Generic output or X-Axis drive direction signal
X2.19	INPUT 9	Digital Input	Generic Input
X2.20	INPUT 8	Digital Input	Generic Input
X2.21	INPUT_7 (*) or ZERO R	Digital Input	Generic input or R-Axis home sensor input. The home search is stopped when this signal goes HIGH
X2.22	INPUT_6 (*) or DISABLE R	Digital Input	Generic input or R-Axis disable signal. When HIGH, the corresponding step signal remains in the state prior to activation
X2.23	OUTPUT_9 (*) or BRAKE R	Digital Output	Generic output or R-Axis electromechanical brake release signal. ON during drive motion
X2.24	OUTPUT_11 (*) or DIR R	Digital Output	Generic output or R-Axis drive direction signal
X2.25	GND	Ground	Ground reference

Table 7: Connector pinout

(*) enabling an axis causes the corresponding control signals to no longer be available as generic inputs/outputs. Refer to Lighter™ user's manual, “Setting the X, Y, Z, and Rotor Axes parameters” to enable/disable Axes and set the Axes properties

(**) see “Axes I/O signals behavior” on page 35

(***) see “Input/Output specifications” on page 31

Encoder

Back panel connector

Socket, M12, 8 pins female. Recommended encoder: incremental Encoder PNP, M12, 8 pins, push/pull outputs AB0 only, 10-30 VDC.

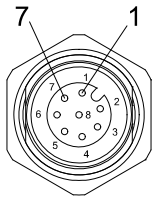


Figure 21: Encoder connector, female panel socket (front view)

PIN	SIGNAL	TYPE*	DESCRIPTION
1	GND	Ground	Ground reference
2	VCC	Power Output	Auxiliary 24V DC power supply (750mA max)
3	ENC_A	Digital input	Encoder HTL A channel signal
4	GND	Ground	Return signal for ENC_A
5	ENC_B	Digital Input	Encoder HTL B channel signal
6	GND	Ground	Return signal for ENC_B
7	RESERVED	-	DO NOT CONNECT
8	RESERVED	-	DO NOT CONNECT
BODY	SHIELD	Shield	Shield

Table 8: Encoder connector pinout

(*) see “Input/Output specifications” on page 31

Photocell

Back panel connector

Socket, M12, 4 pins female. Recommended photocell: Datalogic S51-PA-5-B01-PK; Datalogic S15-PA-5-B01-PK or equivalent.

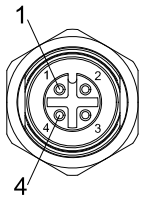


Figure 22: Photocell connector, female panel socket (front view)

PIN	SIGNAL	TYPE*	DESCRIPTION
1	VCC	Power Supply	Auxiliary 24V DC power supply (120mA max)
2	RESERVED	-	DO NOT CONNECT
3	GND	Ground	Ground reference
4	PHOTOCELL	Digital input	PNP photocell signal

Table 9: Photocell connector pinout

(*) see “Input/Output specifications” on page 31

RS232

NOTE: Depending on the system S/N the serial port can be mapped as COM2 or COM3. Contact Datalogic Technical Support for more details (see "Technical Support" on page vi for contact details).

Back panel connector

Plug Sub-D, 9 pins, male.

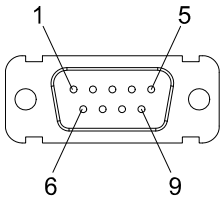


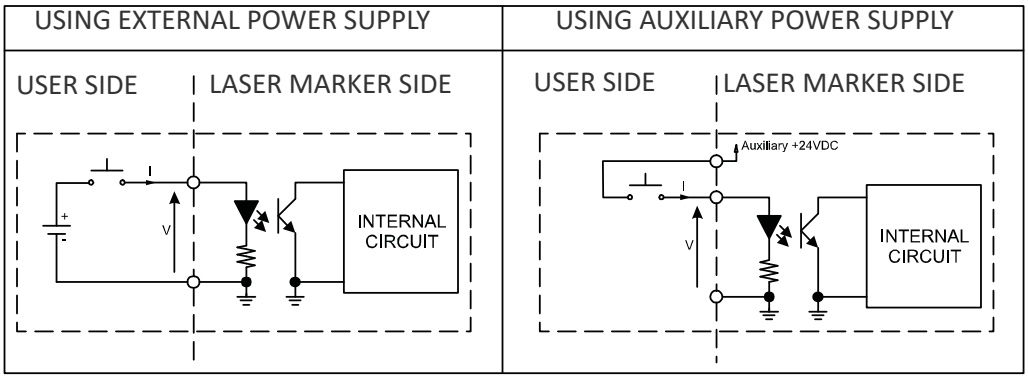
Figure 23: RS232 connector, male panel plug (front view)

PIN	SIGNAL	TYPE	DESCRIPTION
1	DCD	Input	Data Carrier Detect
2	RXD	Input	Receive Data
3	TXD	Output	Transmit Data
4	DTR	Output	Data Terminal Ready
5	GND	Ground	Ground reference
6	DSR	Input	Data Set Ready
7	RTS	Output	Request To Send
8	CTS	Input	Clear To Send
9	RI	Input	Ringing Indicator

Table 10: Standard RS232 connector pinout

INPUT/OUTPUT SPECIFICATIONS

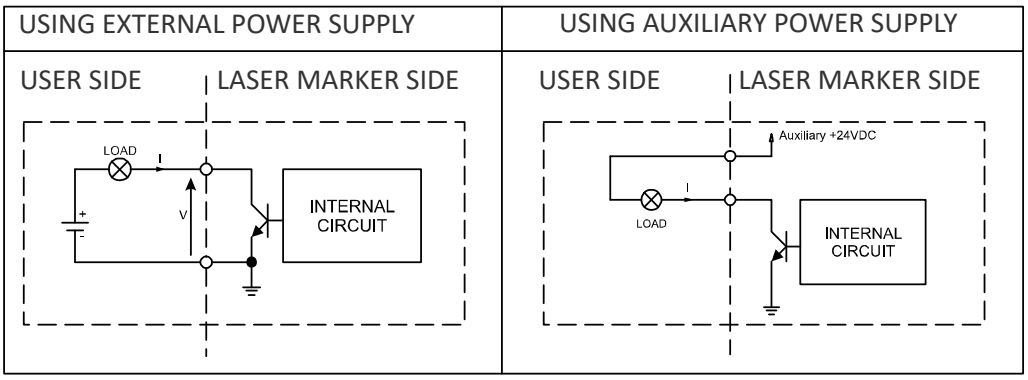
Digital Input



TECHNICAL CHARACTERISTICS			
Type	Optocoupler		
Vmax	28 V DC		
Imax	5 mA @ 24 V DC		
Pulse Width	≥ 1ms (debounce)		
	MIN	TYP	MAX
INPUT Logic LOW	0.0 V DC	0.0 V DC	2.0 V DC
INPUT Logic HIGH	10.0 V DC	24.0 V DC	28.0 V DC

Table 11: Digital Input specification

Digital Output



TECHNICAL CHARACTERISTICS	
Type	Low side driver
Vmax	24 V DC
Imax	250 mA
LOW Level Output	V ≤ 0.5 V DC; I ≤ 250 mA
HIGH Level Output	V ≤ 24 V DC; I ≤ 5 µA

Table 12: Digital Output specification

LASER MARKER STATES

Normal Operation States

STATE	DESCRIPTION	STATUS LED
SYSTEM BOOTING UP	This state occurs since the laser marker is switched on until Laser Engine has been loaded and no errors occurred	 Blinking
WAIT FOR START	In this state the laser marker cannot emit IR lasers radiation and Aiming and Focus beam cannot be activated	 Steady
STANDBY SHUTTER CLOSED	In this state Aiming and Focus beam can be activated while the laser marker cannot emit IR laser radiation	 Steady
READY	In this state the laser marker is able to emit IR laser radiation	 Steady

Error States

STATE	DESCRIPTION	STATUS LED
ERROR	This state occurs if the laser marker detects an error that prevents normal operation	 Blinking

SYSTEM ERROR	DESCRIPTION
INTERLOCK ERROR	This error occurs if the INTERLOCK safety function is ON. To reset the error, set INTERLOCK safety function to OFF and repeat the turning on sequence
CBOX ERROR	This error occurs if the CONNECTOR_PRESENCE signal (pin 10 Command Box connector) is LOW or not connected. To reset the error, set CONNECTOR_PRESENCE signal to HIGH value and repeat the turning on sequence
TEMPERATURE ERROR	This error occurs if the temperature inside the laser marker is out of the operative range. To reset the error, a Laser marker restart is required
BACK REFLECTION ERROR	This error occurs if high optical power is reflected back to the laser source. To reset the error, a Laser marker restart is required
MASTER OSCILLATOR ERROR	This error occurs if the laser source detects an internal failure. To reset the error, a Laser marker restart is required

Warning State

STATE	DESCRIPTION	STATUS LED
WARNING INVALID START SEQUENCE	This state occurs if the turning on sequence has not been followed. To restore normal laser marker operation, repeat the turning on sequence	 Blinking
WARNING LASER WARMUP	This state occurs when the laser marker leaves the interlock error state. The duration of the laser warm-up state is approximately 15 seconds	 Blinking

Control the Laser Marker States

The laser marker states can be controlled by Command Box connector:

STATE	X1 - COMMAND BOX INPUT STATE		STATUS LED
SYSTEM BOOTING UP	EXT_KEY EXT_ENABLE_A EXT_ENABLE_B	LOW LOW LOW	 Blinking
WAIT FOR START	EXT_KEY EXT_ENABLE_A EXT_ENABLE_B	LOW LOW LOW	 Steady
STANDBY SHUTTER CLOSED	EXT_KEY EXT_ENABLE_A EXT_ENABLE_B	HIGH LOW LOW	 Steady
READY	EXT_KEY EXT_ENABLE_A EXT_ENABLE_B	HIGH HIGH HIGH	 Steady

TIMING DIAGRAMS

Turning On sequence

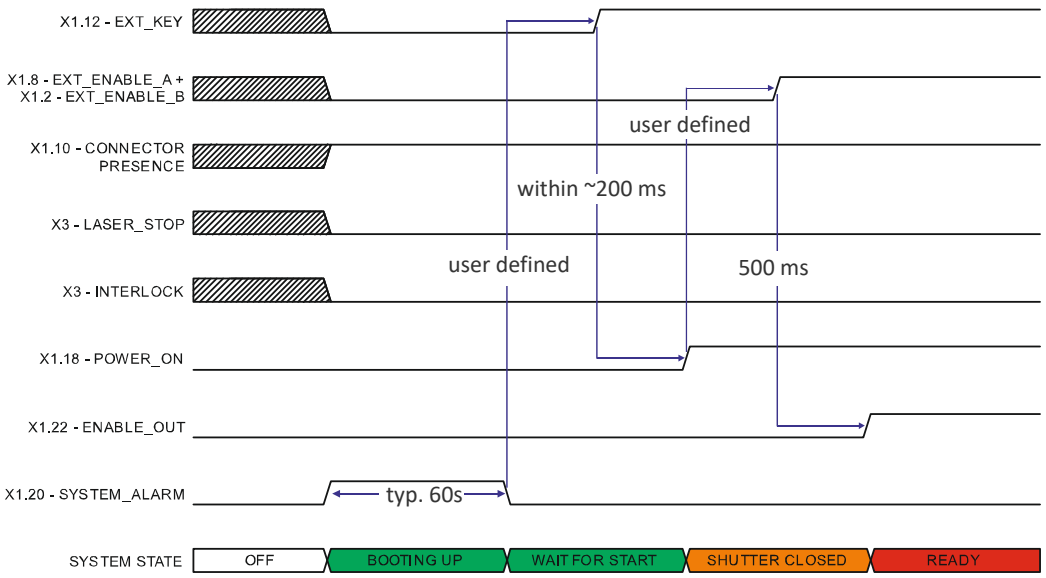


Figure 24: Turning On sequence timing diagram

Marking control signals behavior

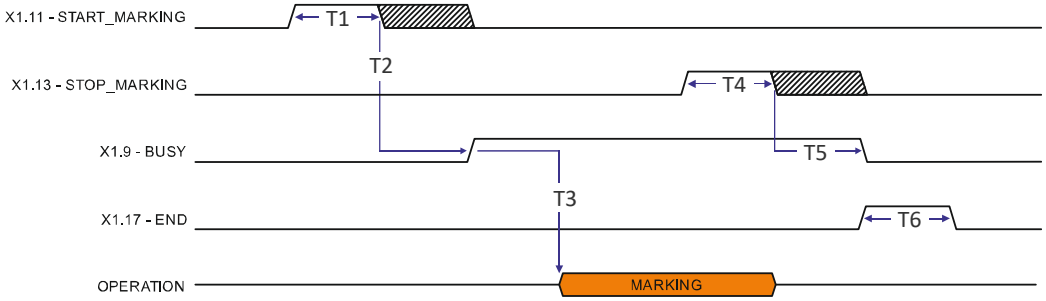


Figure 25: Marking process timing diagram

REF.	NAME	DESCRIPTION
T1	Start Time	Minimum time duration that the START_MARKING signal must have in order to be accepted as a valid START_MARKING event
T2	Start Delay	Delay between the acceptance of the START_MARKING signal and the rising edge of the BUSY signal
T3	Busy Advance	Delay between the rising edge of the BUSY signal and the laser emission
T4	Stop Time	Minimum time duration that the STOP_MARKING signal must have in order to be accepted as a valid STOP_MARKING event
T5	Busy Delay	Delay between the end of the laser emission and the falling edge of the BUSY signal
T6	End Time	Time duration of the END signal

NOTE: Consult Lighter™ software user's manual for a proper use of the same.

ENABLE_OUT behavior

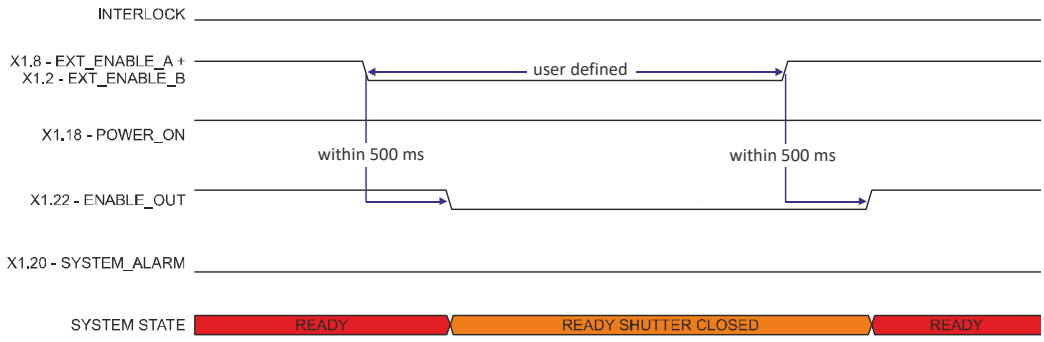


Figure 26: ENABLE_OUT behavior

MARVIS™ I/O SIGNALS BEHAVIOR

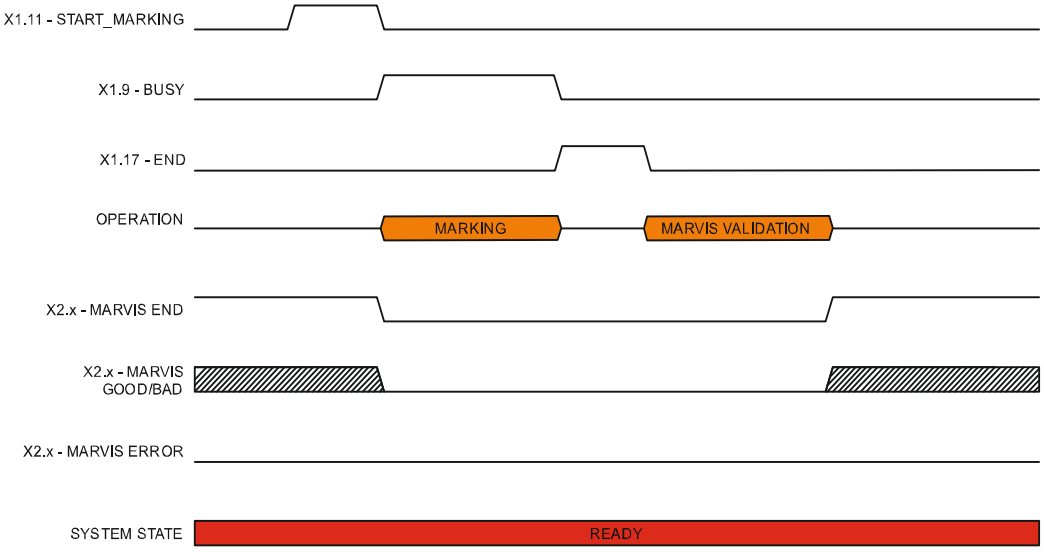


Figure 27: MARVIS™ I/O signals behavior

Axes I/O signals behavior

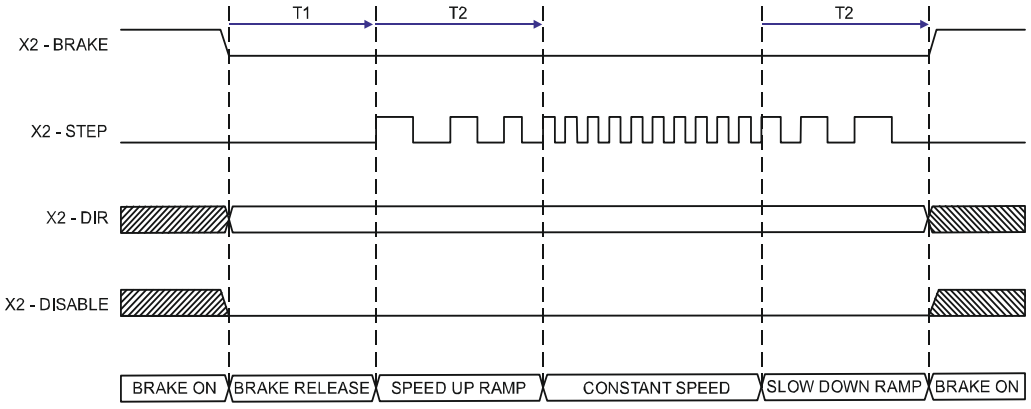


Figure 28: Axes I/O signals behavior

REF.	NAME	DESCRIPTION
T1	Brake release	The time that elapses between the brake release signal activation and the start of mechanical movement
T2	Ramp Time	The time to go from minimum speed (Start speed) to working speed (Speed)

LIGHTER™ SUITE MARKING SOFTWARE

The laser marker is equipped with Lighter™ Suite marking software.

Lighter™ Suite is the all-inclusive editing and laser management software for all Datalogic Laser Marking products.

Lighter™ Suite with its innovative approach focused on the user experience is revolutionizing Laser Marking management; the powerful and simple interface, the flexible and comprehensive customization capabilities and effective production tools represent an important step-ahead in traceability and branding industrial applications.

Lighter™ Suite combines into an unified GUI (Graphical User Interface) a powerful vectorial graphical editor, an advanced laser controller and the innovative MARVIS™ (MArk Read Verify Integrated Solution) feature to seamless interact with AutoID code reader for in-line validation of marked traceability codes.

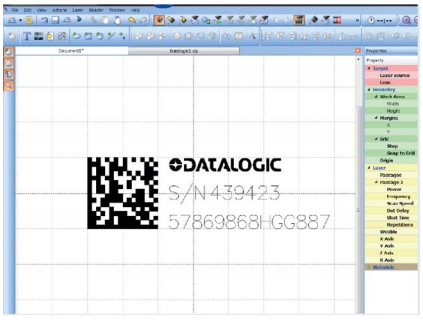
MARVIS™ connects Datalogic MATRIX™ N-series reader with the laser marker, enabling controlling from one single interface and enhancing individual products' performances.

MARVIS™ is also available as update for existing products.

Object-Oriented Configuration

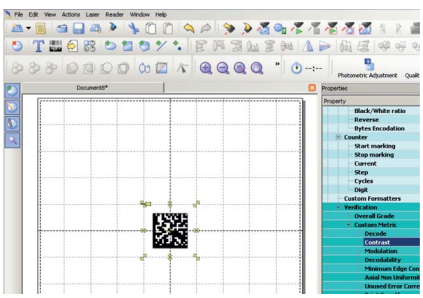
In the Lighter Suite, each object is associated with specific LASER parameters and READER configuration; loading a graphical layout will automatically retrieve and update laser and reader configurations.

Advanced Editing Function



- Easily create, import and edit texts, shapes and logos
- One-click code generator for 1D and 2D symbologies
- Object-related Property Browser for fast adjustment of Marker and Reader parameters
- Imports Bitmap and Vector files (DXF, DWG, PLT, PDF, AI, SVG, BMP, JPG, PNG and TIFF...)
- Advanced filling featured with various laser-optimized patterns

MARVIS™ Integrated Configuration And Setup



- IP address discovery and connection management
- Dedicated Digital output for in-line parts selection
- Dedicated Digital input for deferred reader trigger
- Configurable images storage pool
- New Code Quality Training feature to automatically define code quality threshold from "Golden Sample"
- Patent Pending "Quality Grade Metric Profile" (QGP)

Connectivity

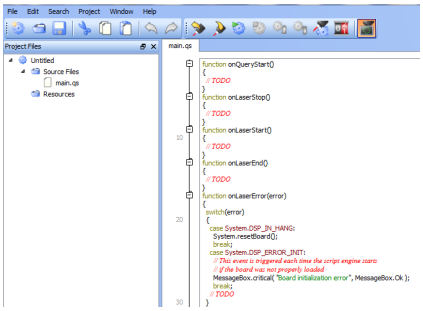
The Lighter™ Suite allows OEMs and Machine builders to develop a complete and cost effective Laser Marking Station, based on embedded hardware and software resources (such as STAND ALONE mode) or to design an advanced Laser Marking Solution able to control machinery over a simple Ethernet connection with a supervisor computer (MASTER-SLAVE mode).

Lighter™ Suite natively embeds TcpServer, Profinet I/O and EtherNet/IP protocols.

Scripting programmability

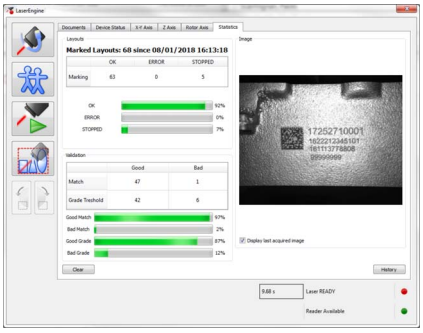
The LIGHTER Suite integrates the IDE (Integrated Development Environment) providing the users with a full set of tools to be used for extremely flexible customization.

The programming language is ECMAScript (also called JavaScript).



- Control the entire marking process
- Create and fully customize marking layout and its content at runtime
- Interact with local or centralized databases
- Create alternative customized interfaces
- Interact with Third Party devices

Runtime Production Statistics and Reports



Built-in validation statistics dashboard.

Configurable log file with Quality Reporting and code images.

CHAPTER 4
SET UP

CONNECTIONS

The laser marker connections are described here below. Follow the operations as described.

Connecting X1 - Command Box connector

The *X1 - Command Box connector* must always be inserted with properly signals provided in order to use the laser marker. The absence of such connector blocks the laser marker operations.

WARNING: If the Command Box Muting Device provided is connected, the laser marker enable is bypassed.

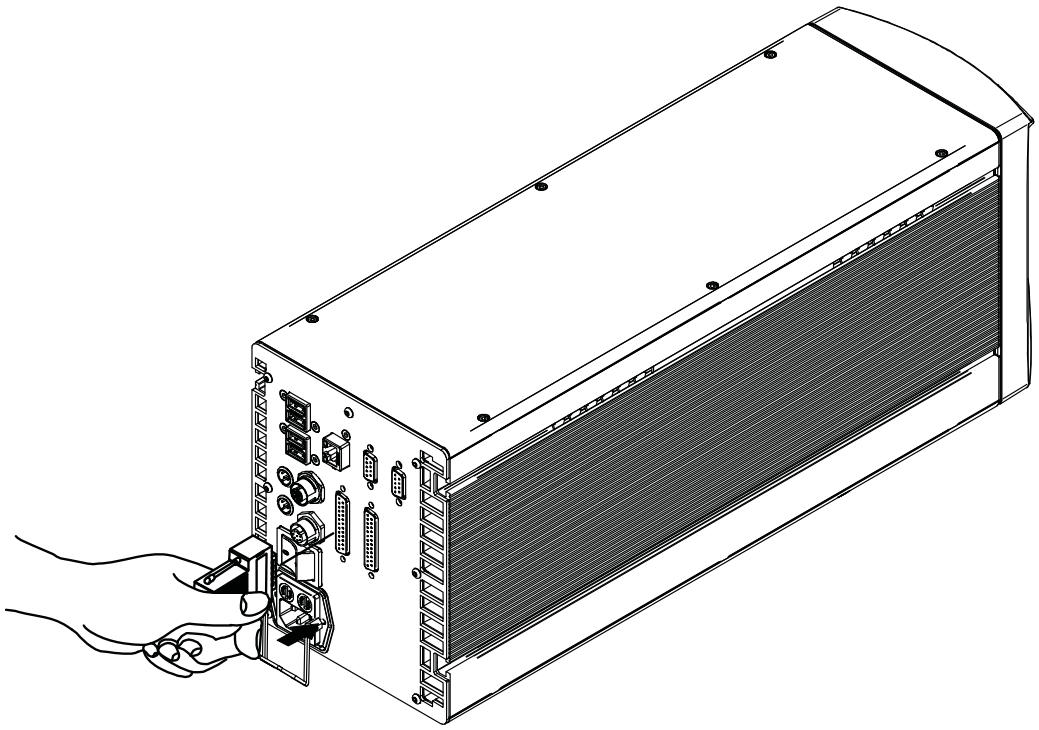


Figure 29: Connecting X1 - Command Box connector

Connecting Interlock connector

The *Interlock connector* must always be inserted with properly signals provided in order to use the laser marker. The absence of such connector blocks the laser emission.

WARNING: Do not use the Interlock Muting Device for external devices, since this will result in loss of the safety function of the machine to which this product is installed.

Do not use the Interlock Muting Device except for maintenance of this product.

WARNING: It is the customer's responsibility to provide a correct integration of the safety signals according to applicable regulations.

NOTE: The interlock connector implements the double and redundancy safety interlock (EN60825 compliant).

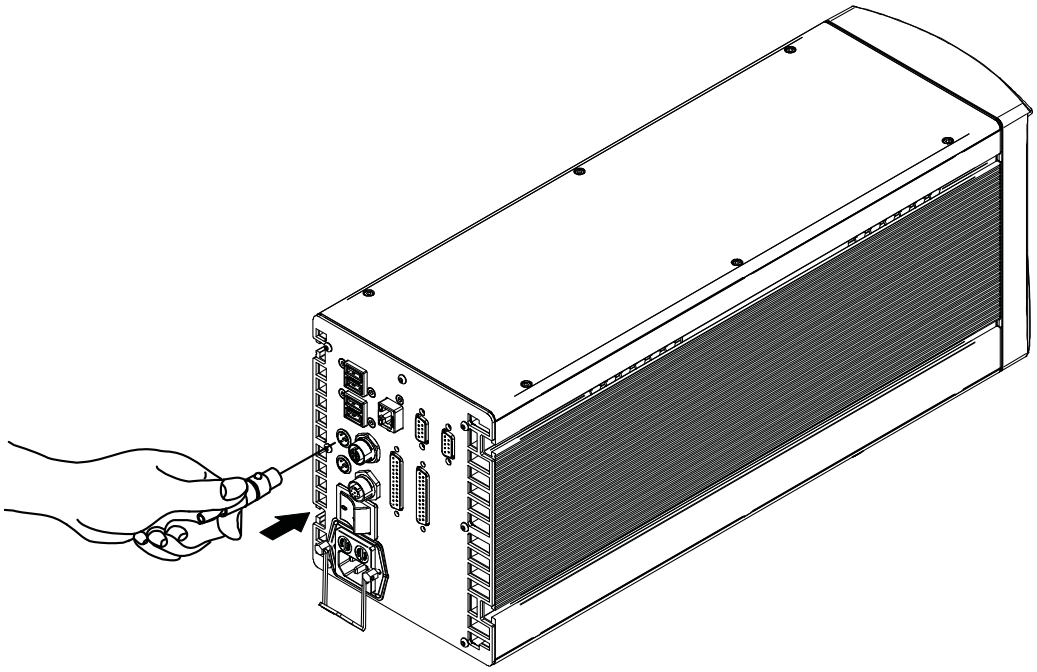


Figure 30: Connecting Interlock connector

Connecting Power Supply cable

Connect the Power Supply cable using the cord retention system.

NOTE: Lock the plug with the retaining clamp to avoid accidental disconnection.

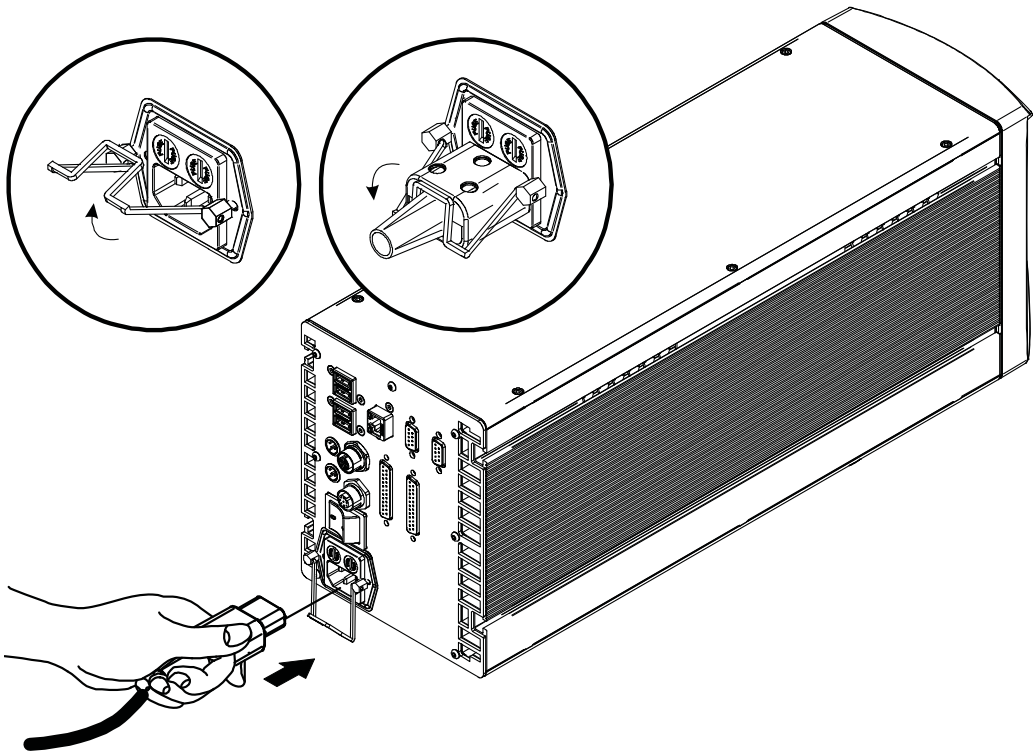


Figure 31: Connecting Power Supply cable

Local Mode Control connections

To use the laser marker in “Local Mode Control” it is necessary to install a mouse, keyboard and monitor. Connect the monitor and input devices to laser marker as shown below:

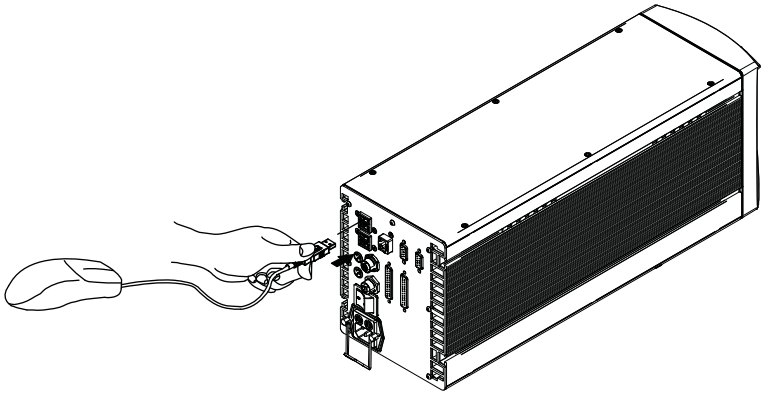


Figure 32: Connecting the mouse

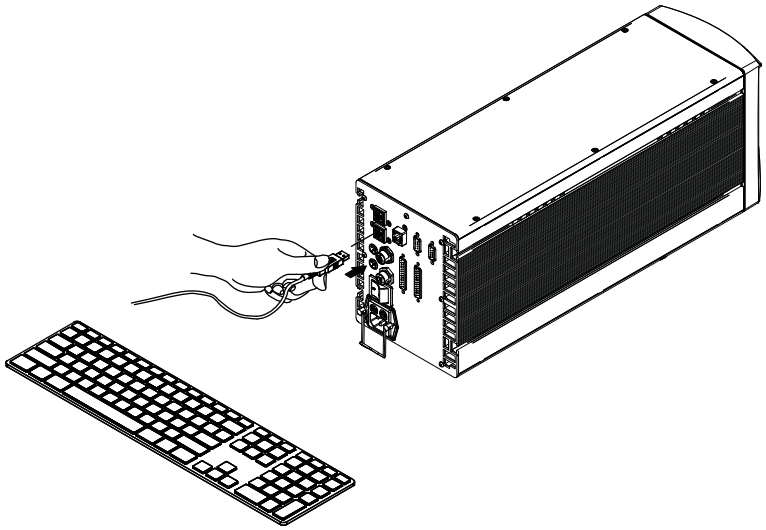


Figure 33: Connecting the keyboard

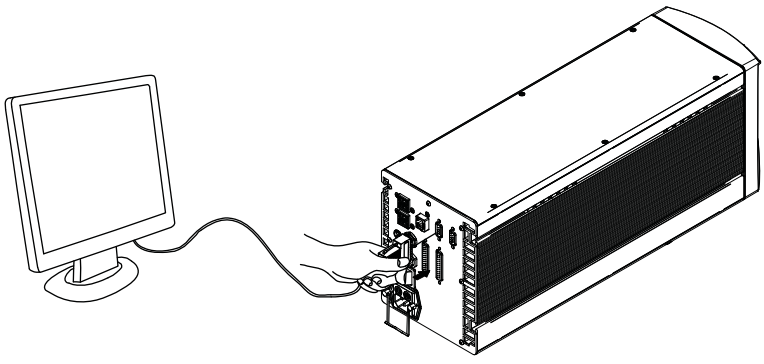


Figure 34: Connecting the monitor

NOTE: Minimum monitor resolution 800 x 600 (VGA standard).

Remote Mode Control connection

To use the laser marker in “Remote Mode Control” it is necessary to connect a network cable:

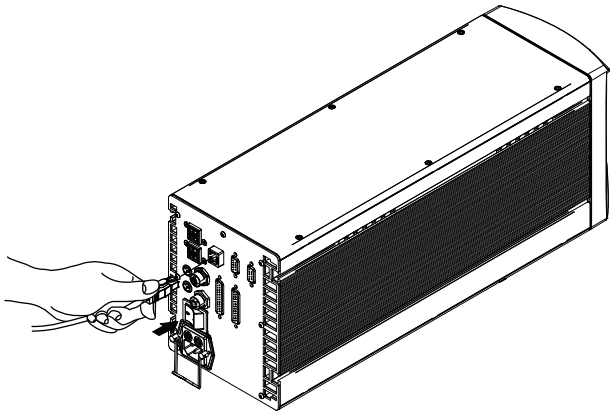


Figure 35: Connecting LAN port

NOTE: The LAN port is configured by default with a fixed IP Address and Subnet Mask:

- LAN 1 Default IP address: 192.168.1.10

- Default Subnet Mask: 255.255.255.0

See “Change the LAN configuration and IP address” on page 55 in order to change LAN configuration.

NOTE: Ethernet TCP/IP 10, 100 Mbit.

F-THETA SCAN LENS PROTECTION CAP REMOVAL

Remove the F-Theta scan lens protection cap before marking operation:

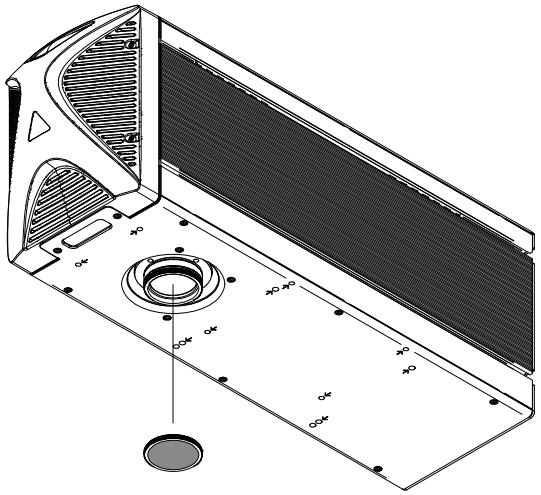


Figure 36: F-Theta scan lens protection cap removal

CAUTION: Marking with the lens protection cap in place could result in damage to the laser marker.

CHAPTER 5
USE AND OPERATION

Before turning on the laser marker, be sure that the laser marker is connected as previously described. Check the presence of:

- Voltage power supply connection
- Interlock connection
- X1 - Command Box connection

WARNING: Do not use the Interlock Muting Device for external devices, since this will result in loss of the safety function of the machine to which this product is installed.

Do not use the Interlock Muting Device except for maintenance oh this product.

WARNING: It is the customer's responsibility to provide a correct integration of the safety signals according to applicable regulations.

TURNING ON SEQUENCE

Turn ON the main power supply switch in the back of the laser marker. The laser marker turn on and goes in *BOOTING-UP* state. During booting up state, the status LED blink green:

STATE	X1 - COMMAND BOX INPUT STATE		STATUS LED
SYSTEM BOOTING UP	EXT_KEY	LOW	 Blinking
	EXT_ENABLE_A	LOW	
	EXT_ENABLE_B	LOW	

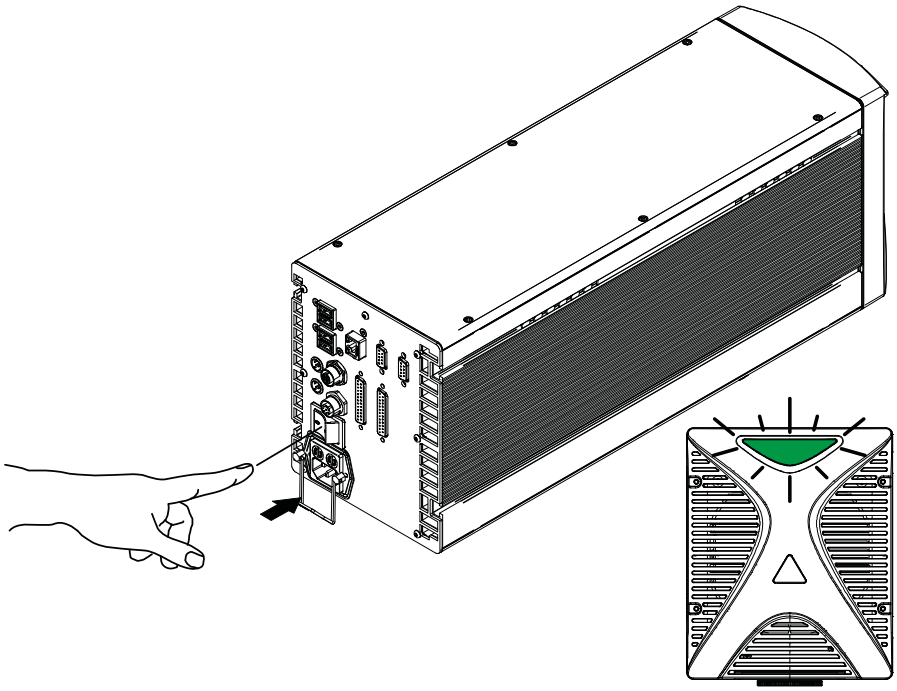


Figure 37: Power on the laser marker

Wait until booting-up finish: the status LED is steady green. The laser marker is in *WAIT FOR START* state.

STATE	X1 - COMMAND BOX INPUT STATE		STATUS LED
WAIT FOR START	EXT_KEY	LOW	 Steady
	EXT_ENABLE_A	LOW	
	EXT_ENABLE_B	LOW	

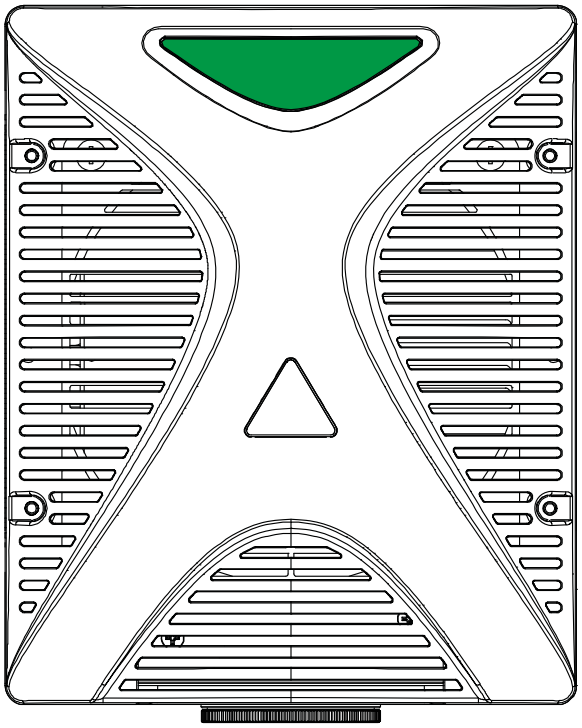


Figure 38: Waiting for start state

Set the Command box input signals as in the table below:

STATE	X1 - COMMAND BOX INPUT STATE		STATUS LED
STANDBY SHUTTER CLOSED	EXT_KEY	HIGH	 Steady
	EXT_ENABLE_A	LOW	
	EXT_ENABLE_B	LOW	

The status LED is steady orange. The laser marker is in *STANDBY SHUTTER CLOSED* state.

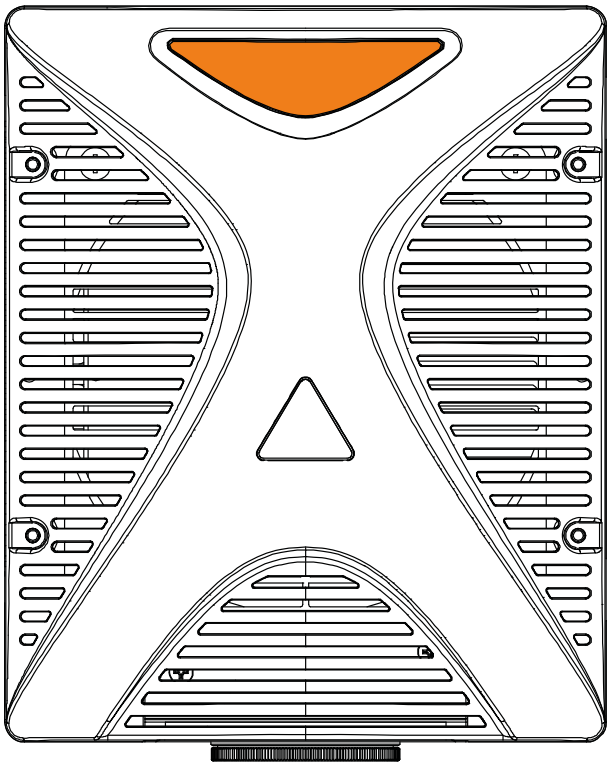


Figure 39: Standby Shutter Closed state

Set the Command box input signals as in the table below:

STATE	X1 - COMMAND BOX INPUT STATE		STATUS LED
READY	EXT_KEY	HIGH	 Steady
	EXT_ENABLE_A	HIGH	
	EXT_ENABLE_B	HIGH	

The status LED will turn red. The laser marker is in *READY* state.

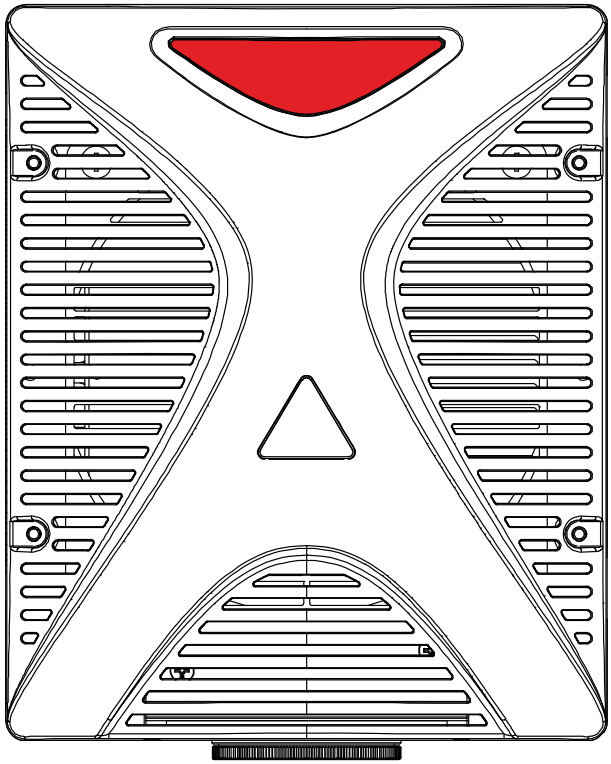


Figure 40: Ready state

CHAPTER 6
CUSTOMIZE THE LASER MARKER SOFTWARE

SYSTEM PROTECTION

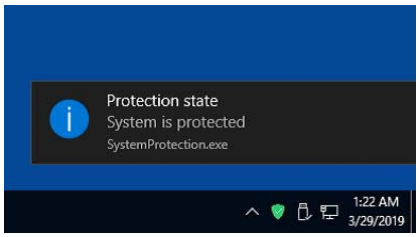
The System Protection enhances the security of the system against disk corruption that might be caused by unexpected system shutdowns or malware attacks and protects the **C:\ drive** from unwanted changes.

When the System Protection is enabled, any change or deletion on the C:\ drive will be restored after system reboot, otherwise when the System Protection is disabled any modification will be stored on the disk and it will persist after reboot.

System Protection Tool

The System Protection tool shows the status of the System Protection and is visible on the tray-bar icon in the lower- right corner of the screen.

A notification popup message that shows the status of System Protection is still visible on the screen for a few seconds after system startup.



The tray-bar icon color represents the protection state:

- **Red**: the system protection is **disabled**
- **Green**: the system protection is **enabled**
- **Yellow**: the system **must be rebooted** to apply the new settings

How to use the System Protection tool

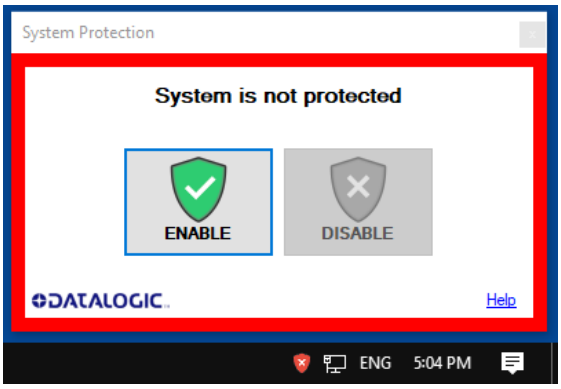
The System Protection tool GUI can be opened:

- By clicking on the notification popup
- By right-clicking the tray-bar icon then, “Configure”
- Double-clicking the tray-bar icon
- From *Start Menu\Datalogic\System Protection*

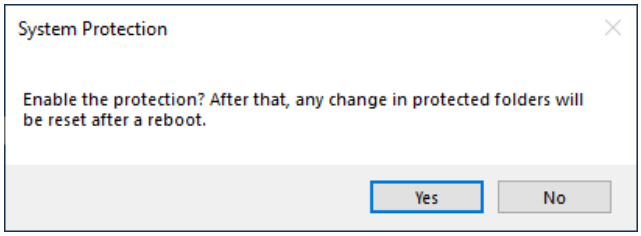
Enable the system protection

NOTE: When the System Protection is enabled any change or deletion on the C:\ drive will be restored after system reboot.

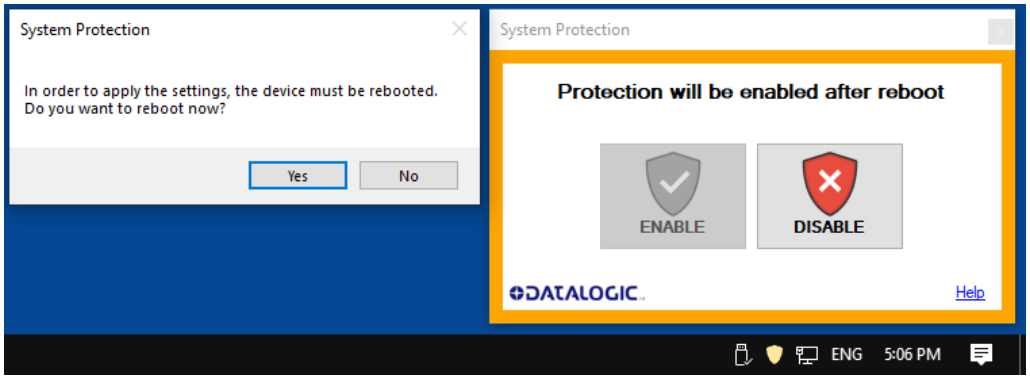
- Open the System Protection tool GUI
- Click the **ENABLE** button



- A message advise the User to confirm the new setting. Press **YES** to enable System Protection



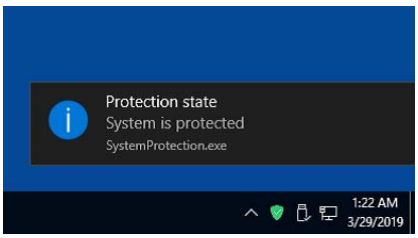
- A message advise the User that the system will be rebooted. Press **YES** to continue



- Wait for system reboot

CAUTION: DO NOT turn OFF or UNPLUG the system while Windows® is shutting down.

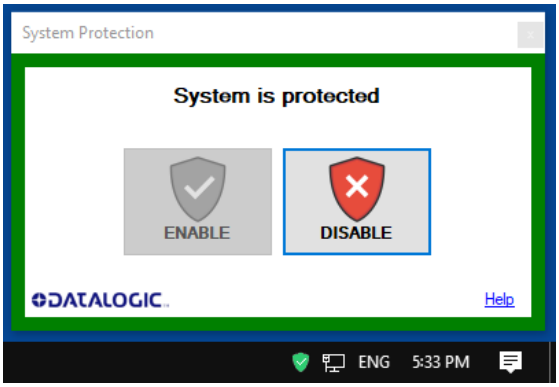
- Check if the Tray-bar icon color is **GREEN** (protection enabled)



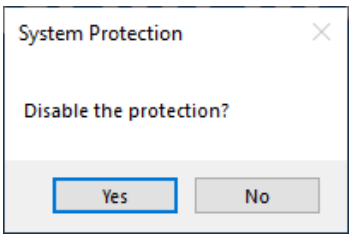
Disable the system protection

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks. Disable the protection only for the time necessary to make disk changes.

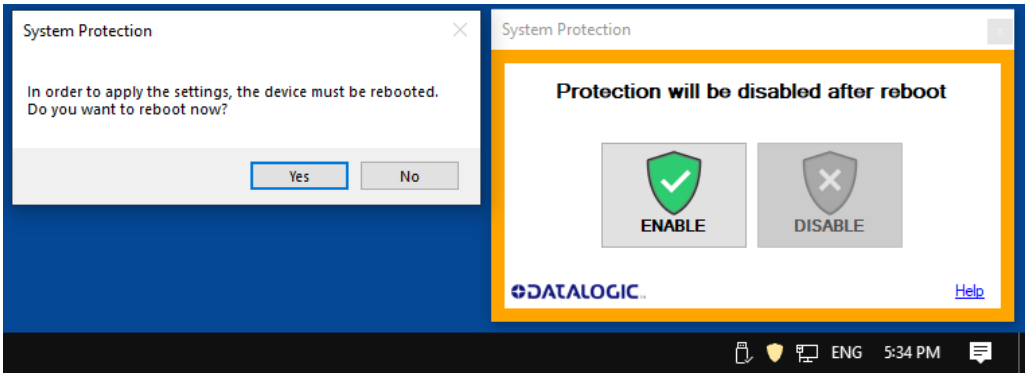
- Open the System Protection tool GUI
- Click the **DISABLE** button



- A message advise the User to confirm the new setting. Press **YES** to disable System Protection



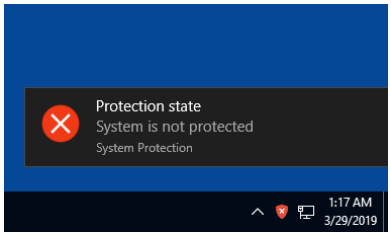
- A message advise the User that the system will be rebooted. Press **YES** to continue



- Wait for system reboot

CAUTION: DO NOT turn OFF or UNPLUG the system while Windows® is shutting down.

- Check if the Tray-bar icon color is **RED** (protection disabled)



CHANGE O.S. LANGUAGE AND KEYBOARD LAYOUT

The laser marker allows you to customize the operating system changing the language used in menus, dialogs and languages you can use to enter text and keyboard layout.

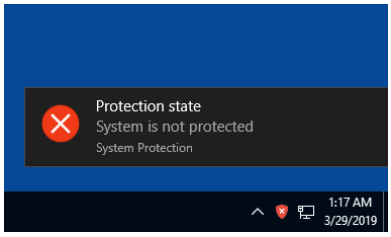
The following languages are pre-installed in the system: Chinese (PRC), Chinese (Taiwan), English (United States), French (France), German (Germany), Italian (Italy), Japanese (Japan), Korean (Korea), Spanish (Spain).

NOTE: In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the laser marker (see "Local Mode Control connections" on page 57).

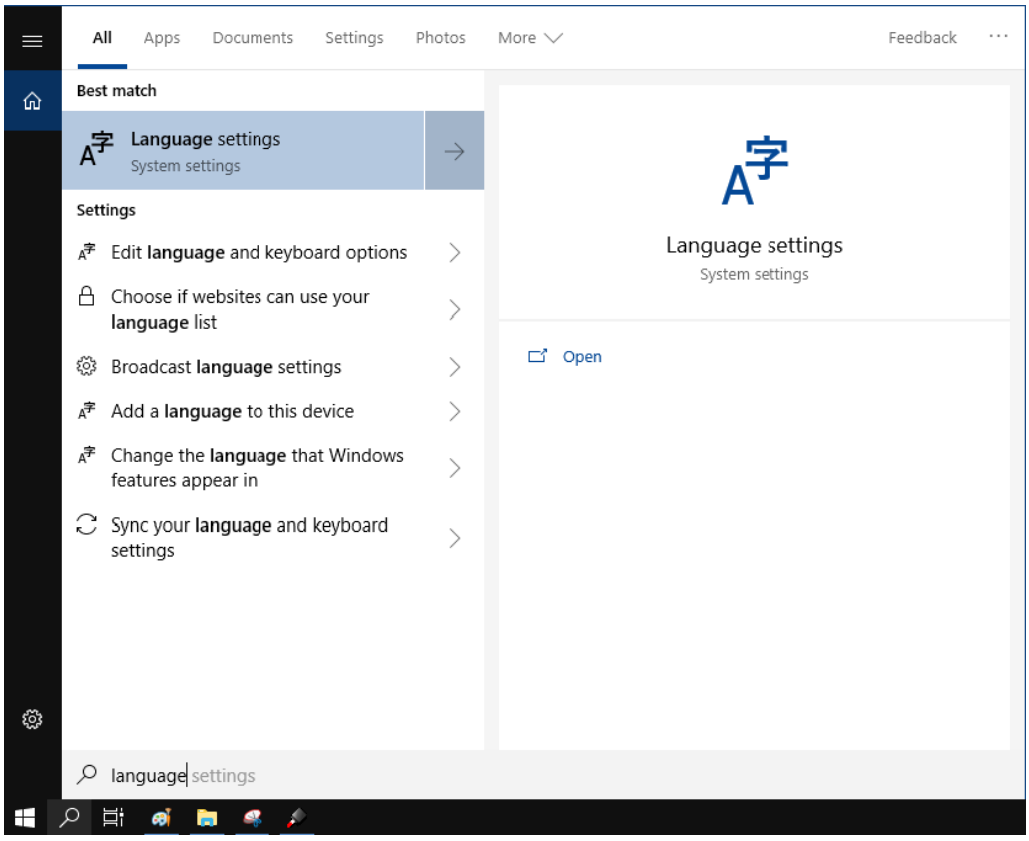
1. Disable system protection (see "Disable the system protection" on page 51)

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks. Disable the protection only for the time necessary to make disk changes.

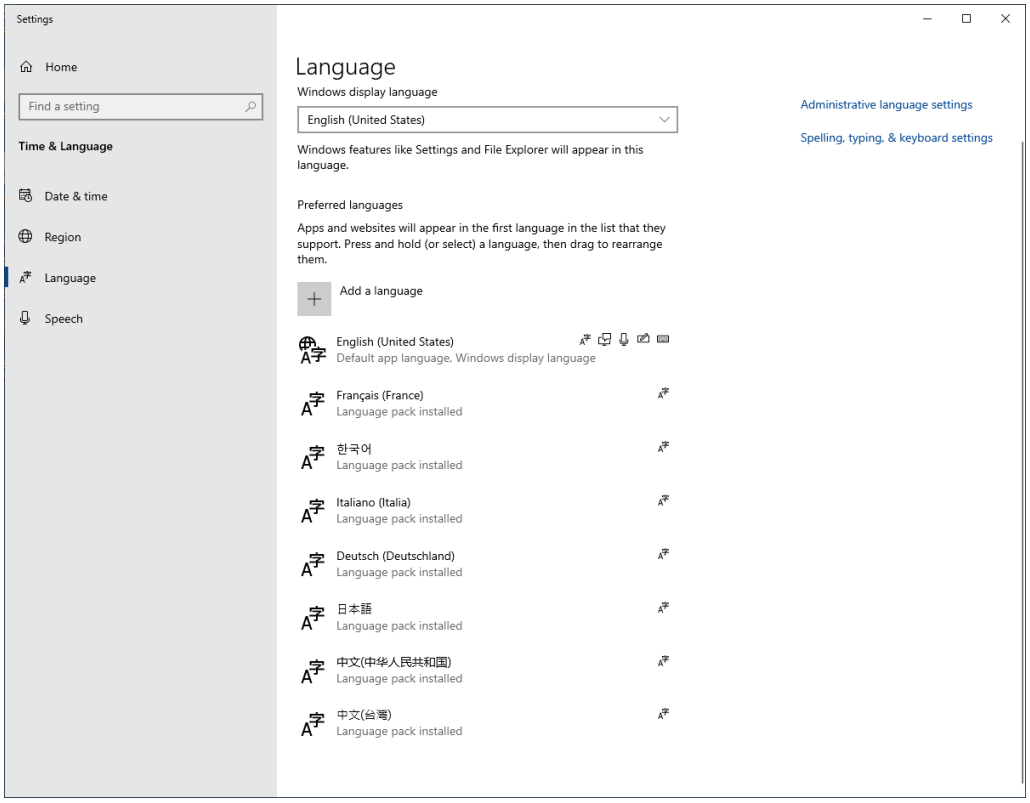
2. Wait for the operating system to **restart**
3. Check that the System Protection is **disabled** (red icon):



4. Click the **Search icon** and type "**language**"
5. Click on **Language settings**

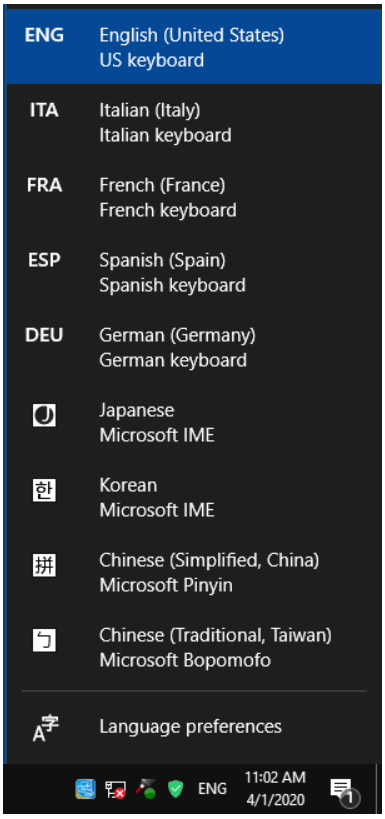


6. Select the Windows display language:



7. Click on the **Input Indicator** icon in the taskbar

8. Select the **keyboard layout** from the list:



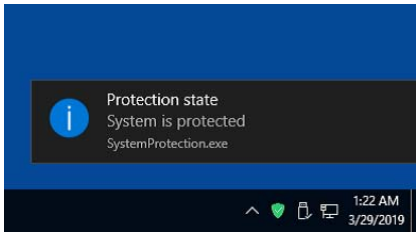
9. Close all the open windows

10. Enable system protection (see “Enable the system protection” on page 49)

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks.

11. Wait for the operating system to **restart**

12. Check that the System protection is **enabled** (green icon):



CHANGE THE LAN CONFIGURATION AND IP ADDRESS

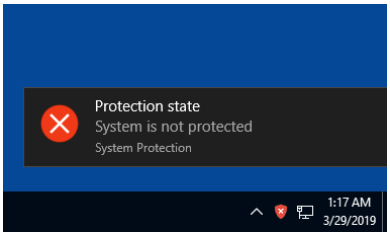
The operating system allows you to change the LAN configuration and IP address.

NOTE: In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the laser marker (see "Local Mode Control connections" on page 41).

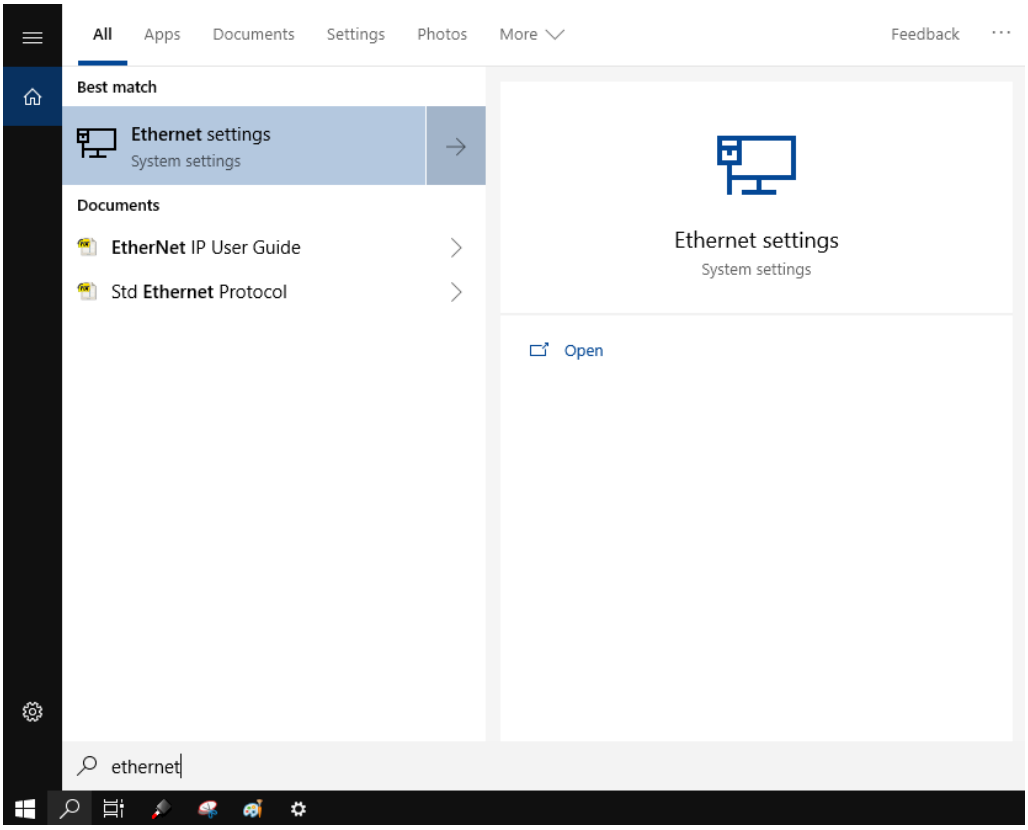
1. Disable system protection (see "Disable the system protection" on page 51)

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks. Disable the protection only for the time necessary to make disk changes.

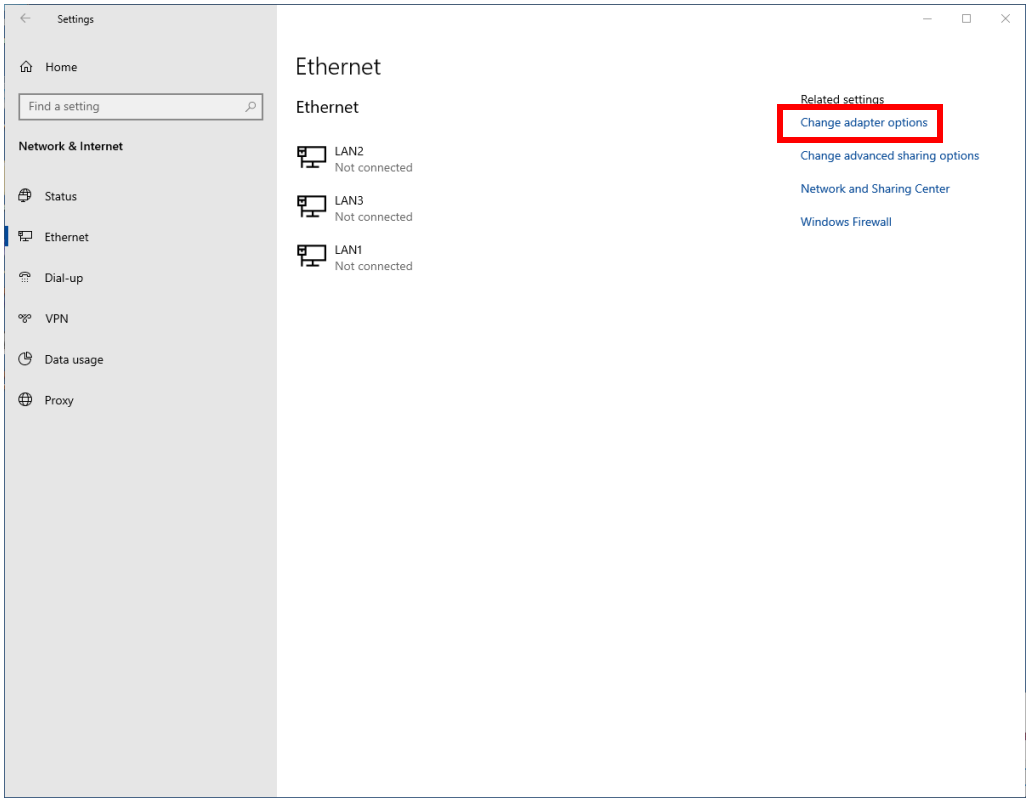
2. Wait for the operating system to **restart**
3. Check that the System protection is **disabled** (red icon):



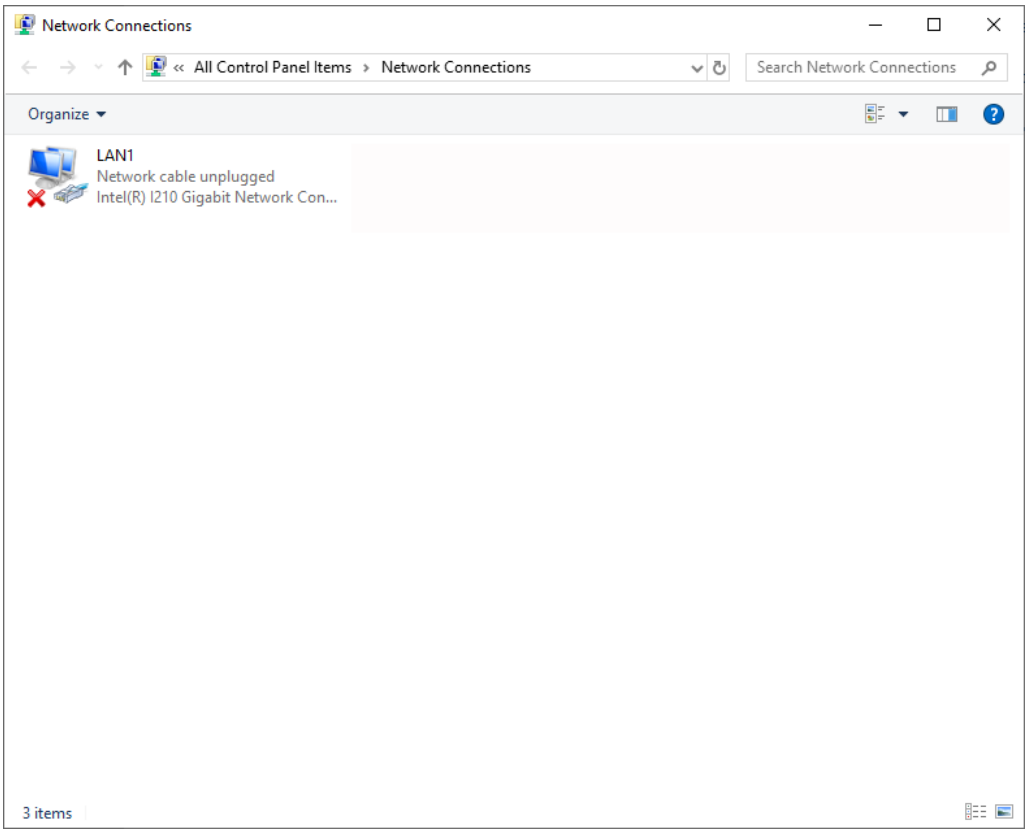
4. Click the **Search icon** and type "**Ethernet**"
5. Click on **Ethernet settings**



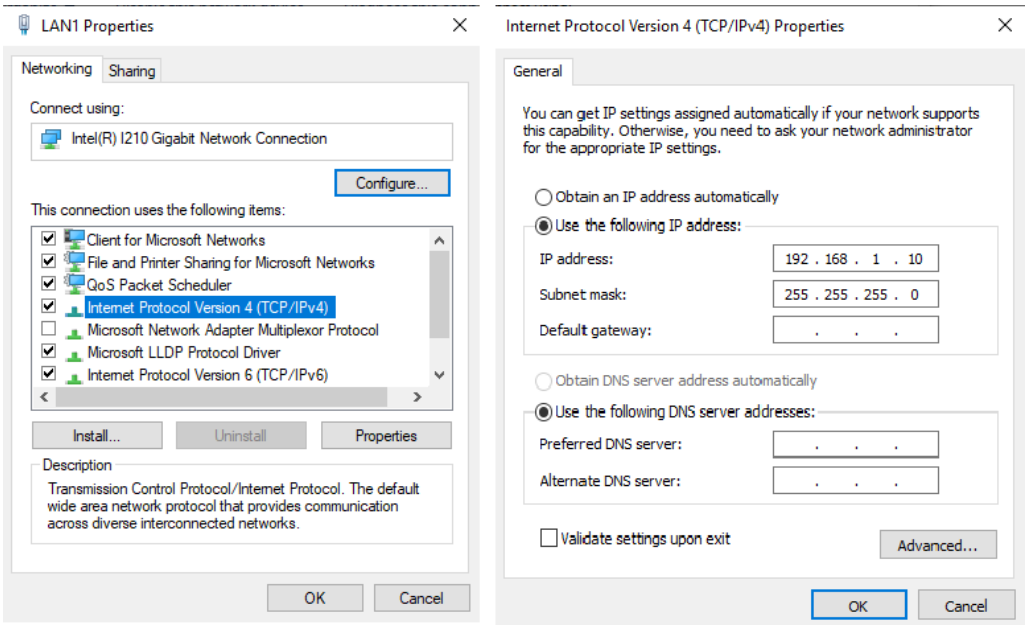
6. Click on **Change adapter options**



7. In the Network Connections window double click on the desired Network icon:



8. In the Network Properties window double click on **Internet Protocol Version 4 (TCP/IPv4)** and edit the IP address and/or subnet mask.



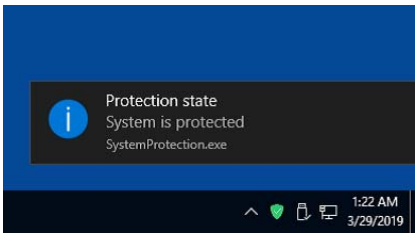
9. Close all the open windows

10. Enable system protection (see “Enable the system protection” on page 49)

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks.

11. Wait for the operating system to **restart**

12. Check that the System protection is **enabled** (green icon):



CHANGE THE VIDEO SETTING

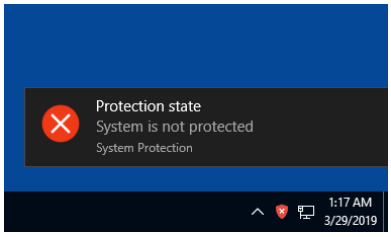
The operating system allows you to change the Video setting.

NOTE: In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the laser marker (see “Local Mode Control connections” on page 41).

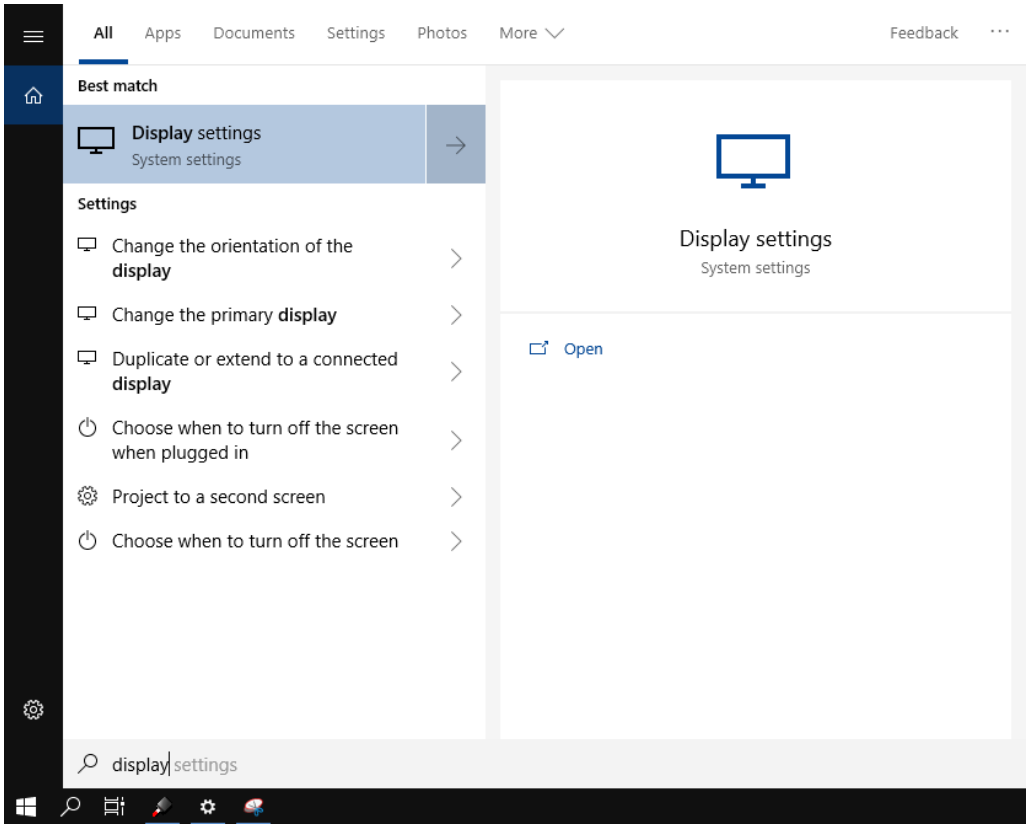
1. Disable system protection (see “Disable the system protection” on page 51)

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks. Disable the protection only for the time necessary to make disk changes.

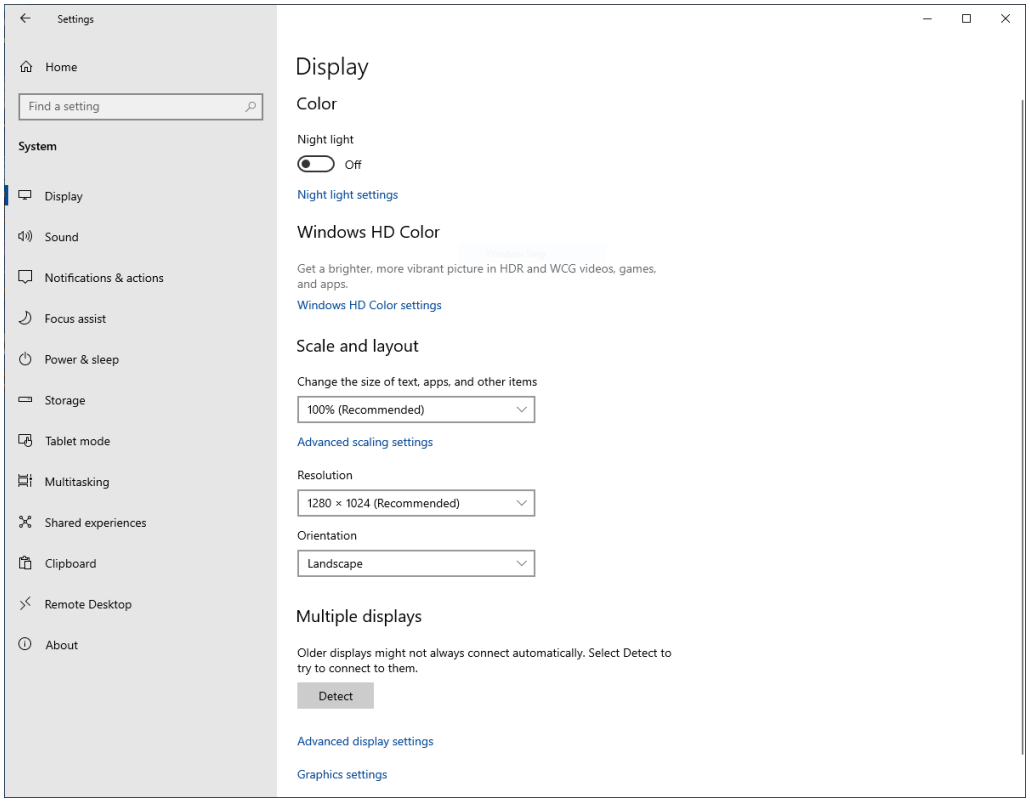
2. Wait for the operating system to **restart**
3. Check that the System protection is **disabled** (red icon):



4. Click the **Search icon** and type “**display**”
5. Click on **Display settings**



6. Change the Display settings



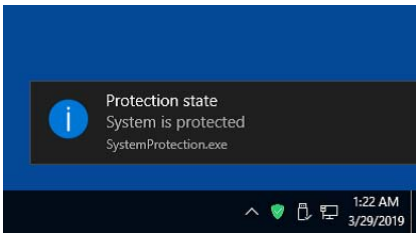
7. Close all the open windows

8. Enable system protection (see “Enable the system protection” on page 49)

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks.

9. Wait for the operating system to **restart**

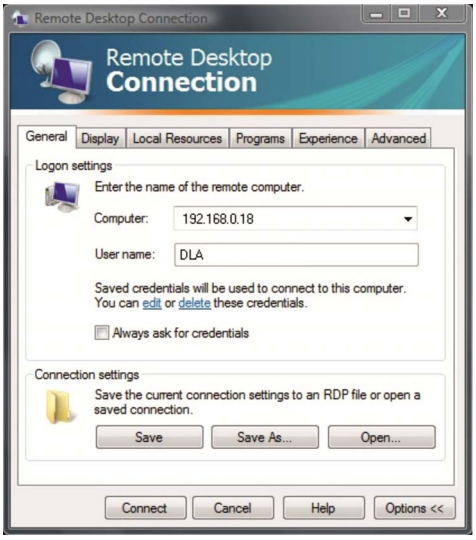
10. Check that the System protection is **enabled** (green icon):



REMOTE DESKTOP CONNECTION

To connect the laser marker to a remote Windows® based computer, follow these steps:

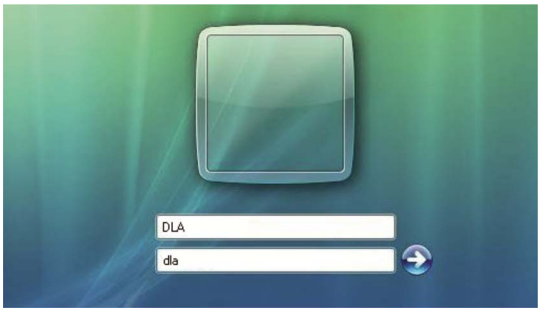
1. Turn on the laser marker
2. Make sure that both laser marker and remote computer are connected to the LAN
3. On the remote computer click **Start > All Programs > Accessories**, and then click **Remote Desktop Connection**
4. Click **Options**
5. In the Computer list, type the host name or the IP address of the computer to which you want to connect
6. Type the user name, password, and domain (if applicable) of an account to which you have allowed remote access into the corresponding boxes, and then click **Connect**



7. In the **Log On to Windows®** dialog box that appears, type the password of the account with remote access privileges into the Password box:

   User name: **DLA**

   Password: **dla**



8. In the **Log on to** list, if applicable, select the domain or remote computer that you want, and then click **OK**.
   The Laser Marker desktop is displayed in a window on the desktop. The Laser Marker computer is locked during this session
9. To disconnect the session, click the **Close** button in the session window, and then click **OK** when you are prompted to disconnect the Windows® session.

CHAPTER 7
ACCESSORIES

The accessories listed here below are described for information purposes only, and are not necessarily included in the packaging. The minimum contents of the packaging include the main hardware, cables and keys. For additional information, please see "Contents of the packaging" on page 10.

CONTROL BOX

This accessory is used to control the laser marker through the Control Box interface.

The Control Box allows to perform the following functions:

- Changing laser marker state
- Starting and Stopping the marking process
- Showing the marking process state
- Showing the system error state

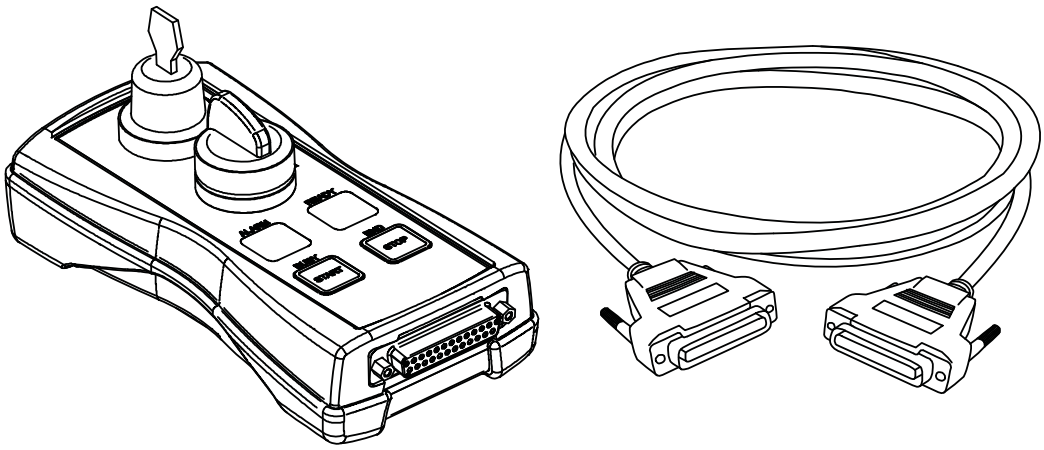


Figure 41: Control Box (ordering no: 985330031)

NOTE: See "X1 - Command Box (Laser Control)" on page 25 **for detailed control signal description.**

REMOTE START FOOT SWITCH

This accessory is used to provide the *START_MARKING* signal to the laser marker when the pedal is pressed by the operator.

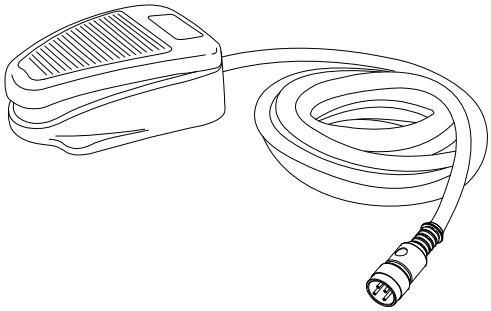


Figure 42: Remote Start Foot Switch (ordering no: 985350035)

NOTE: Refer to Remote Start Foot Switch instruction manual for more information.

I/O INTERFACE

Dedicated to on-site quick and easy termination, PLC interfacing, System Test, I/O troubleshooting, etc. The DB25 Pass-through Command Box connector allows the integrator to use the interface as a I/O test tool on previously installed products.

- I/O Monitoring LED
- Easy assembly thanks to screw down termination
- Dry contact outputs
- Dry contact inputs
- DIN rail mounting enclosure

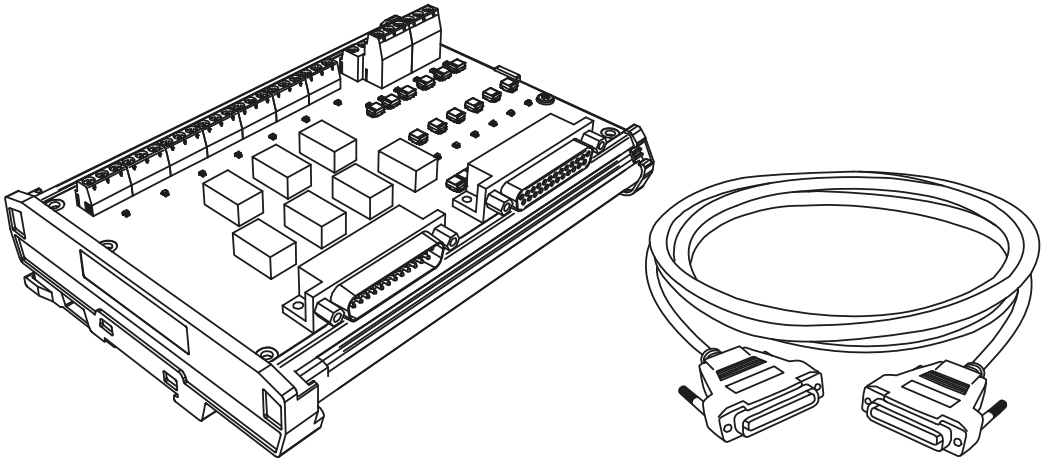


Figure 43: I/O interface (ordering no: 985330032)

NOTE: Refer to I/O Interface instruction manual for more information.

DB25-TO-FREE LEADS CABLE

This accessory allows an easier integration of the laser marker: the Command Box connector signals are all available on the free leads side of the cable, labeled with cable tags.

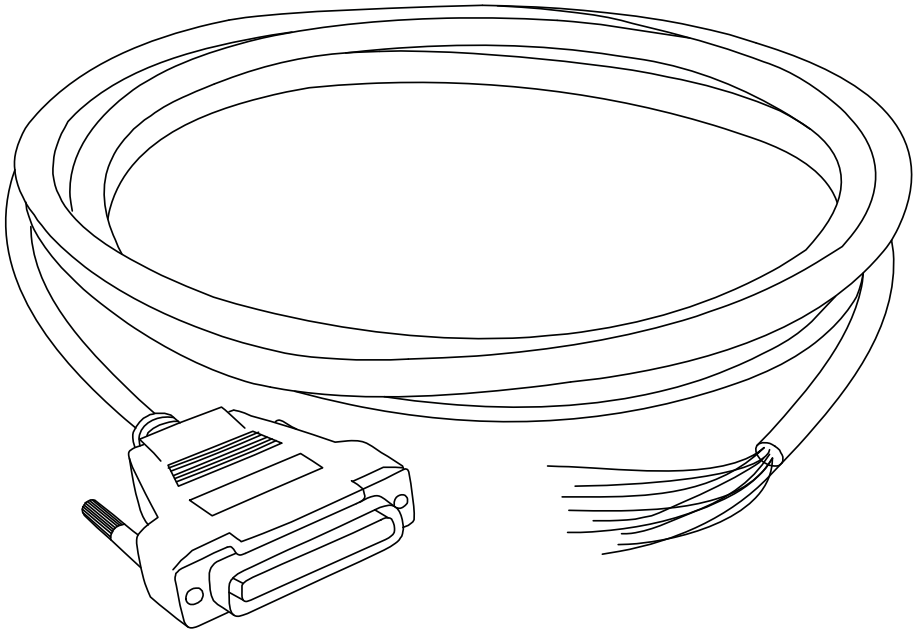


Figure 44: DB25-to-free leads cable (ordering no. 985350032)

MARVIS™ ADD-ON

MARVIS™ is the most advanced MARK and VALIDATE solution for traceability. The innovative Code Quality Training dramatically simplifies setup in a real production environment. The MARVIS™ Add-on for UniQ™ includes:

- MATRIX™ 300N reader
- Power & signals cable
- Ethernet cable
- MARVIS™ license

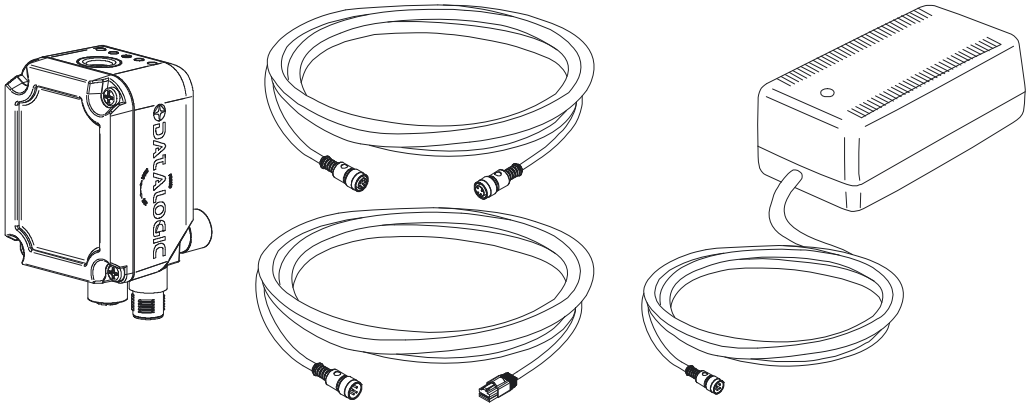


Figure 45: MARVIS™ Add-on for UniQ (ordering no: 937600123)

NOTE: Refer to MARVIS™ Application Note for more information.

MARVIS™ Mounting Bracket UniQ M300N

This accessory is used to properly fix the MATRIX™-N and the MARVIS™ LED Ring Light ID 50mm - White to the scan head in a MARVIS™ application (suitable for F160S and F254S F-Theta scan lens).

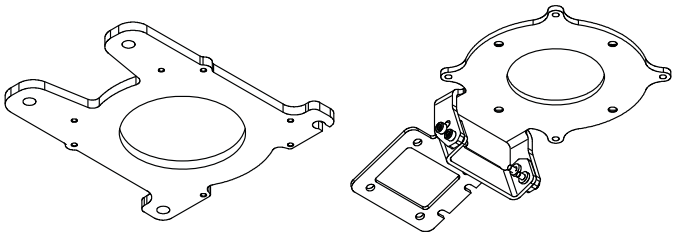


Figure 46: MARVIS™ Mounting Bracket UniQ M300N (ordering no: 93ACC1915)

MARVIS™ LED Ring Light ID 50mm - White

This accessory is used as external illuminator in MARVIS™ application (suitable for F160S and F254S F-Theta scan lens).

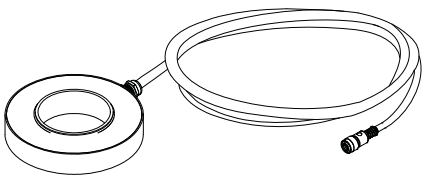


Figure 47: LED Ring Light ID (ordering no: 93A051394)

FUME EXTRACTOR

This accessory is suitable for collecting and filtering dry and non combustible types of dust contained in non explosive air mixtures produced during laser marking.

MODEL	ELECTRICAL DATA	HOSE / NOZZLE
985340038 - FUME EXTRACTOR BASIC 230VAC	230 VAC, 1 phase, @ 50 Hz (EU)	50-50 mm hose, length 4 m. 50 mm nozzle assembly
985340040 - FUME EXTRACTOR BASIC 115VAC	115 VAC, 1 phase, @ 60 Hz (US)	50-50 mm hose, length 4 m. 50 mm nozzle assembly
985340039 - FUME EXTRACTOR PRO 90-257VAC	90 - 257 VAC, 1 phase, @ 50-60 Hz	75-50 mm hose, length 4 m. 50 mm nozzle assembly

CHAPTER 8
TECHNICAL SUPPORT

SEALS

The laser marker has seals in some areas. The seals must not be broken or removed for any reason. The sealed parts may be opened only and exclusively by Datalogic. Breaking these seals voids the warranty on the entire laser marker.

CAUTION: If customer breaks or removes the seals placed by Datalogic on the laser marker the warranty will immediately become “null and void”.

CAUTION: Datalogic shall not be held liable for any non-conforming use of the laser marker.

It is forbidden to operate the laser marker before the machine where it is integrated has been declared in conformance with applicable statutory Directives.

CAUTION: Only Datalogic authorized personnel, who have been trained and instructed on the electrical and optical risks, is allowed to access the internal parts of the laser marker.

Datalogic shall not be held liable for any damage caused by inadequate work from non-authorized personnel.

MAINTENANCE

The ordinary maintenance program of the laser marker includes only simple operations. Some operations consist in a mere “check” of the operating condition.

The maintenance activities must be done in compliance with the legal directives regarding the safety rules during these operations.

The following parts/functions have to be controlled periodically:

COMPONENT	TYPE OPERATION	INTERVALS
F-Theta Scan Lens	Check / Clean	Weekly: wipe gently with a dry cloth (or soaked in high purity isopropyl alcohol) or clean it with dry air blowing
Main Fan (120 mm)	Clean	Every 3 months (according to the environment and frequency of use)

CAUTION: Disconnect AC power cable before starting any maintenance operations.

F-Theta scan lens cleaning procedure

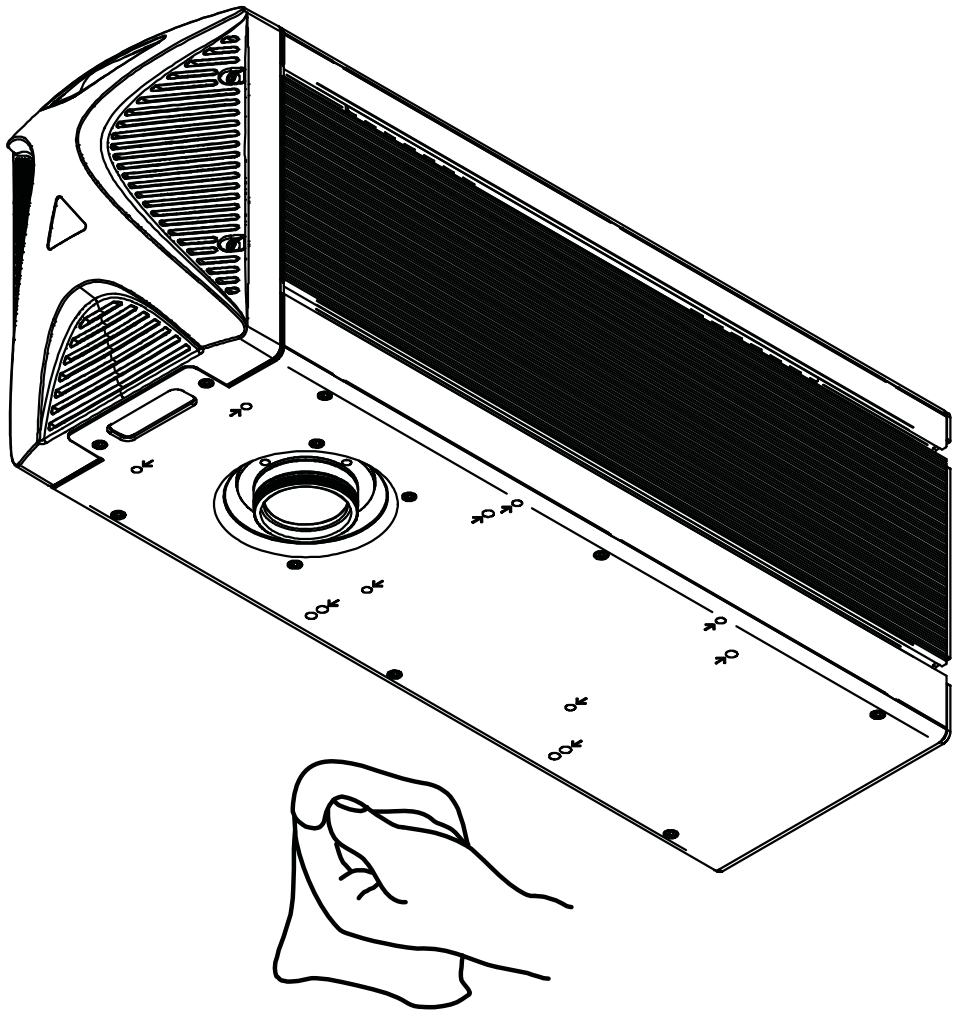


Figure 48: Cleaning F-Theta scan lens

Main fan cleaning procedure

Procedure:

1. Turn off the laser marker
2. Disconnect AC power cable
3. Unscrew front cover screws and remove it

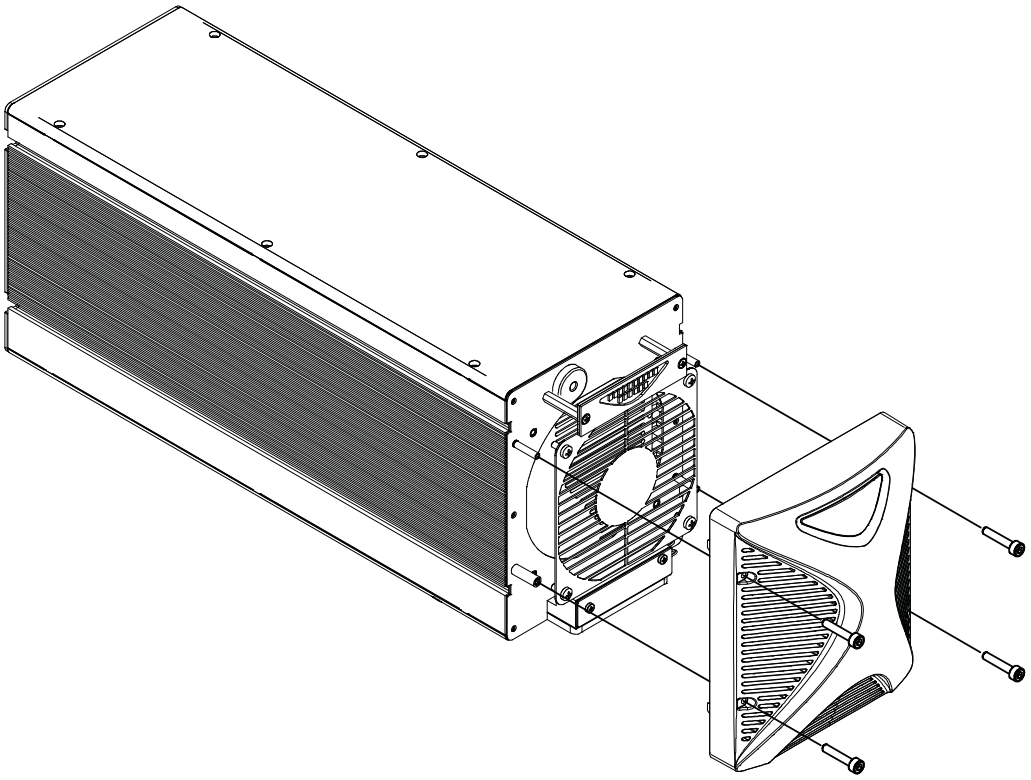


Figure 49: Removal of air filter

4. Clean fan and cover with air blow
5. Reinstall the protective front cover

TROUBLESHOOTING

If a problem occurs during operation, first check the following troubleshooting. If you cannot fix the problem, contact Datalogic customer service (see “Technical Support” on page vi).

List of warning and error states

STATUS LED	DESCRIPTION		ACTION	X1 - COMMAND BOX CONNECTOR OUTPUT STATE	
Blinking ORANGE (1 Hz)	Warning invalid start sequence	Incorrect turning-on sequence	Repeat the “Turning On sequence” on page 44	SYSTEM_ALARM POWER_ON ENABLE_OUT	OFF OFF OFF
Blinking ORANGE (0.5 Hz)	Warning laser warm up	Laser marker leaves the interlock error state	No action. The duration of the laser warm up state is approximately 15 seconds	SYSTEM_ALARM POWER_ON ENABLE_OUT	OFF OFF OFF
Blinking RED at Power ON	System Error	Interlock error	- Check Interlock connector signals (see “Interlock” on page 21) - Check Interlock connector presence	SYSTEM_ALARM POWER_ON ENABLE_OUT	ON OFF OFF
		Connector Presence error	- Check **X1.10** - CONNECTOR_PRESENCE input signal of the *X1 - Command Box* connector (see “X1 - Command Box (Laser Control)” on page 25): **HIGH** level: normal operation; **LOW** level or disconnected: system error		
			- Check if *X1 - Command Box* connector is present		
Blinking RED after KEY activation	System Error	Laser Source Error: - Temperature error - Master Oscillator Error - Back reflection error	Use *Profilab* application to connect to the laser source and report the error status code to Datalogic Technical Support	SYSTEM_ALARM POWER_ON ENABLE_OUT	ON OFF OFF

List of problems related to laser marker states

PROBLEM DESCRIPTION	STATUS LED		ACTION
Laser marker never goes to WAIT FOR START state	Blinking GREEN	- Lighter™ Suite marking SW corrupted - C:\ or D:\ drive corrupted	Restore the laser marker (see "Recover the laser marker" on page 106)
Laser marker never goes to STANDBY SHUTTER CLOSED state	Steady GREEN	*EXT_KEY* contact is LOW level or disconnected	Check **X1.12** (*EXT_KEY*) input signal on the Command Box connector is set to **HIGH** level (see "X1 - Command Box (Laser Control)" on page 25)
Laser marker never goes to READY state	Steady ORANGE	*EXT_ENABLE_A* and/or *EXT_ENABLE_B* contact are LOW level or disconnected	Check **X1.8** (*EXT_ENABLE_A*) and **X1.2** (*EXT_ENABLE_B*) input signals on the *X1 - Command Box* connector are set to **HIGH** level (see "X1 - Command Box (Laser Control)" on page 25)

List of most common problems

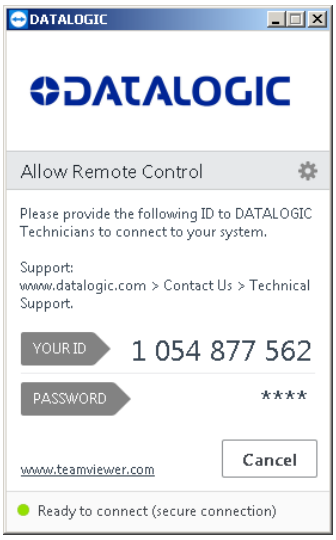
PROBLEM DESCRIPTION	POSSIBLE CAUSE	ACTION
Laser marker doesn't turn ON	Power supply cable disconnected	Check the *POWER SUPPLY CABLE* connection to the power grid
	SWITCH of power supply set to OFF	Check that the *POWER SUPPLY* switch is set to **ON**
	FUSES damaged	Check that *FUSES* of power supply are not damaged
Impossible to control the marking process using the X1 - Command Box control signals	Incorrect integration	Check that the *X1 - Command Box* control signals are compatible with the external devices used for integration
Bad marking result	F-Theta scan lens is dirty	Clean the *F-Theta scan lens*. See "F-Theta scan lens cleaning procedure" on page 67
	Incorrect focus distance	Check that the material to be marked is placed at the right working distance. See "Marking Area Specification" on page 19
	Incorrect laser parameters	Check that the laser parameters set in the layout are appropriate for the material to be marked. Contact Datalogic Technical Support
Laser marker doesn't engrave	Incorrect laser marker state	Check the laser marker state is set to **READY**
	F-Theta lens protection not removed	Check that the F-Theta scan lens protection has been removed
	The optical path is obstructed	Check that the optical path is free
Laser marker doesn't start to engrave using external START_MARKING signal on the Command Box connector	STOP_MARKING signal is active	Check that the **X1.13** (*STOP_MARKING*) signal on the Command Box connector is not set to **HIGH** level
	START_MARKING signal incorrect timing	- Check the **X1.11** (*START_MARKING*) signal on the *X1 - Command Box connector* (see "X1 - Command Box (Laser Control)" on page 25). **HIGH** level pulsed signal start the marking process (refers to Lighter™ user's manual "Setting I/O parameters" paragraph to set the signal properties) - Use Lighter™ System Test to check external **X1.11** (*START_MARKING*) and **X.13** (*STOP_MARKING*) signals
	Lighter™ is not set in AUTO MODE / WORK MODE	Check that Laser Engine is set in *AUTO MODE* or that Laser Editor is set in *WORK MODE*

PROBLEM DESCRIPTION	POSSIBLE CAUSE	ACTION
Laser marker doesn't start to engrave using the START MARKING signal on the Command Box connector	STOP_MARKING signal is active	Check that the **X1.13** (*STOP_MARKING*) signal on the Command Box connector is not set to **HIGH** level
	START_MARKING signal incorrect timing	- Check the **X1.11** (*START_MARKING*) signal on the *X1 - Command Box connector* (see "X1 - Command Box (Laser Control)" on page 25). **HIGH** level pulsed signal start the marking process (refers to Lighter™ user's manual "Setting I/O parameters" paragraph to set the signal properties) - Use Lighter™ System Test to check external **X1.11** (*START_MARKING*) and **X.13** (*STOP_MARKING*) signals
	Lighter™ is not set in AUTO MODE / WORK MODE	Check that Laser Engine is set in *AUTO MODE* or that Laser Editor is set in *WORK MODE*
Laser marker doesn't start to engrave using an external photocell	STOP_MARKING signal is active	Check that the **X.13** (*STOP_MARKING*) signal on the *X1 - Command Box connector* is not set to **HIGH** level
	Incorrect photocell type or incorrect connection	Check that the *photocell* is compatible with the laser marker (see "Photocell" on page 29). **HIGH** level pulsed signal start the marking process (refers to Lighter™ user's manual "Setting I/O parameters" paragraph to set the signal properties)
	Lighter™ is not set in AUTO MODE / WORK MODE	Check that Laser Engine is set in *AUTO MODE* or that Laser Editor is set in *WORK MODE*
Laser marker doesn't work in Marking On Fly mode	MOF is not enabled or not configured	- Use the Laser Engine *MOF wizard* to setup the laser marker (refers to Lighter™ User's Manual) - Check that the *MOF MODE* is **enabled** (refers to Lighter™ User's Manual)
	Laser Engine is not set in AUTO MODE	Check that Laser Engine is set in *AUTO MODE* (refers to Lighter™ User's Manual)
	Incorrect encoder's type or connection	- Check that the *encoder* is compatible with the laser marker (see "Encoder" on page 29) - Check that the *encoder* is working using Laser Engine *MOF wizard* (refers to Lighter™ User's Manual)
	Incorrect photocell type or connection	- Check that the *photocell* is compatible with the laser marker - Check that the *photocell* is working using Laser Engine *MOF wizard* (refers to Lighter™ User's Manual)
	Inappropriate layout	Check that the layout to engrave is compatible, in terms of marking time, with the MOF application

PROBLEM DESCRIPTION	POSSIBLE CAUSE	ACTION
Red Aiming Beam not visible	F-Theta Lens protection not removed	Check that the F-Theta scan lens *protection* has been removed
	Laser marker is not in the correct state	Check that the laser marker state is coherent with the *AIMING BEAM TYPE* property set in Laser Engine Configuration "**LASER**" (refers to Lighter™ User's Manual)
	Incorrect Aiming beam setting in Laser Engine	Check *STANBY POSITION* property in Laser Engine Configuration "**SCANNER**". Depending on the setting, the aiming beam could be not visible because pointed outside the marking field (refers to Lighter™ User's Manual)
		Check *AIMING BEAM TYPE* property in Laser Engine Configuration "LASER" (refers to Lighter™ User's Manual) • **ON**: always ON • **OFF**: always OFF • **AUTOMATIC**: active only in *STANDBY SHUTTER CLOSED* state
Red Focusing Beam not visible	The focusing beam output window is obstructed	Check that the focusing beam output window is not obstructed
	Laser marker is not in the correct state	Check that the laser marker state is coherent with the *FOCUSING BEAM TYPE* property in Laser Engine Configuration "**LASER**" (refers to Lighter™ User's Manual)
	Incorrect Focusing Beam setting	Check *FOCUSING BEAM TYPE* property in Laser Engine Configuration "**LASER**" (refers to Lighter™ User's Manual) • **ON**: always ON • **OFF**: always OFF • **AUTOMATIC**: active only in *STANDBY SHUTTER CLOSED* state
X, Y, Z, R Axis doesn't work	Incorrect integration	Check that the *X2 - Axes control signals* are compatible with the external devices used for integration
	Axis is not enabled	Check that the selected *Axis* is enabled in Laser Engine Configuration (refers to Lighter™ User's Manual)
	Axis is not correctly configured	Check that the selected *Axis* is correctly configured in Laser Engine Configuration (refers to Lighter™ User's Manual)
Windows settings are not saved at system restart	C:\ drive is write protected by UWF filter	Follow the procedure present in "Customize the laser marker software" on page 48
Generic I/O signals doesn't work	Incorrect integration	Check that the *I/O control signals* are compatible with the external devices used for integration
	I/O already used by Axis	*Generic I/O and Axes* share the same I/O signals. Check that the selected I/O are not used by an Axis that is enabled

REMOTE ASSISTANCE

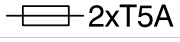
The laser marker is equipped with a remote connection tool that can be used for diagnostic purposes by Datalogic technical support.



NOTE: The laser marker must be connected to the Internet.

APPENDIX A
LABELS

LABELS

LABEL	DESCRIPTION
	Identification label
	Warning laser logotype
	Laser Label[a]
	Aperture Label
	Label for non-interlock protective housing
	Caution, possibility of electric shock
	USB port
	MAC Address
	Windows 10 IoT Enterprise COA
X1	Command Box connector
X2	Control Axes connector
INTERLOCK	Interlock connector
SHUTTER OUT	Shutter OUT connector
LAN	LAN port
RS232	RS232 port
VGA	VGA port
PHOTOCELL	Photocell connector
ENCODER	Encoder connector
	Fuses

a. Maximum output of laser radiation as per definition 3.55 of IEC60825-1 considering single fault conditions.

POSITIONING OF EXTERNAL LABELS

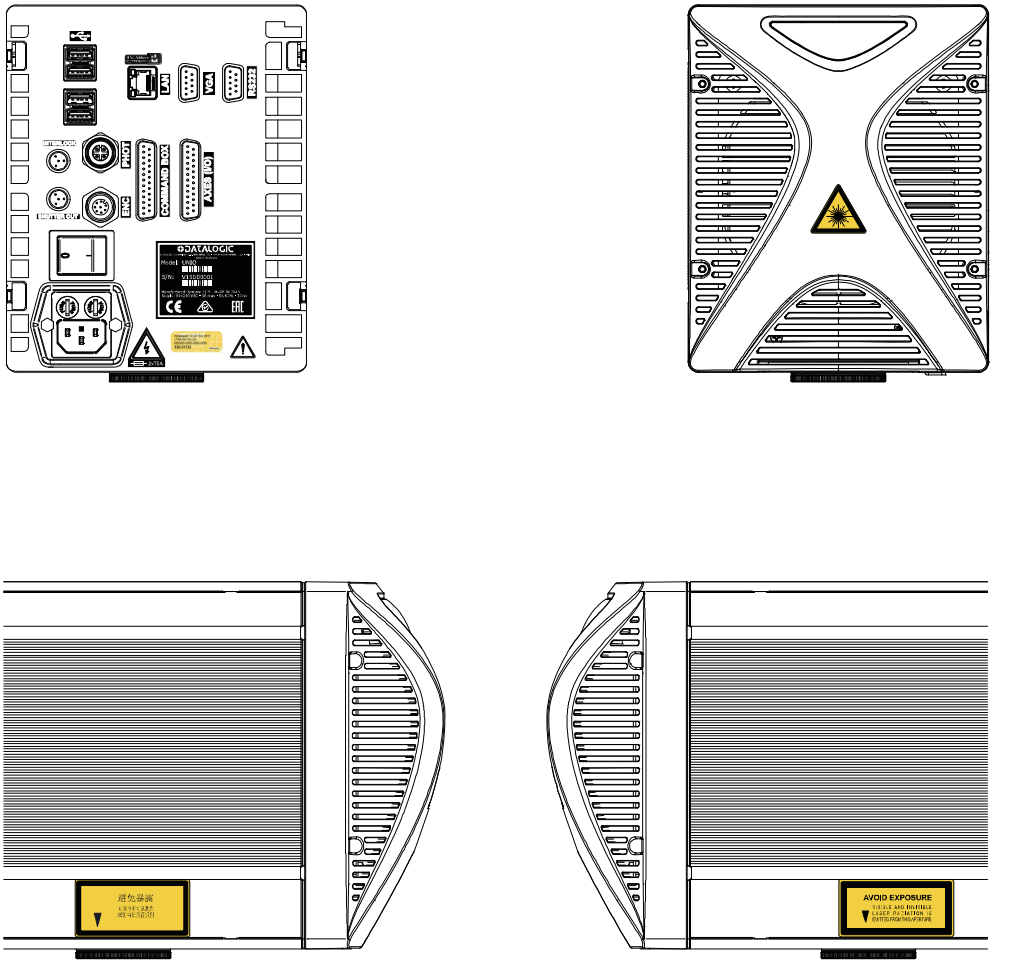


Figure 50: External labels location

APPENDIX B
SAFETY CONSIDERATION ACCORDING TO EN ISO 13849-1:2008

PERFORMANCE LEVEL (PL)

The PL is specified in EN-ISO13849-1. The risk analysis will lead to a PLr (Performance Level required) for a safety function based on the following graph:

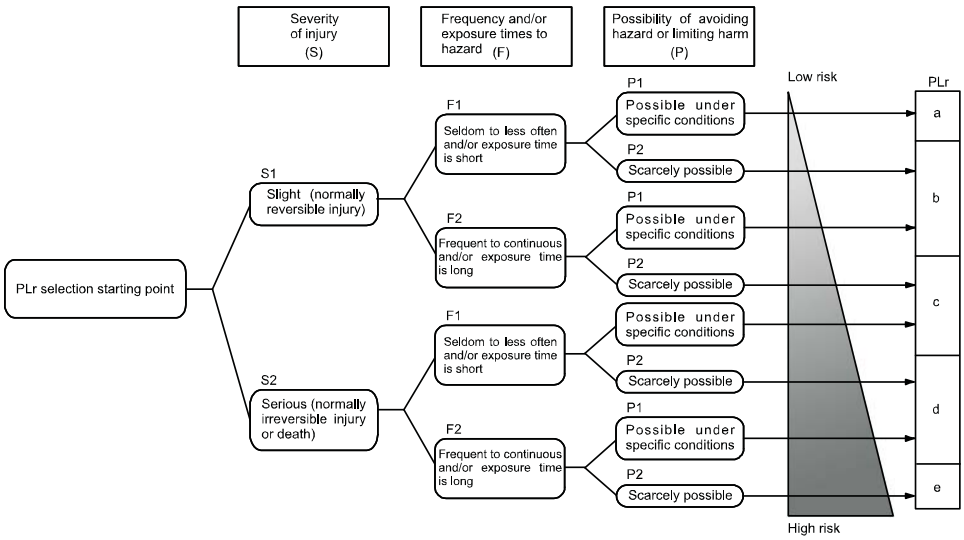


Figure 51: Determining the required Performance Level (PLr)

Application example

CAUTION: These examples relate only to the features introduced in UniQ™ to assist in the risk reduction from the laser radiation. Any other risks (mechanical, electrical, etc.) must always be evaluated and must be taken appropriate risk reduction measures where necessary.
The Machinery Directive and EN 13849-1 are NOT applicable to the product UniQ™.

The target safety integrity or performance level (e.g. PLd according to ISO13849-1) shall be determined by the machine integrator, taking into account the machinery directive, the harmonized standards and any sector-specific standard that may apply.

CAUTION: These examples are based on the parameters indicated on paragraph "Safety Functions of UniQ™" on page 83.

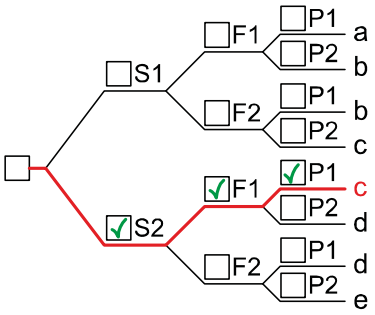
Example automatic production line

In this case the Protective Housing may have a guard capable of being opened or removed, typically only for service operation (frequency: seldom or occasional):

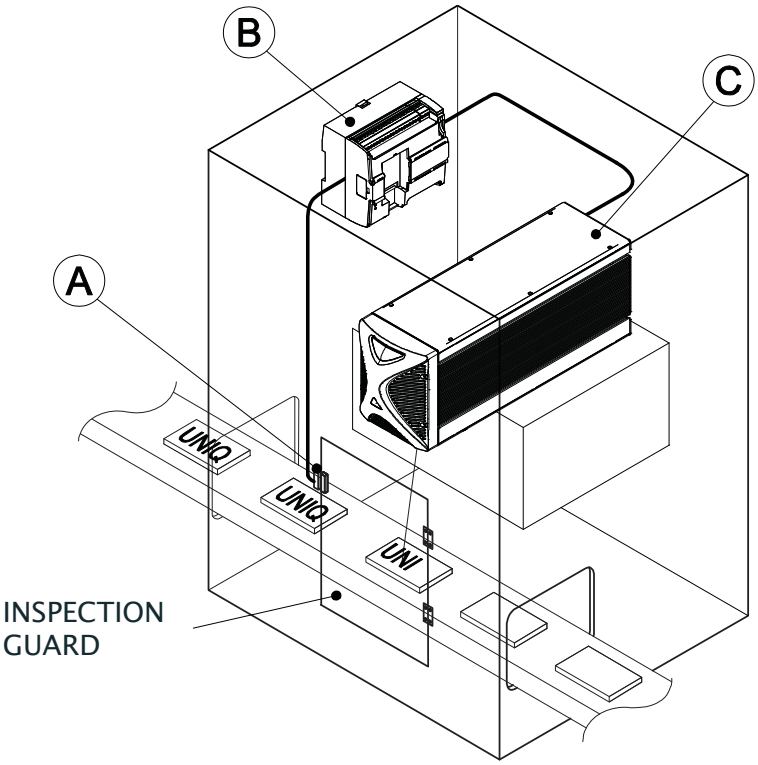
- Guard opening should only be possible with the aid of a tool.
- Guard interlock is connected as input of a safety logic (e.g. safety PLC) and UniQ™ interlock system as output/input of that PLC.
- Warning label for access panel according EN60825-1 must be applied.

Since the frequency is LOW (F1) and the removal of the guard is intentional, the MINIMUM REQUIREMENT as per IEC13849-1 is PLc.

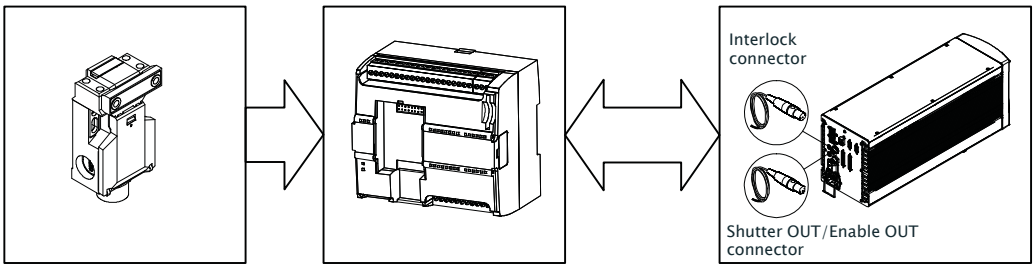
Target: PLr = c



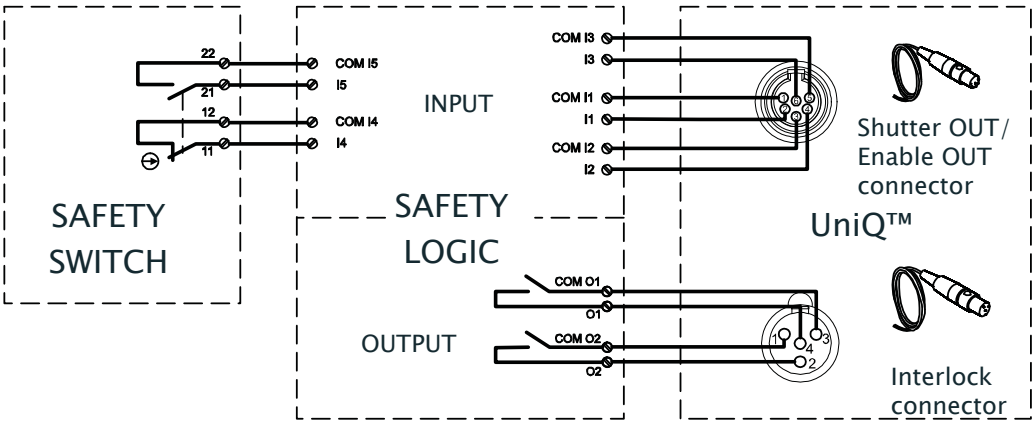
Severity of injury (S)
S1 Slight (normally reversible injury)
✓ **S2** Serious (normally irreversible injury or death)
Frequency and/or exposure time to hazard (F)
✓ **F1** Seldom to less often and/or exposure time is short
F2 Frequent to continuous and/or exposure time is long
Possibility of avoiding hazard or limiting harm (P)
✓ **P1** Possible under specific conditions
P2 Scarcely possible



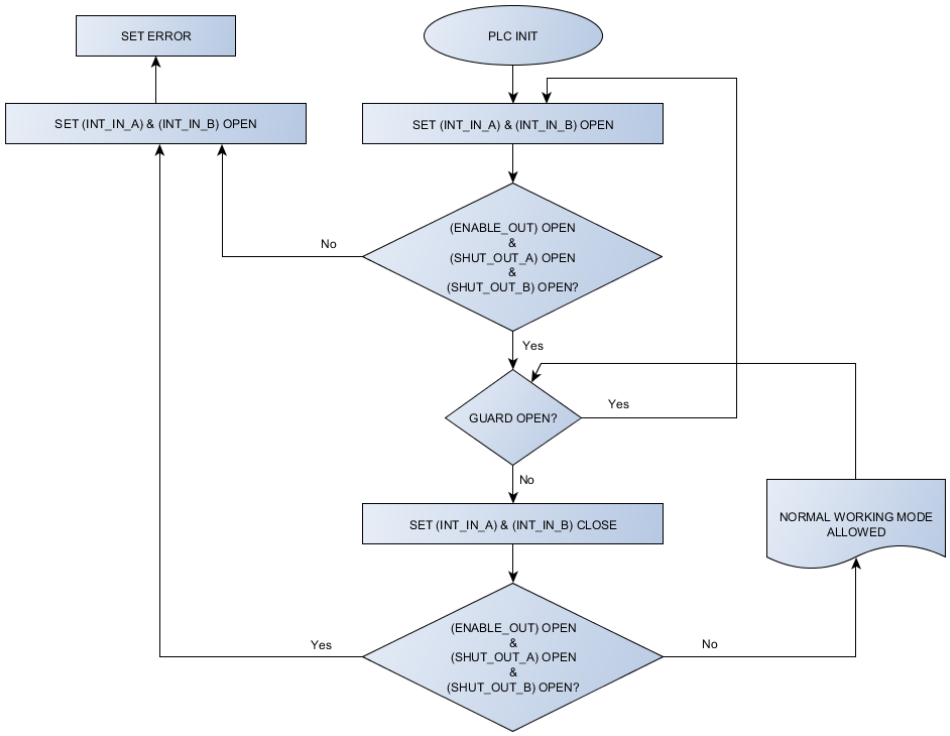
Block Diagram



Safety Logic to UniQ™ details for automatic production line



PLC Safety Diagram



Characteristics of components

DOOR SWITCH: SAFETY INTERLOCK SWITCH, designed in compliance with the standard currently in effect IEC60947, EN292, EN60204, EN1088. Two redundant contacts. IP67. B10d=2000000.

SAFETY LOGIC: main component SAFETY PLC min. PLd according EN13849-1. Output type relays, min 10mA. To be installed in an IP54 enclosure.

Conclusion

Safety Function of this example meets the quantitative requirements of PLr = c.

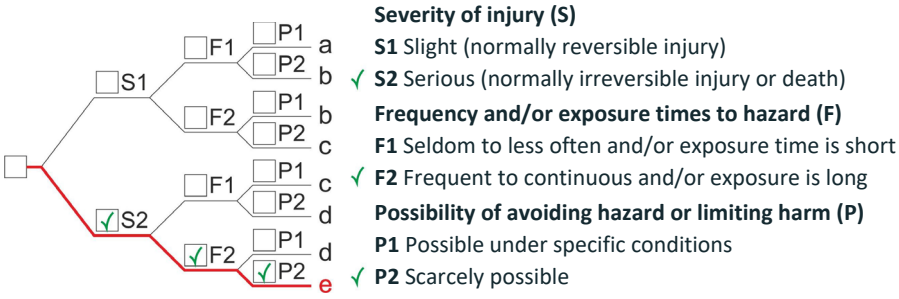
Example manual production line

In this case the Protective Housing have one movable guard to load/unload target items. Mechanical construction of the guard assures that the opening of the door causes the opening of the switch but not the exposure of the operator to the laser emission within 500 ms (eg. main door provided with switch and secondary door to access the load/unload plate).

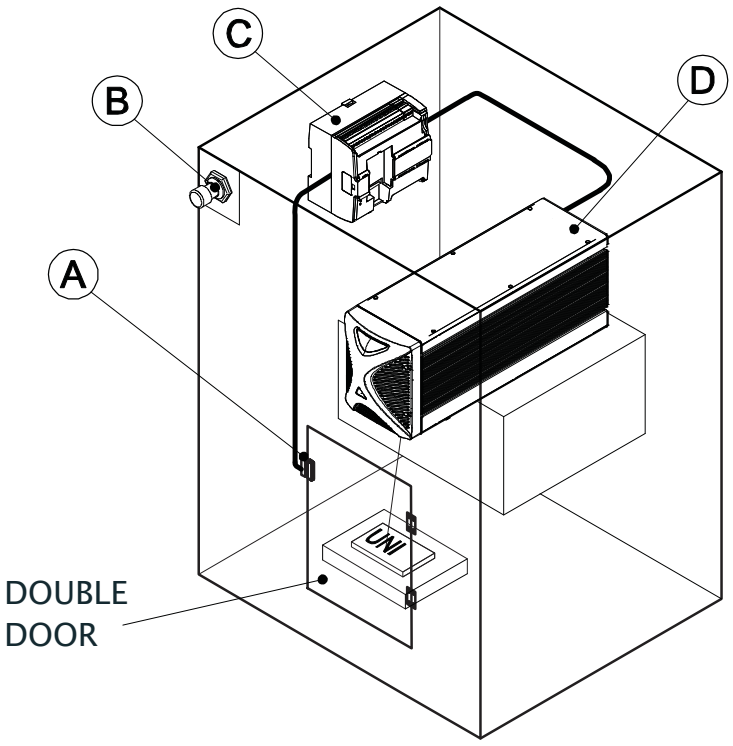
- Operation is frequent/continuous (286 days per year, 9 hours per day and 20 seconds per cycle).
- Guard switch is connected to a safety PLC as input and UniQ™ Interlock and Enable systems as output/input of that PLC.
- Restart system must be provided.

Since the severity of injury is Serious (S2), frequency is HIGH (F2) and possibility of avoiding hazard is scarcely possible (P2), the MINIMUM REQUIREMENT as per IEC13849-1 is PL e.

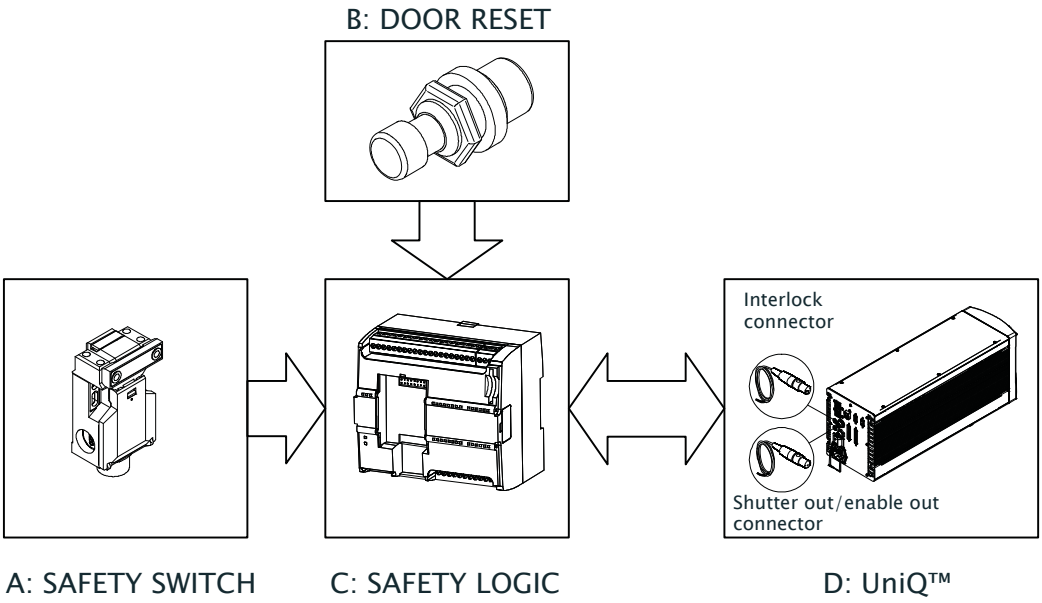
Target: PLr = e



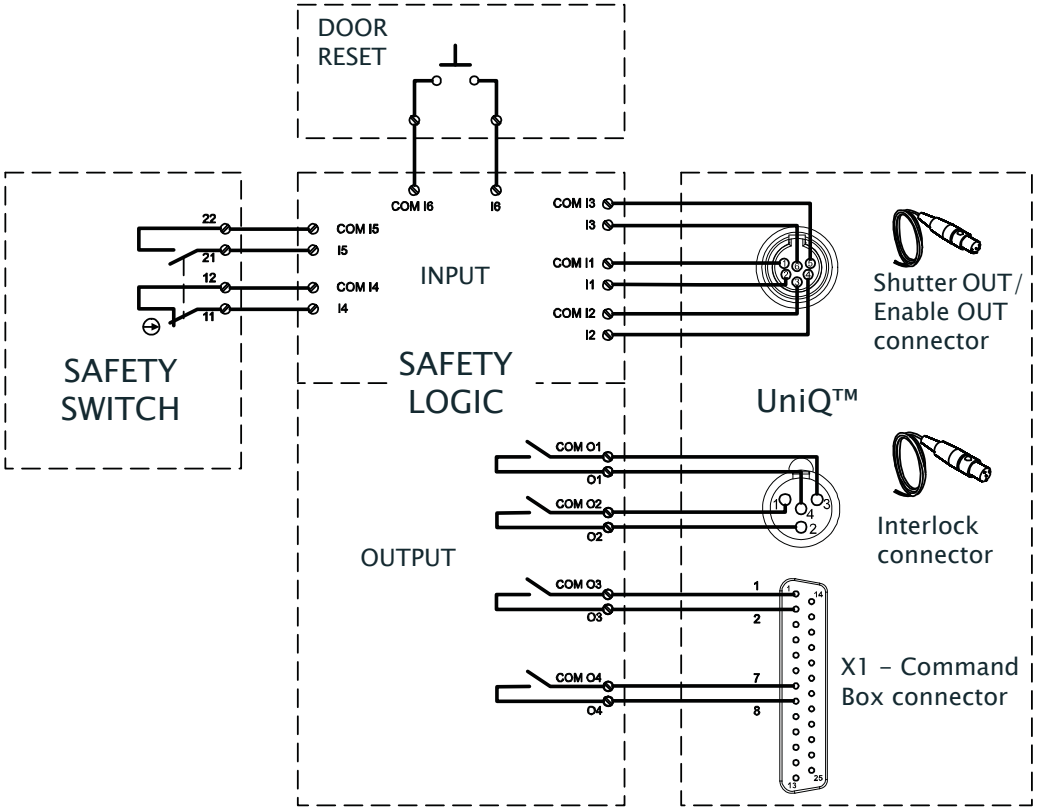
NOTE: Considering the switching response time of I/O, it must prevent access in a time less than 500 ms.



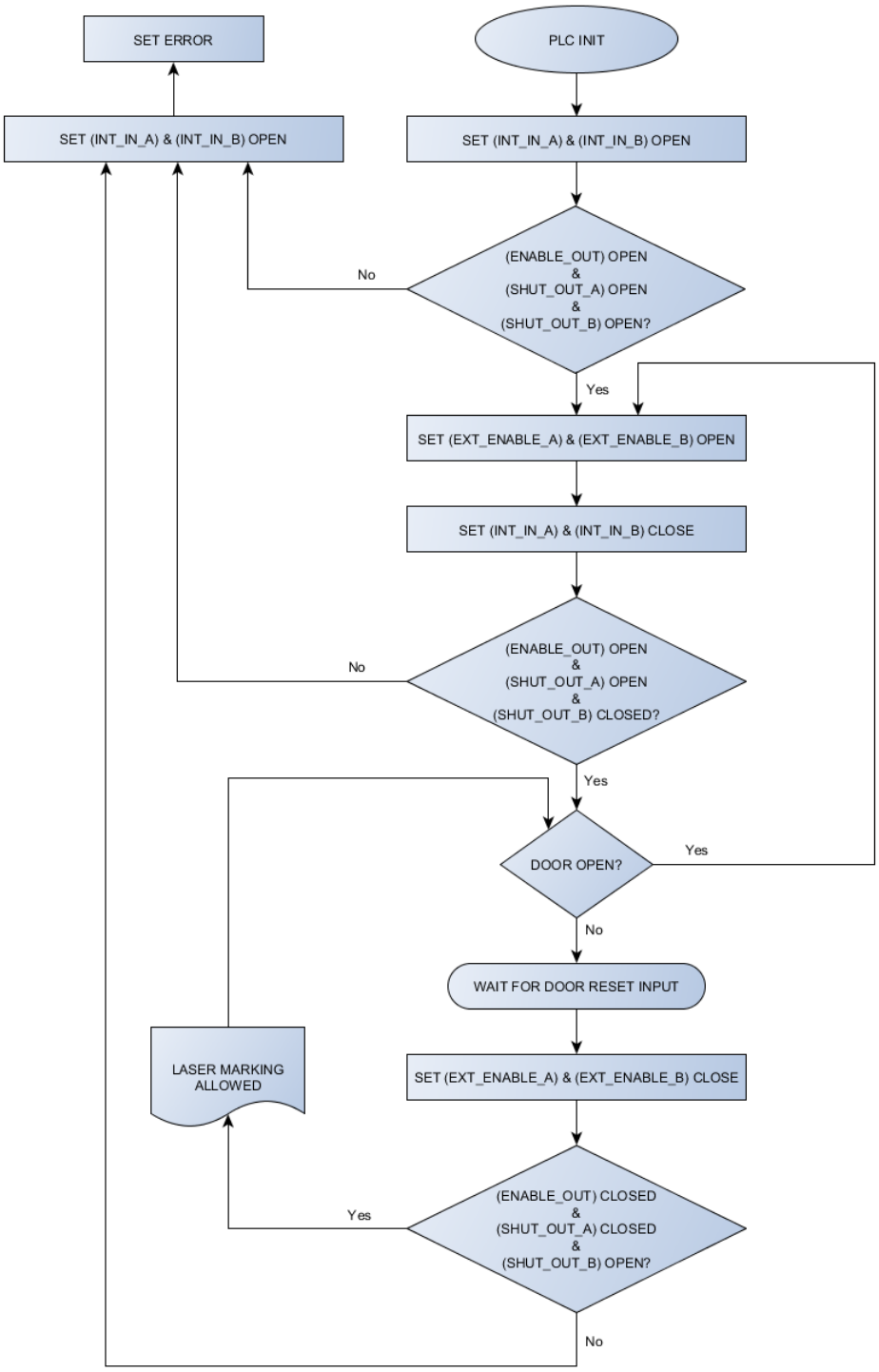
Block Diagram



Safety Logic to UniQ™ details for manual production line



Safety Logic diagram suitable for a DC=90%



Characteristics of components

DOOR SWITCH: SAFETY INTERLOCK SWITCH, designed in compliance with the standard currently in effect IEC60947, EN292, EN60204, EN1088. Two redundant contacts. IP67. B10d=2000000.

SAFETY LOGIC: main component SAFETY PLC min. PLd according EN13849-1. Output type relays, min 10mA. To be installed in an IP54 enclosure.

Conclusions

Safety Function of this example meets the quantitative requirements of PLr = e.

Safety Functions of UniQ™

UniQ™ provides inputs, outputs and actuators to implement the following safety functions:

- SF.1 ENABLE (e.g. no IR laser output if “EXT_ENABLE_A” or “EXT_ENABLE_B” are disabled, where “disabled” means contact open)
- SF.2 INTERLOCK (e.g. no IR laser output if “INTERLOCK_A” or “INTERLOCK_B” are disabled, where “disabled” means contact open)

These functions has been evaluated according to UNI EN ISO 13849-1. The results are:

- SF.1:

1. Category: 3
2. MTTFd = 114 years (dop = 286 days, hop = 9h, Tcycle = 20s)
3. DC: feedbacks are provided. The determination of the diagnostic coverage (DC%) is then assigned to the integrator of the system depending on realized supervision system.
4. Response time: 500ms

- SF.2:

1. Category: 3
2. MTTFd = 114 years (dop = 286 days, hop = 9h, Tcycle = 20s)
3. DC: feedbacks are provided. The determination of the diagnostic coverage (DC%) is then assigned to the integrator of the system depending on realized supervision system.
4. Response time: 10ms

APPENDIX C
LASER SAFETY

The following information is provided in compliance with regulations set by International Authorities, and it refers to proper use of the laser marker.

LASER RADIATION

Laser radiation is form of electromagnetic emission in the wavelength range from the ultraviolet (e.g. from excimer lasers), through visible (e.g. HeNe or Argon lasers) and near infrared (e.g. Yb Doped Fiber and ND:YAG DPSS lasers) up to long infrared (e.g. CO2 lasers). It should be considered as non-ionizing Radiation.

In the UniQ™ laser marker, the laser radiation emission of light is stimulated by “optical pumping” generated by a Diode Laser. The continuous reflection of Photons, between a front mirror and rear mirror, creates a positive reaction so that their number continues to increase, until reaching the concentration necessary to produce a beam which projects from the semi-reflecting front mirror. The radiation (which we can imagine as a “Beam of invisible light”) is then Collimated and Focused with Lenses at a point where the intensity becomes high enough to be able to react with various materials producing an alteration in them due to thermal effect.

The radiations of UniQ™ laser marker are visible and invisible and the Eye receives it almost in its entirety without using the natural defense provided by pupil reflex! Added to this is the fact that it is generally very intense, with the result that it can be very harmful to the eye and present vision problems.

WARNING: Directly viewing a laser beam can cause irreversible damage to human eye.

UniQ™ laser markers are classified Class 4 according to applicable norms. This means that the laser radiation level emitted by these laser markers is dangerous even when not directly exposed to the laser beam. Partial reflected laser beam or scattered laser radiation surfaces can cause damage to human eye and skin. It is therefore mandatory that customer apply all applicable regulatory safety protection measures when integrating these laser markers into their machines including, but not limiting, to individual operator protection devices such as protective eye goggles, etc.

WARNING: Viewing of a reflected laser beam can cause irreversible damage to human eye. The use of accessory external optics may increase the risk of damage.

In addition to possible injuries to human eye and skin, these lasers can ignite flammable materials and cause fires even at long distances.

WARNING: This laser marker is classified as Class 4. Class 4 Lasers can cause damage, not only from direct or reflected laser radiation, but also from scattered radiation. These lasers cause significant risk of irreversible damage to human eye and skin as well as risk of ignition and fire of flammable materials, even at long distances form laser radiation output aperture.

WARNING: Make sure that no flammable objects/materials are within the laser beam path. Use only non-flammable materials for enclosures or any other machine surfaces that may be exposed to direct or indirect laser beam radiation.

ABSORPTION OF LASER RADIATION

Human tissues absorbs electromagnetic radiation in different ways depending on tissue characteristics and the wavelength of the radiation. Certain wavelengths may be transmitted or absorbed, in different levels, by the human tissue. In the specific case of the eye, the Cornea and Crystalline lens allows most of the radiation within the wavelength range of 400nm to 1400nm to pass a reach the retina (where are the vision sensors). This range includes the visible light as wells a s near-infrared. The UniQ™ laser markers emit in the 1064nm range and thus can be focused by the eye lens at retina with serious risk of causing irreversible damage do vision sensors.

Regarding human skin, the tissue abortion level is higher for the same wavelength range but the maximum exposure tolerance level, before there is a damage, is different compared to eye.

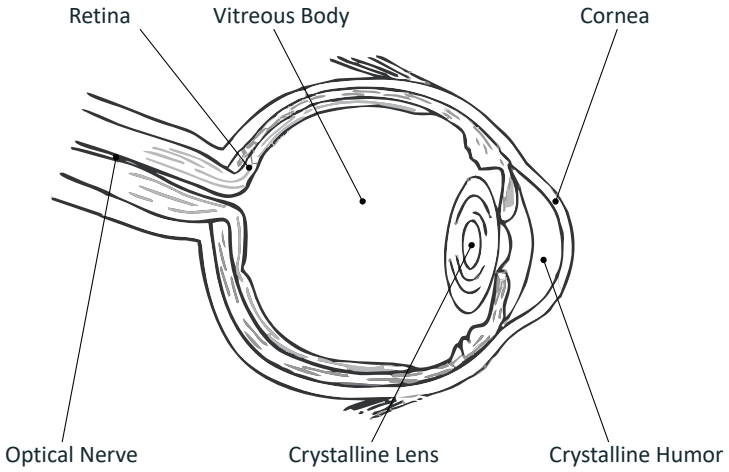


Figure 52: Eyeball section.

The degree of injury depends on the amount of absorbed radiation; the power, energy and peak power of the radiation source, as well as the time exposed to such radiation.

CLASSIFICATION AND DANGER LEVEL

Regulations have established different classes of Lasers, based on their ability to cause human injury. These classes ranges from Class 1 (basically safe in all conditions) to Class 4 (dangerous in several conditions).

Lasers that can produce risk to human being, not only from direct or reflected radiation but also from scattered radiation, belong to Class 4. These lasers sources can also present risk of causing fires through ignition of flammable materials. For these reasons the Customer must, when integrating the laser marker into their machine, implement all necessary measures to contain laser radiation and ensure compliance with applicable safety regulations. All operators using lasers systems should also use appropriated individual protection devices such as goggles, etc.

WARNING: The UniQ™ laser marker contain Class 4 invisible laser sources. Refer to applicable regulations (including Laser Safety and Machine safety) for recommendations for compliance of your machine with integration and use of such Class lasers type.

DEGREE OF RISK WITH RADIATION VIEWING CONDITIONS

If F-Theta scan lens is removed from scan head the output radiation is a collimated intense coherent laser beam. The image of such a beam, created by any lens is then a very small spot with extremely high power and energy density. Such a beam is also focalized by the human eye and thus result in irreversible damage to the retina. The output radiation of the laser marker, with the F-Theta scan lens, is not a collimated beam but a convergent (before focus plane) and divergent (after focus plane) laser beam. The degree of convergence and divergence depends on the F-theta scan lens specifications and thus varies with the different laser marker models. While marking the laser radiation is typically scattered at the object being marked. Special attention must my taken with objects with high reflectivity to the laser wavelength range since such objects may not only reflect the laser radiation but also change its characteristics according to the shape of such surface (that can work as a lens element). Thus the risk related with laser radiation depends on the characteristics of the beam at which the human is exposed.

In the following sections the risk degree to human eye, related with different viewing conditions, is qualitatively described. Please note that this is intended only as awareness on such risks.

WARNING: It is responsibility of Customer to makes an independent risk evaluation and to implement the necessary safety measures, according to applicable regulations, pertinent to Class 4 Lasers.

Direct viewing of the laser beam

This type of viewing is the most danger for human eye and can occur if looking directly into laser output aperture. Risk is higher in case F-Theta scan lens is removed since output laser beam is, in such conditions, collimated.

WARNING: Do not look directly to laser beam. Individual Protection Devices such goggles do not warrant protection for direct exposure to laser radiation.

Viewing of a laser reflected beam

This may occur when beam is reflected on a mirror surface. This type of viewing is as danger for human eye as direct viewing of the laser beam.

WARNING: Do not look to reflected laser beam. Individual Protection Devices such goggles may only provide protection for a short period of time and thus do not warrant protection for exposure to reflected laser radiation.

WARNING: Many materials, including metals and plastics, have surfaces that strongly reflect laser radiation. Make sure to use non-reflective materials for enclosures or any other machine surfaces that may be exposed to direct or indirect laser beam radiation. Pay special attention when marking objects with high reflectivity properties.

Viewing of scattered laser beam

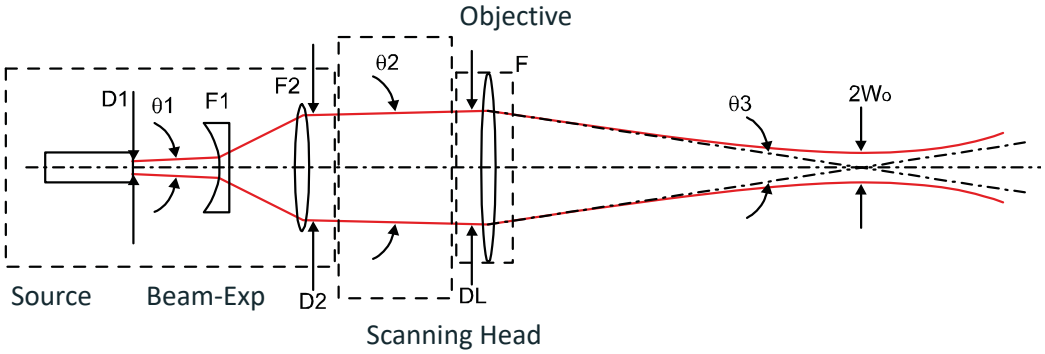
This is the most typical exposure condition when laser is scattered by at a non-reflective surface (such as blocking element or when marking of some materials). In this case, special filter widows and Individual Protective Devices (such as goggles) may allow full protection even for prolonged exposures if is such protective means respect applicable norms for the type of laser radiation.

WARNING: Always use certified protecting goggles appropriated for the laser radiation characteristics to which you can be exposed.

WARNING: Remember that none goggles can provide sufficient protection for prolonged direct or reflected laser beams.

N.O.H.D. DETERMINATION AND O.D. OF PROTECTION GOGGLES

In order to determine the characteristics of the protection goggles, it is essential to determine the characteristics of the radiation, knowing its optical path, the dimensions of the beam and its divergence.



It is very important to know the real divergence of the laser beam at the output of the F-Theta scan lens.

With the availability of these optical data, it is possible to calculate the Nominal Ocular Hazard Distance (N.O.H.D.) and the Optical Density (O.D.) required by the laser radiation protection filters (goggles).

Below results have been done considering Directive 2006/25/CE on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation). The user must check if Directive 2006/25/EC was implemented as a law in his own country and regulate himself accordingly.

Only accidental direct exposure has been considered (exposure time = 10 seconds).

PARAMETER		1150-134X
Wavelength	nm	1064
Pulse Energy	mJ	0.82 @ 15 kHz
Pulse Duration	ns	75
Beam Diameter (DL)	mm	6.25
Working Distance (WD)[1]	mm	183
Real Divergence after the lens (θ_3)	mrad	34.15
N.O.H.D.[2]	m	19.10
O.D.[3]		> 5

1. See Note on page 20
2. Assuming the F-Theta scan lens as reference point
3. Assuming the F-Theta scan lens as reference point, this O.D. is valid for a distance greater of 0.5 m + WD

EN207 and EN208

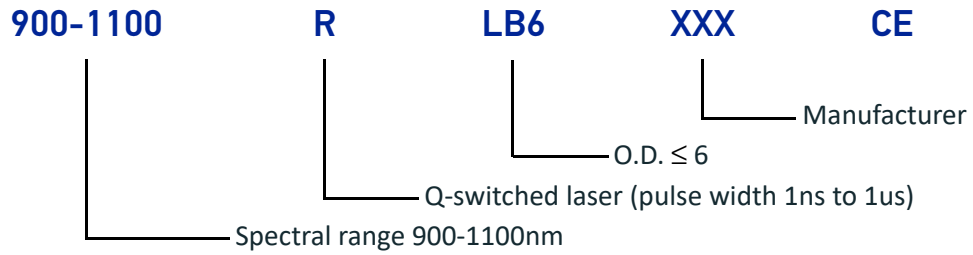
The O.D. value specifies the attenuation factor that the filter material theoretically has on the beam. However it does not specify the damage threshold of the filter material! The filter material may not be able to withstand the power of a particular laser and may fail instantaneously and result in serious eye injury.

In Europe, two standards have been developed for materials used as filters and frames for laser protective eye wear and laser protection windows. The EN207 and EN208 norms both specify the damage threshold of the filter material used.

The EN207 standard is used for full attenuation, these filters are used to completely block the wavelength for which they are specified.

The EN208 standard is used for partial attenuation, these filters are used only in the visible range 380-700nm where they reduce the beam intensity down to the Maximum Permissible Exposure (safe level). They are particularly useful for alignment where seeing the beam is necessary.

Safety goggles are labeled according to EN207 or EN208 as appropriate. For example, a filter labeled 900-1100 R LB6 xxx CE means that:



EYES AND SKIN RISKS

If exposed to intense Laser radiation, even of a short duration, or a less intense but longer lasting duration, both the Cornea and the Retina can burn and be damaged irreparably. This is particularly critical for Class 4 laser beam.

If subject to direct focused radiation, even the skin can burn.

GENERAL SAFETY REGULATIONS

The user of the laser marker must comply with all regulations and work best practices regarding safety. Therefore it is necessary to develop a Standard Operating Procedure (S.O.P.) related to operations of the machine incorporating this laser marker. This procedure, shall be available at time of installation, shall serve as a reference for the Operator and shall be written in his/her language.

Training is essential and must include:

- Familiarization with system operating procedures.
- Knowledge of the biological effects of radiation on the Eyes and Skin.
- Understanding of the necessity for Individual Protection Devices (I.P.D.)

OTHER RISKS

An additional risk may be represented by fire caused by processing materials other than those the laser marker was designed for.

WARNING: Do not use this laser marker for other purpose than the one it was designed for.

Another additional risk associated with the laser marker is electricity. This may occur when accessing internal parts of the laser marker.

CAUTION: Only Datalogic authorized personnel, who have been trained and instructed on the electrical and optical risks, is allowed to access the internal parts of the laser marker.

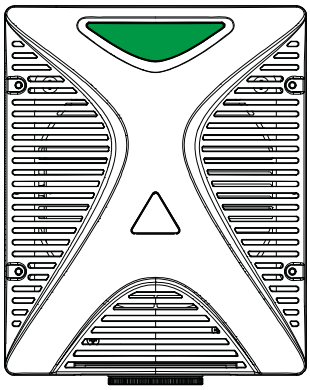
Datalogic shall not be held liable for any damage caused by inadequate work from non-authorized personnel.

APPENDIX D
USING MARKING SOFTWARE

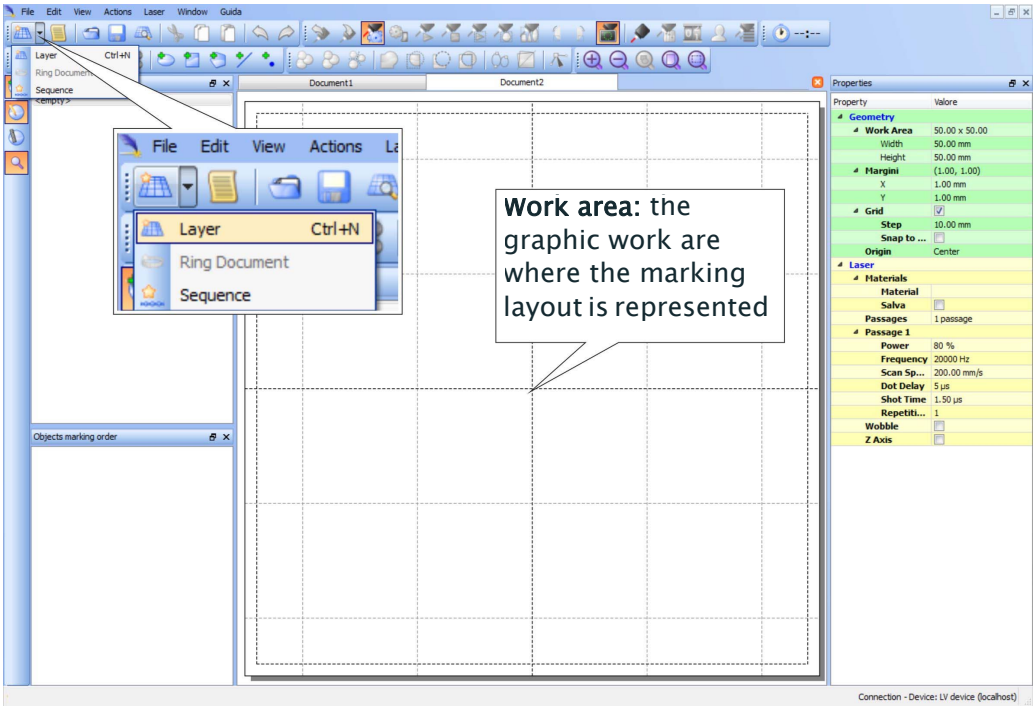
HOW TO CREATE AND EDIT GRAPHICS LAYOUT

In “WAIT FOR START” state (refer to “Laser Marker States” on page 32), double click the Laser Editor icon to start the layout editor application.

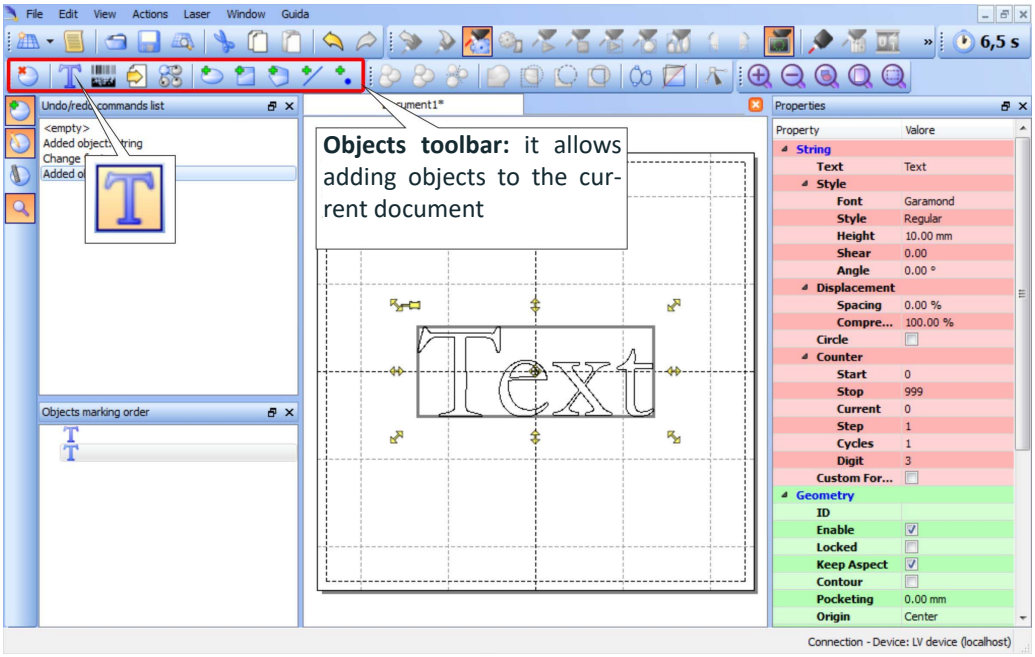
X1- COMMAND BOX SIGNAL	STATE
EXT_KEY	OFF
EXT_ENABLE_A	OFF
EXT_ENABLE_B	OFF



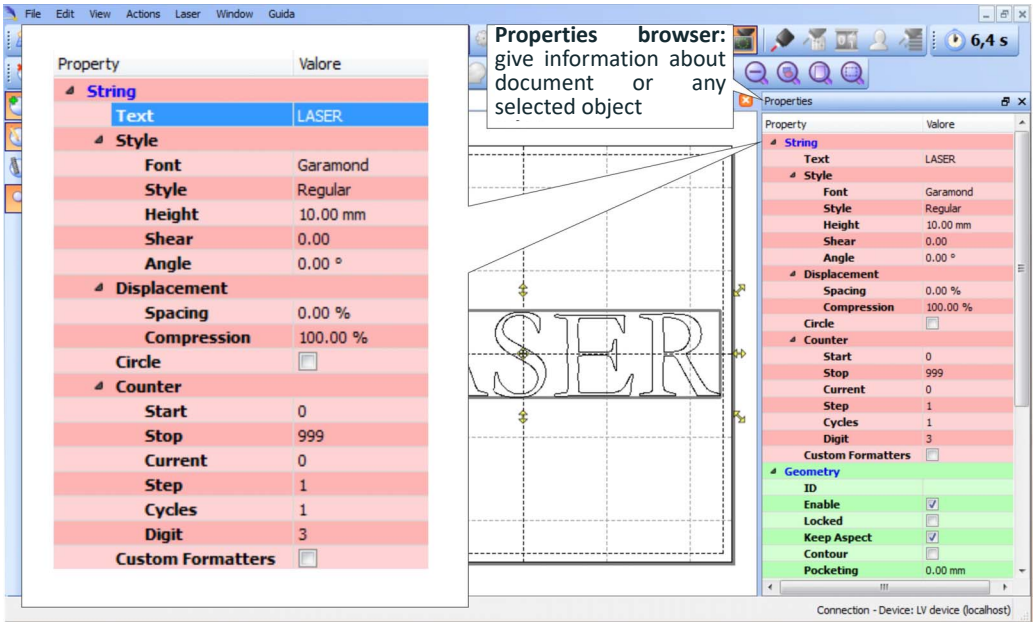
Click on the document type selector and choose **Layer**:



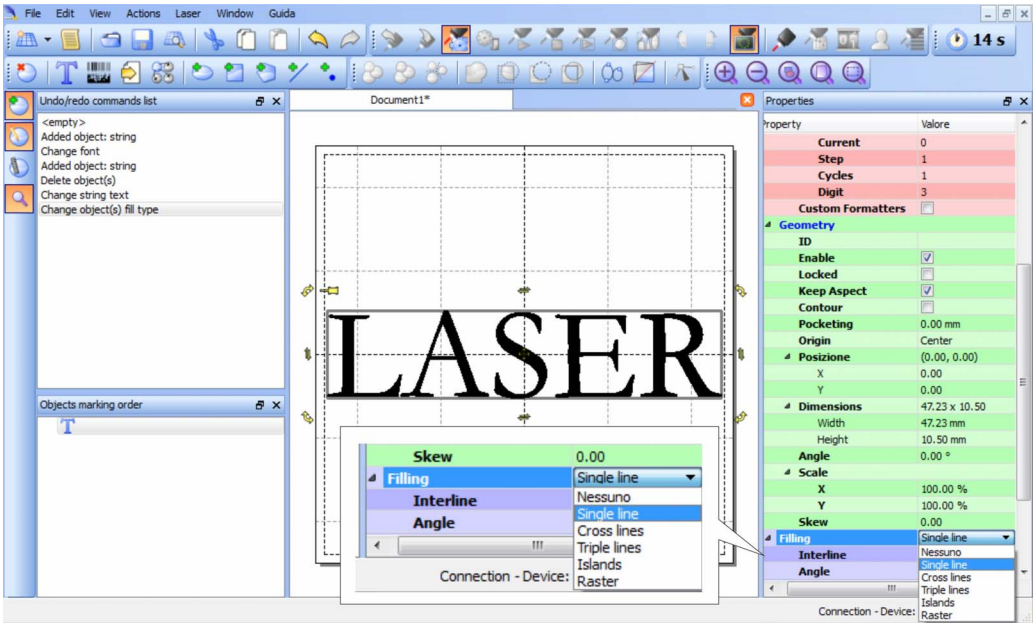
Click on the **Text String** icon in the **Object toolbar** to add a string object to the layer:



Edit String properties such as value, font, style, etc. using the **Properties browser**:



Edit Filling properties such as filling type, interline, etc. using the **Properties browser**:

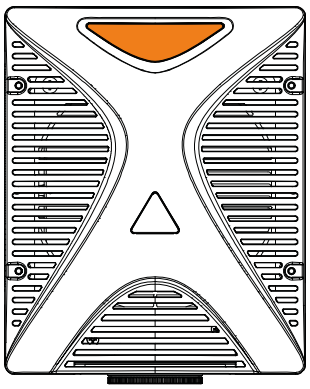


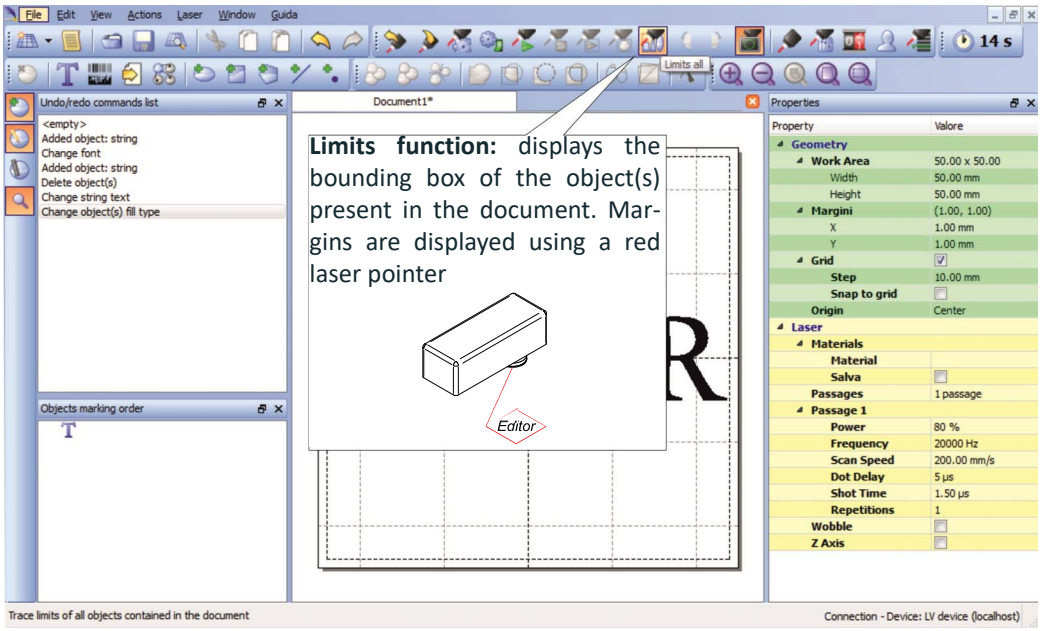
NOTE: Consult Lighter™ software user's manual for a proper use of the same.

HOW TO TEST AND MARK LAYOUT

In “STANDBY SHUTTER CLOSED” state, press **Limits All** button in the **Laser Toolbar** to adjust the object position in the marking field:

X1 - COMMAND BOX SIGNAL	STATE
EXT_KEY	ON
EXT_ENABLE_A	OFF
EXT_ENABLE_B	OFF





CAUTION: Marking highly reflective materials might cause optical feedback into laser marker. This may result into irreversible damage of the optical components of laser marker.

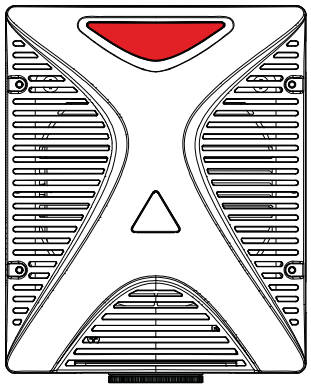
Verify that the position and geometry of the object to mark does not cause any reflection into the optical aperture of the laser marker F-Theta scan lens.

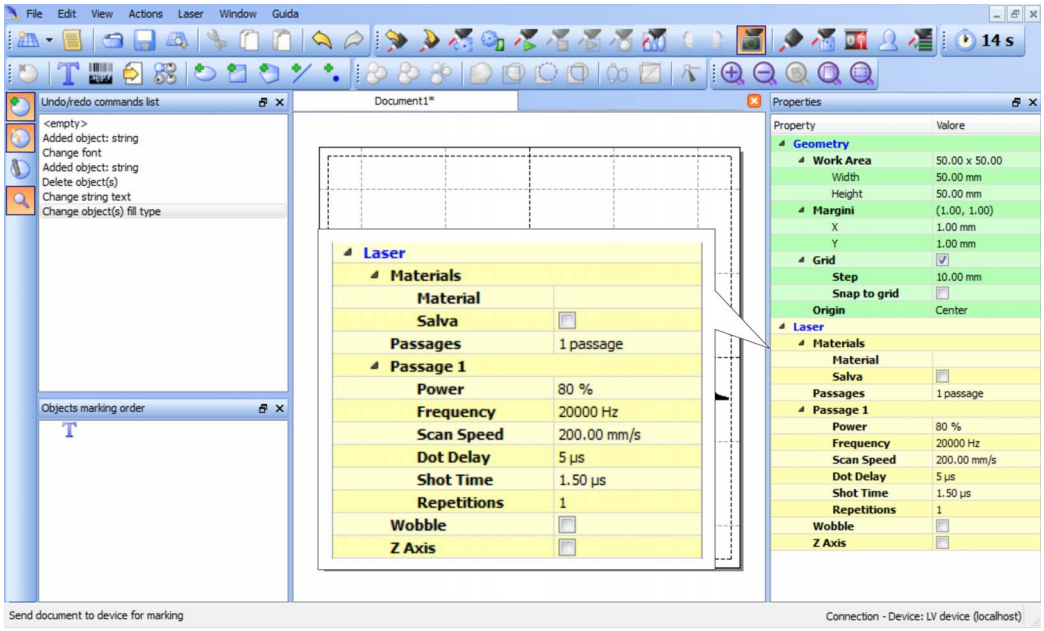
Please contact our Customer Support Service for support on your particular application.

Optical induced damage caused to laser marker by back reflection from high reflective materials is not covered by warranty.

In “READY” state, adjust the Laser parameters using the **Properties browser**:

X1 - COMMAND BOX SIGNAL	STATE
X1.12 - EXT_KEY	ON
X1.8 - EXT_ENABLE_A	ON
X1.2 - EXT_ENABLE_B	ON





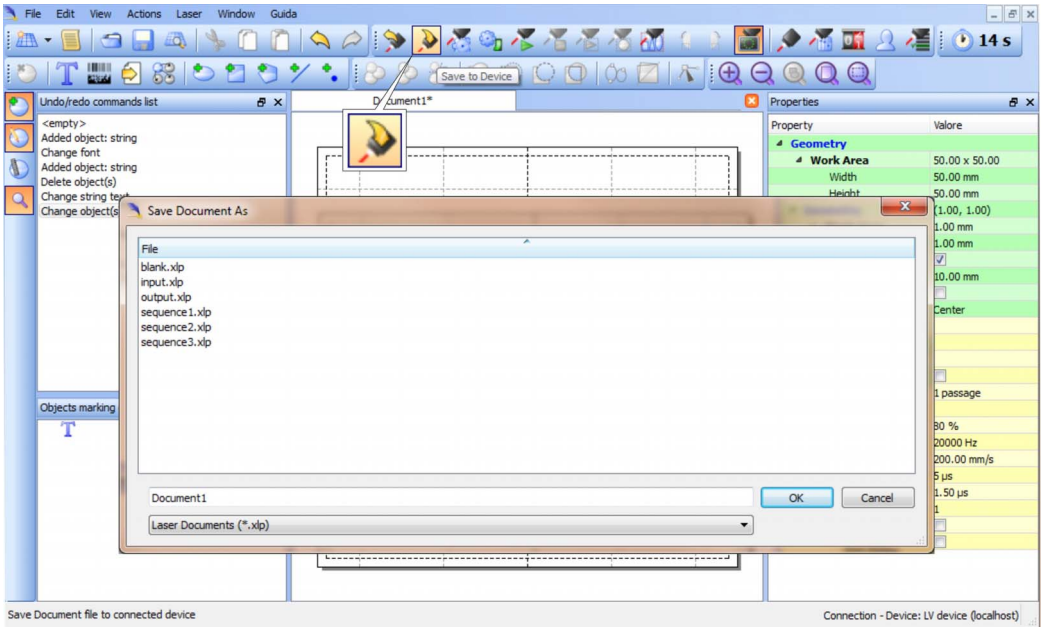
Press the **Send Marking** button in the **Laser Toolbar** .

NOTE: Consult Lighter™ software user's manual for a proper use of the same.

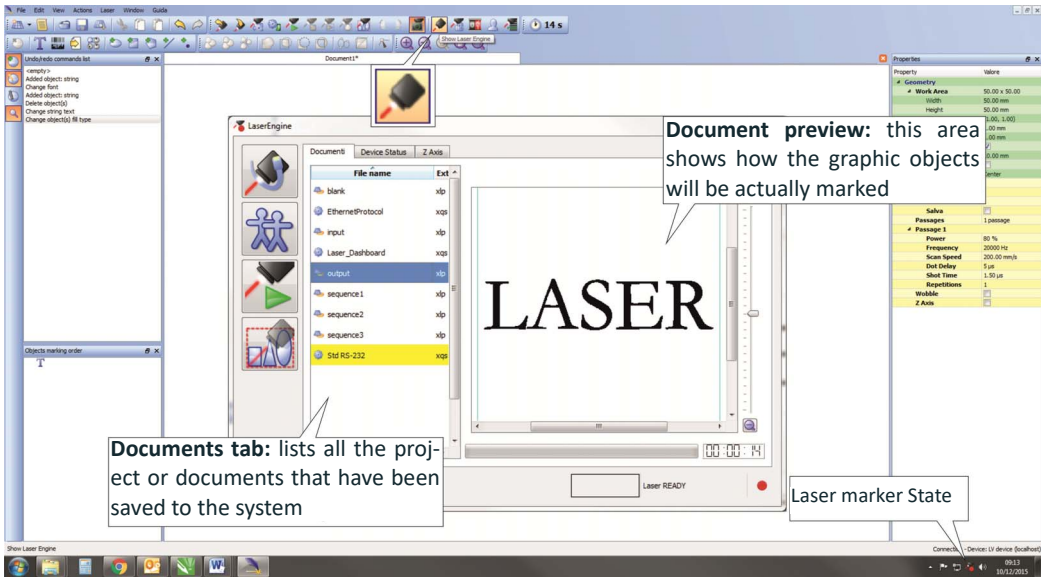
HOW TO USE X1 - COMMAND BOX SIGNALS TO MARK LAYOUT

Automate the marking process allowing documents to be marked using external **X1.11** (*START_MARKING*) and **X1.13** (*STOP_MARKING*) signals, which can be generated by PLC or other external devices.

Click on the **Save to Device** button to save the layout in the device memory:



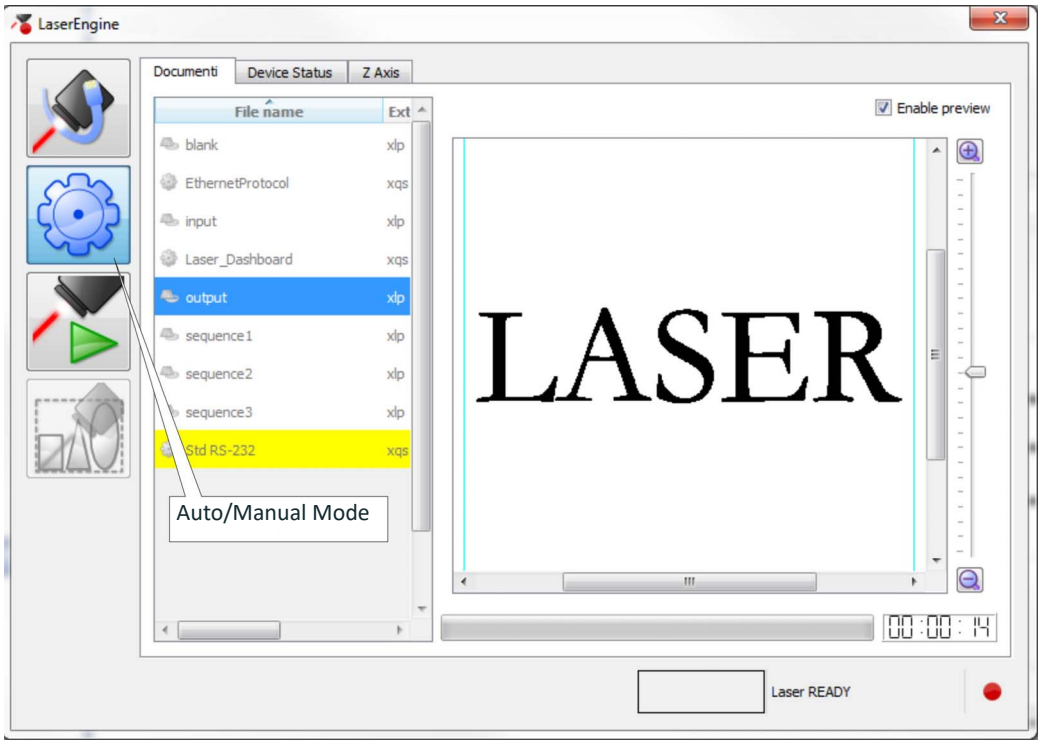
Click on the **Show Laser Engine** button to display Laser Engine window:



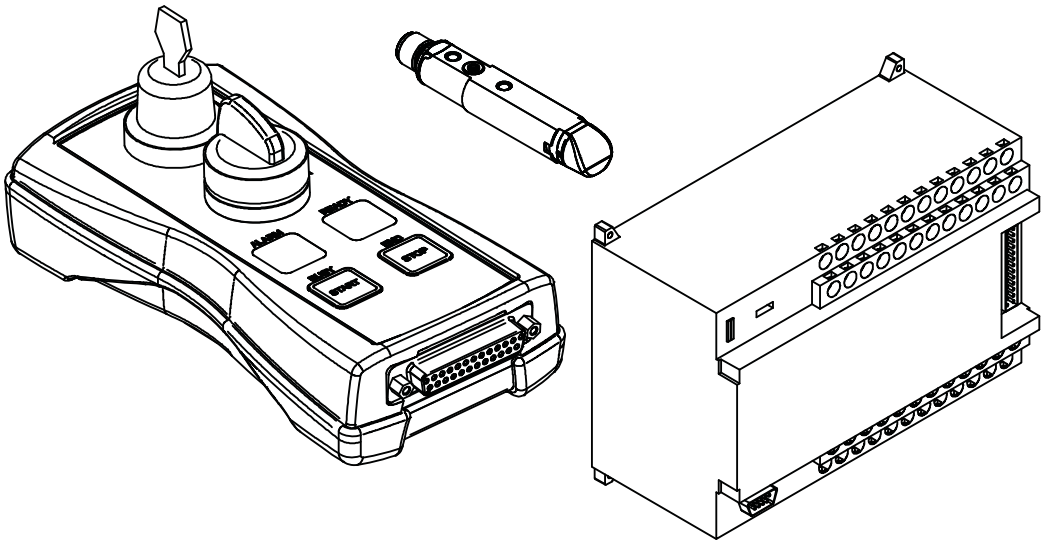
AUTO/MANUAL Mode button allows switching between the two available working modes:

- Auto mode: the engraving operations are executed automatically using external signals.
- Manual mode: used for displaying the margins of the graphic objects to be marked and to test layouts.

Select the document from the list and click on the **To Auto Mode** button:



The laser marker is ready to mark the document using external *START_MARKING* and *STOP_MARKING* signals:



NOTE: Consult Lighter™ software user's manual for a proper use of the same.

APPENDIX E
MARKING SOFTWARE UPGRADE

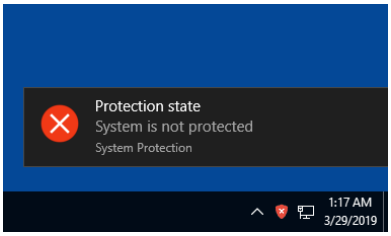
HOW TO UPDATE THE MARKING SOFTWARE

This document describes how to update the Lighter™ Suite software version.

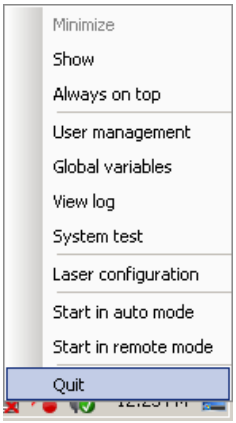
Before updating the software, disable system protection (see “Disable the system protection” on page 51).

CAUTION: When the System Protection is disabled the system is not protected against disk corruption or malware attacks. Disable the protection only for the time necessary to make disk changes.

1. Wait for the operating system to **restart**
2. Check that the System Protection is **disabled** (red icon):

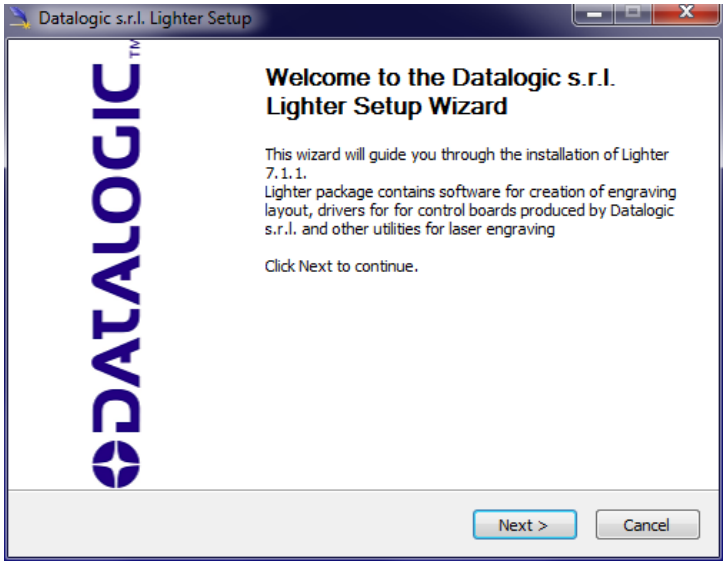


3. Close Lighter™ *Laser Editor* and *Laser Engine* (right-click on the icon in the tray bar and select **QUIT**)

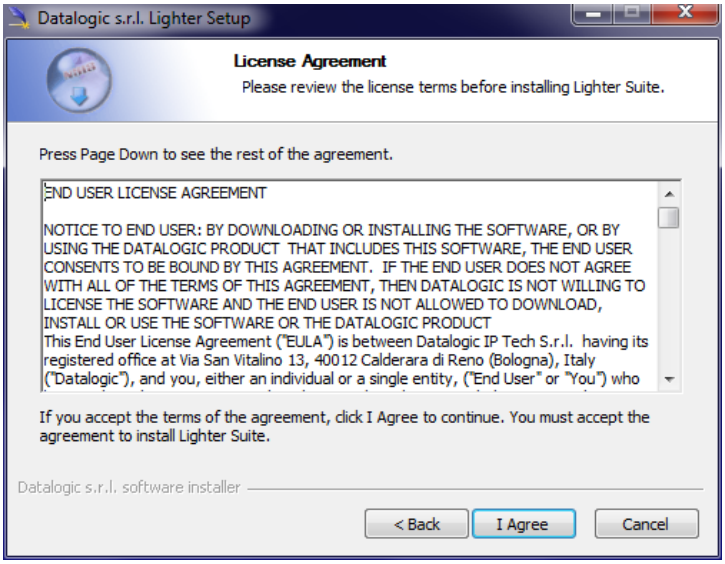


4. Run the new *Lighter™ Suite installer* from an external USB device.

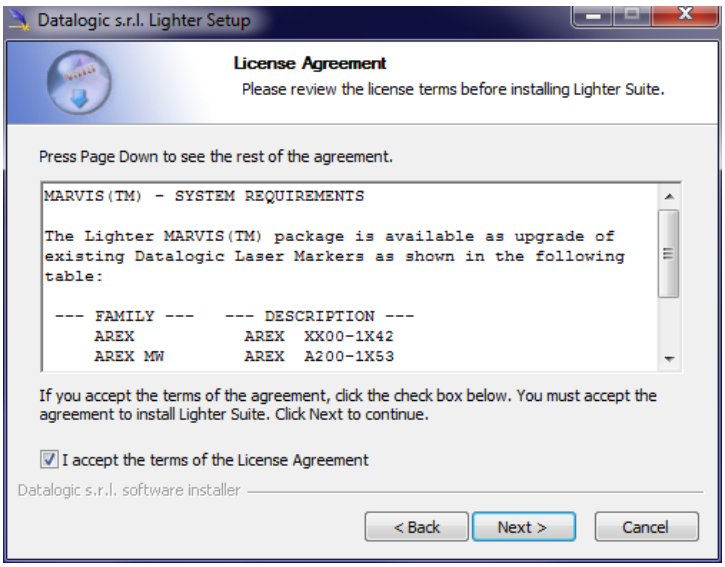
5. Press **Next** to continue:



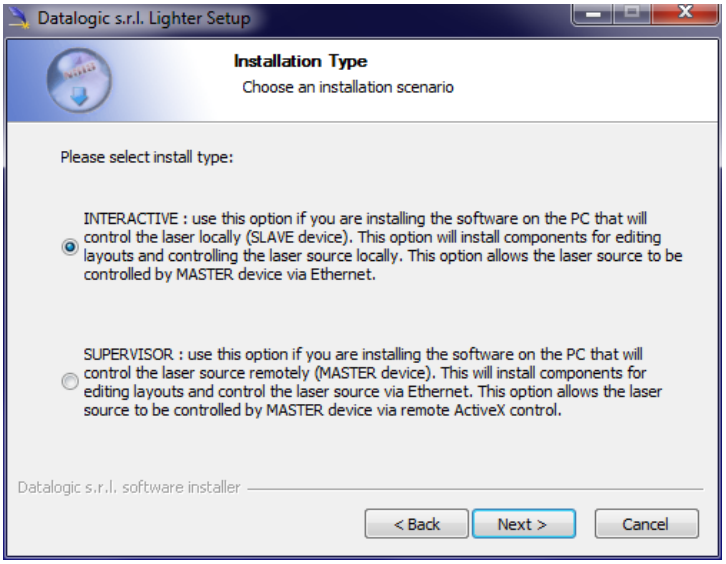
6. Press **I Agree** to continue:



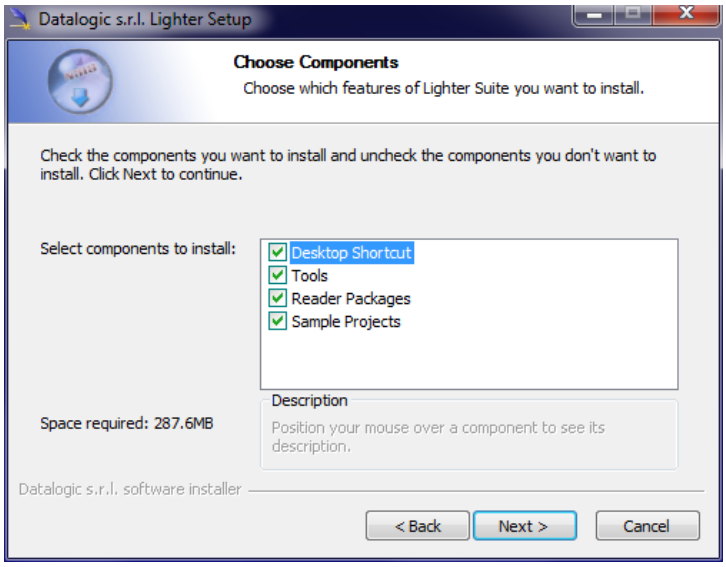
7. Check *"I accept the terms of the License Agreement"* and press **Next** to continue:



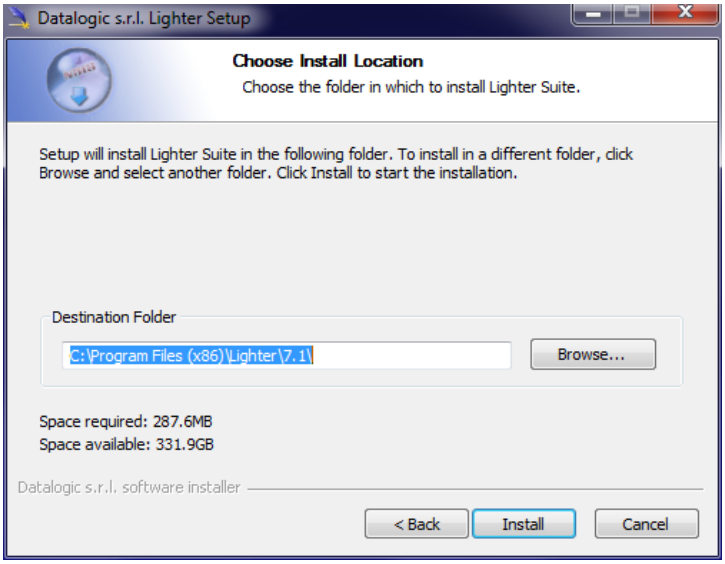
8. Choose the *INTERACTIVE* installation type and press **Next** to continue:



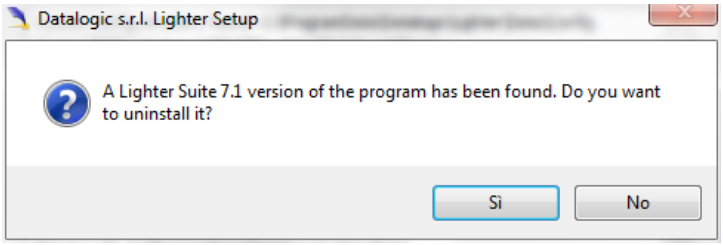
9. Choose the components to install and press **Next** to continue:



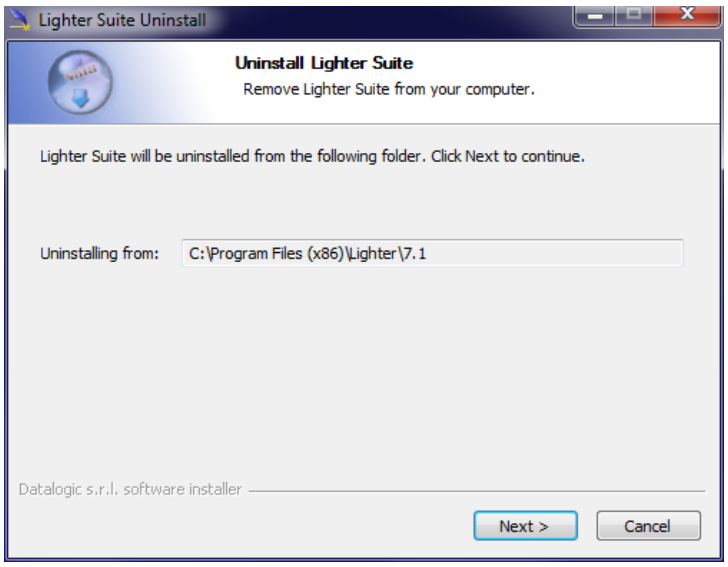
10. Do not change the destination folder and press **Install** to continue:



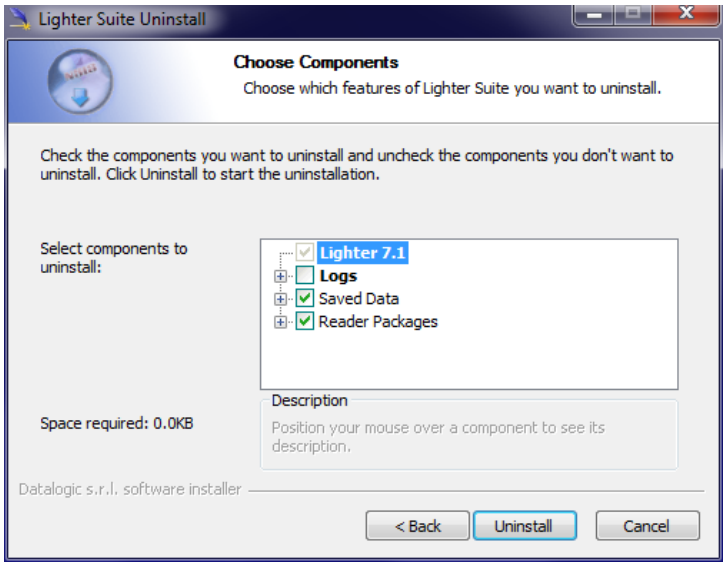
11. Press **OK** to uninstall the old Lighter™ Suite version



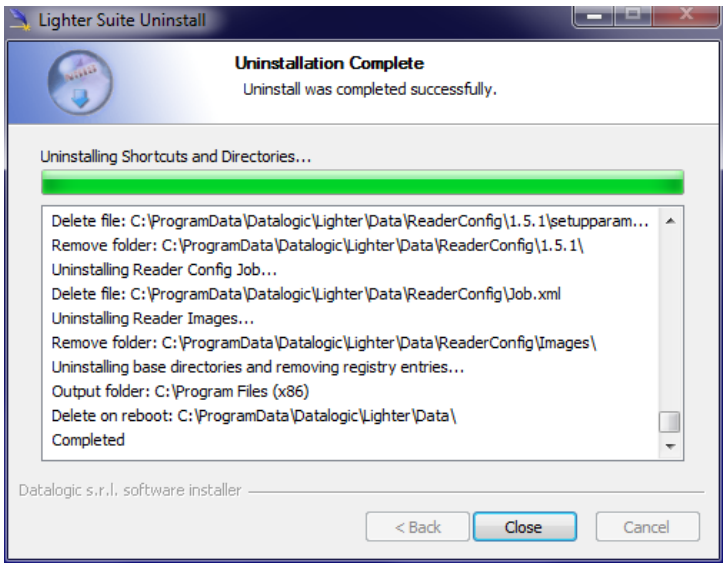
12. Press **Next** to continue:



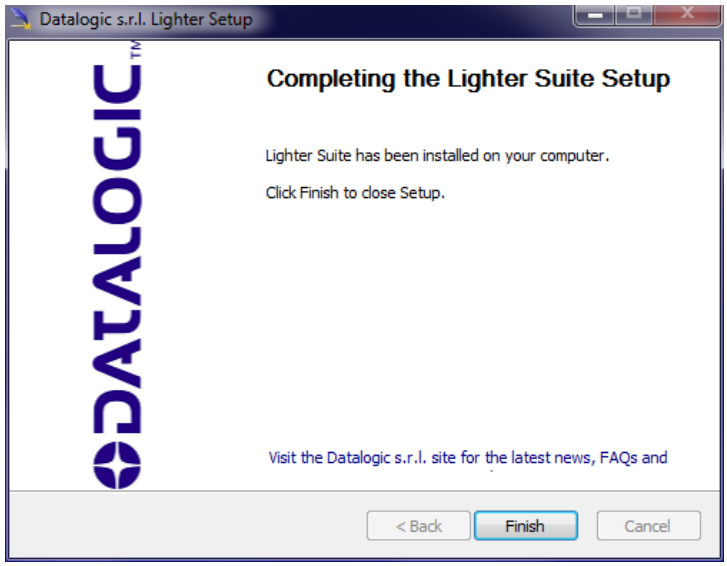
13. Select the components of the old Lighter™ Suite version to remove and press **Uninstall**:



14. Wait until the uninstallation is complete and press **Close** to continue:

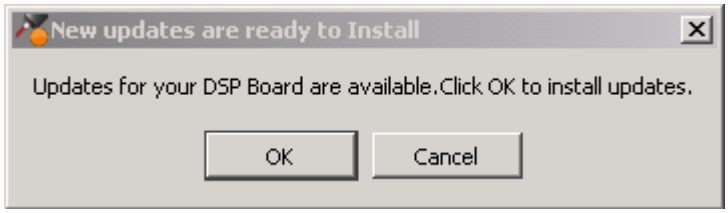


15. Lighter Suite will be installed. Press **Finish** to complete the procedure:



16. If Lighter™ Suite update includes any **control board updates** follow the procedure below otherwise jump to step 17:

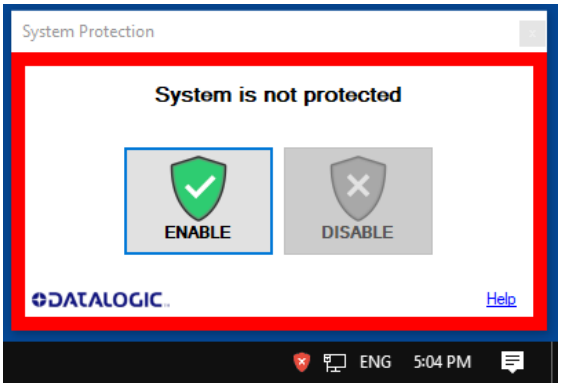
- Procedure with laser **control board upgrade**:



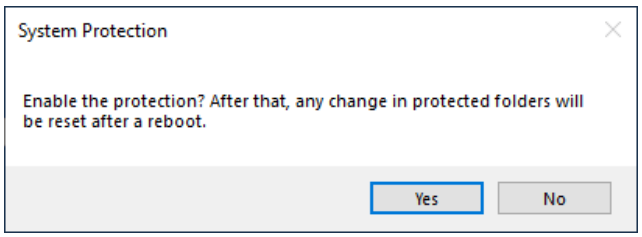
- press **OK** to execute control board update
- wait for the laser control board update

17. Open the System Protection tool GUI

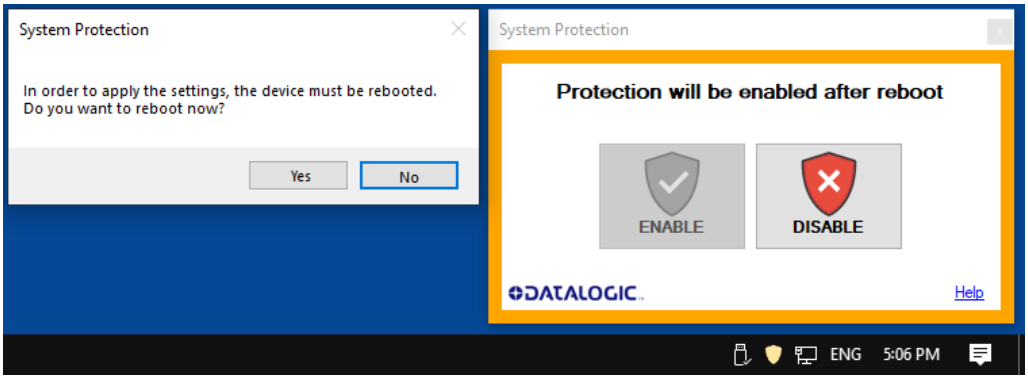
- Click the **ENABLE** button



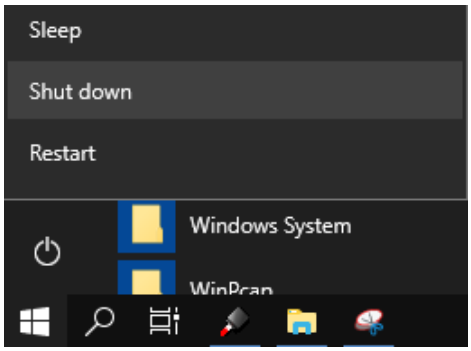
- A message advise the User to confirm the new setting. Press **YES** to enable System Protection



- A message advise the User that the system will be rebooted. Press **NO** to continue



- Shut down the system:



- wait until the operating system shuts down (black screen)

CAUTION: DO NOT turn OFF or UNPLUG the laser marker while Windows® is shutting down!

- **POWER OFF** the laser marker to complete installation

APPENDIX F
RECOVER THE LASER MARKER

OVERVIEW

The laser marker is provided with a *RECOVERY partition* able to restore the system to the factory settings.

The RECOVERY procedure should be used if the Operating System is corrupted or disks are corrupted.

HOW TO RECOVER THE LASER MARKER

CAUTION: All existing data in the laser marker will be overwritten. All existing data will be lost. If possible, make a backup of all the customer's data located by default in D:\Data folder, before recovering the system.

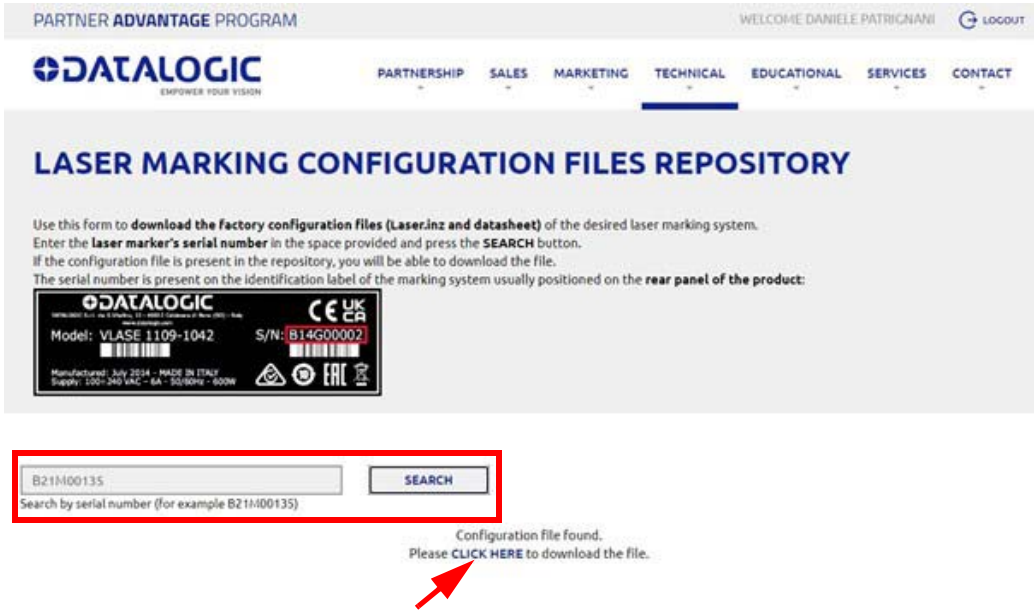
NOTE: The following images are indicative only.

Preliminary Operation

Before proceeding with the recovery procedure, it is necessary to get the original factory configuration file (`laser.inz`):

1. From an external PC connected to the Internet, go to Datalogic web site and click on **PARTNER LOGIN**.
2. If you are not registered yet, you will be asked to **Create your login**.
3. Enter **Username** and **Password**.
4. Select **TECHNICAL** and click on **LASER MARKING CONFIG. FILES REPOSITORY**.

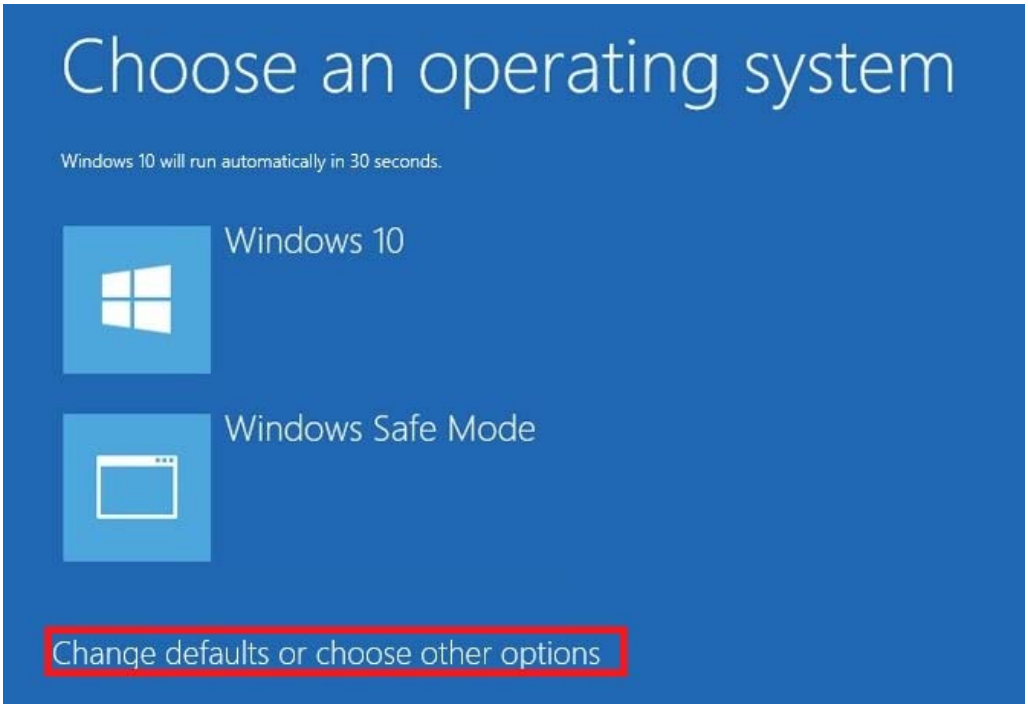
5. Insert the **Serial Number** and press **SEARCH** button.
6. Select **CLICK HERE** to download the file in **zip** format.



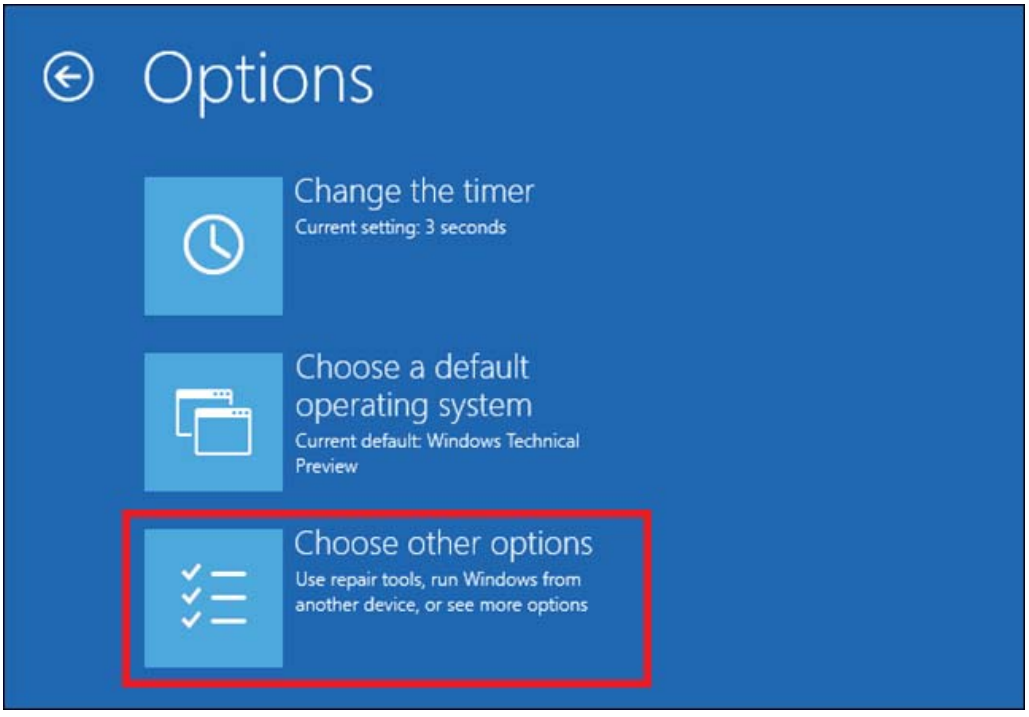
7. **Extract** the content of the **zip** file in a USB drive (the file `laser.inz` is contained in the folder ***Fileinz and report***).

Recover the system

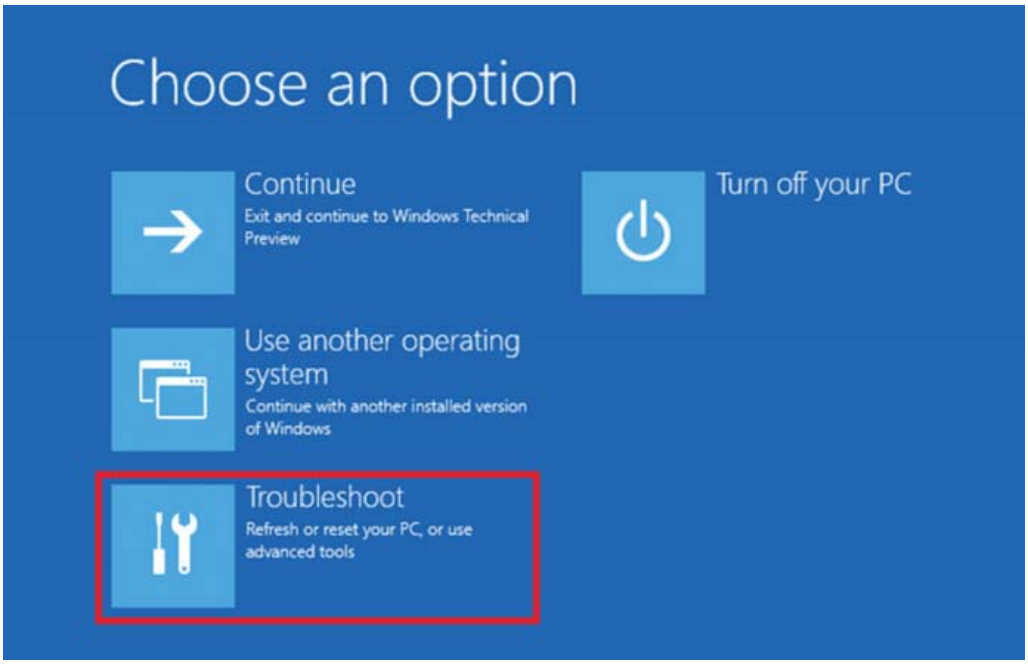
1. Turn ON the laser marker
2. Wait for '**Choose an operating system**' menu to appears
3. Select '*Change defaults or choose other options*' using **TAB** key and then press **ENTER** key



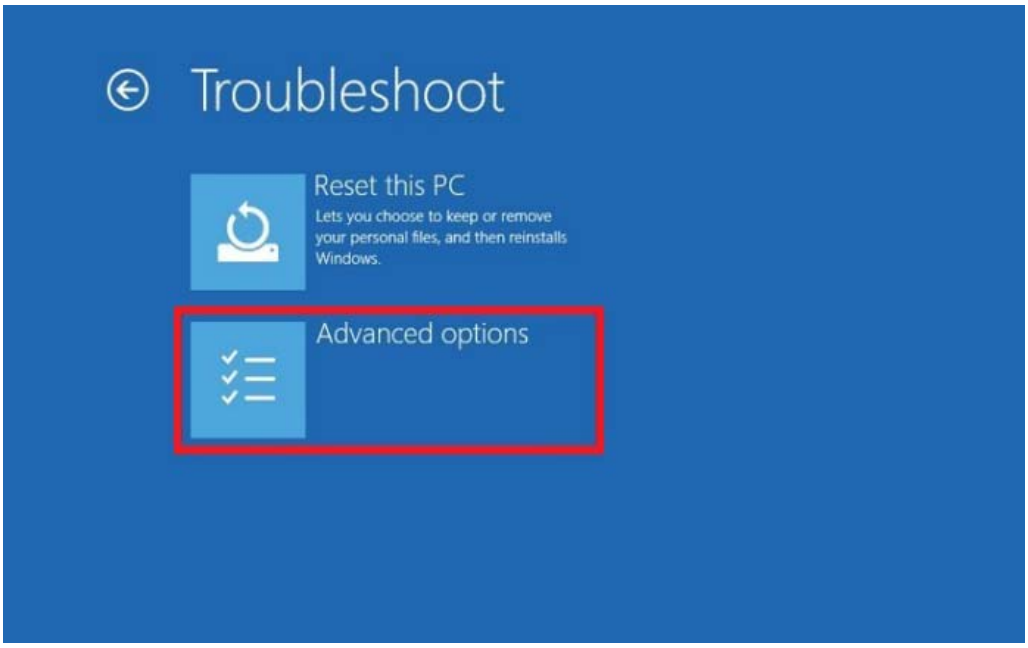
4. The **Options** screen will be shown
5. Select '*Choose other options*' using **TAB** key and then press **ENTER** key



6. The **Choose an Option** menu will be shown
7. Select '*Troubleshoot*' using **TAB** key and then press **ENTER** key

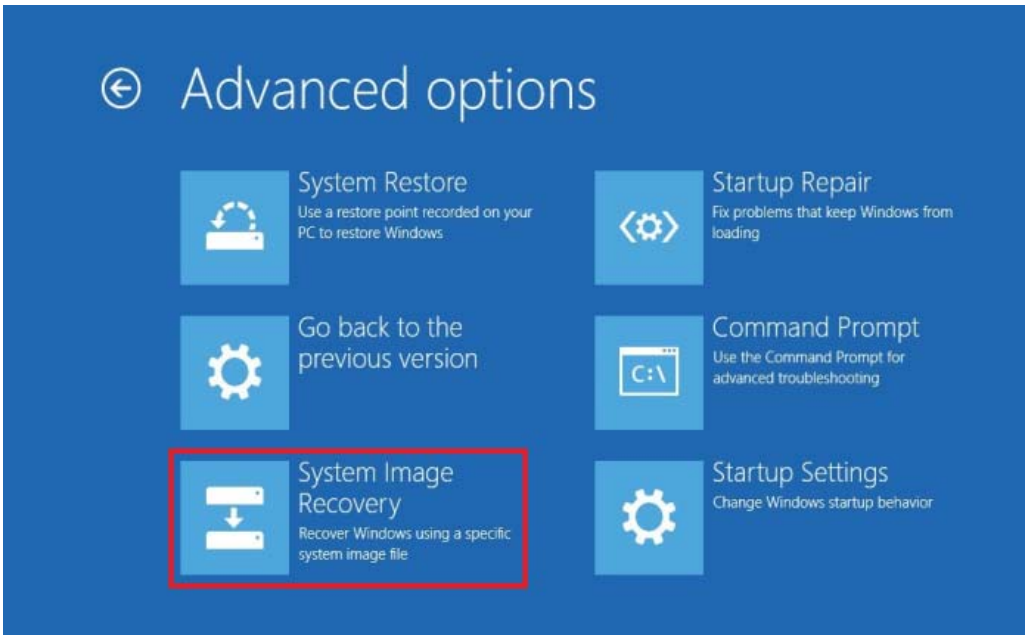


8. The Troubleshoot menu will be shown
9. Select '*Advanced Options*' using **TAB** key and then press **ENTER** key

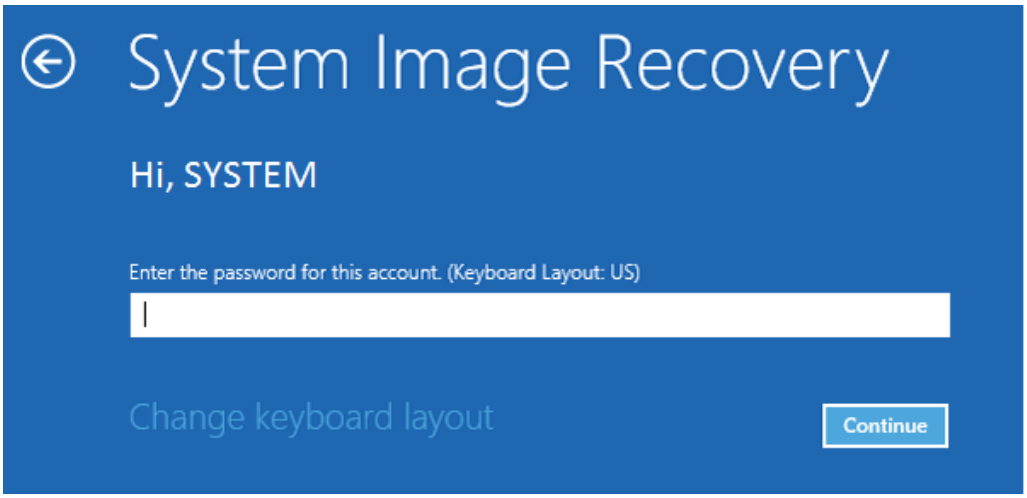


10. The **Advanced options** menu will be shown

11. Select '*System Image Recovery*' using **TAB** key and then press **ENTER** key

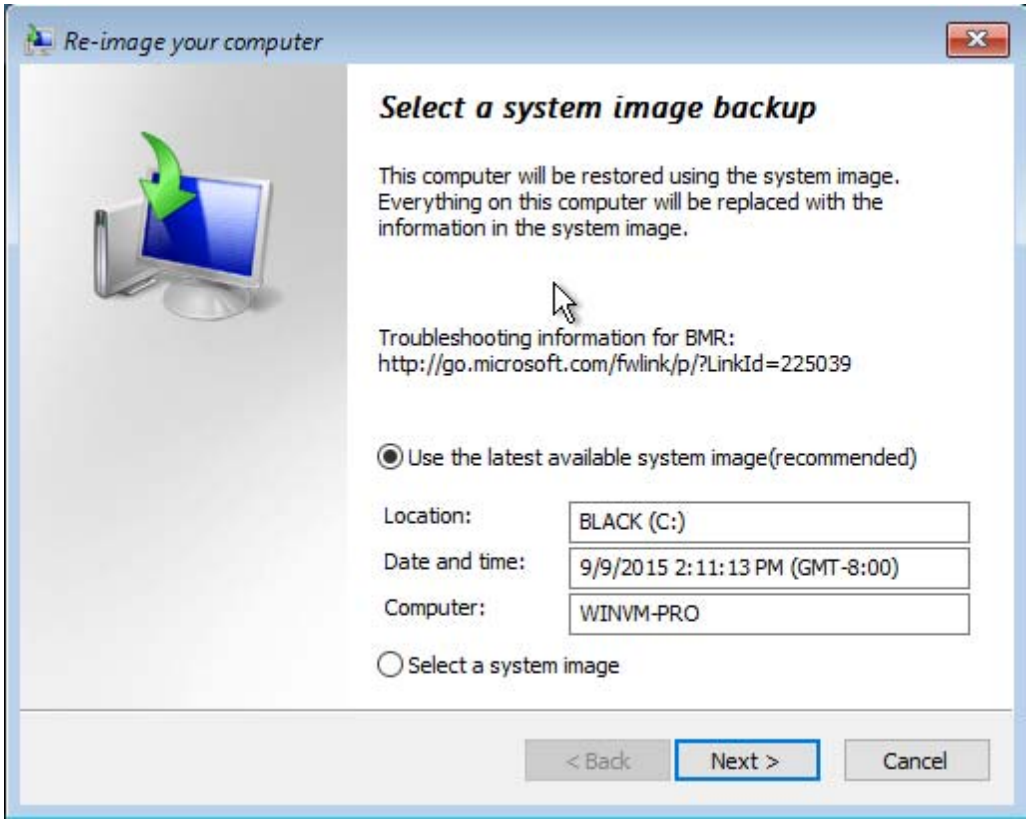


12. Enter the password '*dla*' and press **CONTINUE**

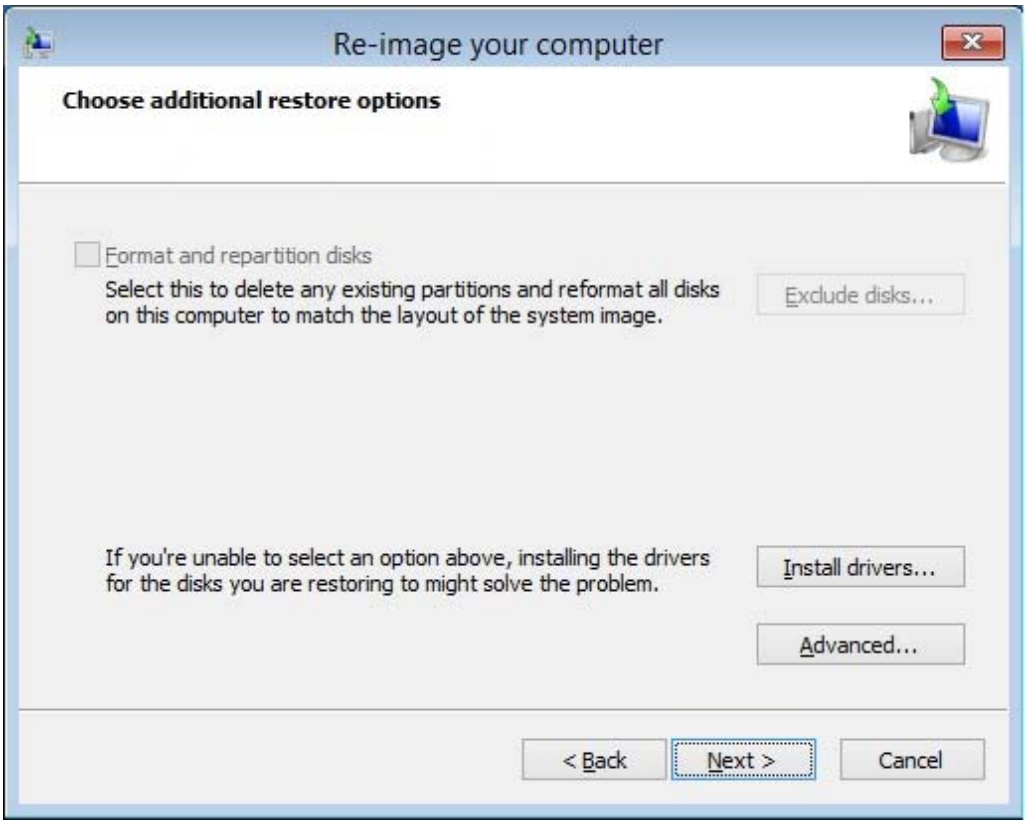


13. Select '*Use the latest available system image (recommended)*'

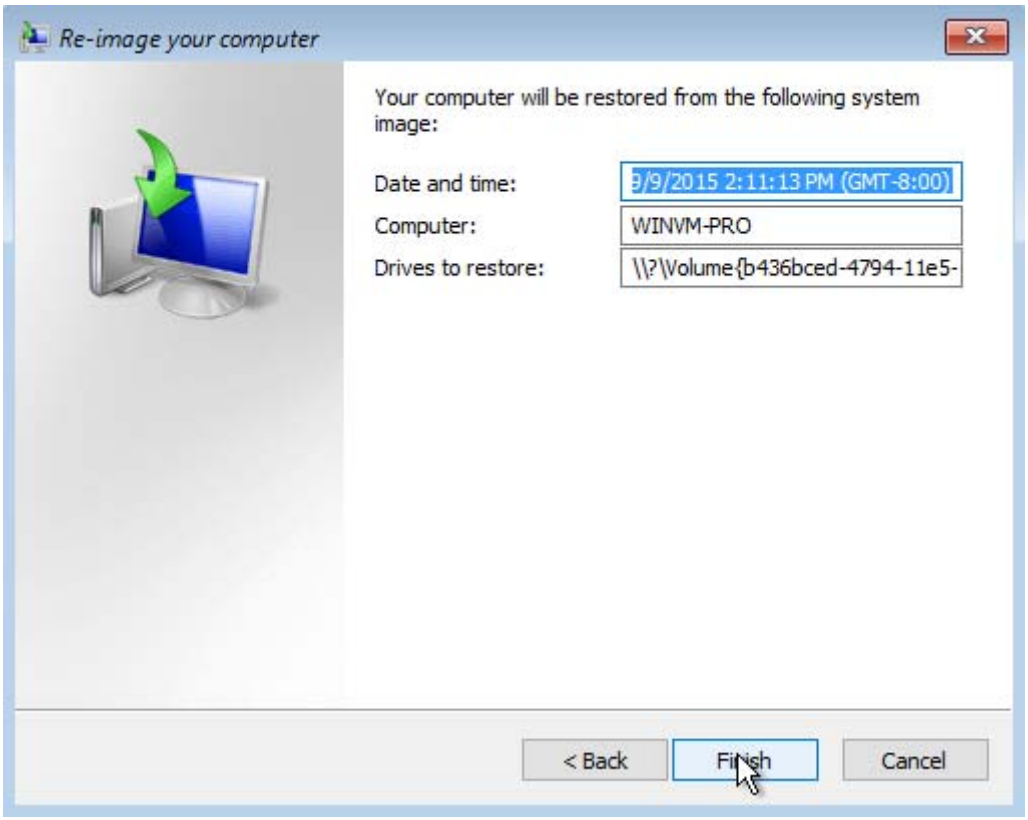
14. Press **NEXT** to continue



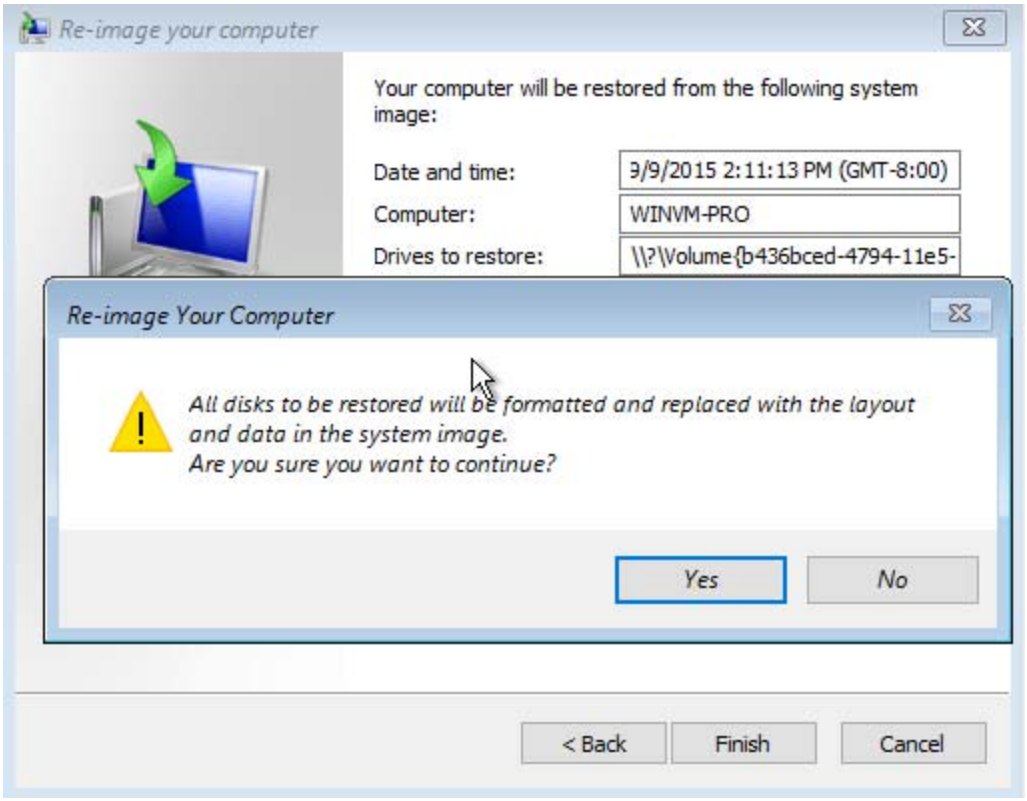
15. Press **NEXT** to continue



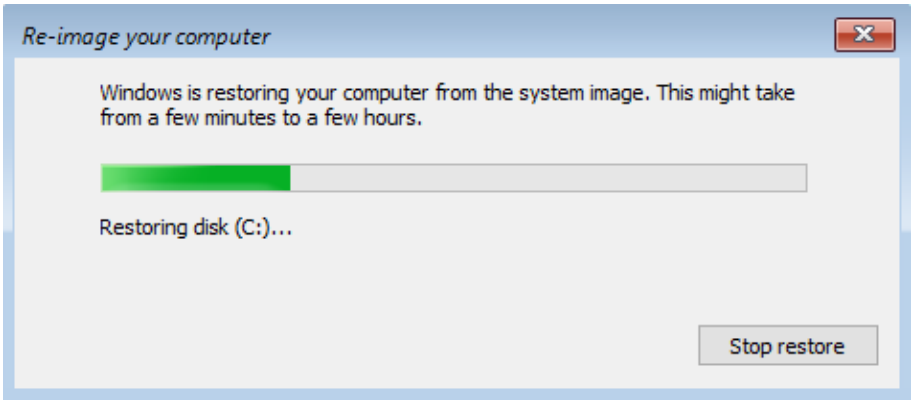
16. Press **FINISH** to continue



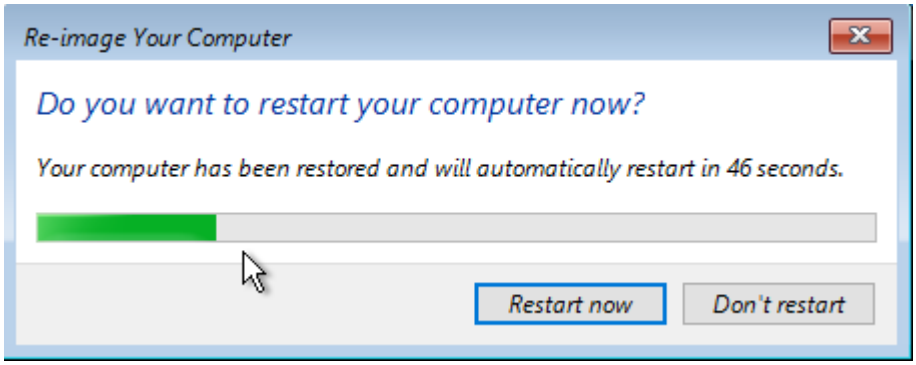
17. Press **YES** to continue



18. **Wait** for disks restoring



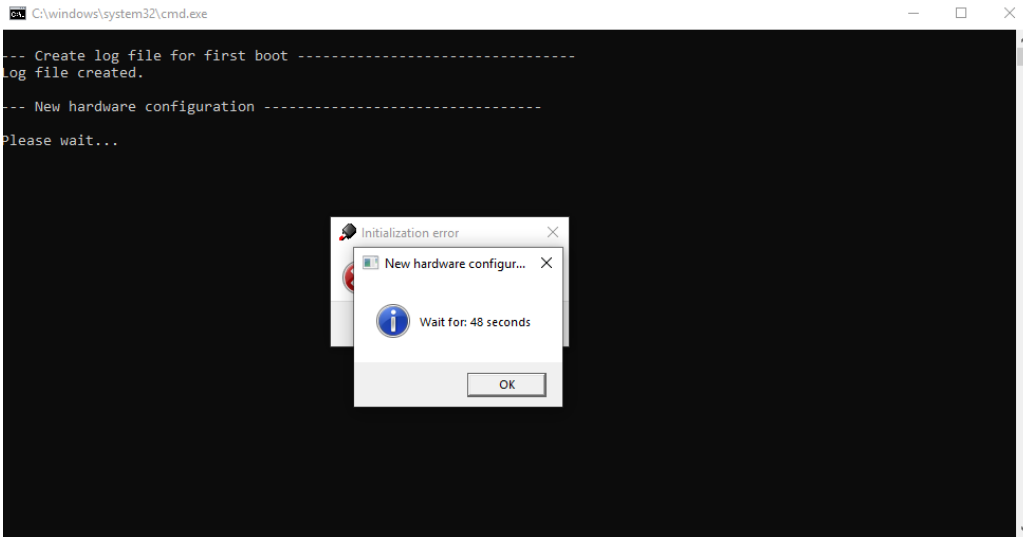
19. The system will **restart** automatically



20. **Turn ON** the system

21. The system will perform the ***New Hardware Configuration*** procedure (approx. 2 minutes)

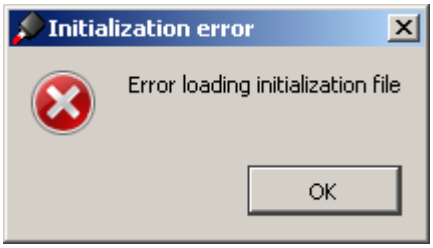
22. **Wait** for the end of the procedure



23. The system will **restart** automatically

CAUTION: DO NOT turn OFF or UNPLUG the laser marker while Windows® is restarting!

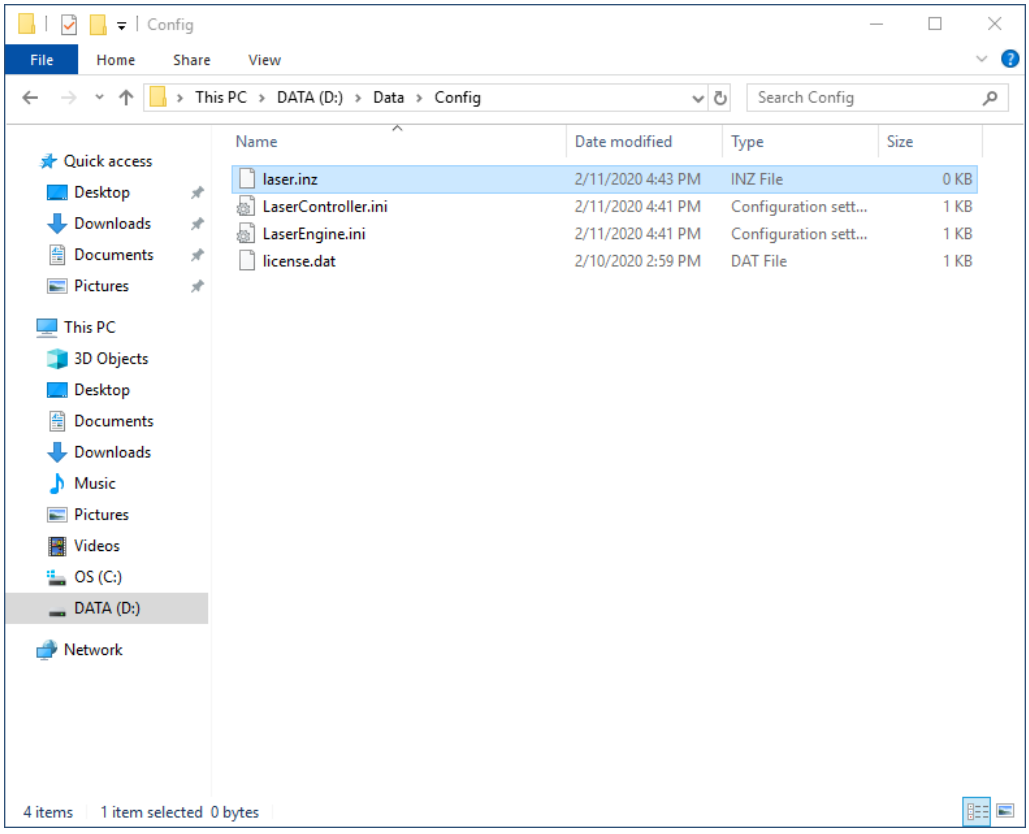
24. After the restart an error message will advise you that Lighter™ initialization file is not present. Press **OK** to continue:



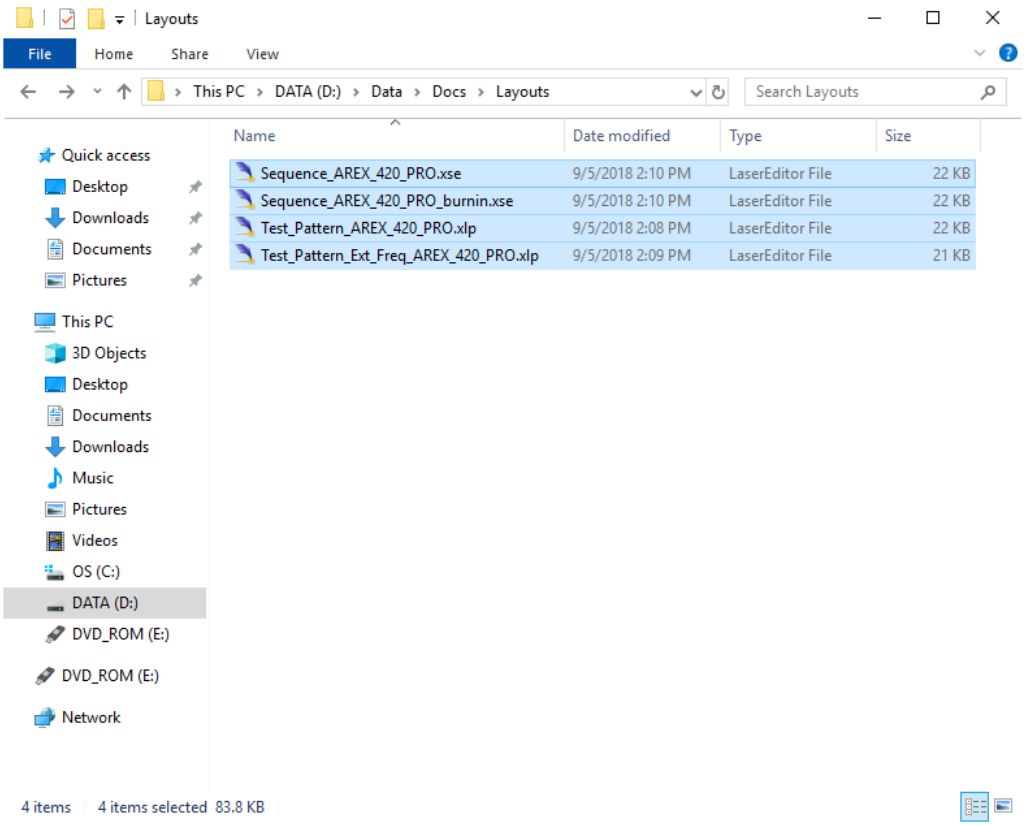
NOTE: In order to work, the marking software must be customized with the factory configuration file. The custom `Laser.inz` file is present in the Partner Area of the Datalogic website (see "Preliminary Operation" on page 107).

25. Insert the USB drive with the `laser.inz` file in a USB port of the laser marker.

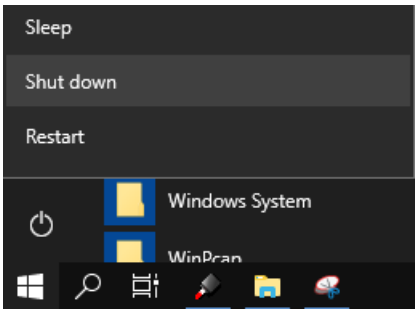
26. Navigate to the folder ***Fileinz and report*** and copy customized `laser.inz` to ***D:\DATA\CONFIG***



27. Navigate to the folder ***Test Layouts***, select the ***right test layout*** files depending on the laser marker model and copy them to **D:\DATA\DOCS\LAYOUTS**



28. **Shut down** the operating system:



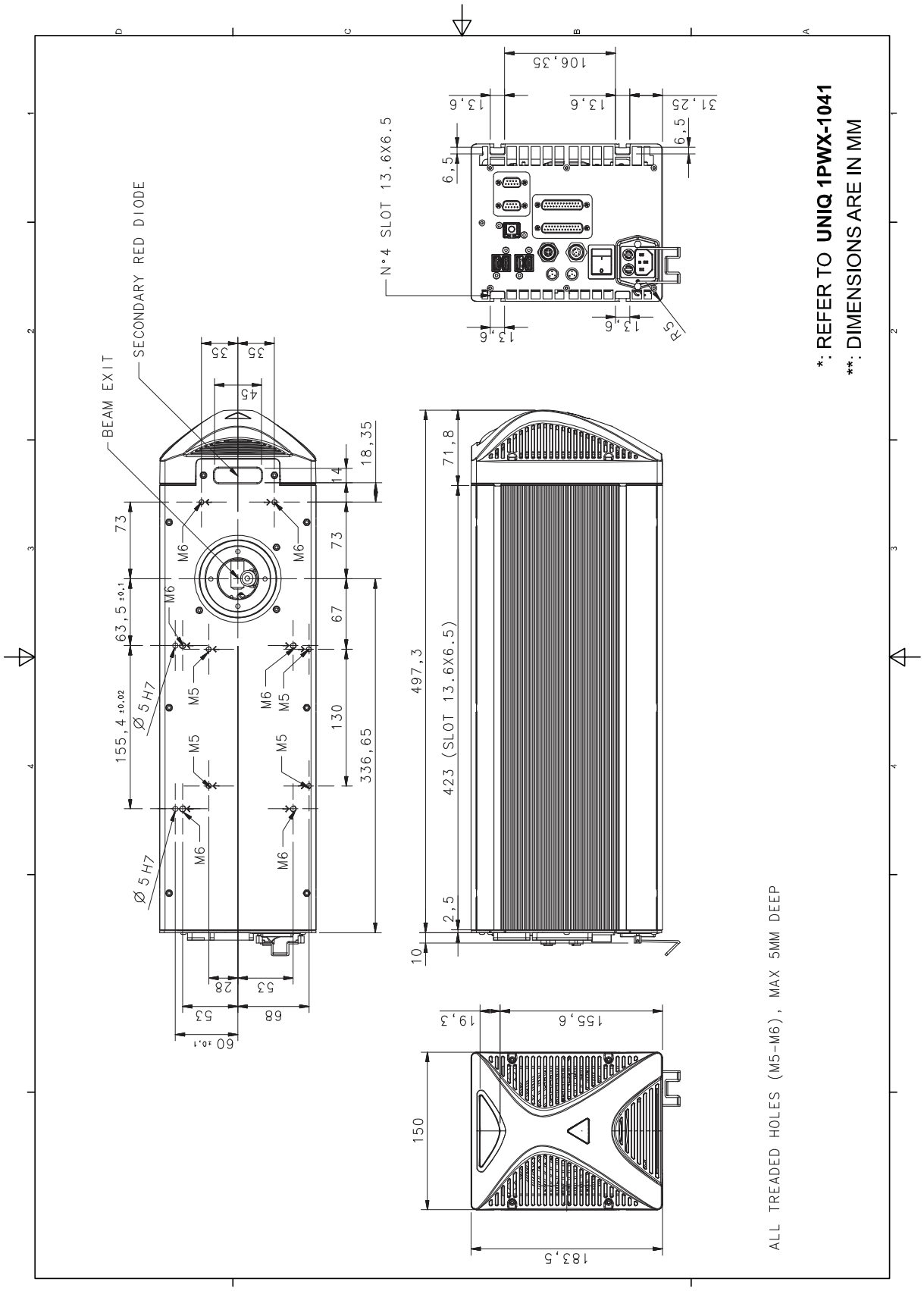
CAUTION: DO NOT turn OFF or UNPLUG the laser marker while Windows® is shutting down!

29. **Wait** until the operating system is shutting down

30. Turn **OFF** the laser marker

APPENDIX G
MECHANICAL DRAWINGS

LASER MARKER



NOTE: Please refer to Datalogic website for detailed drawings.

DATALOGIC

www.datalogic.com

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