

USER'S MANUAL



> UniQ™

UniQ™ User's Manual

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SYMBOLS

Symbols used in this manual along with their meaning are shown below. Symbols and signs are repeated within the chapters and/or sections and have the following meaning:



Generic Warning:

This symbol indicates the need to read the manual carefully or the necessity of an important maneuver or maintenance operation.



Electricity Warning:

This symbol indicates dangerous voltage associated with the laser product, or powerful enough to constitute an electrical risk. This symbol may also appear on the marking system at the risk area.



Laser Warning:

This symbol indicates the danger of exposure to visible or invisible laser radiation. This symbol may also appear on the marking system at the risk area.



Fire Warning:

This symbol indicates the danger of a fire when processing flammable materials. Because there is a danger of fire, it is indispensable to follow the instructions provided by the manufacturer when commissioning the marking system.



Notice:

Notes, usage tips, or additional information.



Note:

Carefully read the user's manual before using the marking system.

REVISION INDEX

| Revision | Date | Number of added or edited pages |
|-----------------|------------|---------------------------------------|
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NOTE:

We sometimes update the documentation after original publication. Therefore, you should also review the documentation at www.datalogic.com for updates.

FOREWORD

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

Following manual refers to an UniQ™ 1PWX-TLSV marking system in Class 4 configuration.

In addition to being professionally trained in their role, personnel assigned to work on the marking system 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.

The workers assigned to the marking system can be identified as:

- **OPERATOR**
responsible for loading elements to be processed, visually checking the work cycle, removing the finished product and cleaning the marking system.
- **MAINTENANCE WORKER**
responsible for the electrical, mechanical and optical maintenance and adjustment of the marking system.



WARNING!

Datalogic Automation S.r.l. shall not be held responsible for any non-conforming use of marking system of its manufacture.



NOTE:

BEFORE INSTALLING AND USING THE LASER, READ CAREFULLY THE APPENDICES.

OVERVIEW

We are honoured by your choice of a Datalogic Automation product, specifically a new product belonging to the UniQ™ product families, which aim to satisfy new market evolutions, and especially the integration industrial laser sources.

OPERATION OF A LASER SYSTEM WITH GALVANOMETRIC SCANNING

The laser generates a train of high-energy pulses of invisible radiation.

In order to obtain a more accurate focus, the laser beam is first enlarged by using an optical expansion system and then focused, after being 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; etching of the product surface occurs by coordinating the movement of the two motors with the turning on/off of the laser beam.

The deflected laser beam is focused by an F-Theta scan lens before it hits the surface of the target.

Generally speaking, the marking is carried out within the focus of the beam.

MARKING SOFTWARE

The marking software Lighter is preinstalled on the system.



NOTE:

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



NOTE:

Consult the proper Appendix to upgrade the preinstalled software if necessary.

The new **UniQ™** laser marking system, 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 laser marking system connections are found on the rear side of the marking system: power supply, safety, electrical signals, communication ports. The newly designed front cover houses the status LED, whose colour relates to the laser status.

UniQ™ marking system 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 marking system control platform allows for an easy integration in industrial environments and complies with the standard of the other Datalogic Industrial Automation marking systems, 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 Automation laboratories, which reduces warm-up time and improves the stability of emitted laser power. The operating temperature range is 5°- 40°C for use in industrial environments.



WARNING!

Marking system installation in secure environment is responsibility of the system integrator!

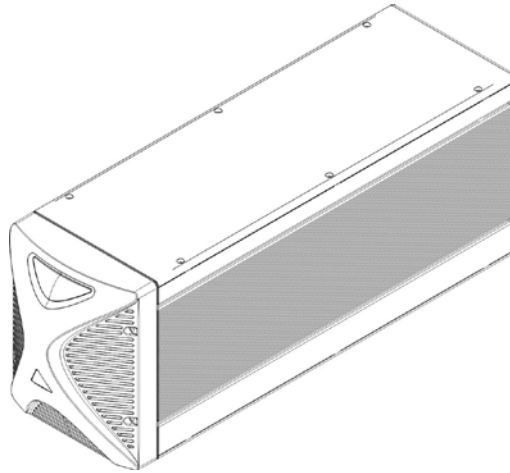


Figure 1: UniQ™ monolithic design.

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/New 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 Ingress Protection level (IP54 category 1 degree)
- Fixing points compatible with Arex and Ulyxe family
- Possibility to install in any position (vertical, horizontal, etc.) and in side-by-side configuration
- Low power consumption
- Extremely Low noise level
- High centre field precision and repeatability

IMPORTANT WARNINGS

Only authorized, qualified, fully-trained personnel and, in any case, only technicians who are fully skilled and aware of the risks inherent in the maintenance of electric, mechanical and optical components, may be allowed to access the internal parts of the electric sections and components of this marking system.

Datalogic Automation S.r.l. declines all responsibility and liability for maintenance and repair work carried out on live parts of this marking system by technicians who have not been authorized or trained to perform such.

The level of training of the persons who intend to work on the marking system must be checked beforehand with the Datalogic Automation.Srl.



WARNING!

It's not allowed modify destination use of the marking system in different way of its functions.

Datalogic Automation S.r.l. declines any responsibility and liability for irregular and improper use of the marking system which it manufactures.



WARNING!

These marking system actuation is demanded to the system integrator.

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1 CONTENTS OF THE PACKAGING



WARNING!

UniQ™ is a **CLASS 4 LASER PRODUCT** and it is the responsibility of the OEM/system integrator to provide the safety completeness to be ready-to-use.

1.1 UNPACKING

When unpacking the marking system from the shipping carton you should:

- Remove transport's protection (remove the four screws on the bottom)
- Remove the documentation from the top of the marking system
- Remove the box containing the accessories
- Carefully remove the marking system from the packaging using both hands

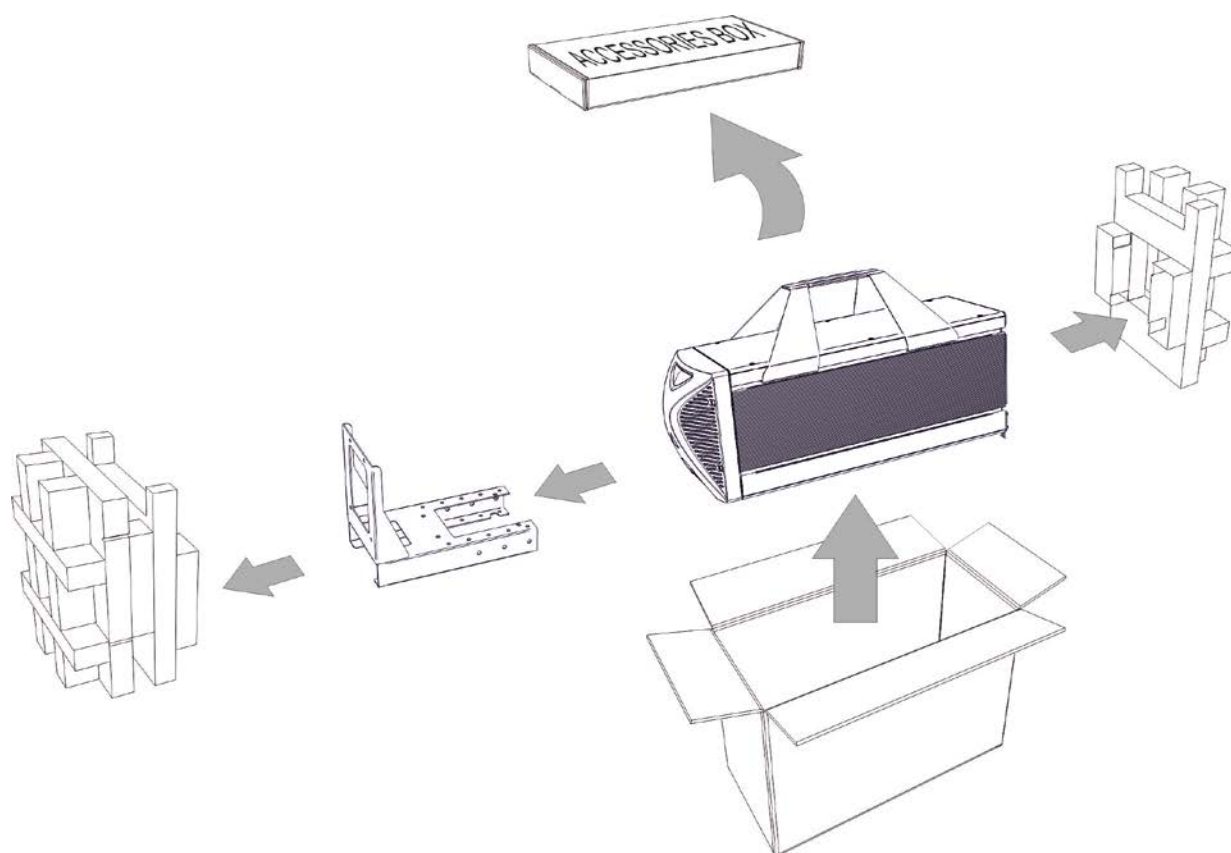


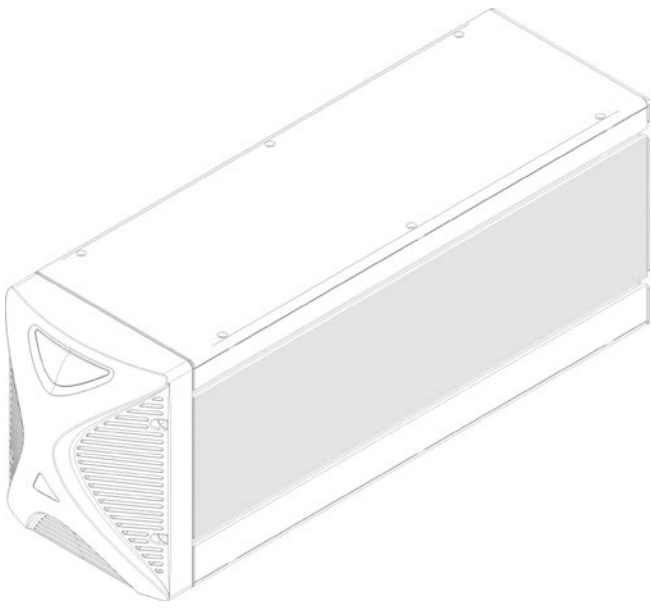

Figure 2: Unpacking.

Before installing or operating the marking system, you should:

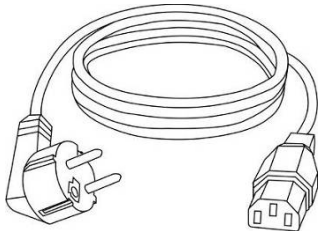



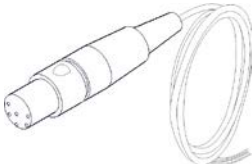
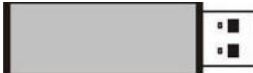
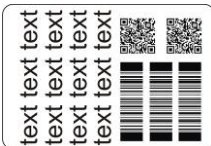



- Inspect the shipping container for damage
- Inspect the marking system for signs of damage
- Confirm that the shipping carton contains all items on the shipping inventory list including any accessories

Retain all packaging materials until the marking system has been inspected for completeness and damage, and you have checked the operating performance. If anything is missing or defective, see Chapter 7 for contact details.

1.2 MAIN HARDWARE

| | |
|---|---|
|  <p>Marking System</p> |  <p>F-Theta (except UniQ™ 1PWX-T0SV)</p> |
|---|---|

1.3 CABLE AND OTHER COMPONENTS

| | | | |
|---|---|---|---|
|  <p>Power supply cable</p> |  <p>Interlock connector gold (*)</p> |  <p>Command Box gold connector (*)</p> | |
|  <p>Interlock cable</p> |  <p>Shutter OUT cable</p> |  <p>USB Stick</p> | |
|  <p>Sample Test</p> |  <p>Manuals</p> |  <p>Test Report</p> |  <p>Sliding nuts</p> |

* If this connector is used, the marking system works in **DANGEROUS** condition (MUTING DEVICE).

1.4 TRANSPORT

The marking system can be easily lifted up and moved by a single person thanks to its compact size and reduced weight.

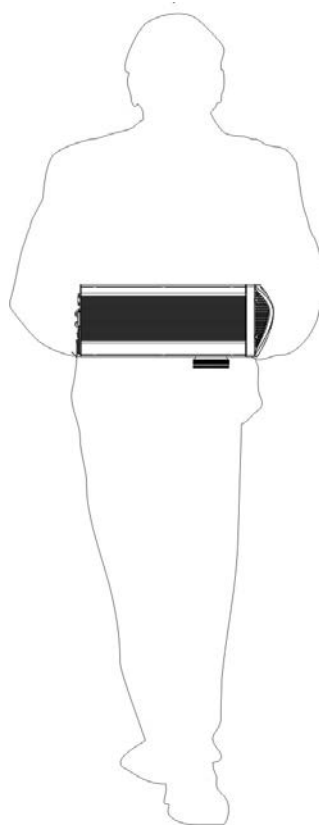


Figure 3: Transport.



WARNING!

The UniQ™ is a delicate optical marking system, avoid damaging it with shock and vibrations.

1.5 ON MOISTURE CONDENSATION

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

If moisture condensation occurs

Turn off the marking system and wait about 1 hour for the moisture to evaporate.

Note on moisture condensation

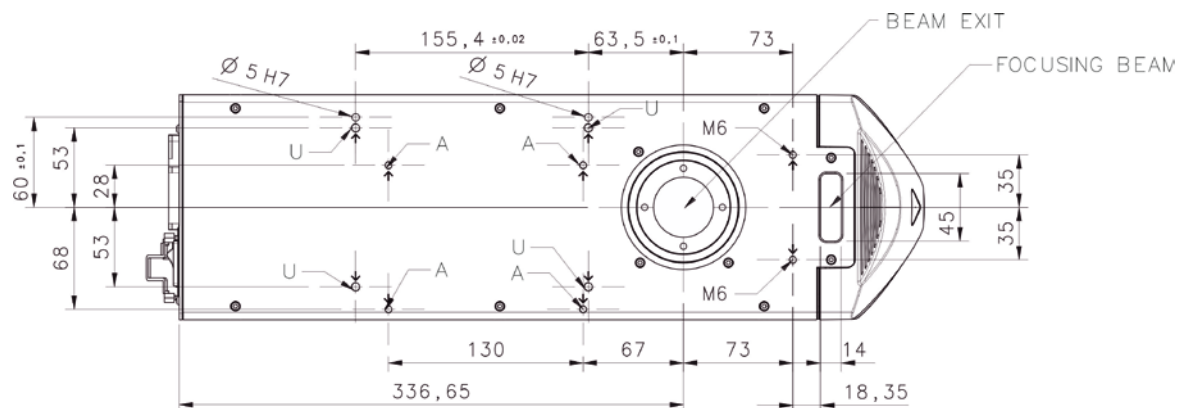
Moisture may condense when you bring the marking system from a cold place into a warm place (or vice versa) or when you use the marking system in a humid place as shown below.

How to avoid moisture condensation

When you bring the marking system 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).

1.6 FIXING AND POSITIONING

The marking system 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.



* DIMENSIONS ARE IN MM

Figure 4: Fixing points.

A = Threaded holes M5 (Arex family compatibility)

U = Threaded holes M6 (Ulyxe family compatibility)

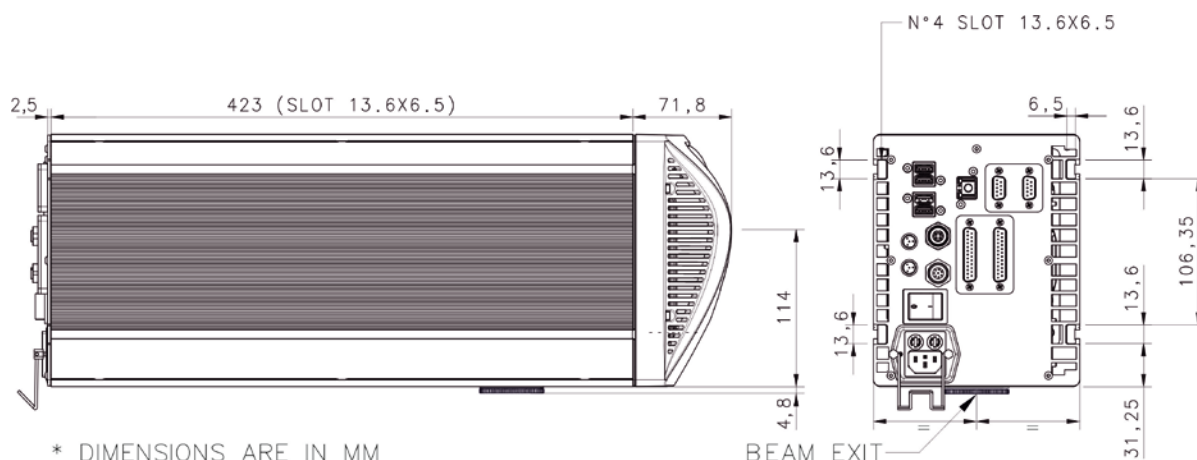
M6 = Threaded holes M6 for accessory



NOTE:

ALL treaded holes (M5-M6), **max 5mm deep!**

The marking system can be also fixed by using side slots shown in picture



* DIMENSIONS ARE IN MM

Figure 5: Lateral fixing points.



WARNING!

It is very important to secure the marking system before you start marking the piece since improper securing or positioning may cause serious damage. Do not secure the marking system in a way other than the one described in the figure.



NOTE:

In order to prevent marking distortions, check for the absence of vibrations between marking system and piece to be marked.



NOTE:

It is recommended to install the marking system on a micrometer positioning Z-axis system!

1.7 INSTALLATION ENVIRONMENT

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

UniQ™ is an air cooled marking system, an adequate air flow is necessary to guarantee its correct cooling. Installation must not slow or stop the flow of air cooling. Moreover, do not install a heat source near.

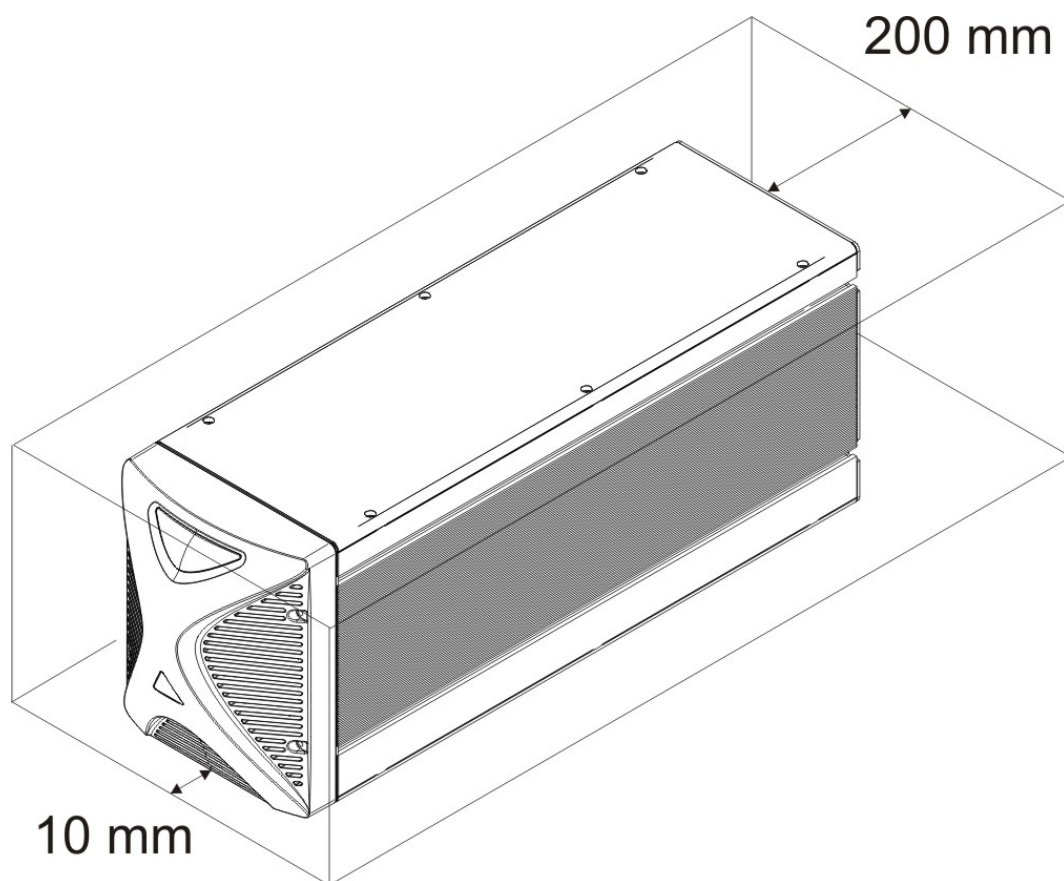


Figure 6: Installation environment.

To obtain a good marking quality, and not to decrease life time, we recommended a ventilation or vacuum system in a protection box to limit dust due to marking phase.

1.8 FUME / DUST EXTRACTOR

During marking process, dust and/or gas may be produced. It is important to use adequate fume extractor and/or air filtration.



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 system itself. Always use adequate fume extractor during PVC and plastic marking.

2 TECHNICAL SPECIFICATIONS

**NOTE:**

BEFORE INSTALLING AND USING THE LASER, READ CAREFULLY THE APPENDICES.

**WARNING!**

UniQ™ is a **CLASS 4 LASER PRODUCT** and it is the responsibility of the OEM/system integrator to provide the safety completeness to be ready-to-use.

2.1 TECHNICAL CHARACTERISTICS

MECHANICAL CHARACTERISTICS

| | |
|-----------|------------------------|
| Weight | 10.3 Kg |
| Height | 183.5 mm |
| Width | 150 mm |
| Depth | 497.3 mm |
| IP Rating | IP54 category 1 degree |

* without F-Theta scan lens

**NOTE:**

Refer to Datalogic's website for detailed drawings.

STORAGE AND TRASPORTATION CONDITIONS

| | |
|----------------------|---------------------------------------|
| Storage temperature | -10° to 60°C (14° to 140°F) |
| Shock and vibrations | MIL 810E "CAT 1 Basic Transportation" |
| Package Drop Test | 76 cm |

**WARNING!**

This product includes precision optical parts; avoid vibration and shocks: marking quality may deteriorate.

ENVIRONMENTAL OPERATING CONDITIONS

| | |
|---------------------------|----------------------------|
| Environmental temperature | 5°C to 40°C (41° to 104°F) |
| Humidity | < 90% without condensation |
| Altitude | < 2000 m |
| Pollution Degree | 2 |
| Overvoltage Category | II |
| Vibration to EN60068-26 | 0.02mm @ 10 to 55Hz * |

*max vibration allowed for better quality

ELECTRICAL POWER SUPPLY

| | |
|---------------|---------------------------|
| Input Voltage | 100 to 240 V AC @ 50/60Hz |
| Input Current | 3 A max |
| Max Power | 300W |

PERFORMANCE

| LASER MARKER SOURCE (typical values @ 25°C) | | |
|--|-------|---|
| Laser Type | | Class 4 |
| Average Power ¹ @ 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 ÷ 100 |
| Laser aiming beam | | Class 2 <1mW @ 630-670nm |
| Focus aiming beam | | Class 2 <1mW @ 630-670nm |
| Cooling | | Forced Air FAN 60mm : L10 @ 40°C : 83000h FAN 120mm : L10 @ 40°C : 68000h |
| Noise | dB(A) | < 70 @ 1 meter |

| OTHER | | |
|--|--------|---------------------------------|
| Marking Speed ¹ | mm/sec | Up to 5000 mm/sec |
| Char Marking Speed ² | char/s | Up to 670 char/s |
| MOF (Marking on the fly) | | YES [constant speed or encoder] |
| Line speed ~ Productivity ³ | | Up to 75 m/min – 3 Pcs/Sec |
| Marking Control | | EMC Embedded Control |
| Software | | Lighter Suite |
| Communication interfaces | | 4xUSB, LAN, RS232, digital I/O |

¹ With F-Theta 160S

² h char=1mm in roman s Level100% f=100kHz F-Theta160S on TESA label

³ Single line string, Roman-s font

2.2 DESCRIPTION OF THE LASER MODULES

A description of the main parts of the UniQ™ marking system is provided here below:

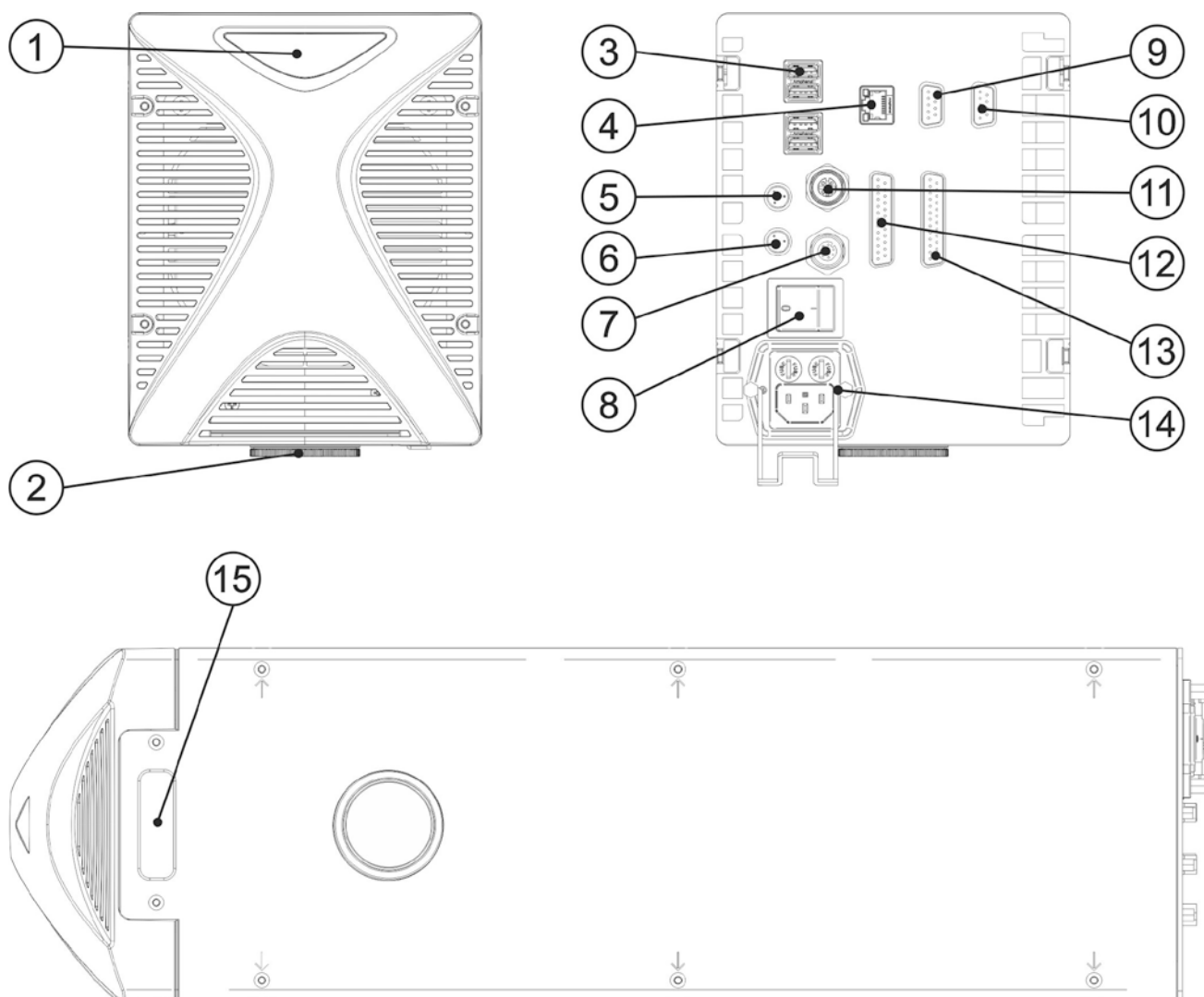


Figure 7: UniQ™ marking system view.

| | |
|-------------------------------------|---|
| 1) Status LED | 9) VGA connector |
| 2) F-Theta scan lens | 10) RS232 port |
| 3) 4x USB ports | 11) Photocell connector |
| 4) LAN port | 12) Command Box connector (laser control) |
| 5) Interlock connector | 13) I/O connector (axes control) |
| 6) Shutter OUT/Enable OUT connector | 14) Power entry module with fuses |
| 7) Encoder connector | 15) Focus beam output |
| 8) Main Switch | |

2.3 MARKING AREA SPECIFICATION

Datalogic provides a wide range of F-Theta scan lenses to be attached to the scanning head to focus the laser beam in flat Marking Field, in order to achieve high-resolution marking results.

These F-Theta scan lenses are available to best-match the object (i.e.: logo; string; 2D matrix; etc.) to be marked with customer need, over the material processing, and fit the standard Datalogic Scanning Head; further solutions about different models of lenses and scanning heads will be considered upon request.

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

| F-Theta Scan Lens diameter: M39 | | | | |
|---------------------------------|-----------------|-------------|-------------|-------------|
| F-Theta Scan Lens | | $f = 100S$ | $f = 160S$ | $f = 254S$ |
| Working Distance | mm | 118 ± 3 | 183 ± 5 | 280 ± 4 |
| Fixing Distance | mm | 137 ± 4 | 189 ± 6 | 292 ± 5 |
| Marking Area | mm ² | 60 x 60 | 100 x 100 | 140 x 140 |

| F-Theta Scan Lens diameter: M85 | | |
|---------------------------------|-----------------|-------------|
| F-Theta Scan Lens | | $f = 254L$ |
| Working Distance | mm | 296 ± 5 |
| Fixing Distance | mm | 359 ± 6 |
| Marking Area | mm ² | 180 x 180 |



NOTE:

Definition of Marking Area: *square marking field measured on black anodized aluminium plate.*



WARNING!

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

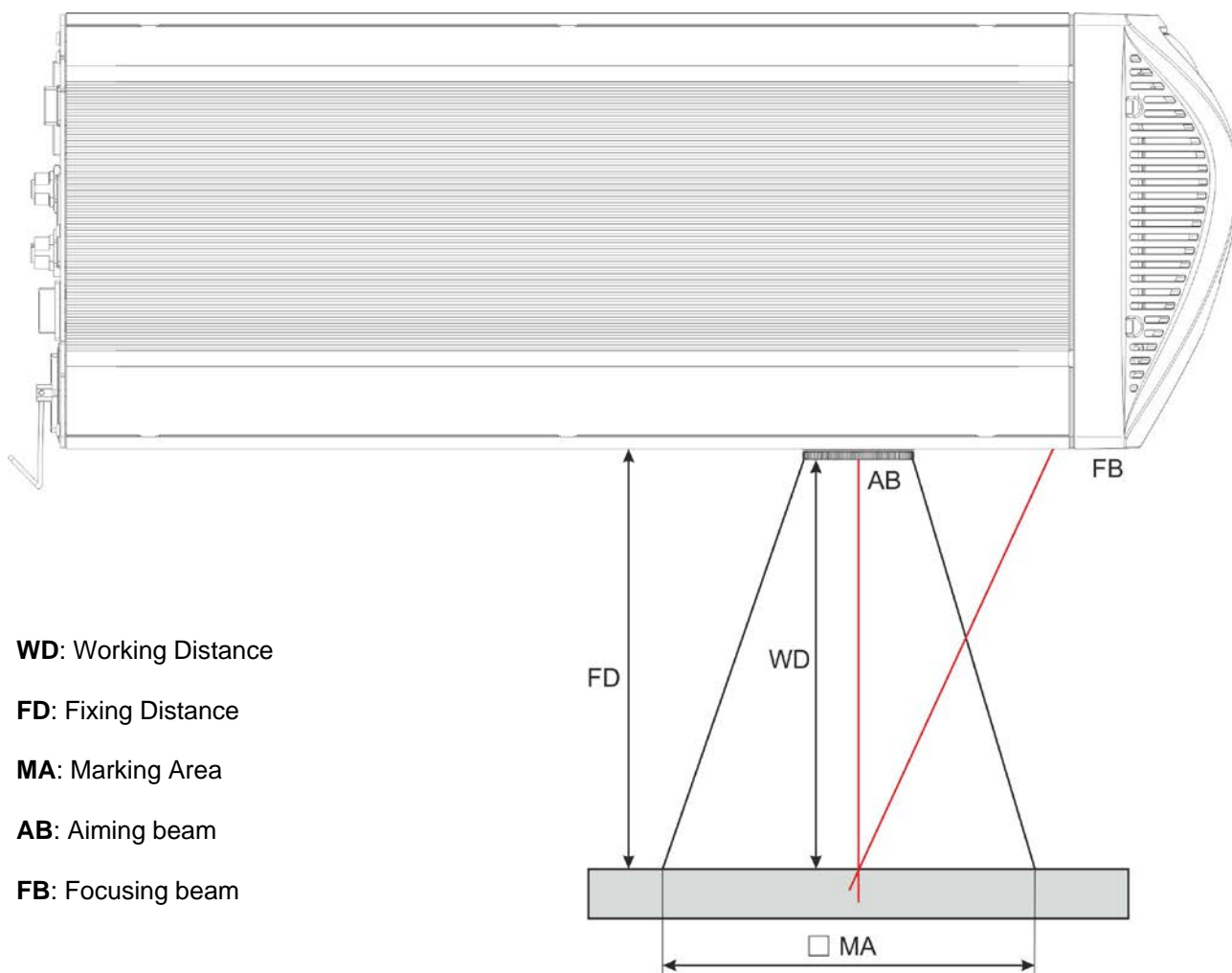


WARNING!

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

**NOTE:**

Working Distance is defined as the distance between the center of the marking area (defined in the focal plane) and the last mechanical edge of the F-Theta Scan Lens. Refer to the following figure.



WD: Working Distance

FD: Fixing Distance

MA: Marking Area

AB: Aiming beam

FB: Focusing beam

Figura 8: Working distance.

**NOTE:**

For systems equipped with standard F-Theta Scan Lens the focus condition is obtained by matching the Aiming Beam with the Focusing beam.

2.4 CONNECTORS SPECIFICATIONS

2.4.1 INTERLOCK CONNECTOR

Interlock **disables** the Class4 laser source inside the marking system. 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 9: Male panel plug cod. TB4M (front view).

PLUG CONNECTOR

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

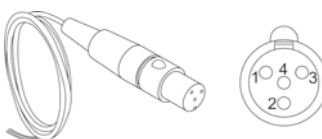


Figure 10: Female cable mount connector cod. TA4FX (solder view).

| PIN | SIGNAL | TYPE | DESCRIPTION | FUNCTIONAL DIAGRAM |
|-----|--------------|--------|--|--|
| 1 | VCC_INT_IN_A | OUTPUT | 24 VDC reference for interlock IN signal A | <div> <div>USER SIDE</div> <div>SYSTEM SIDE</div> </div> |
| 2 | INT_IN_A | INPUT | Interlock IN signal A | |
| 3 | GND_INT_IN_B | GND | Ground reference for interlock IN signal B | |
| 4 | INT_IN_B | INPUT | Interlock IN signal B | |

| PIN 1- PIN 2 | PIN 3- PIN 4 | 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 |



WARNING!

If the interlock gold connector is used, the marking system is in **DANGEROUS** condition. (MUTING DEVICE)



NOTE:

To restore the marking system it is necessary to repeat the “Turning on sequence” without shutting down the system. See Paragraph 4.1 for more details.

2.4.2 COMMAND BOX CONNECTOR (LASER CONTROL)

Panel socket SUB-D, 25 positions, female.

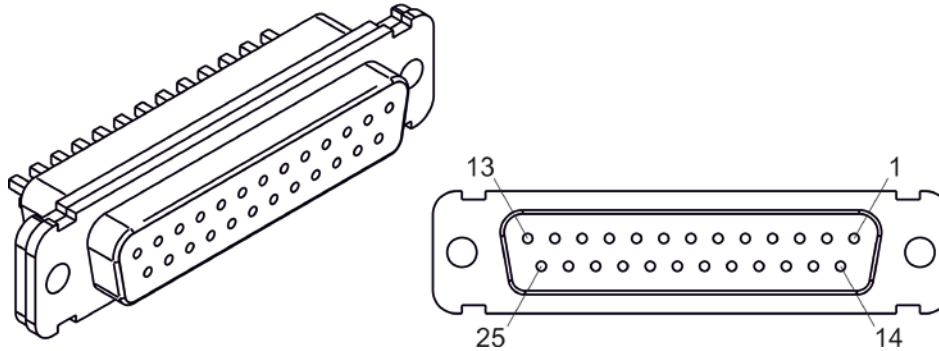


Figure 11: Female panel socket SUB-D 25 (front view).

| PIN | SIGNAL | TYPE (***) | DESCRIPTION |
|-----|--------------------|---------------------|---|
| 1 | 24V_ENABLE_B | Output power supply | 24 VDC power supply available for ENABLE B (max 125mA) |
| 2 | EXT_ENABLE_B | Digital Input | Secondary external enable signal (see paragraph 2.4.3) - HIGH level: contact closed - LOW level or disconnected: contact opened |
| 3 | RESERVED | Digital Output | DO NOT CONNECT |
| 4 | EXT_24V | Output power supply | Auxiliary 24 VDC power supply available for drive input logical HIGH (max 125mA) |
| 5 | EXT_24V | Output power supply | Auxiliary 24 VDC power supply available for drive input logical HIGH (max 125mA) |
| 6 | EXT_24V | Output power supply | Auxiliary 24 VDC power supply available for drive input logical HIGH (max 125mA) |
| 7 | 24V_ENABLE_A | Output power supply | 24 VDC power supply available for ENABLE A (max 125mA) |
| 8 | EXT_ENABLE_A | Digital Input | Primary external enable signal (see paragraph 2.4.3) - HIGH level: contact closed; - LOW level or disconnected: contact opened |
| 9 | BUSY (*) | Digital Output | This signal is used to know if the current spooler is executing (marking in progress) (see paragraph 2.4.7) - ON during marking process |
| 10 | CONNECTOR_PRESENCE | Digital Input | This signal is used to check the presence of the command box connector (see paragraph 2.4.6) - HIGH level: normal operation; - LOW level or disconnected: laser source faulty |
| 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 (**): (see paragraph 2.4.7) - HIGH level pulsed signal start the marking process |
| 12 | EXT_KEY | Digital Input | External key signal (see paragraph 2.6) - HIGH level: contact closed; - LOW level or disconnected: contact opened |
| 13 | STOP_MARKING (*) | Digital Input | This signal is used to stop the marking process (see paragraph 2.4.7) - HIGH level pulsed signal stop the marking process |

| | | | |
|----|--------------|----------------|--|
| 14 | RESERVED | Digital Input | DO NOT CONNECT |
| 15 | RESERVED | Digital Input | DO NOT CONNECT |
| 16 | RESERVED | Digital Input | DO NOT CONNECT |
| 17 | END | Digital Output | This signal is used to know if the marking process is finished (see paragraph 2.4.7): - ON at the end of marking process |
| 18 | POWER_ON | Digital Output | This signal is used to know if the system is already warmed up: (see paragraph 2.4.6) - ON when the laser is in STAND_BY or READY state |
| 19 | GND | Ground | Ground reference |
| 20 | SYSTEM_ALARM | Digital Output | This signal is used to know if the system is in booting up state or in error state: (see paragraph 2.4.6) - ON during BOOTING UP - ON in case of system error |
| 21 | GND | Ground | Ground reference |
| 22 | ENABLE_OUT | Digital Output | This signal is used to know if the system is ready to emit laser radiation: (see paragraph 2.4.6) - ON when the system is in READY state |
| 23 | SW_READY (*) | Digital Output | This signal is used to know if a document, sequence or script is loaded and ready to be executed: - ON when a document or a sequence is running in AUTO MODE (**) or WORK MODE (**) (SW_READY COMPATIBILITY (**) = true) - ON when a document or a sequence is running in AUTO MODE (**) and laser in READY state (SW_READY COMPATIBILITY (**) = false) - ON when a script is running in AUTO MODE (**) and "IoPort.setReady (true)" function is used |
| 24 | GND | Ground | Ground reference |
| 25 | GND | Ground | Ground reference |

(*) refers to Lighter user's manual "Setting I/O parameters" paragraph to set the signal properties

(**) refers to Lighter user's manual

(***) refers to paragraph 2.5



NOTE:

Connection example in paragraph 2.6.

2.4.3 ENABLE SIGNAL'S SCHEME (COMMAND BOX CONNECTOR)

| PIN 1- PIN 2 | PIN 7- PIN 8 | MARKING FUNCTIONALITY | CONDITION |
|----------------|----------------|--------------------------|---------------------|
| CONTACT OPEN | CONTACT OPEN | NOT POSSIBLE | SAFE CONDITION |
| CONTACT CLOSED | CONTACT OPEN | NOT POSSIBLE | DANGEROUS CONDITION |
| CONTACT OPEN | CONTACT CLOSED | NOT POSSIBLE | DANGEROUS CONDITION |
| CONTACT CLOSED | CONTACT CLOSED | POSSIBLE | DANGEROUS CONDITION |



NOTE:

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

FEEDBACK SAFETY ENABLE SIGNALS

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

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

2.4.4 SHUTTER OUT/ENABLE OUT CONNECTOR

PANEL CONNECTOR

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

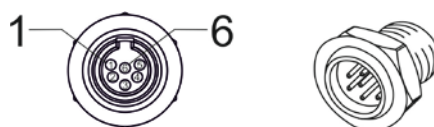


Figure 12: Male panel connector code TB6M (front view).

PLUG CONNECTOR

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

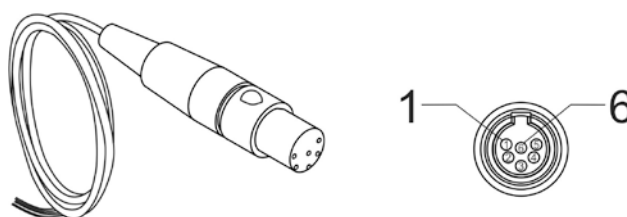
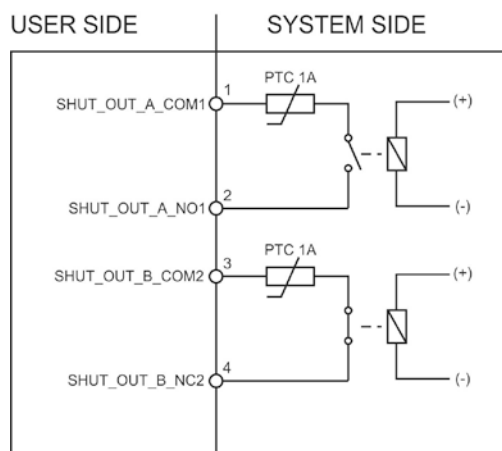
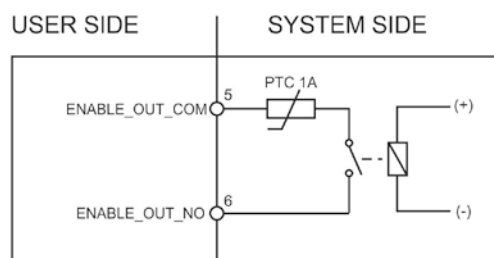


Figure 13: Female cable plug connector code TA6FLX (solder view).

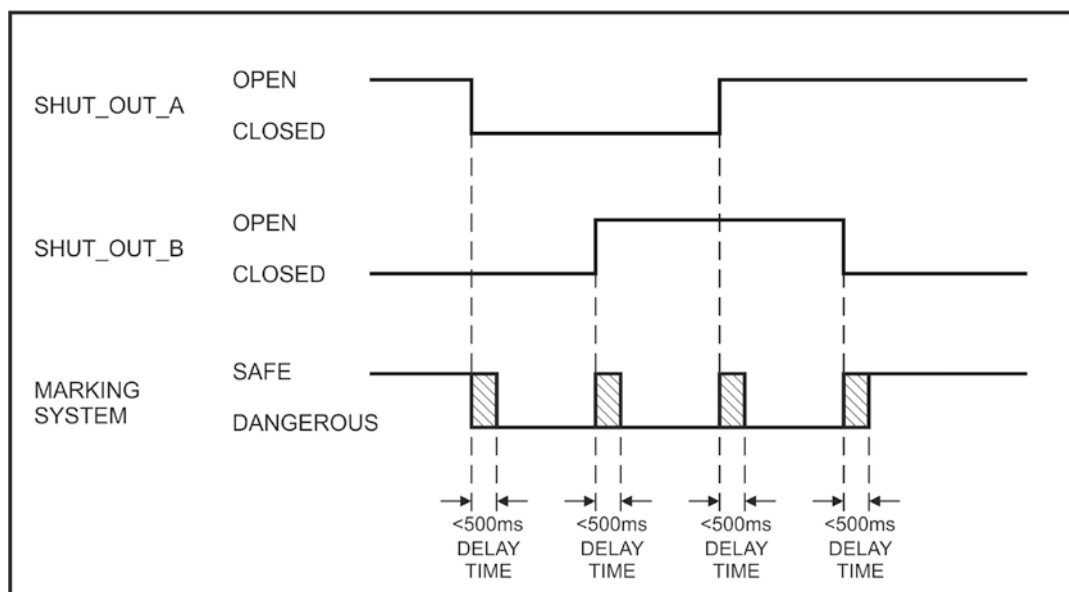
| PIN | SIGNAL | TYPE | DESCRIPTION |
|-----|-----------------|---------------------------|------------------|
| 1 | SHUT_OUT_A_COM1 | COMMON 1 | Shutter signal A |
| 2 | SHUT_OUT_A_NO1 | NORMALLY OPEN 1 CONTACT | |
| 3 | SHUT_OUT_B_COM2 | COMMON 2 | Shutter signal B |
| 4 | SHUT_OUT_B_NC2 | NORMALLY CLOSED 2 CONTACT | |
| 5 | ENABLE_OUT_COM | COMMON ENABLE | Enable OUT |
| 6 | ENABLE_OUT_NO | NORMALLY OPEN ENABLE | |

FUNCTIONAL DIAGRAM**SHUTTER OUT****ENABLE OUT**

| SHUT_OUT_A | SHUT_OUT_B | ENABLE OUT | STATUS |
|------------|------------|------------|---------------------|
| Closed | Closed | Closed | DANGEROUS CONDITION |
| Closed | Closed | Open | DANGEROUS CONDITION |
| Closed | Open | Closed | DANGEROUS CONDITION |
| Closed | Open | Open | DANGEROUS CONDITION |
| Open | Closed | Closed | DANGEROUS CONDITION |
| Open | Closed | Open | SAFE CONDITION |
| Open | Open | Closed | DANGEROUS CONDITION |
| Open | Open | Open | DANGEROUS CONDITION |

**NOTE:**

The response time is 500ms from the output's switching.

2.4.5 SHUTTER OUT SIGNALS TIMING CHART

2.4.6 LASER CONTROL SIGNALS TIMING (POWER ON SEQUENCE)

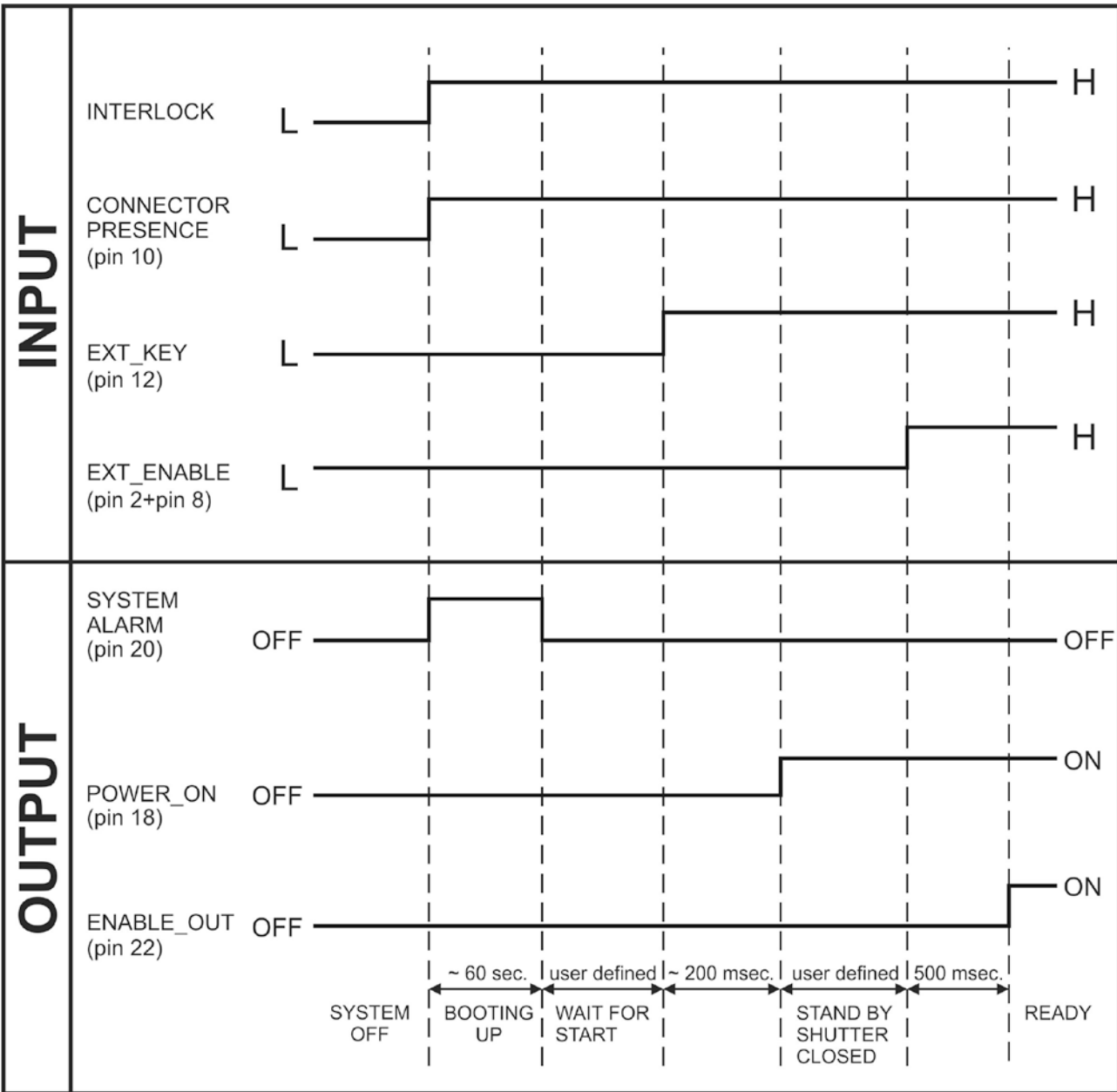


Figure 14: Timing control signals

2.4.7 MARKING PROCESS SIGNALS TIMING

The following diagram illustrates the possible timings and settings of these signals:

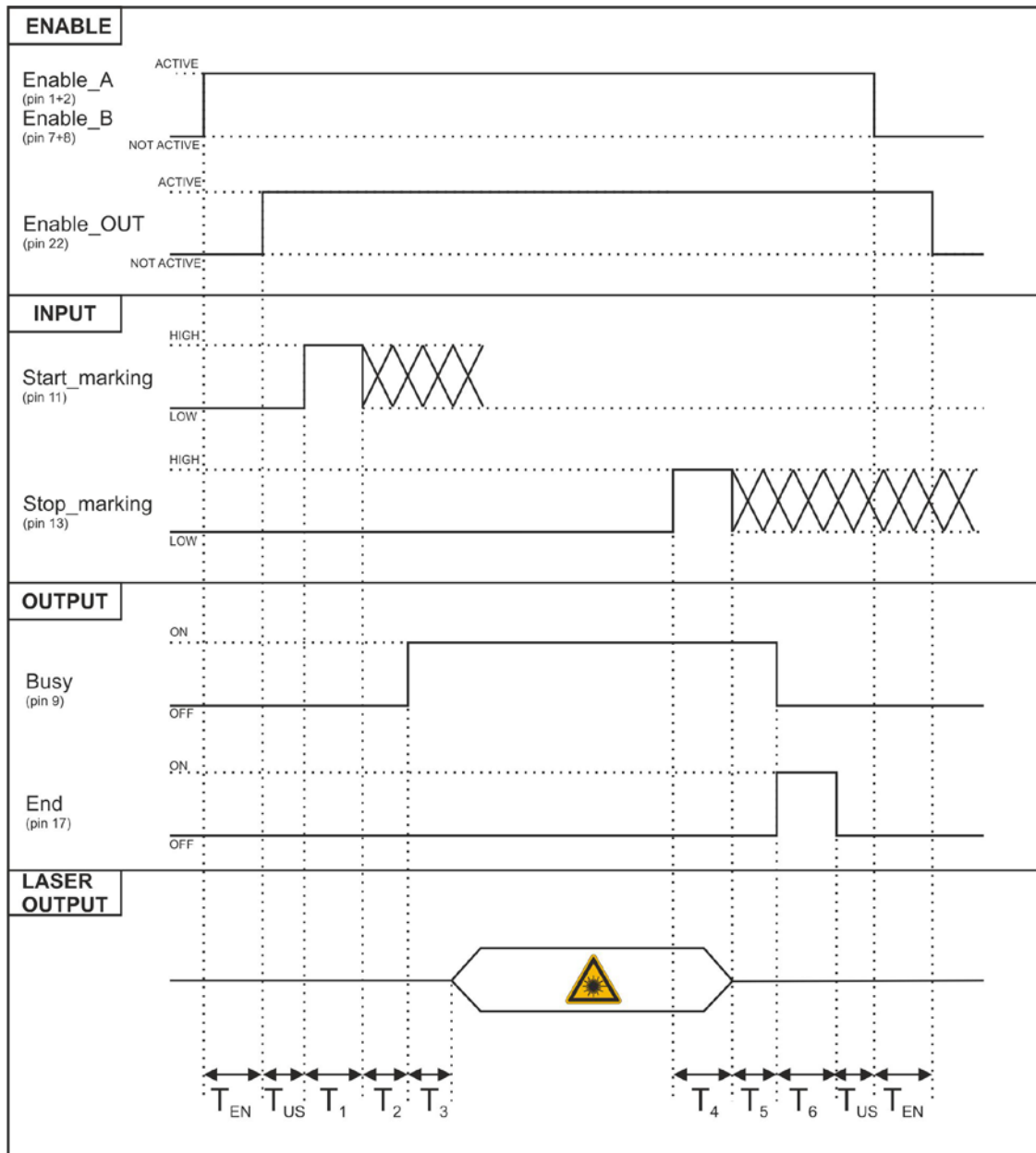


Figure 15: Timing signals

The time intervals in the diagram can all be programmed with a resolution of 1 ms⁴.

| | | |
|----------|--------------|--|
| T_{EN} | Enable Time | 500msec |
| T_{US} | User Time | User-defined time |
| T_1 | Start Time | For setting the minimum acceptable time for the start marking signal |
| T_2 | Start Delay | For delaying the start of marking process |
| T_3 | Busy Advance | Busy signal corresponding to marking progress |
| T_4 | Stop Time | The minimum time for stop signal to stop the marking process |
| T_5 | Busy Delay | For delaying the Laser End signal with respect to laser emission |
| T_6 | End Time | For setting the Laser End activation time |

⁴ Refer to Lighter user's manual "Setting I/O parameters" to set the signal's properties.

2.4.8 AXES CONNECTOR (I/O CONTROL)

Panel socket SUB-D, 25 positions, male.

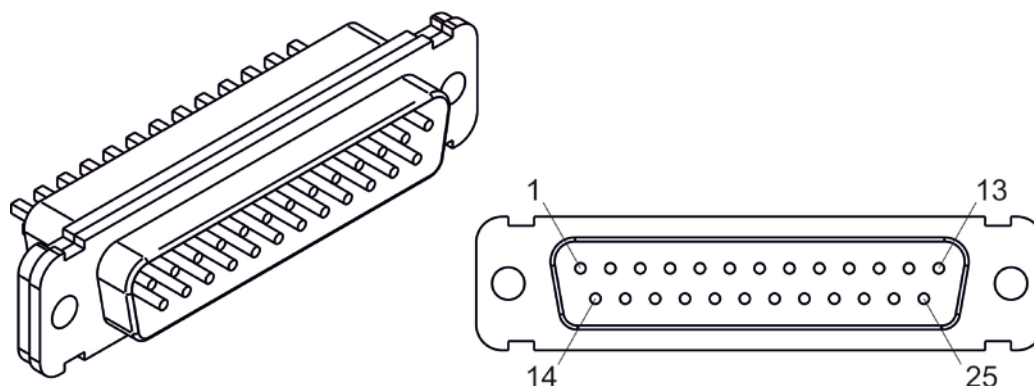


Figure 16: Male panel socket SUB-D 25 (front view).

| PIN | SIGNAL | TYPE (**) | DESCRIPTION |
|-----|--------------------------|---------------------|--|
| 1 | EXT_24V | Output Power supply | Auxiliary 24 VDC power supply available for drive input logical HIGH (max 125mA) |
| 2 | OUTPUT_0 (*) or STEP_Y | Digital Output | Generic output or Y-Axis drive step signal (Clock) for axis control |
| 3 | OUTPUT_2 (*) or STEP_Z | Digital Output | Generic output or Z-Axis drive step signal (Clock) for axis control |
| 4 | OUTPUT_4 (*) or BRAKE X | Digital Output | Generic output or X-Axis electromechanical brake release signal. ON during drive motion |
| 5 | OUTPUT_6 (*) or BRAKE Y | Digital Output | Generic output or Y-Axis electromechanical brake release signal. ON during drive motion |
| 6 | OUTPUT_8 (*) or BRAKE Z | Digital Output | Generic output or Z-Axis electromechanical brake release signal. ON during drive motion |
| 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 |
| 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 |
| 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 |
| 10 | INPUT_3 (*) or DISABLE X | Digital Input | Generic input or X-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation |
| 11 | INPUT_4 (*) or DISABLE Y | Digital Input | Generic input or Y-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation |
| 12 | INPUT_5 (*) or DISABLE Z | Digital Input | Generic input or Z-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation |
| 13 | GND | Ground | Ground reference |
| 14 | OUTPUT_12 (*) or STEP R | Digital Output | Generic output or R-Axis drive step signal (Clock) for axis control |
| 15 | OUTPUT_1 (*) or STEP X | Digital Output | Generic output or X-Axis drive step signal (Clock) for axis control |

| | | | |
|----|--------------------------|----------------|--|
| 16 | OUTPUT_3 (*) or DIR Z | Digital Output | Generic output or Z-Axis drive direction signal |
| 17 | OUTPUT_5 (*) or DIR Y | Digital Output | Generic output or Y-Axis drive direction signal |
| 18 | OUTPUT_7 (*) or DIR X | Digital Output | Generic output or X-Axis drive direction signal |
| 19 | INPUT 9 | Digital Input | Generic Input |
| 20 | INPUT 8 | Digital Input | Generic Input |
| 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 |
| 22 | INPUT_6 (*) or DISABLE R | Digital Input | Generic input or R-Axis disable signal. When HIGH, the corresponding step signal remains in the status prior to activation |
| 23 | OUTPUT_9 (*) or BRAKE R | Digital Output | Generic output or R-Axis electromechanical brake release signal. ON during drive motion |
| 24 | OUTPUT_11 (*) or DIR R | Digital Output | Generic output or R-Axis drive direction signal |
| 25 | GND | Ground | Ground reference |

(*) enable an axis cause that the corresponding signals will no longer be available as generic inputs/output. Refer to Lighter user's manual, "Setting the X, Y, Z, and Rotor Axes parameters" to enable/disable Axes and set the Axes properties.

(**) refers to paragraph 2.5

2.4.9 RS232 CONNECTOR (COM2)

Panel socket SUB-D, 9 positions, male.

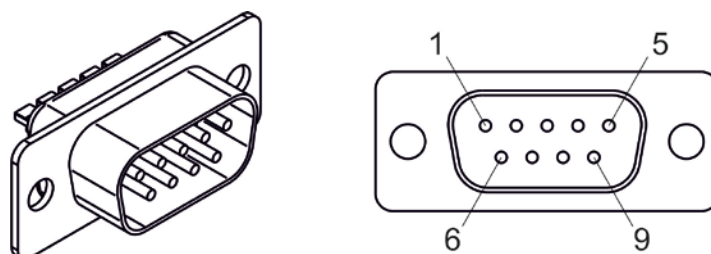


Figure 17: Male panel socket SUB-D 9 (front view).

| 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 |

2.4.10 ENCODER CONNECTOR

Panel socket BINDER, M12, 8 positions female, 763 series. Recommended encoder: Datalogic ENC58-S10-XXXX-M12 (ENC58-S10-5000-M12).

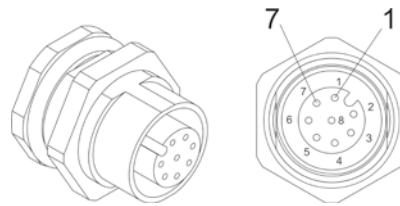


Figure 18: Female panel socket code 09-3482-87-08 (front view).

| PIN | SIGNAL | TYPE | DESCRIPTION |
|------|--------|---------------|--------------------------------|
| 1 | GND | GND | Ground signal |
| 2 | VCC | POWER OUTPUT | 24VDC power supply (max 120mA) |
| 3 | ENC_A | DIGITAL INPUT | Encoder HTL A channel signal |
| 4 | GND | GND | Return signal for ENC_A |
| 5 | ENC_B | DIGITAL INPUT | Encoder HTL B channel signal |
| 6 | GND | GND | Return signal for ENC_B |
| 7 | NC | NC | NC |
| 8 | NC | NC | NC |
| BODY | SHIELD | SHIELD | SHIELD |

2.4.11 PHOTOCELL CONNECTOR

Panel socket BINDER, M12, 4 positions female, 763 series. Recommended photocell: Datalogic S51-PA-5-B01-PK; Datalogic S15-PA-5-B01-PK or equivalent.

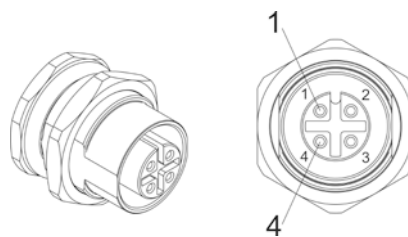
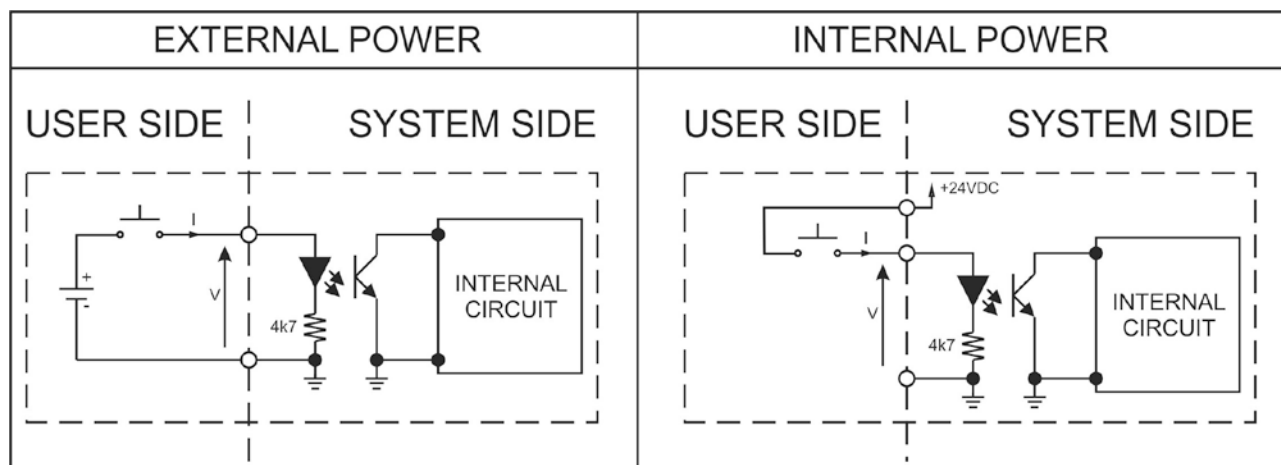


Figure 19: Female panel socket code 09-3482-87-04 (front view).

| PIN | SIGNAL | TYPE | DESCRIPTION |
|-----|-----------|---------------|--------------------------------|
| 1 | VCC | POWER OUTPUT | 24VDC power supply (max 120mA) |
| 2 | NC | NC | NC |
| 3 | GND | GND | Ground signal |
| 4 | PHOTOCELL | DIGITAL INPUT | PNP photocell signal |

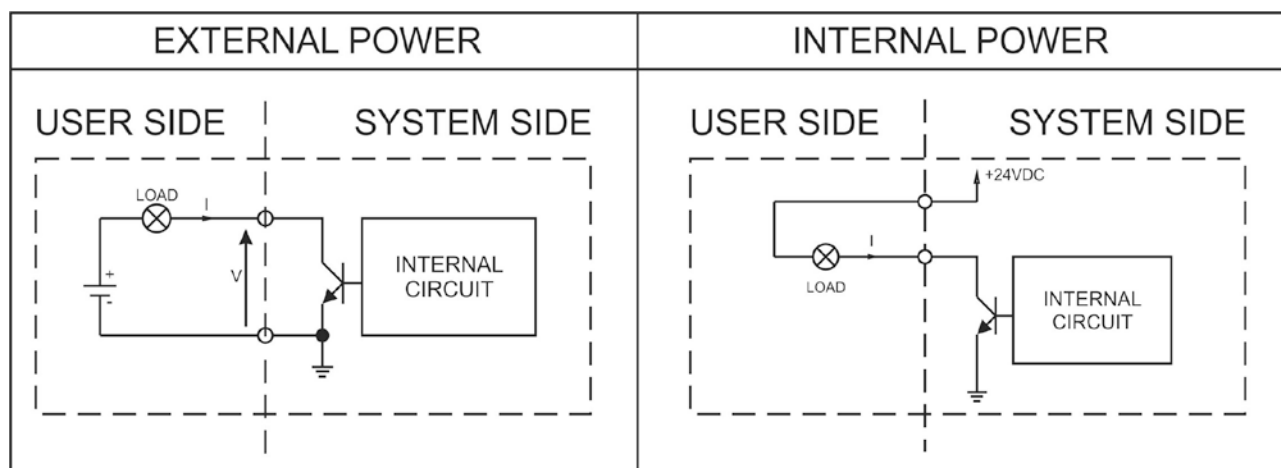
2.5 INPUT/OUTPUT SIGNAL SPECIFICATIONS

DIGITAL INPUT:



| | | | |
|------------------|------------------------|----------|----------|
| Type | Optocoupler | | |
| V_{max} | 28 VDC | | |
| I_{max} | 5mA @ 24 VDC | | |
| Pulse Width | ≥ 1 ms (debounce) | | |
| | MIN | TYP | MAX |
| INPUT Logic LOW | 0.0 VDC | 0.0 VDC | 2.0 VDC |
| INPUT Logic HIGH | 10.0 VDC | 24.0 VDC | 28.0 VDC |

DIGITAL OUTPUT:



| | |
|------------------|-----------------------------------|
| Type | Low side driver |
| V_{max} | 24 VDC |
| I_{max} | 250mA |
| $V_{saturation}$ | < 0.5 VDC |
| Leakage current | $< 5\mu A$ |
| OUTPUT State ON | $V \leq 0.5$ VDC; $I \leq 250$ mA |
| OUTPUT State OFF | $V \leq 24$ VDC; $I \leq 5\mu A$ |

2.6 CONNECTION EXAMPLES

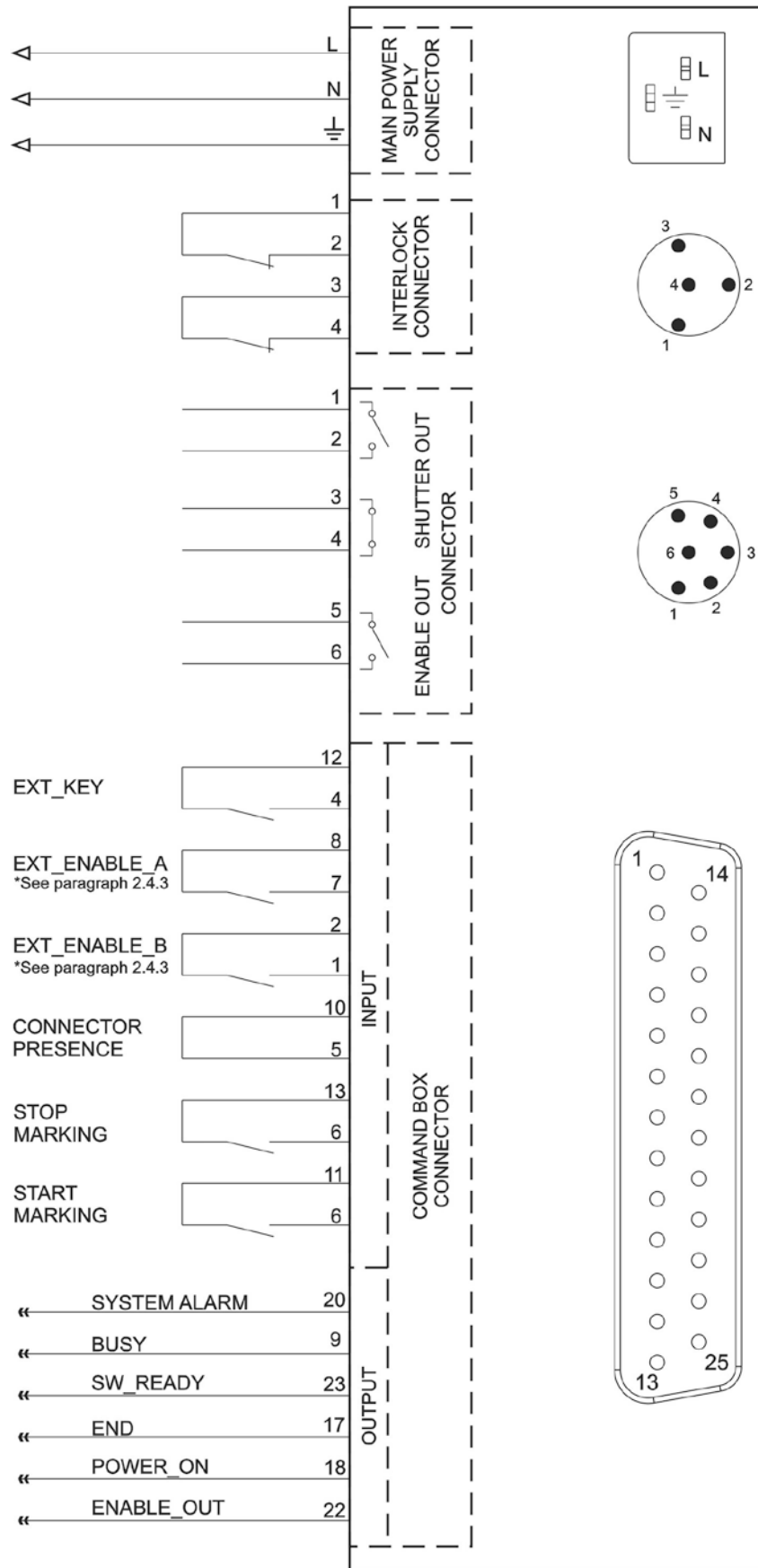


Figure 20: Connection examples.

3 INSTALLATION AND SET UP

3.1 CONNECTIONS

This section of the manual describes the marking system connections. Carry out the connecting operations as described below.

**WARNING!**

Connect the marking system to other parts **WITHOUT** voltage in order to avoid risks for the operator and for the laser source.

3.1.1 COMMAND BOX CONNECTOR CONNECTION

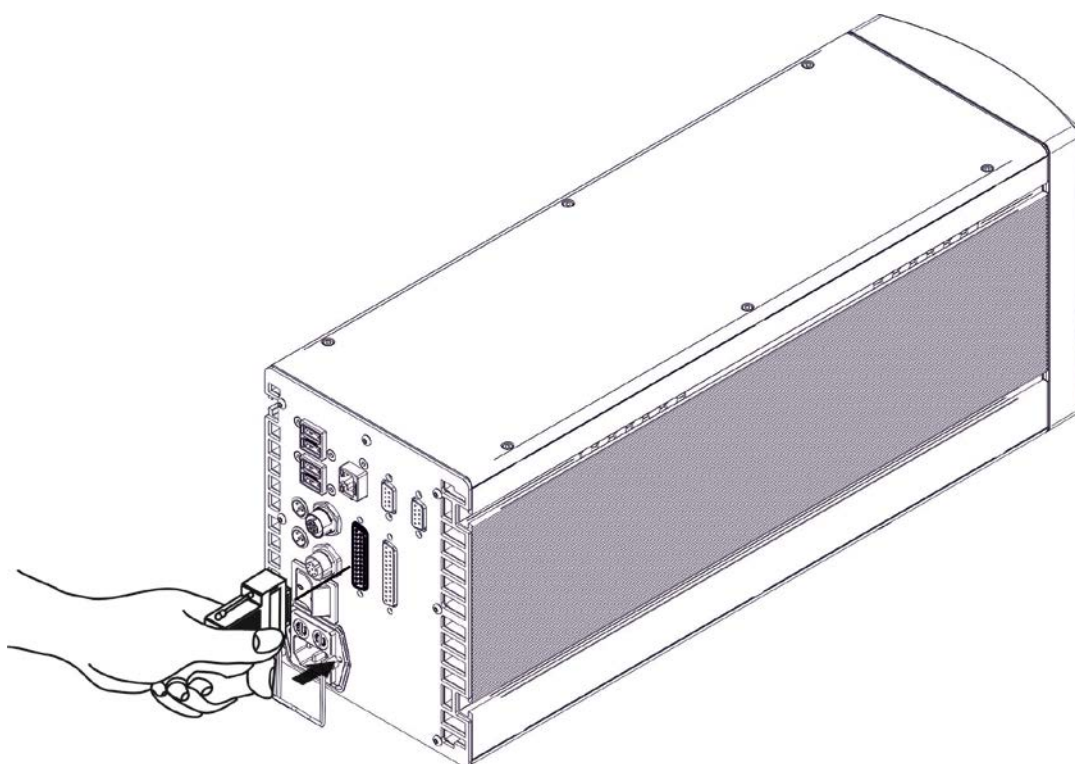


Figure 21: Connecting Command Box connector.

**NOTE:**

The command box connector must always be inserted and wired properly in order to use the marking system. If this connection is not present the marking system goes in error status.

**NOTE:**

Refer to paragraph 2.6 for a connection example of the Command Box Connector.

3.1.2 INTERLOCK CABLE CONNECTION

Connecting interlock cable.

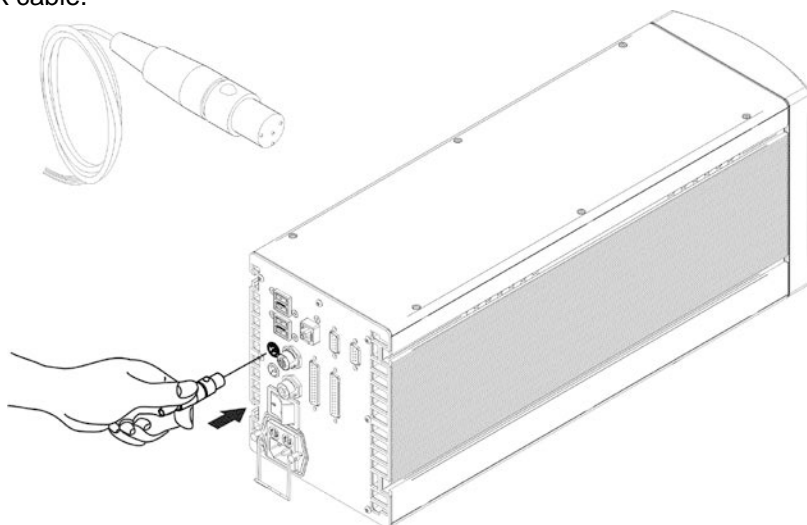


Figure 22: Connecting interlock cable.



NOTE:

The interlock cable must always be inserted in order to use the marking system. The absence of such connector locks the marking system.



NOTE:

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

3.1.3 POWER SUPPLY CABLE CONNECTION

Connecting power supply cable.

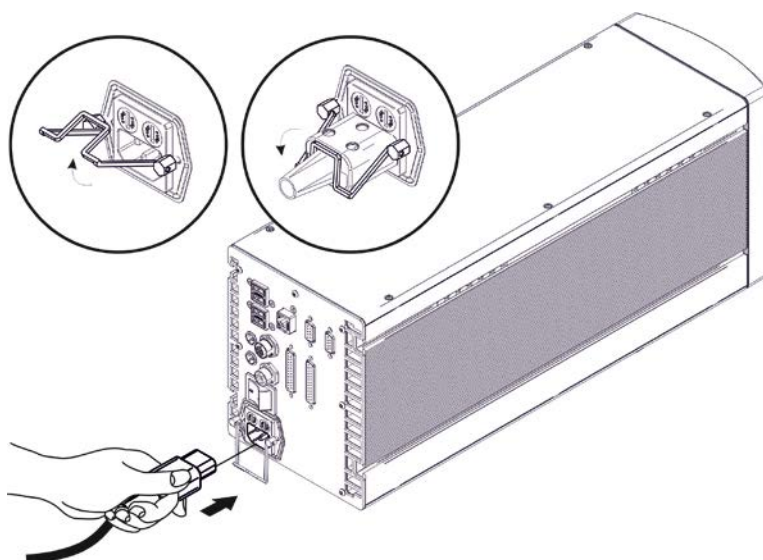


Figure 23: Connecting Power supply cable.



NOTE:

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

3.1.4 LOCAL MODE CONNECTION

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

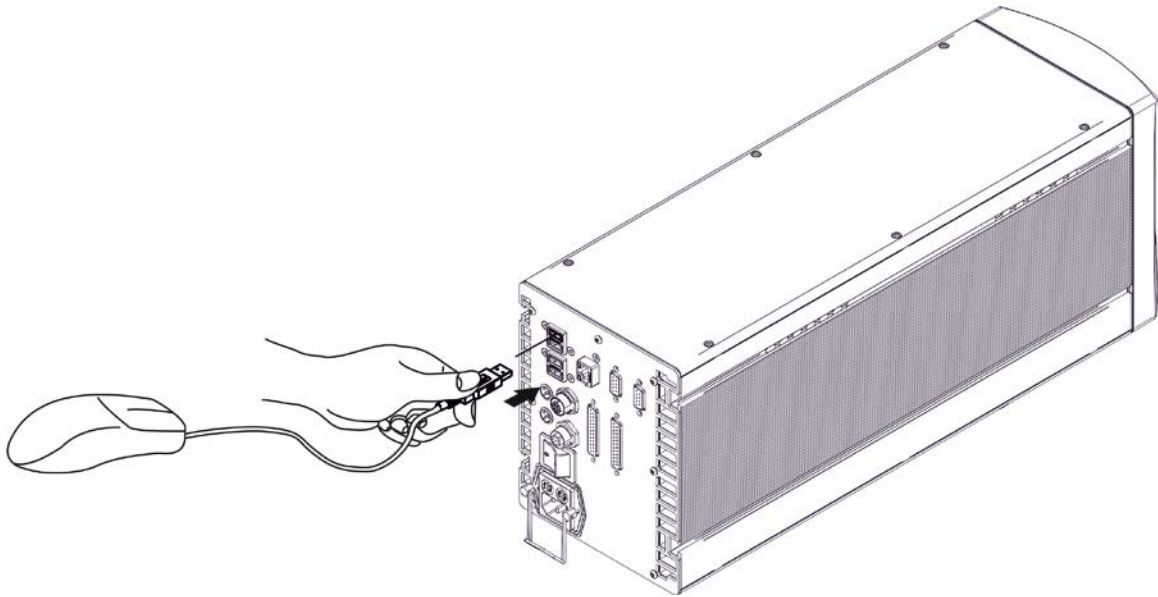


Figure 24: USB mouse connection.

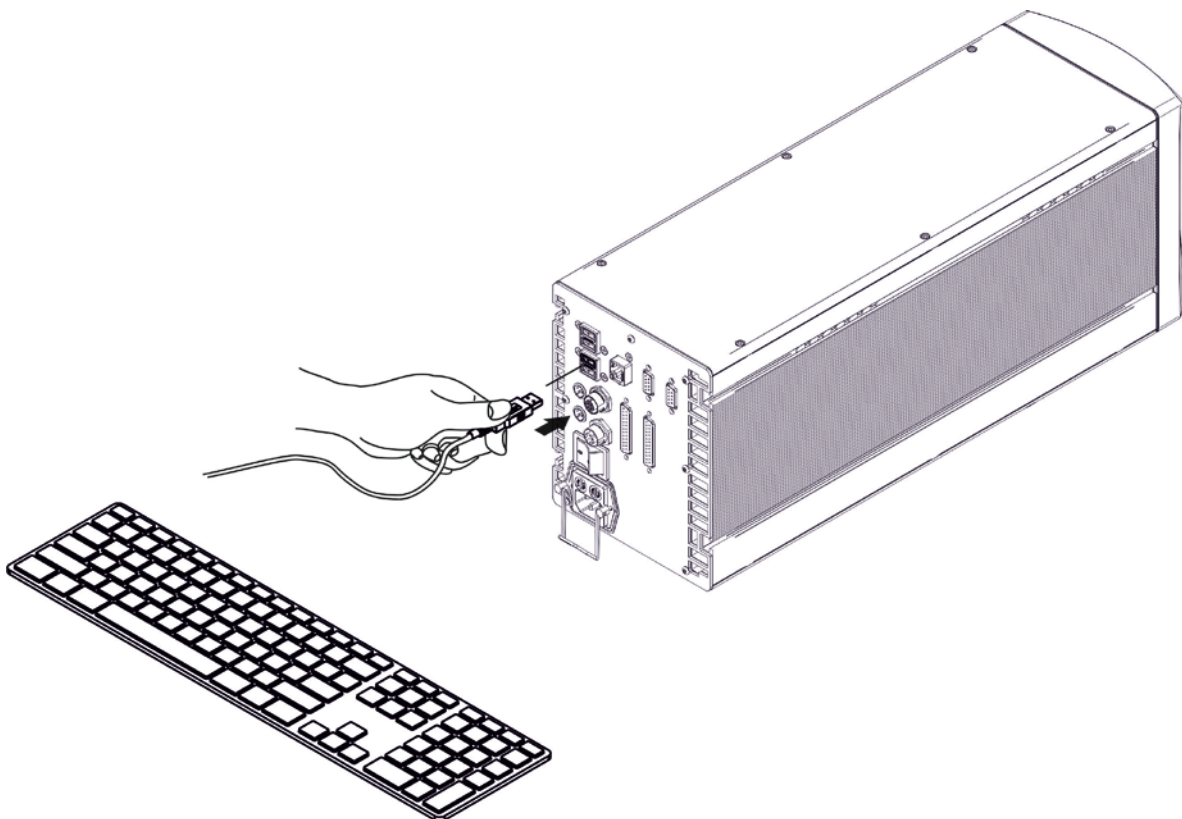


Figure 25: USB keyboard connection.

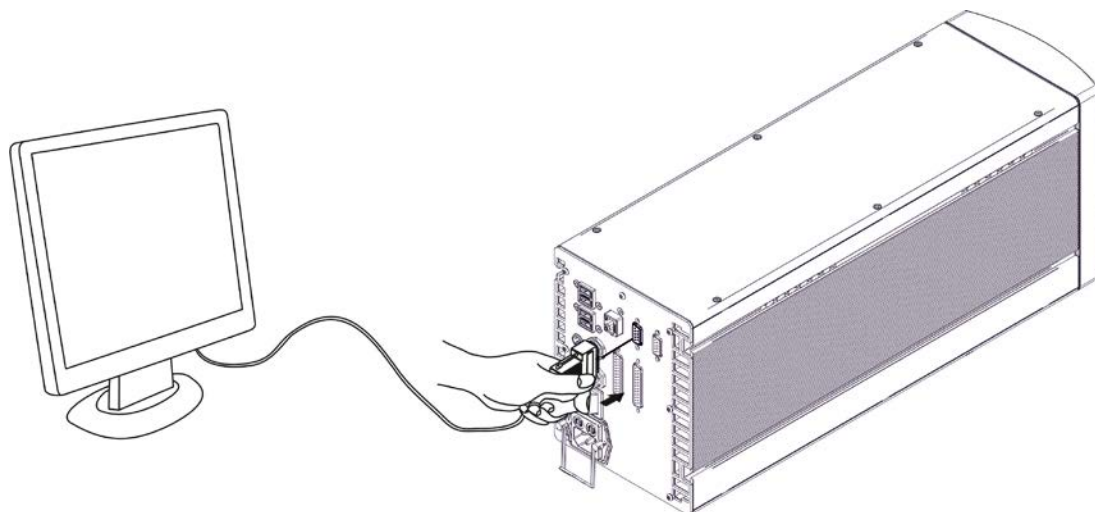


Figure 26: VGA monitor connection.



NOTE:

Minimum resolution 800 x 600.

3.1.5 REMOTE MODE CONNECTION

To use the marking system in “Remote Control” mode it is necessary to connect a network cable:

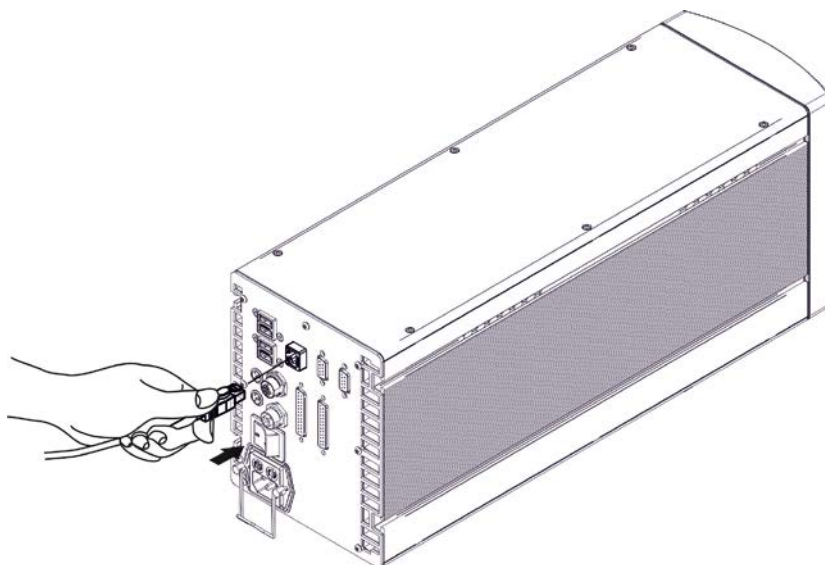


Figure 27: RJ45 Ethernet connection.



NOTE:

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

- Default IP address: 192.168.0.10

- Default Subnet Mask: 255.255.255.0

See paragraph 5.2 in order to change LAN configuration.



NOTE:

Ethernet TCP/IP 10, 100 Mbit.

3.1.6 F-THETA LENS PROTECTION CAP REMOVAL

Remove the F-Theta Lens protection cap before marking operation.

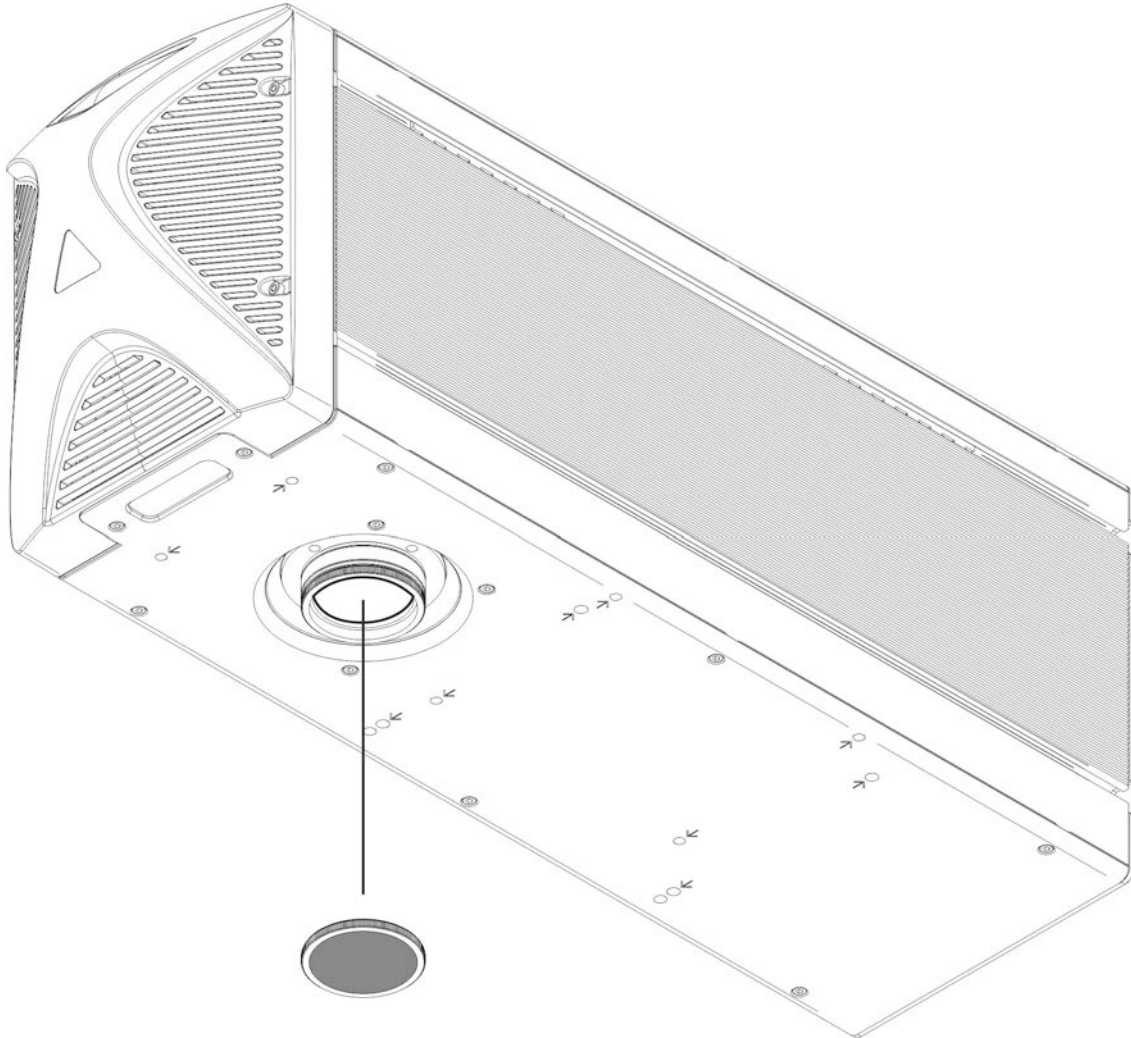


Figure 28: F-Theta Lens protection cap removal.



WARNING!

Marking with the lens protection cap could result in damage to the lens.

4 USE AND OPERATION

4.1 TURNING ON SEQUENCE

1ST step: before turning on the marking system, be sure that the system is connected as previously described. Check presence of voltage power supply connection, interlock connector and Command Box connection as described in the previous chapter.

2ND step: turn on the main switch in the back of the marking system:

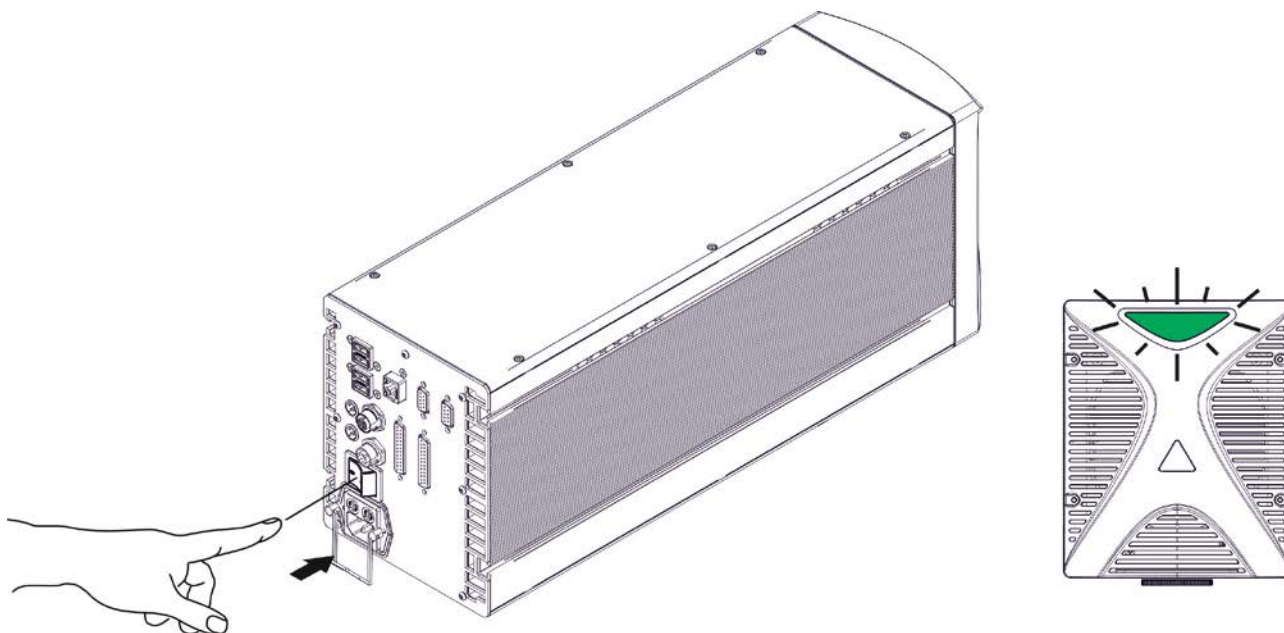


Figure 29: Power on.

During booting-up, status LED on the front cover will be blinking green.

3RD step: wait the end of the booting-up. The status LED on the front cover will be steady green:

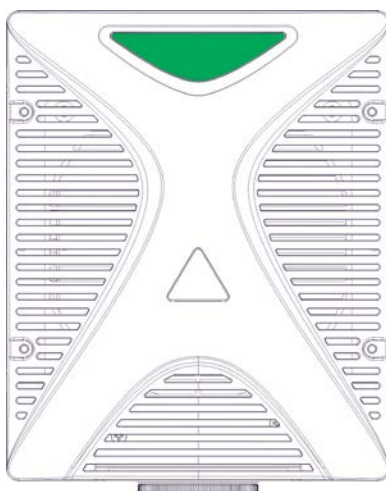


Figure 30: Status LED display.

4TH step: activate the command “*KEY*”. When the “*KEY*” command is enabled, the status LED on the front cover will be steady orange:

| SIGNAL | STATUS |
|----------|--------|
| EXT_KEY | ON |
| ENABLE_A | OFF |
| ENABLE_B | OFF |

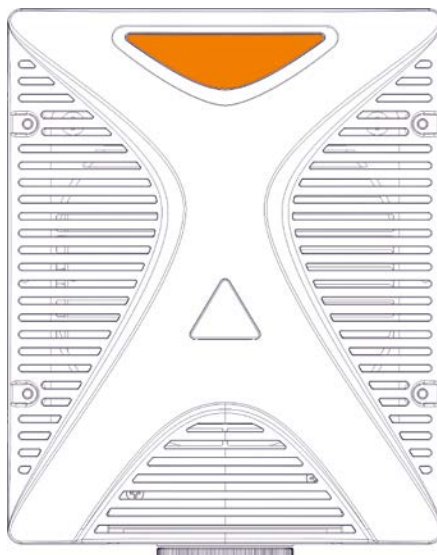


Figure 31: Status LED display.

5TH step: activate the “*ENABLE*”. The system is ready to mark and the status led on the front cover will turn red:

| SIGNAL | STATUS |
|----------|--------|
| EXT_KEY | ON |
| ENABLE_A | ON |
| ENABLE_B | ON |

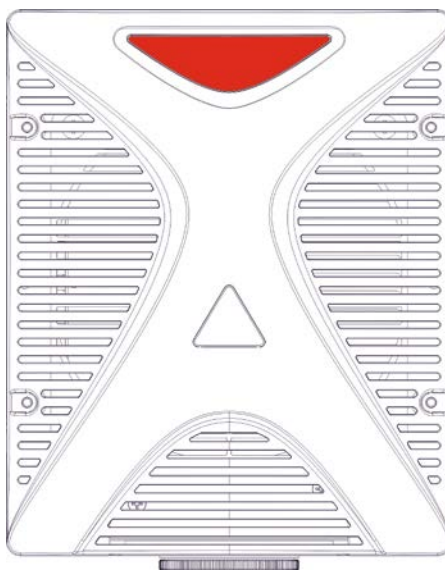


Figure 32: Status led display.

RESUME TABLE

| STATUS | STATUS LED | INPUT STATUS (*) | | OUTPUT STATUS (*) | |
|---------------------------|----------------------|-------------------------|--------------|---------------------------------|-------------------|
| SYSTEM BOOTING UP | BLINKING GREEN (1Hz) | KEY ENABLE | LOW LOW | ALARM POWER_ON ENABLE_OUT | ON OFF OFF |
| WAIT FOR START | STEADY GREEN | KEY ENABLE | LOW LOW | ALARM POWER_ON ENABLE_OUT | OFF OFF OFF |
| STANDBY SHUTTER CLOSED | STEADY ORANGE | KEY ENABLE | HIGH LOW | ALARM POWER_ON ENABLE_OUT | OFF ON OFF |
| READY | STEADY RED | KEY ENABLE | HIGH HIGH | ALARM POWER_ON ENABLE_OUT | OFF ON ON |

| STATUS | STATUS LED | OUTPUT STATUS (*) | |
|--------------------------------------|--------------------------|---------------------------------|-------------------|
| WARNING INVALID START SEQUENCE | BLINKING ORANGE (2Hz) | ALARM POWER_ON ENABLE_OUT | OFF OFF OFF |
| SYSTEM ERROR | BLINKING RED (2Hz) | ALARM POWER_ON ENABLE_OUT | ON OFF OFF |

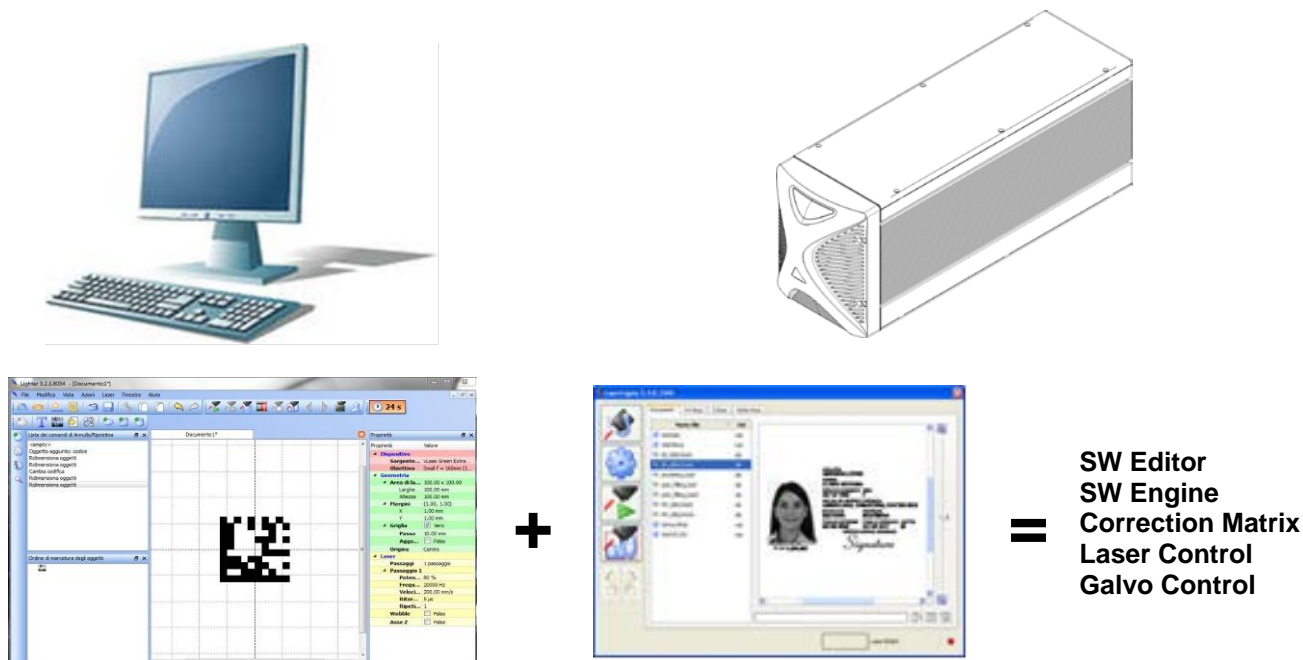
(*) See paragraph 2.4.6 for more information.

**NOTE:**

Refer to paragraph 7.3 for troubleshooting.

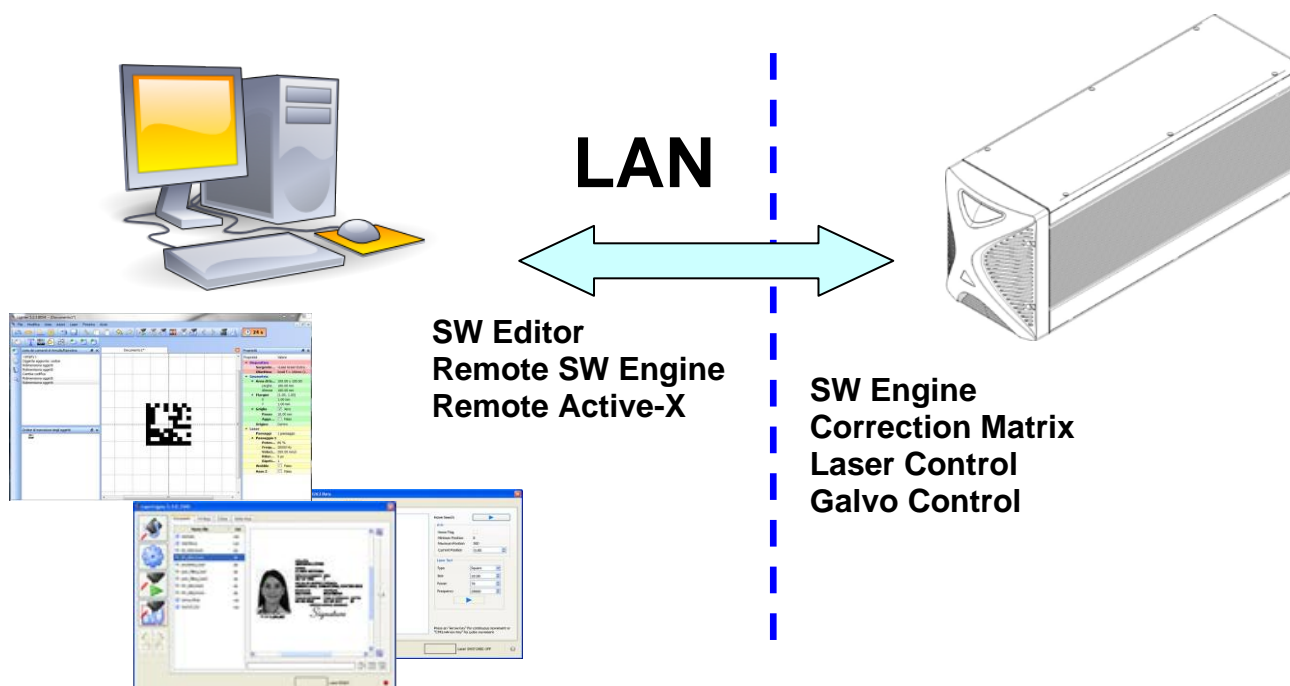
4.2 LOCAL MODE OPERATIONS

The local mode (with monitor, keyboard and mouse connected) is optimal to fully benefit of the ALL-IN-ONE Rack architecture characteristics.



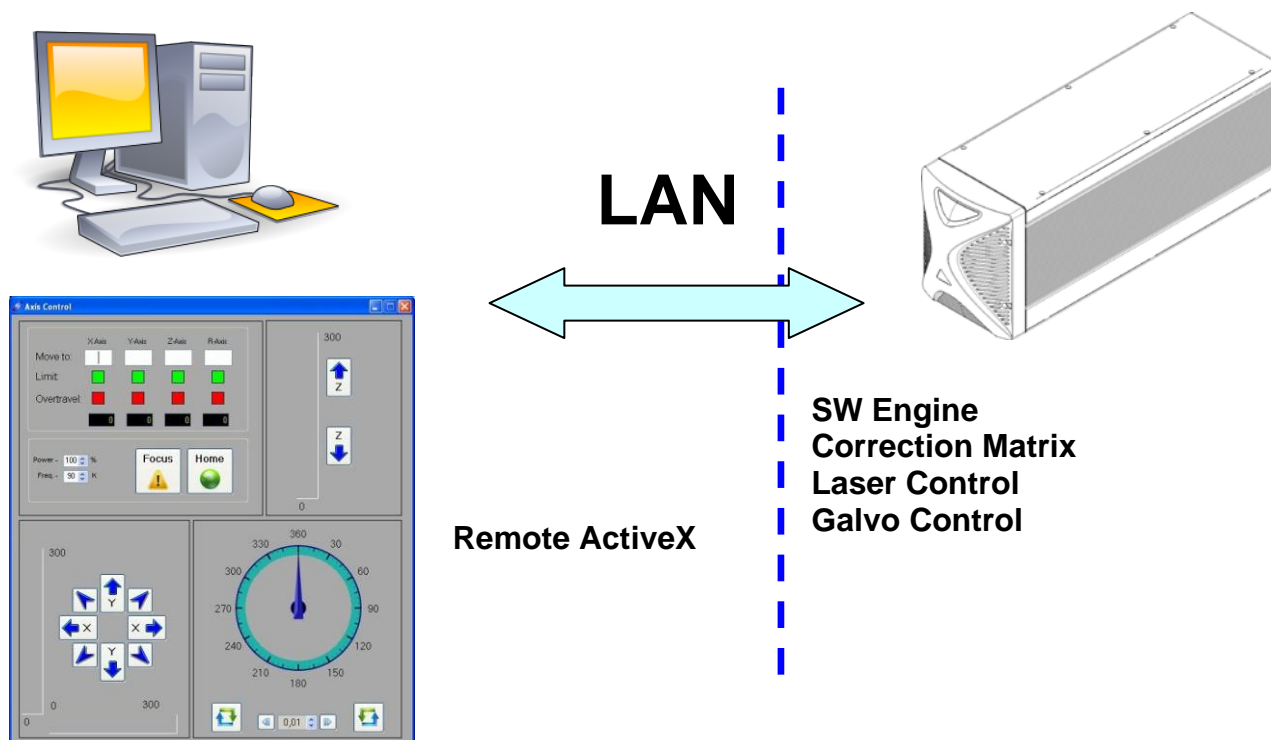
4.3 REMOTE MODE OPERATIONS

Keyboard, mouse and monitor are not necessary in this configuration.



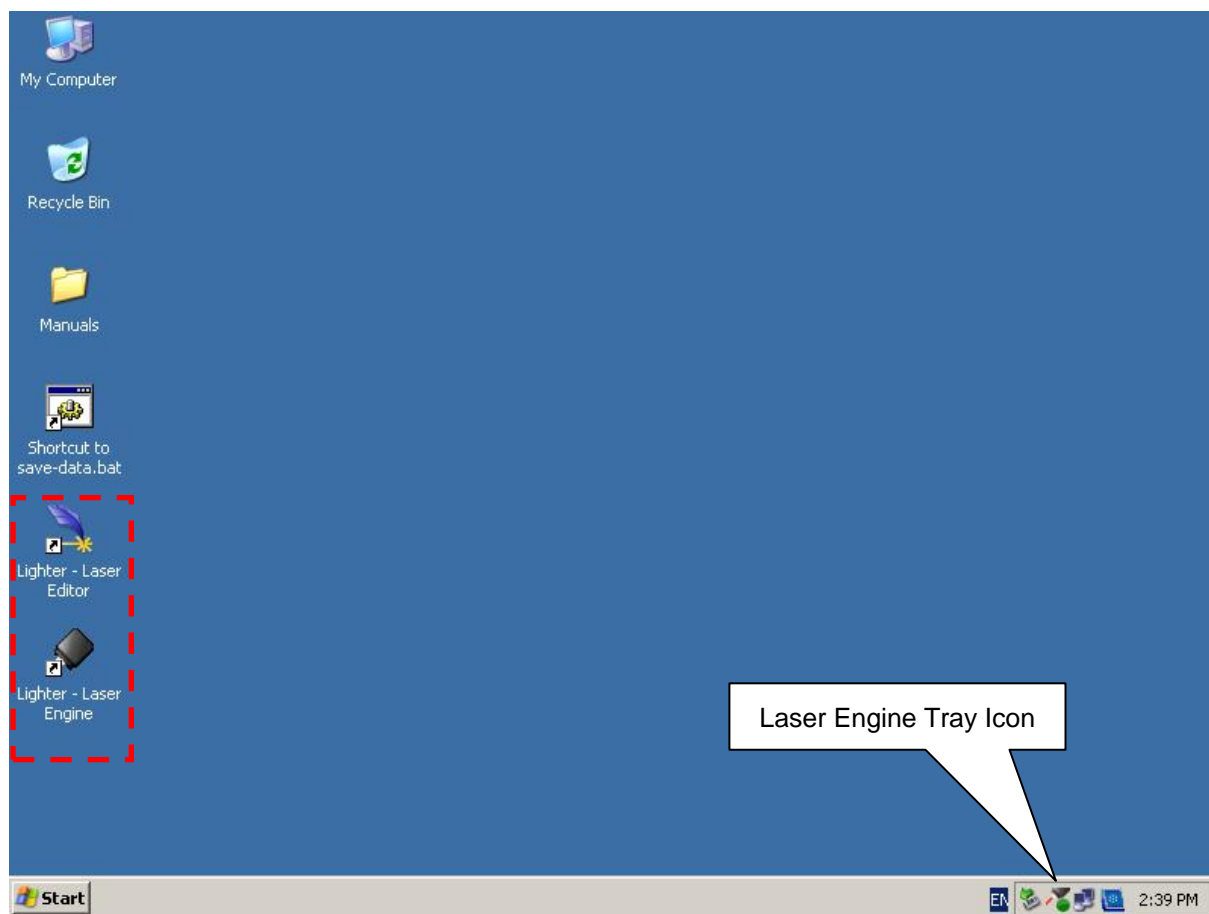
New IP ActiveX allows OEM integrators and end-users to create customized Applications and User Interfaces via Ethernet.



Local or remote ActiveX control interface is available with the same commands to allow the use of the same application developed for both local and remote configurations.



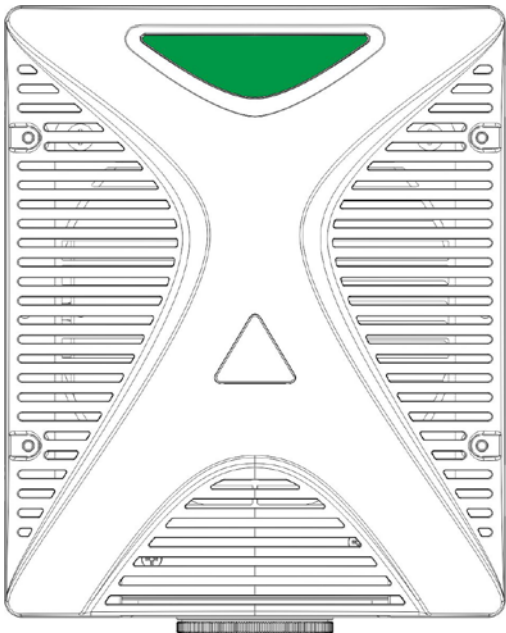
4.4 OPERATING IN LOCAL MODE

Connecting monitor, mouse and keyboard to the marking system (see paragraph 3.1.4) allows the operator to access the console which contains the instruments to operate with laser.



| | |
|---|--|
|  <p>Lighter - Laser Editor</p> | <p>Laser Editor is a software that allows to easily mark or engrave product identification information such as 2D matrix codes, barcodes, text, alpha-numeric serial numbers, date codes, part numbers, graphics and logos in any production environment.</p> <p>With Laser Editor you can:</p> <ul style="list-style-type: none"> ○ edit graphic layouts ○ set laser parameters ○ set marking system configuration ○ control the integrated I/O module for axis management ○ create automated procedures ○ create programs using Lighter programming language |
|  <p>Lighter - Laser Engine</p> | <p>Laser Engine is an application automatically loaded at start-up that allows to operate on the marking system. Laser Engine is present in the tray icon.</p> <p>With Laser Engine you can:</p> <ul style="list-style-type: none"> ○ monitor the system status ○ select a saved document, display limits using a red laser pointer, watch the marking preview and do marking tests ○ switch between Manual/Auto mode (engraving operations controlled by operator or external signals) |

4.4.1 HOW TO CREATE AND EDIT YOUR FIRST GRAPHIC DOCUMENT

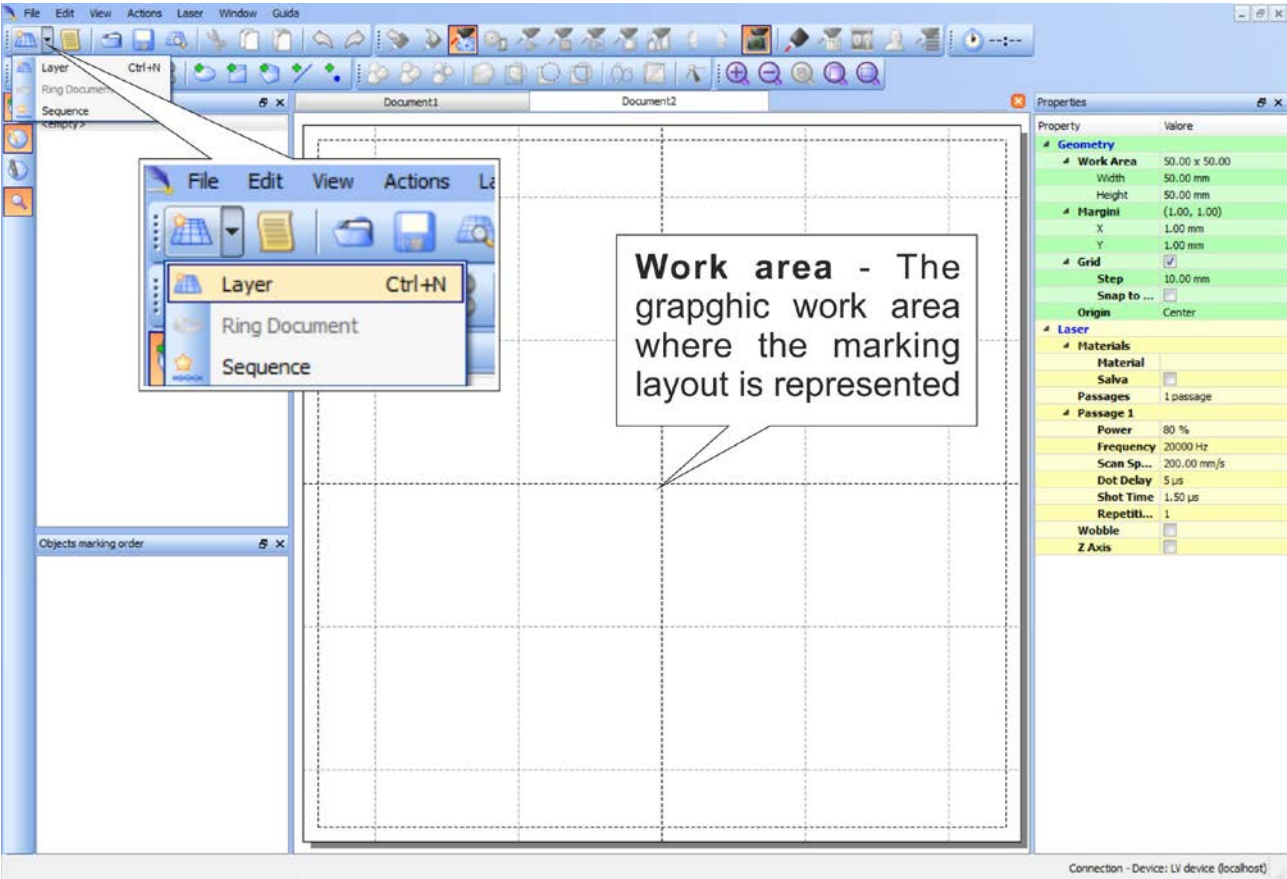


| SIGNAL | STATUS |
|---------|--------|
| EXT_KEY | OFF |
| EXT_KEY | OFF |
| EXT_KEY | OFF |

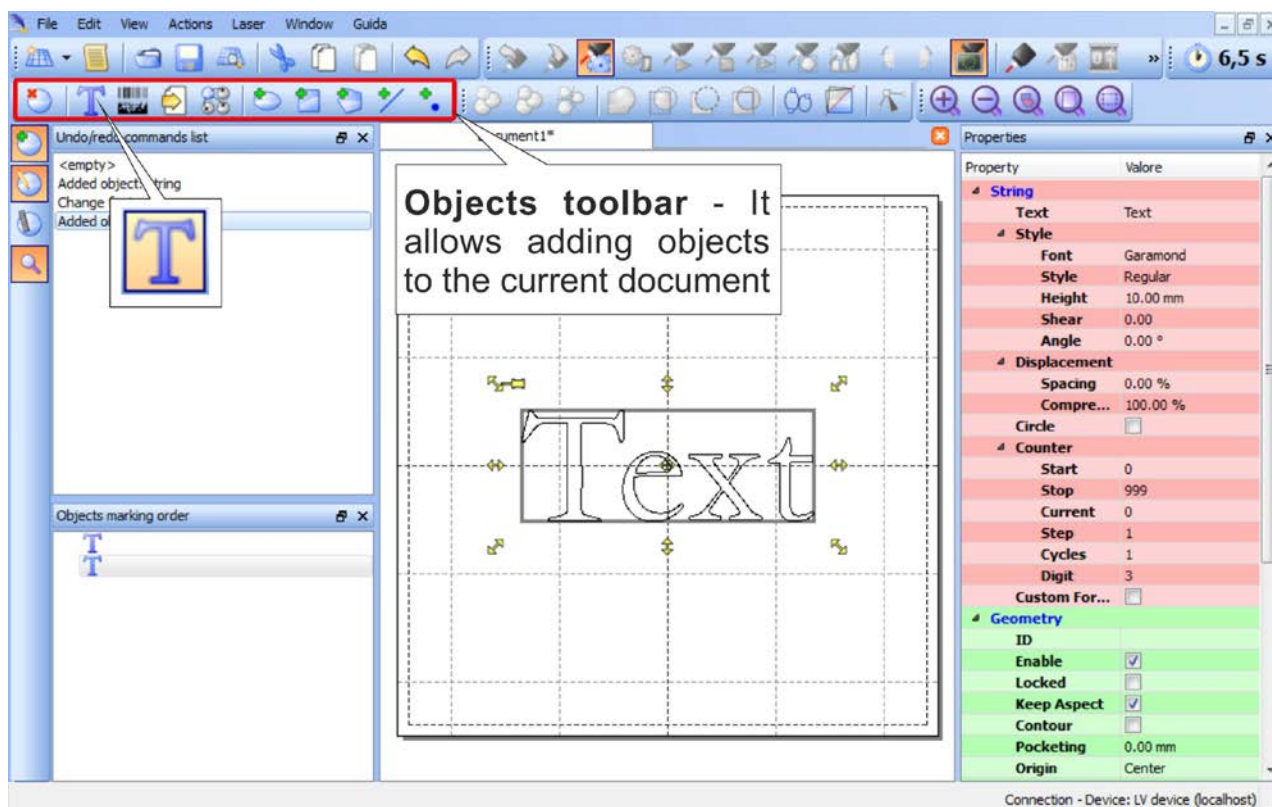
Double click on Laser Editor icon to start the layout editor application



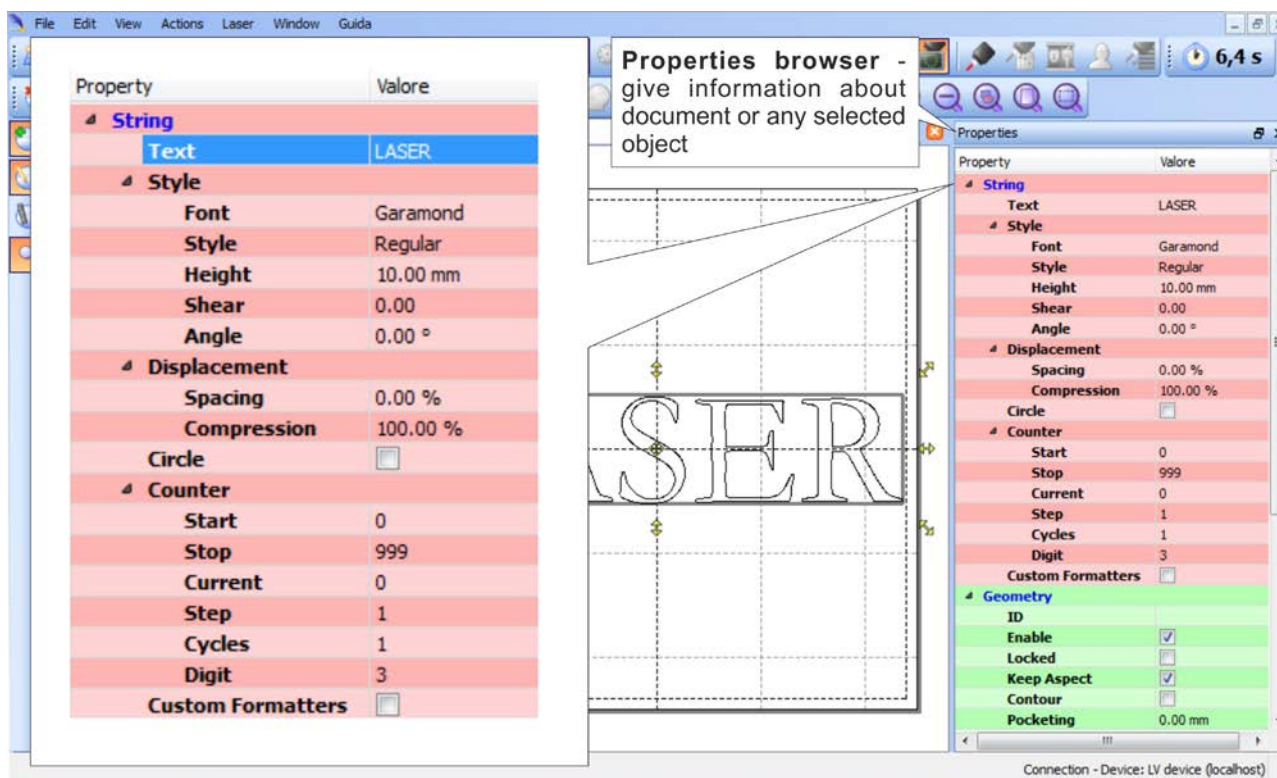
Click on the document type selector and choose *Layer*:



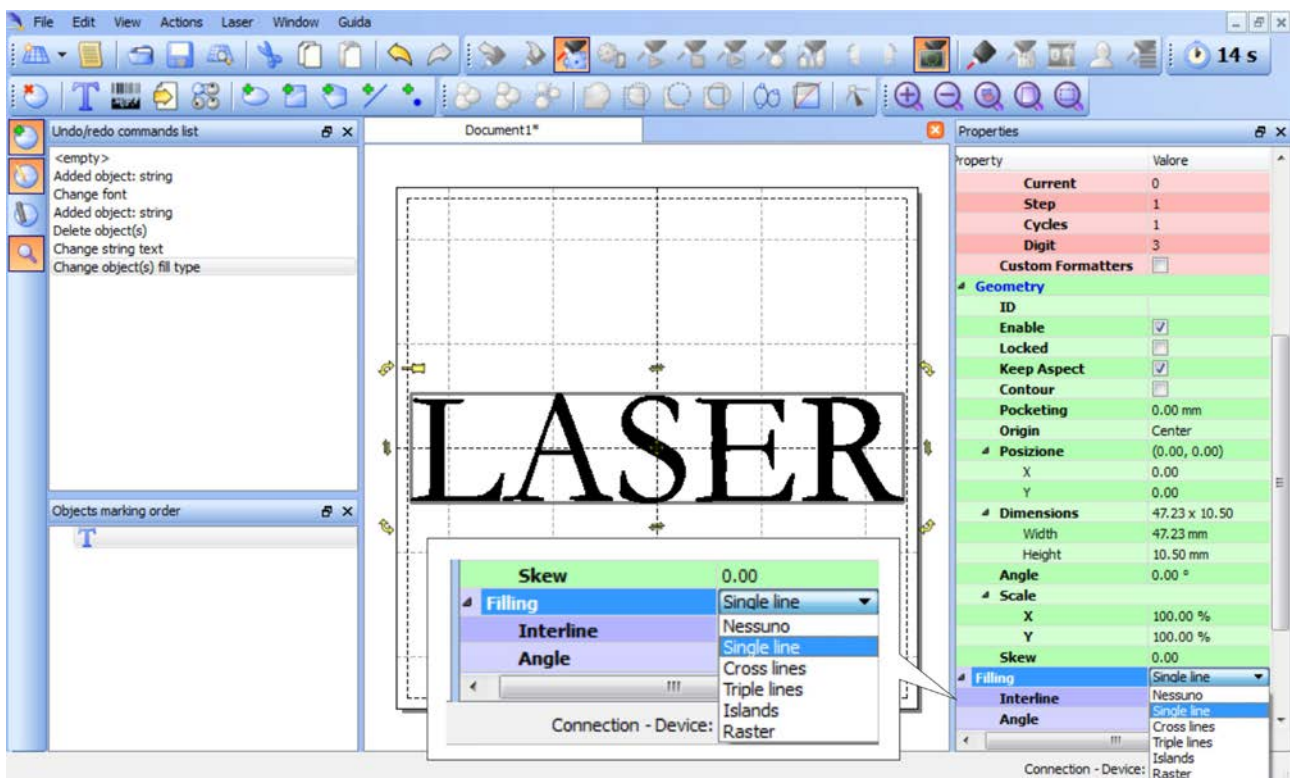
Click on the *Text String* icon in the Object toolbar to add a string object to the layer:



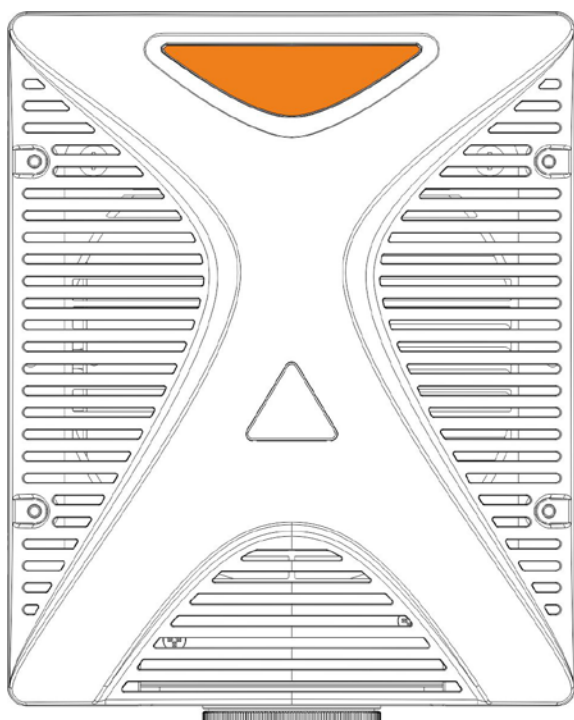
Edit String properties such as value, font, style, etc. using the *Properties browser*:



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

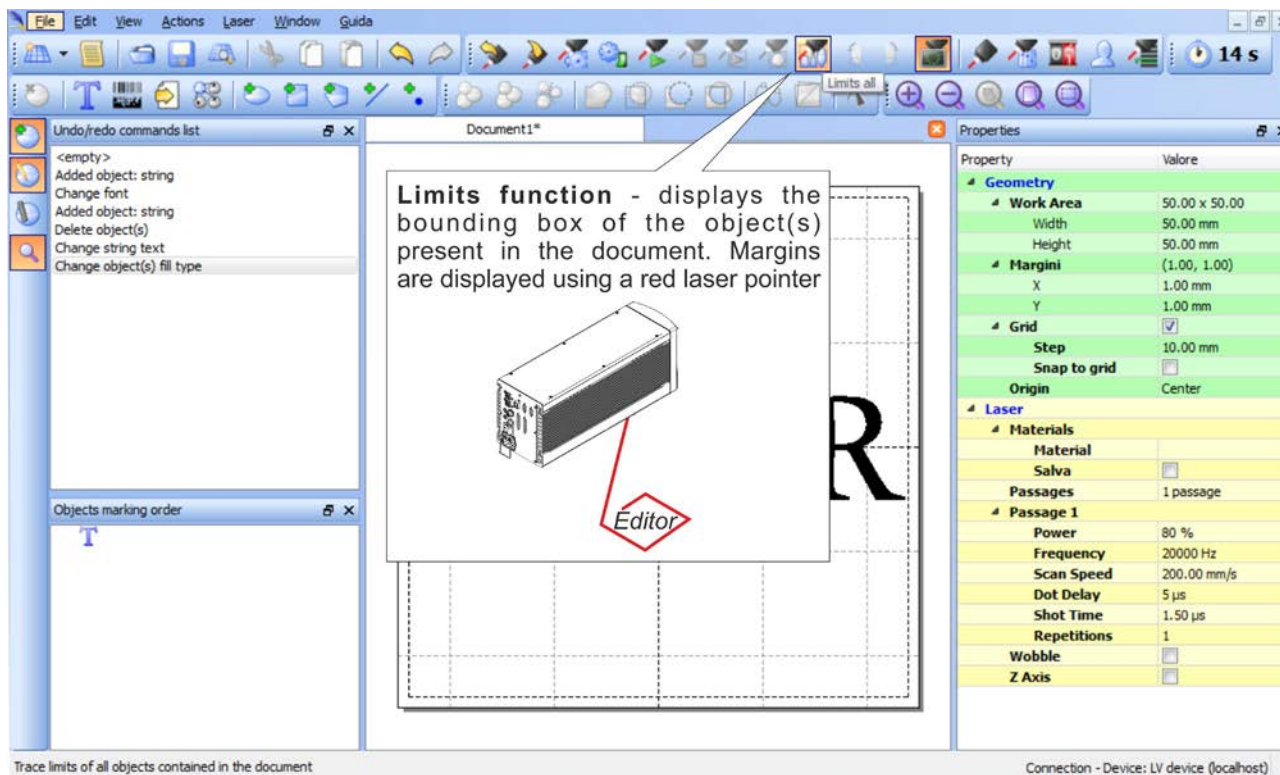


4.4.2 HOW TO TEST AND ENGRAVE YOUR DOCUMENT

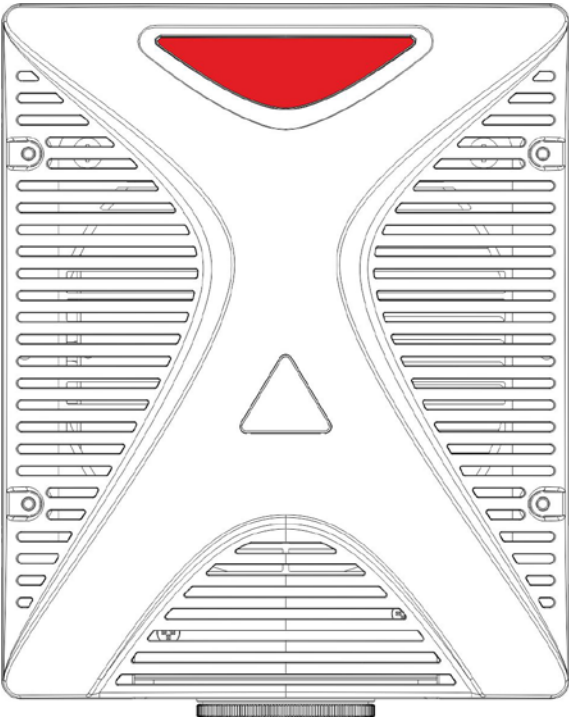


| SIGNAL | STATUS |
|---------|--------|
| EXT_KEY | ON |
| EXT_KEY | OFF |
| EXT_KEY | OFF |

Press *Limits All* button in the *Laser Toolbar* to adjust the object position in the marking field:

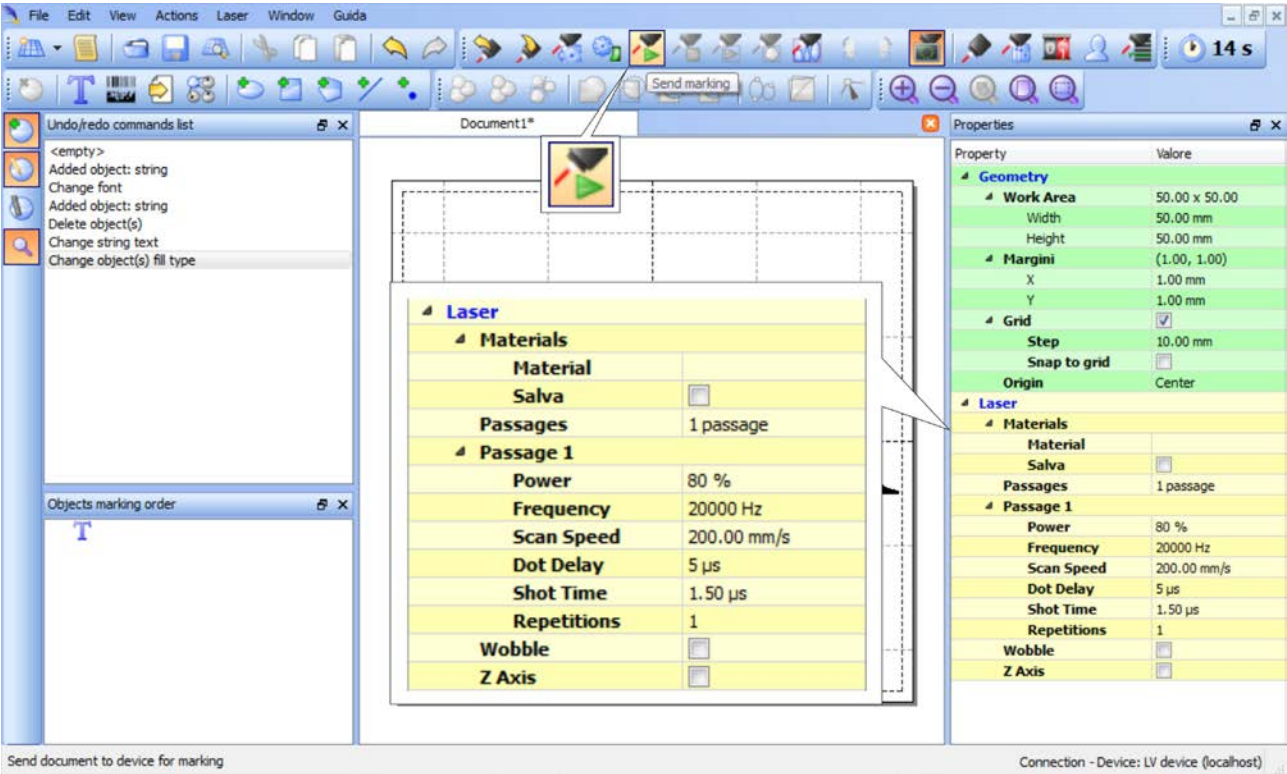


Adjust the Laser parameters using the *Properties* browser



| SIGNAL | STATUS |
|---------|--------|
| EXT_KEY | ON |
| EXT_KEY | ON |
| EXT_KEY | ON |

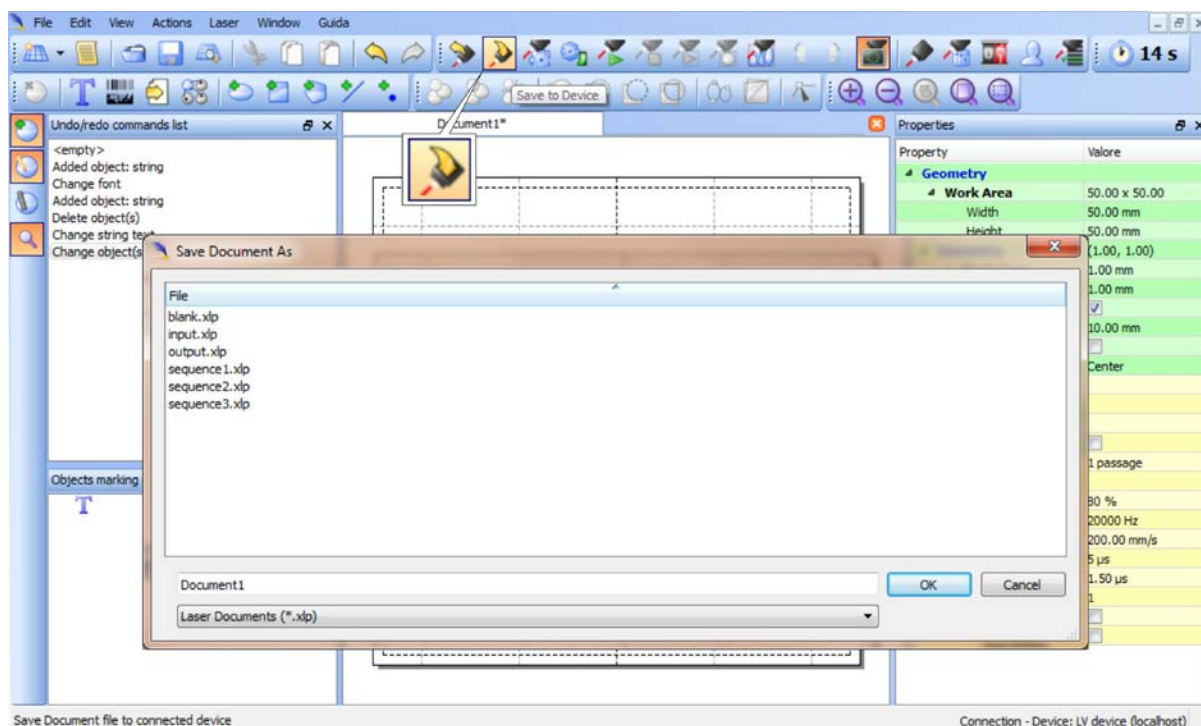
Press *Send Marking* button in the *Laser Toolbar* to start the marking process:



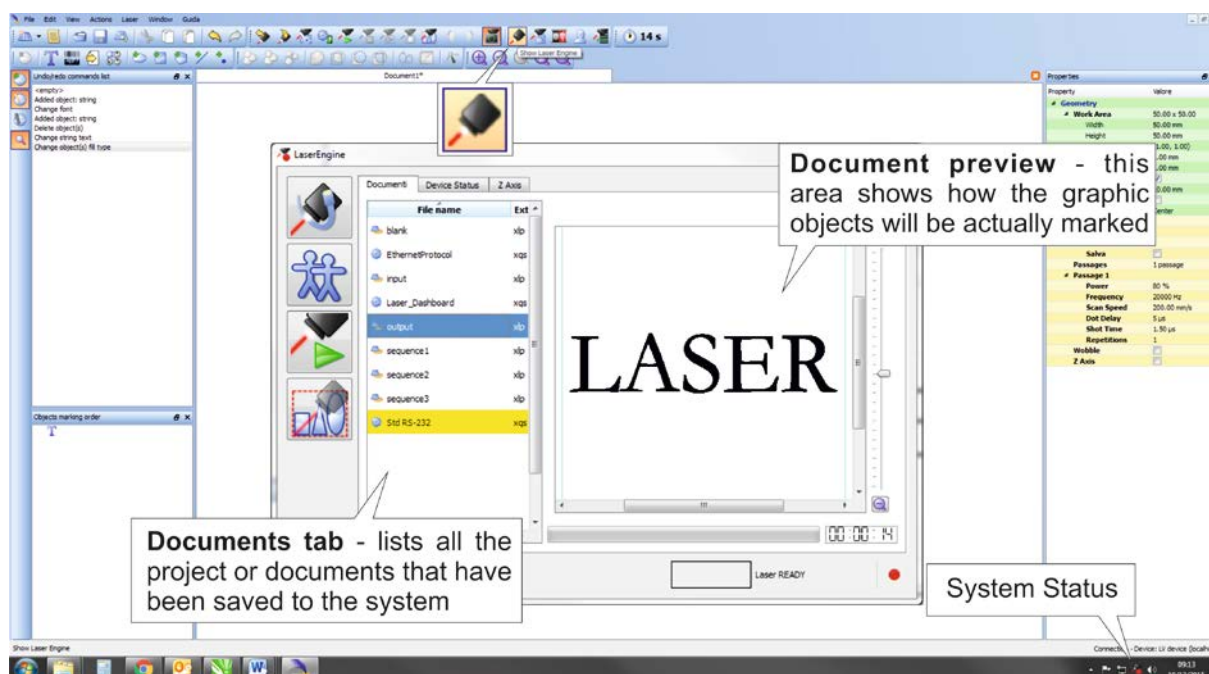
4.4.3 HOW TO USE EXTERNAL SIGNALS TO ENGRAVE YOUR DOCUMENT

Automate the marking process allowing documents to be marked using external START & STOP signals, that can be generated by PLC or other external devices.

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



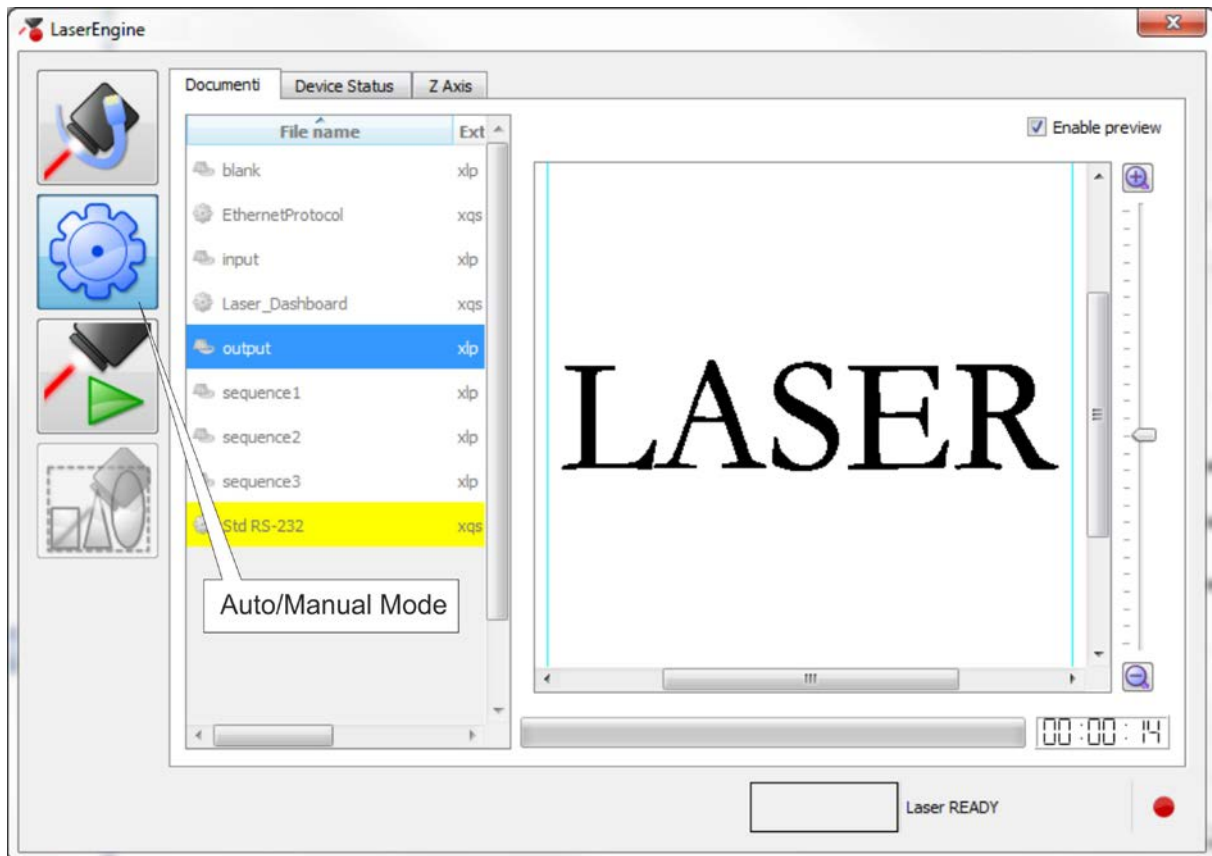
Click on *Show Laser Engine* button to display Laser Engine window:



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 testing layouts.

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



The marking system is ready to mark document using external START & STOP signals:



5 CUSTOMIZE THE SYSTEM'S SOFTWARE

5.1 CHANGE O.S. LANGUAGE AND KEYBOARD LAYOUT

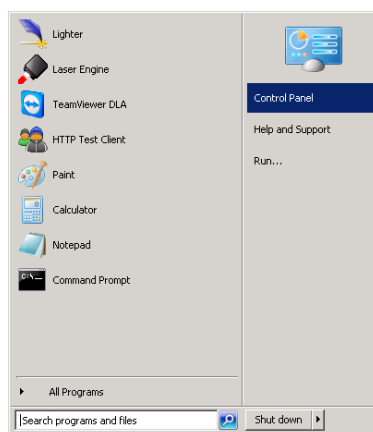
The marking system allows you to personalize the operating system changing the language used in menus and dialogs, languages you can use to enter text and keyboard layout.



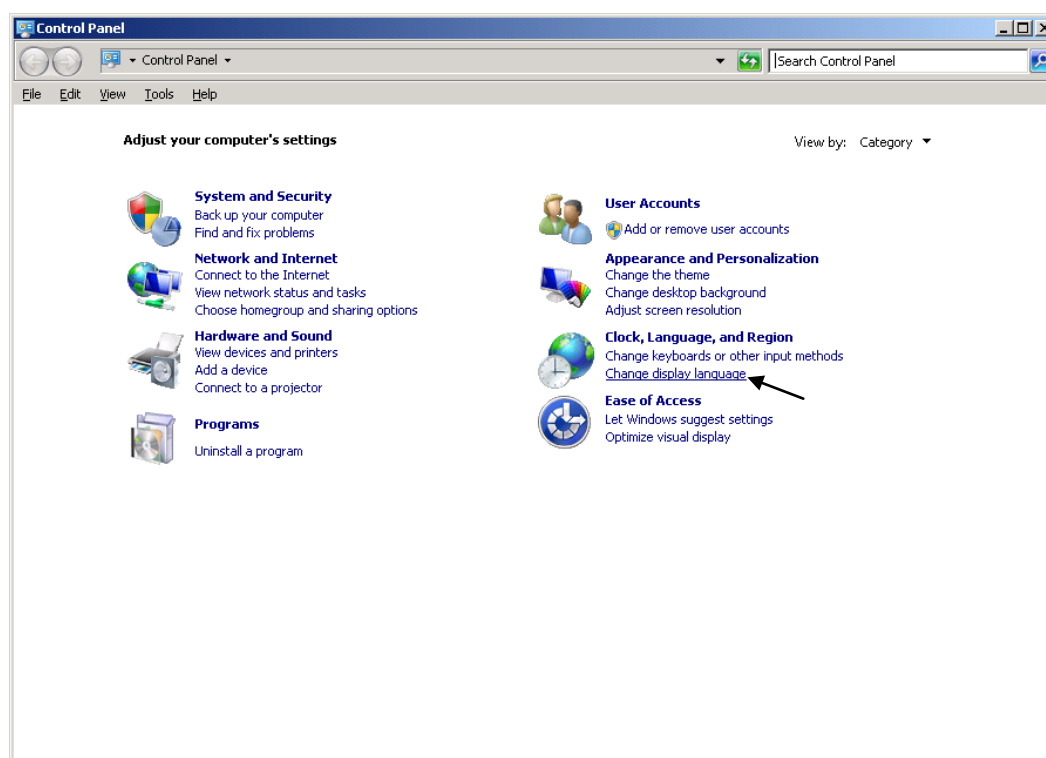
NOTE:

In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the marking system (see paragraph 3.1.4).

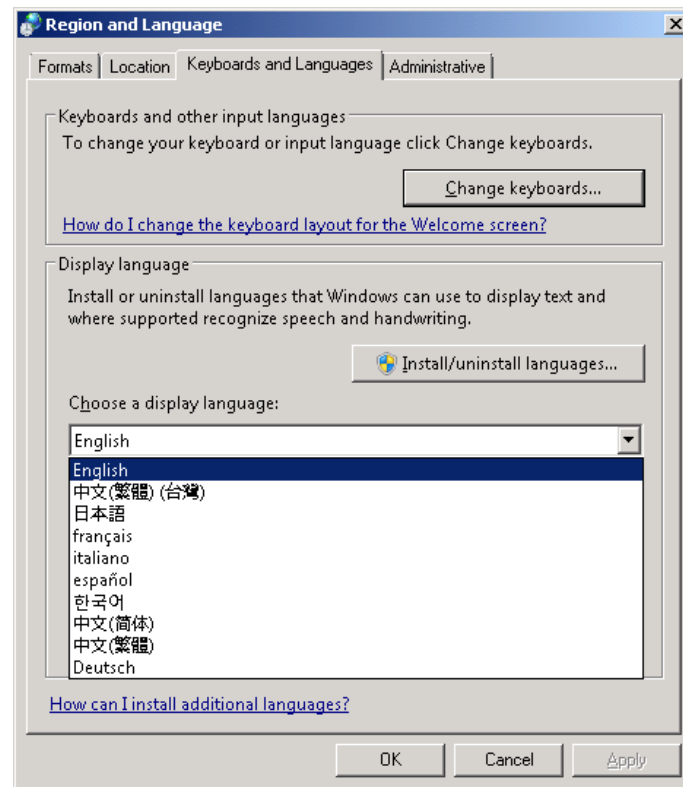
- Turn OFF and ON the marking system and wait the end of the booting-up (the status LED on the rack and on the scan head must be steady green)
- From the main screen click on *START/Control Panel*



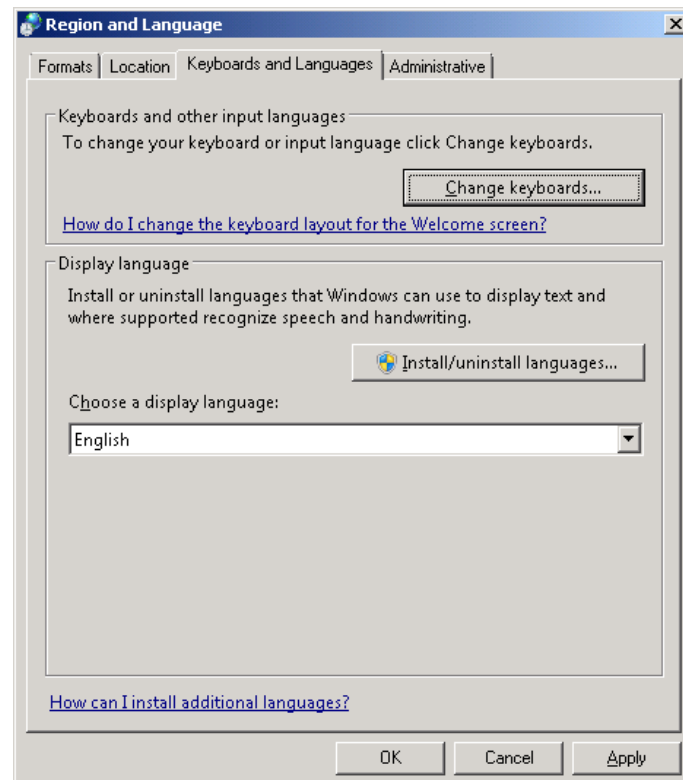
- Select *Change display language*:



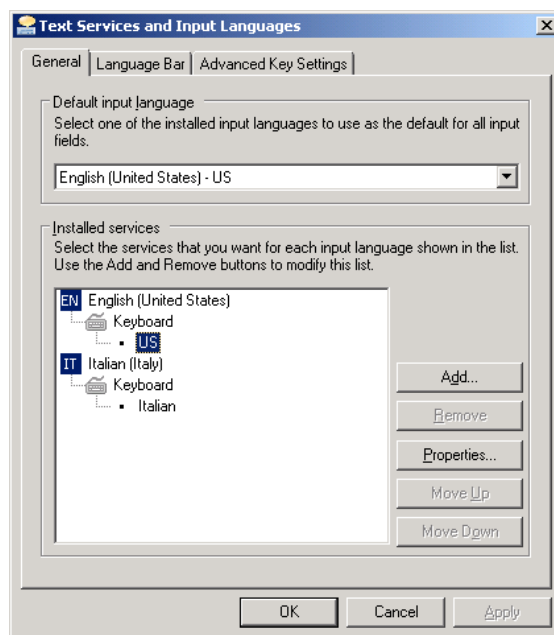
- In “*Keyboards and Languages*” select and choose the desired language.



- Select *Change keyboards* to change your keyboard or input language:



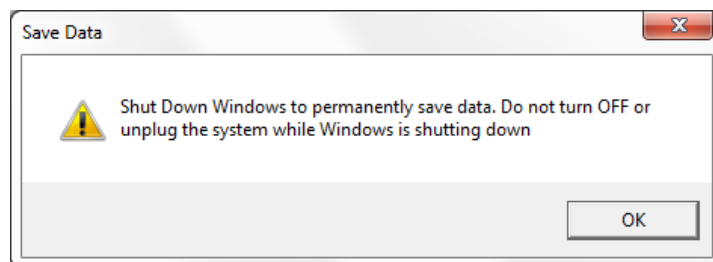
- Select now input languages and press **OK**:



- Close all the open screens and double click on the **Shortcut to save-data.bat** icon in the Desktop screen:



- A message advise you to shut the system in order to permanently save data. Press **OK**:



- **Shut down** the system in order to save the new settings:



WARNING!

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

- **WAIT** until system shuts down automatically (black screen)
- Power off the system to complete installation

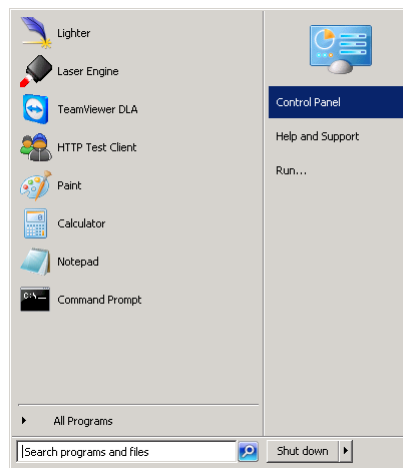
5.2 CHANGE THE LAN CONFIGURATION AND IP ADDRESS

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

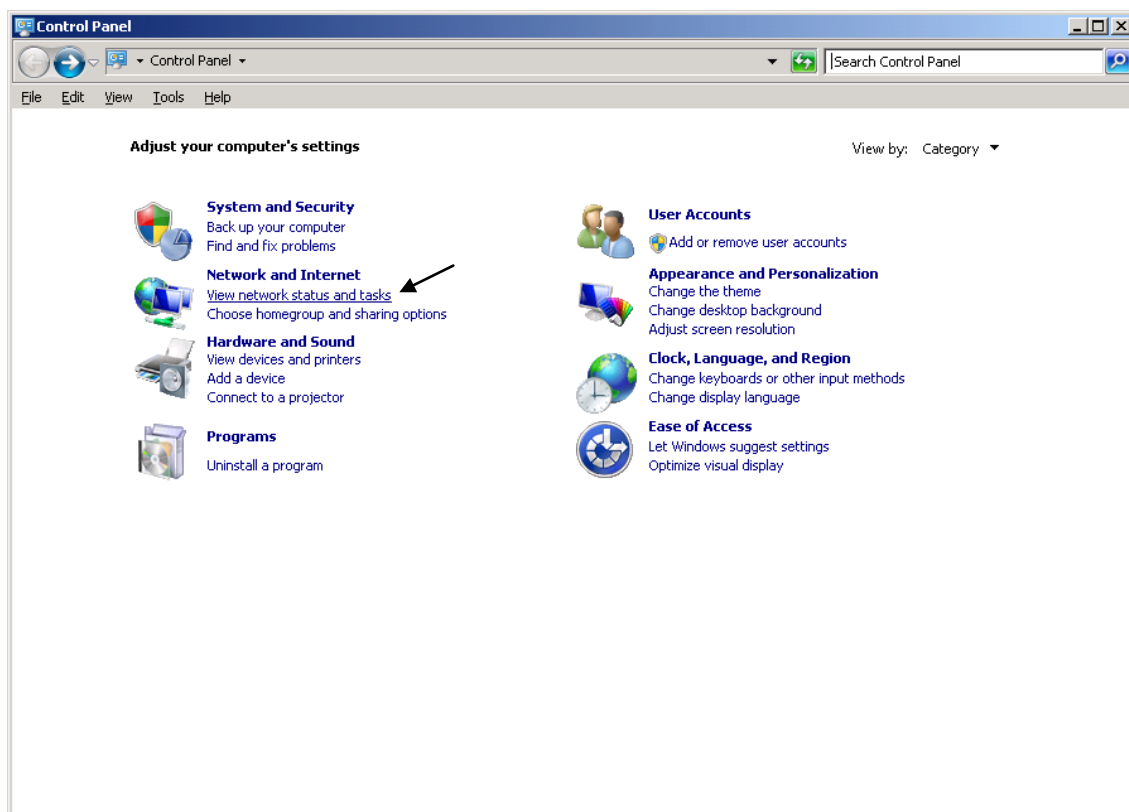
**NOTE:**

In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the marking system (see paragraph 3.1.4).

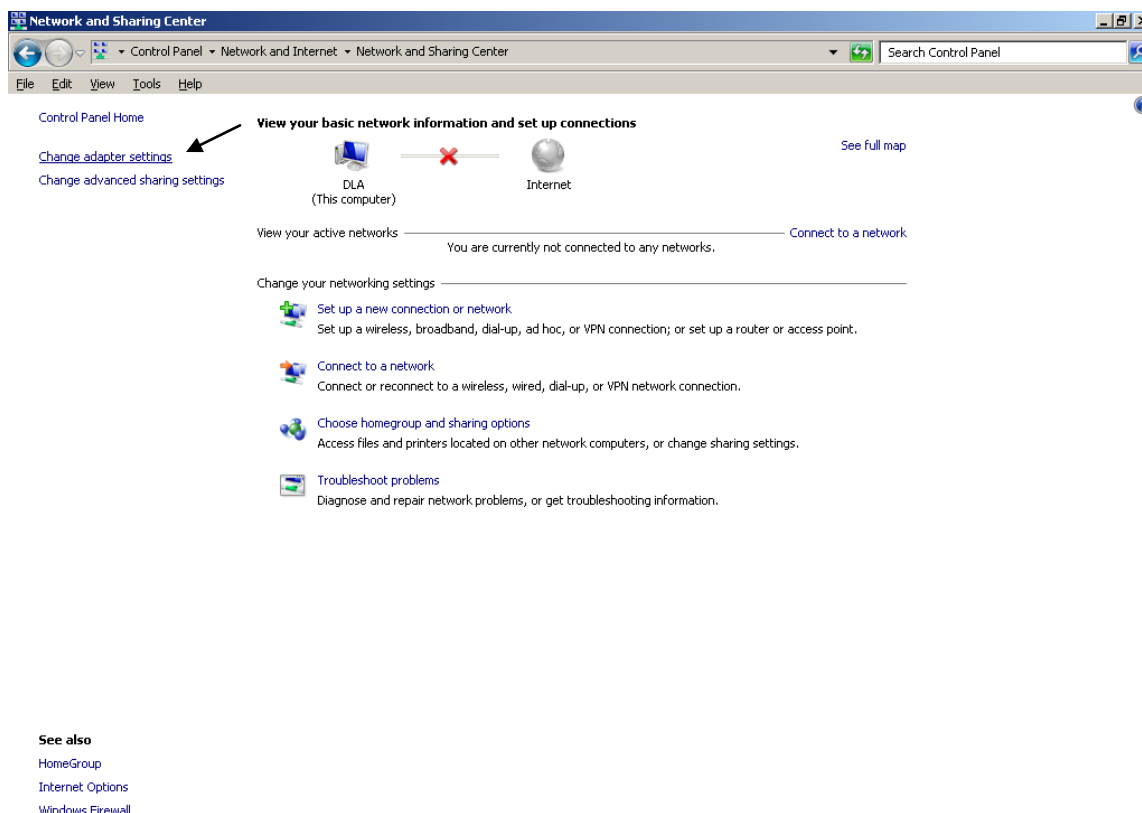
- Turn OFF and ON the marking system and wait the end of the booting-up (the status LED on the rack and on the scan head must be steady green)
- From the main screen click on *START/Control Panel*



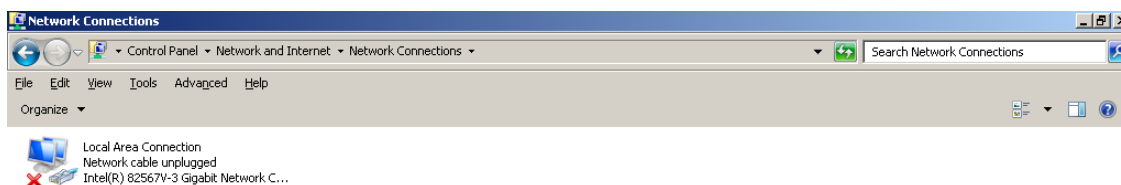
- Select *View network status and task*:



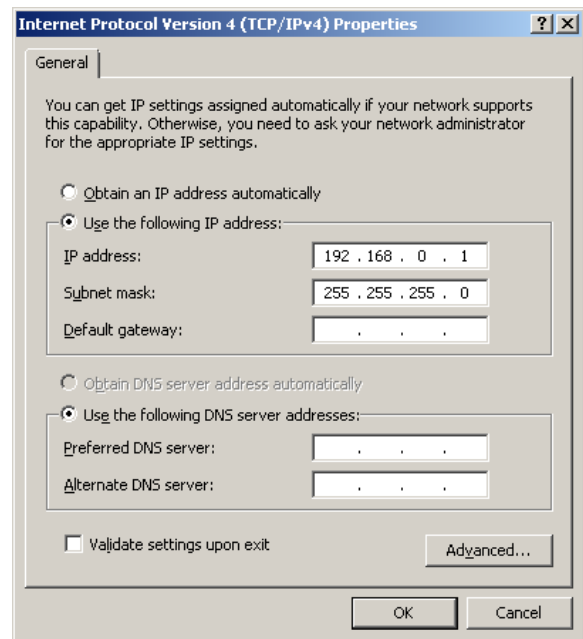
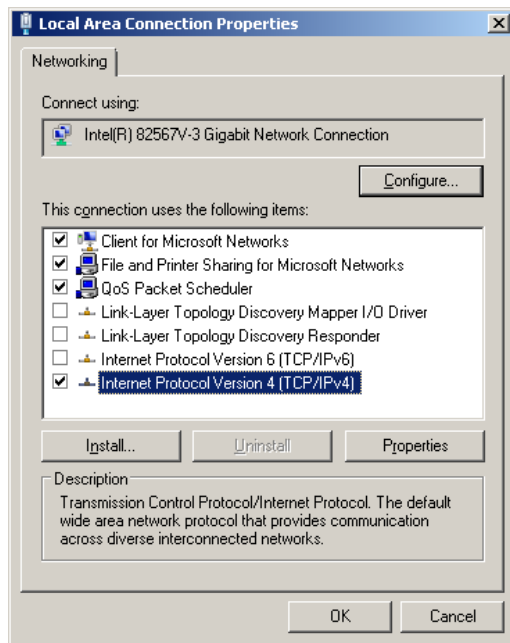
- In the Network and Sharing Center screen select *Change adapter settings*:



- In the Network Connections screen double click on *Local Area Connection* icon



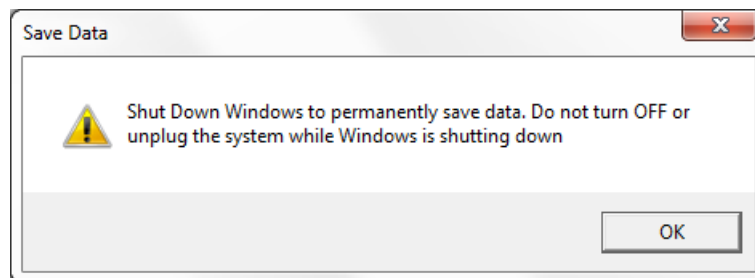
- In the Local Area Connection Properties screen double click on *Internet Protocol Version 4 (TCP/IPv4)*
- In the Internet Protocol Version 4 (TCP/IPv4) Properties you can change the IP address and configuration



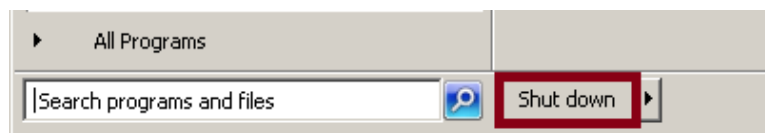
- Close all the open screens and double click on the Shortcut to save-data.bat icon in the Desktop screen:



- A message advise you to shut the system in order to permanently save data. Press OK:



- **Shut down** the system in order to save the new settings:

**WARNING!**

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

- **WAIT** until system shuts down automatically (black screen)
- Power off the system to complete installation

5.3 CHANGE THE VIDEO SETTING

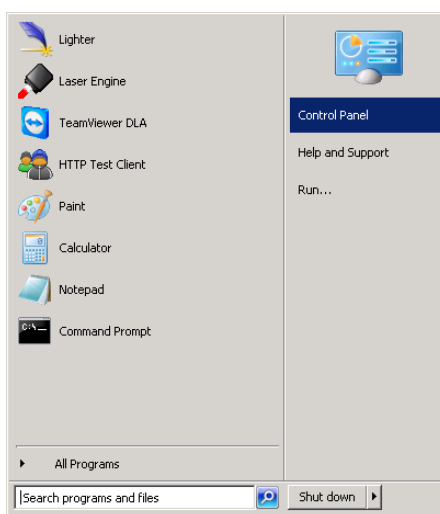
The system allows you to change the Video setting.



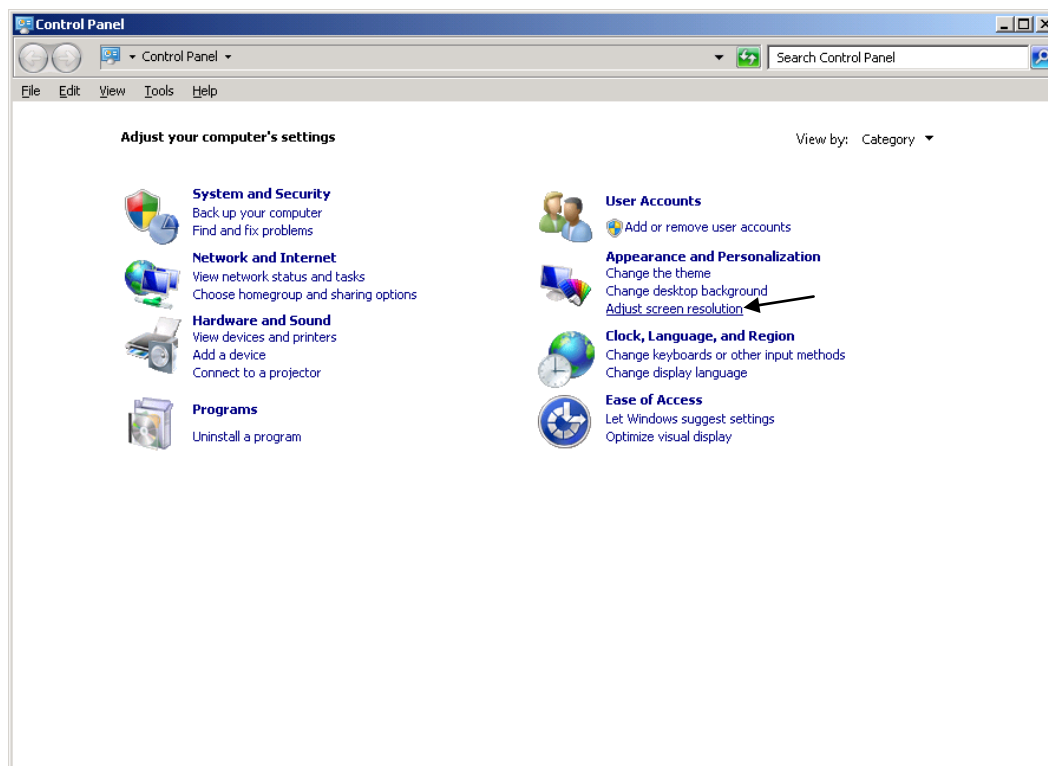
NOTE:

In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the marking system (see paragraph 3.1.4).

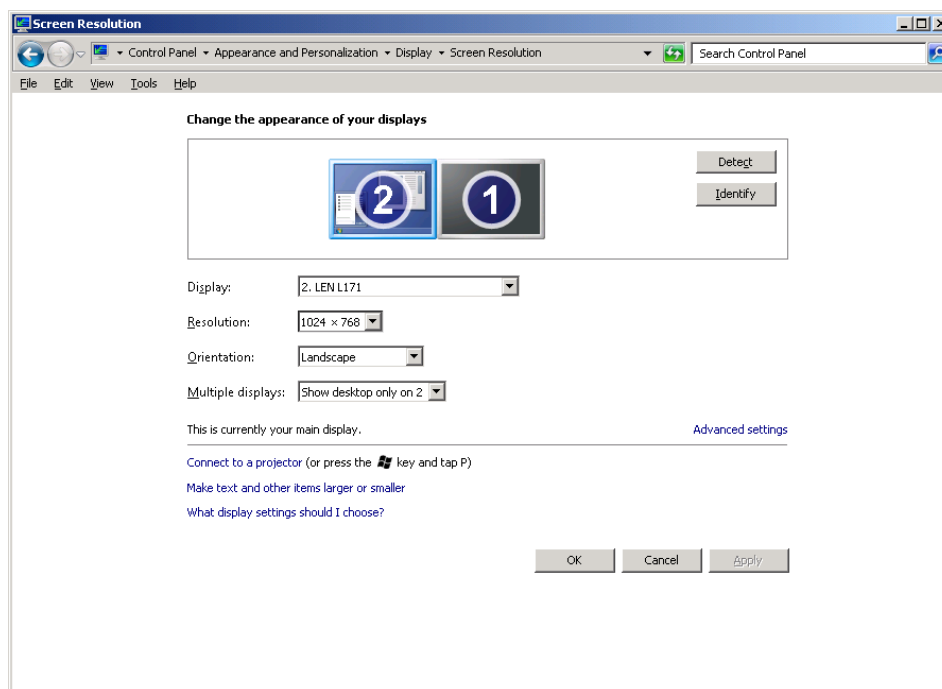
- Turn OFF and ON the marking system and wait the end of the booting-up (the status LED on the rack and on the scan head must be steady green)
- From the main screen click on *START/Control Panel*



- Select *Adjust screen resolution*:



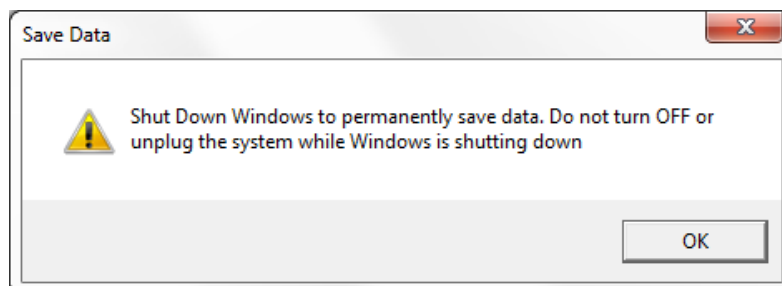
- In the Screen Resolution window select the desired Screen resolution and Color quality:



- Close all the open screen and double click on the Shortcut to save-data.bat icon in the Desktop screen:



- A message advise you to shut the system in order to permanently save data. Press OK:



- **Shut down** the system in order to save the new settings:



WARNING!

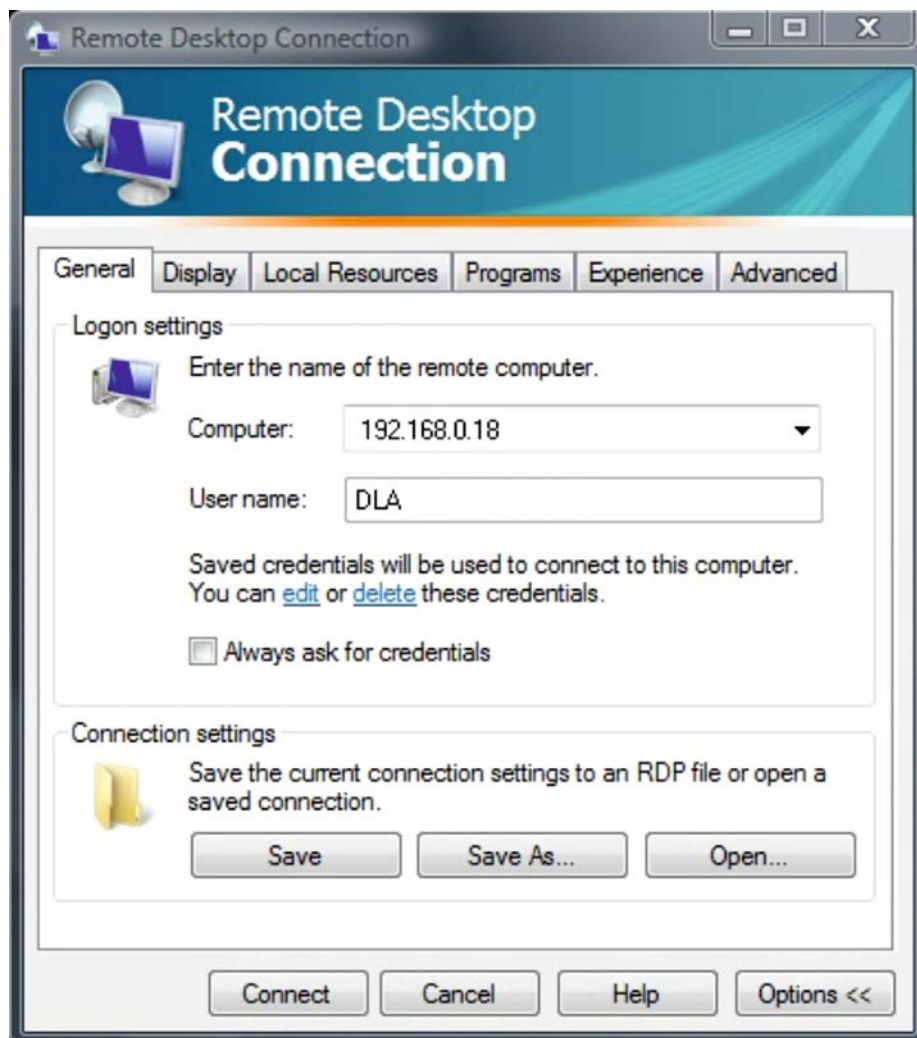
DO NOT turn **OFF** or **UNPLUG** the system while Windows® is shutting down.

- **WAIT** until system shuts down automatically (black screen)
- Power off the system to complete installation

5.4 REMOTE DESKTOP CONNECTION

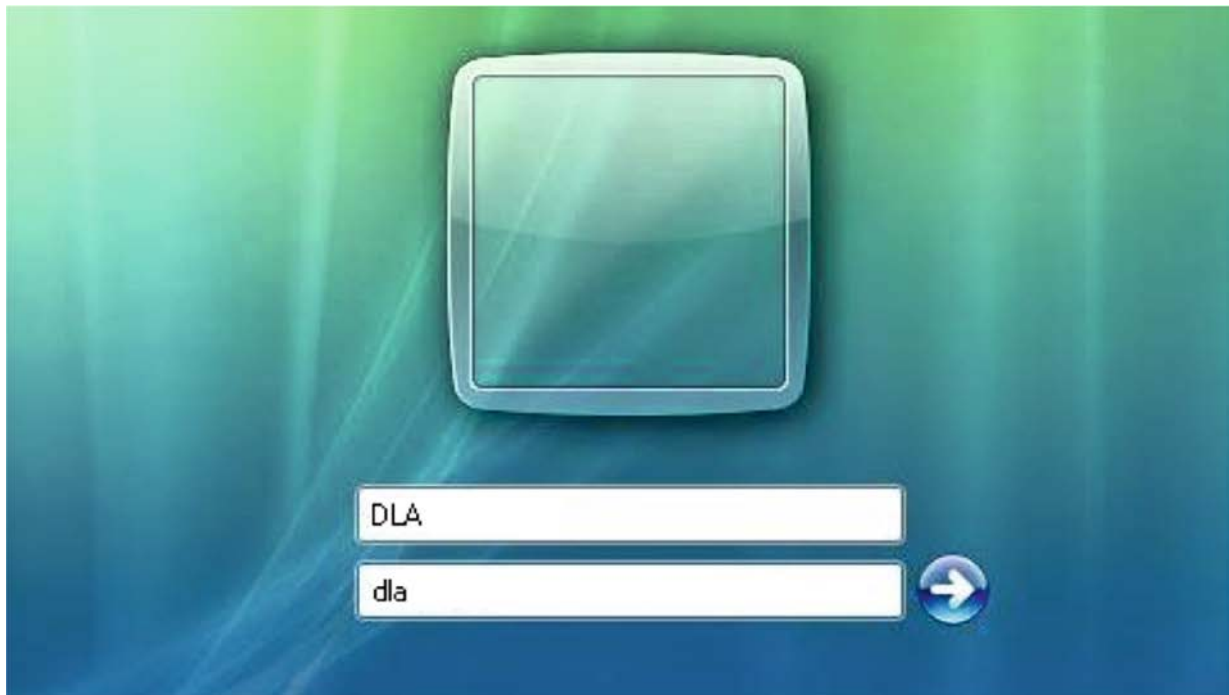
To connect the marking system to a remote Windows® based computer, follow these steps:

- Turn on marking system
- Make sure that both marking system and remote computer are connected to the LAN
- Click *Start/All Programs/Accessories*, and then click *Remote Desktop Connection*
- Click *Options*
- In the *Computer* list, type the host name or the IP address of the computer to which you want to connect
- 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*



- 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**



- In the **Log on to** list, if applicable, select the domain or remote computer that you want, and then click *OK*
The remote desktop is displayed in a window on the desktop. The remote computer is locked during this session
- 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.

6 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 refer to paragraph 1.2.

6.1 CONTROL BOX

Control and command device able to manage:

- Warmup the system
- Open the shutter and enable laser emission
- Start and Stop the marking process
- Show the marking process status
- Show the system error status

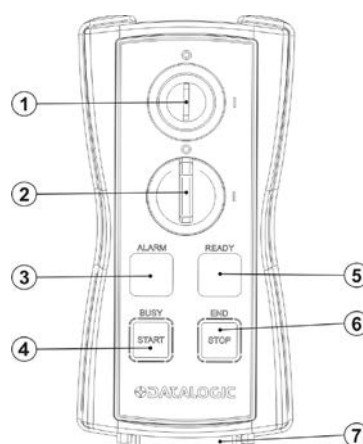
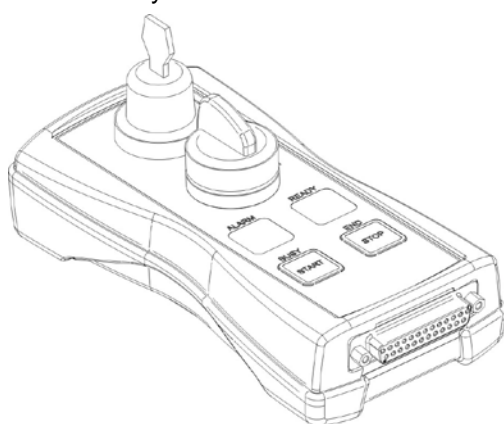


Figure 33: Control Box (Ordering no: 985330031).

| | |
|---|---|
| 1 | Key selector |
| | Selector switch for EXT_KEY control signal |
| 2 | Enable selector/ Enable indicator |
| | Selector switch for both EXT_ENABLE_A and EXT_ENABLE_B control signals with led indicator for ENABLE_OUT control signal |
| 3 | Alarm indicator |
| | Led indicator for SYSTEM_ALARM control signal |
| 4 | Start button / Busy indicator |
| | Pushbutton for START_MARKING control signal with led indicator for BUSY control signal |
| 5 | Stop button / End indicator |
| | Pushbutton for STOP_MARKING control signal with led indicator for END control signal |
| 6 | Ready indicator |
| | Led indicator for SW_READY control signal |
| 7 | External connector |
| | Connection to Command Box connector |

* Refer to Command Box connector (see paragraph 2.4.2) for detailed control signal's description.



WARNING!

If the control box is used, the marking system works in **DANGEROUS** condition.

6.2 MARKING ON FLY KIT

The marking on fly kit is available on request. Kit includes: encoder, photocell, cables and plastic reflectors.

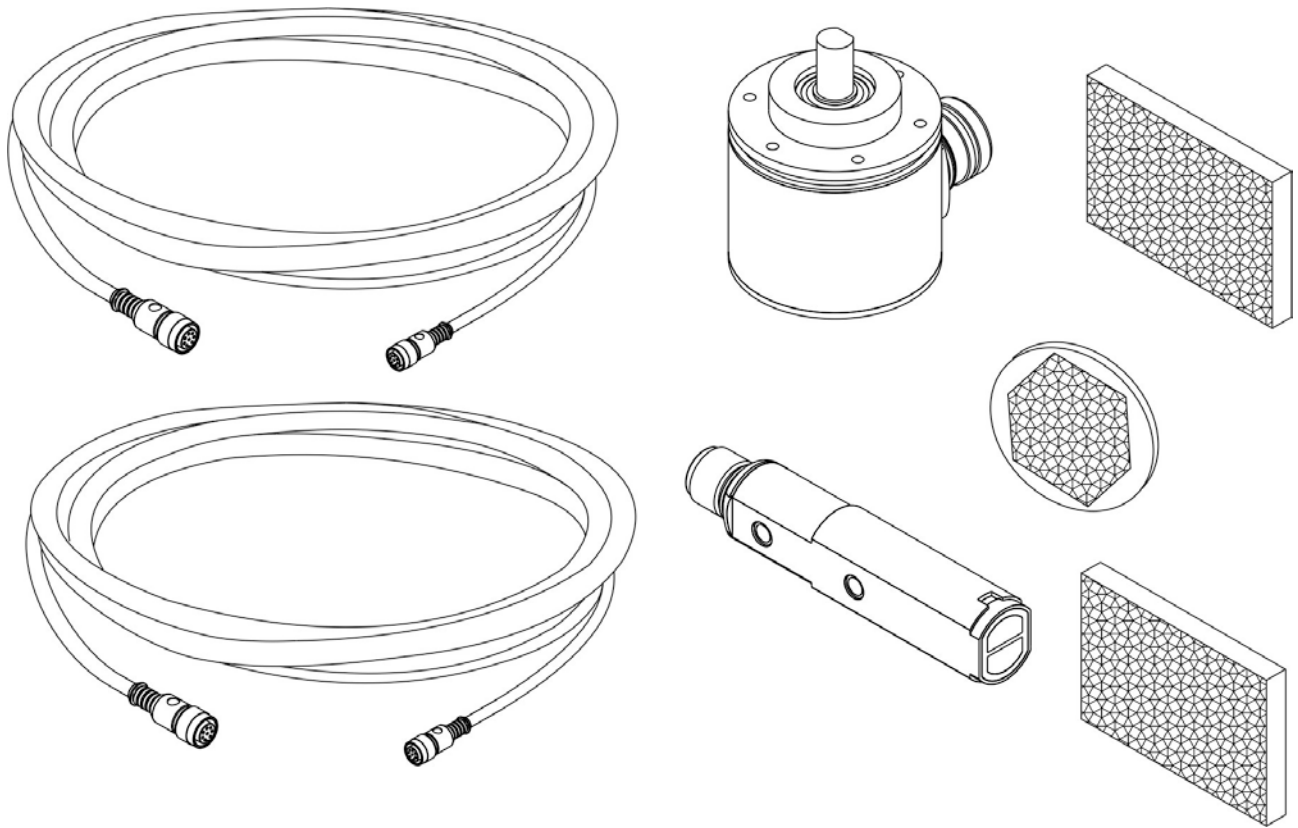
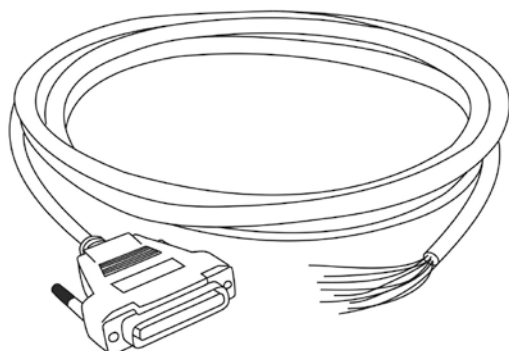


Figure 34: Kit MOF (Ordering no: 985330027).

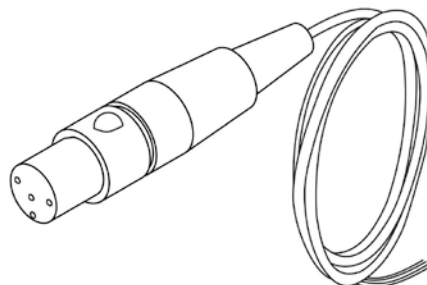
6.3 STARTER KIT

CONTROL FAN-OUT CABLE



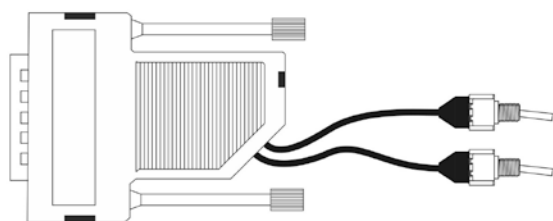
This cable allows an easier integration of the marking system: the laser control signals (Command Box connector) are all available on the frayed side of the cable in order to make easier the integration's operations.

INTERLOCK CONNECTOR CABLE



This cable allows an easier integration of the marking system: the interlock signals (Interlock connector) are all available on the frayed side of the cable in order to make easier the integration's operations.

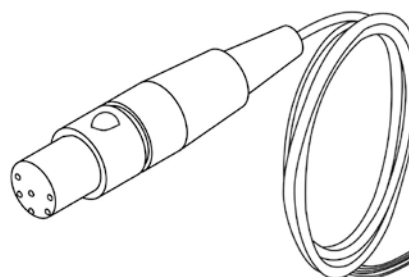
COMMAND BOX GOLD CONNECTOR



If this connector is used, the marking system works in DANGEROUS condition (MUTING DEVICE).

This pre-wired connector allows to operate with the marking system through the wiring of the appropriate control signals of the Command Box connector. It also allows to control the signals EXT_ENABLE_A and EXT_KEY signals via two integrated switches. Its use is related to the service's operations.

SHUTTER OUT CONNECTOR CABLE



This cable allows an easier integration of the marking system: the shutter OUT signals (Shutter OUT connector) are all available on the frayed side of the cable in order to make easier the integration's operations.

Figure 35: Starter kit (Ordering no: 985350033).

7 TECHNICAL SUPPORT

7.1 SEALS

Several seals have been applied to the marking system.

The marking system 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 Automation S.r.l. Breakage of these seals by a customer shall result in immediate cancellation of the warranty on the entire marking system.



WARNING!

If a customer **breaks or removes the seals placed** by the manufacturer on the marking system **the warranty** on the entire marking system will immediately become “**null and void**”.



WARNING!

The manufacturer shall not be held liable for any **non-conforming use** of marking system of its manufacture.

It is **forbidden** to operate the marking system before the machine it is intended for, has been **declared in conformance** with statutory Directives.



WARNING!

Access to the internal parts of the marking system is only permitted for **authorized personnel**, who have been trained and instructed on the electrical risks.

Datalogic Automation S.r.l. shall not be held liable for work on electrically charged parts by inadequately trained personnel!



WARNING!

Access to the internal parts of the marking system is only permitted for **authorized personnel**, who have been trained and instructed on the optical risks!

Datalogic Automation S.r.l. shall not be held liable for work on parts by inadequately trained personnel!

7.2 MAINTENANCE

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

The maintenance activities must be done in compliance with the law prescriptions regarding the safety rules during the operations.

The following parts/functions have to be controlled:

MAINTENANCE PROGRAM

| COMPONENT OR FUNCTION | TYPE OF 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 air blowing |
| Main Fan (120 mm) | Clean | Every 3 months (according to the environment and frequency of use) |

7.2.1 F-THETA SCAN LENS CLEANING PROCEDURE

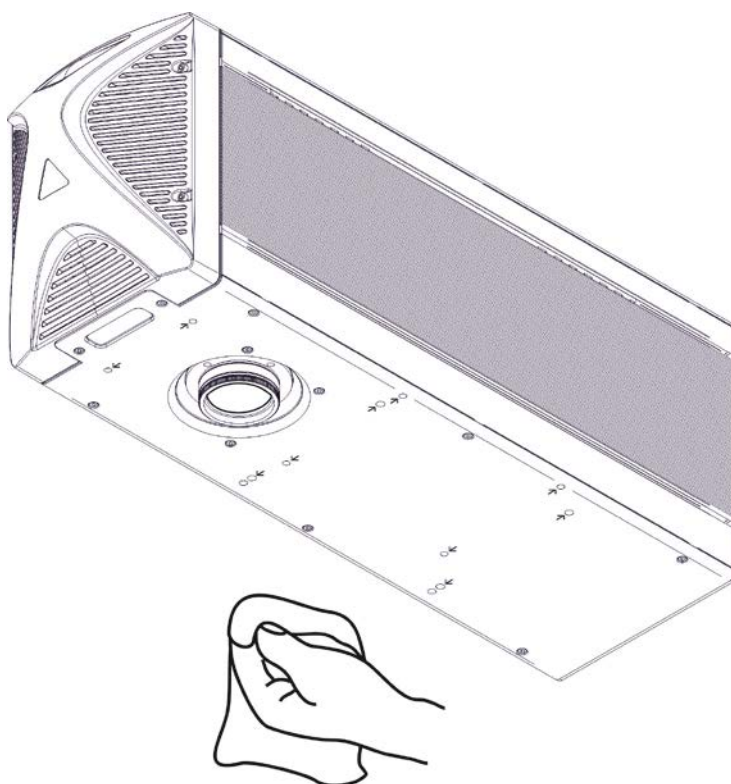


Figure 36: Cleaning F-Theta lens.



WARNING!

Before cleaning the F-Theta scan lens, the marking system **MUST** be in set **SAFE** mode:

- 1- Disable enable A and enable B
- 2- Disable interlock A and interlock B

7.2.2 MAIN FAN CLEANING PROCEDURE

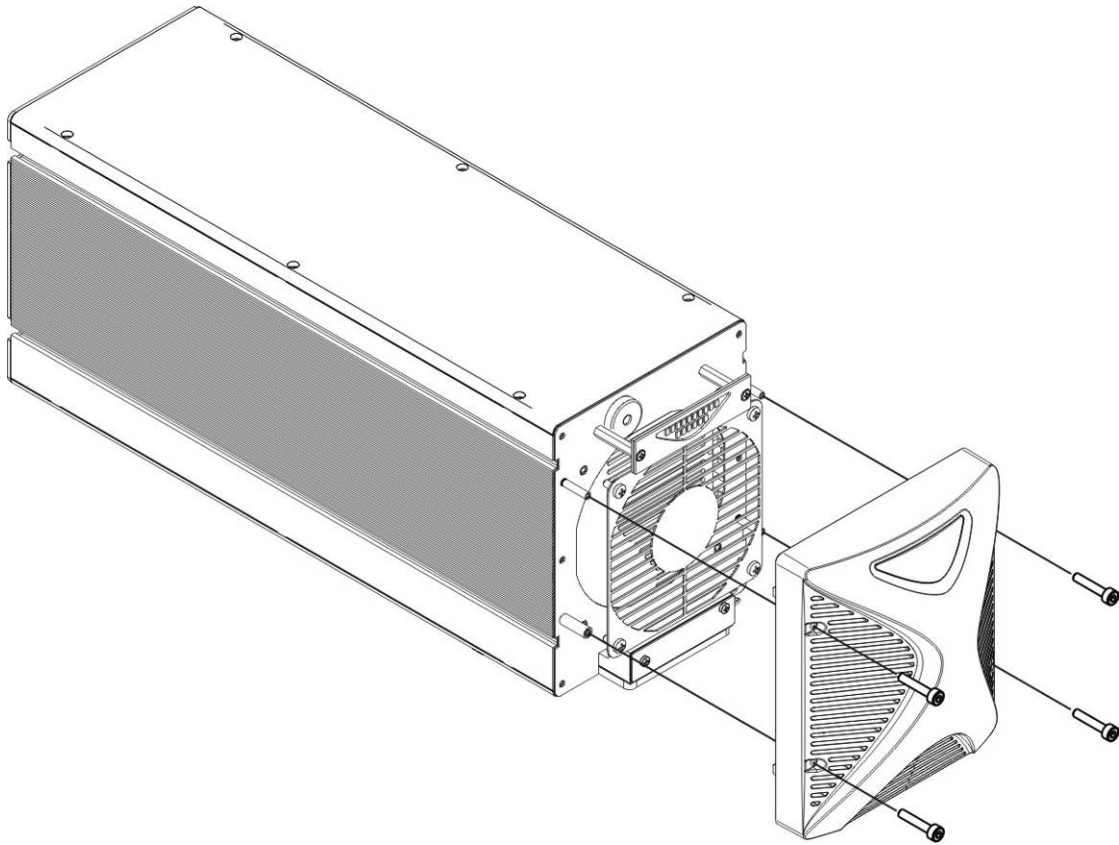


Figure 37: Main fan cleaning procedure.



WARNING!

In order to set the marking system in SAFE mode, disconnect AC power cable before starting this operation!

1. Turn off key switch on marking system
2. Disconnect AC power cable
3. Loosen screws of front cover and remove them
4. Clean fan with air blow
5. Reinstall the protective front cover

7.3 TROUBLESHOOTING

If a problem occurs during operation, first check the following troubleshooting. If you cannot fix the problem, contact Datalogic customer service.

7.3.1 LIST OF POSSIBLE WARNING AND ERROR STATUS

| STATUS LED | DESCRIPTION | POSSIBLE CAUSE | ACTION | OUTPUT STATUS COMMAND BOX CONNECTOR |
|---|--------------------------------|--|---|---|
| Blinking ORANGE (2Hz) | Warning invalid start sequence | Wrong turning ON sequence | Set KEY=OFF, ENABLE=OFF and repeat the turning ON sequence (see paragraph 3.1) | ALARM OFF POWER_ON OFF ENABLE_OUT OFF |
| Blinking RED (2Hz) at power ON | System error | INTERLOCK ERROR | Check INTERLOCK IN connector signals (see paragraph 2.4.1) | ALARM ON POWER_ON OFF ENABLE_OUT OFF |
| | | | Check INTERLOCK IN connector presence (see paragraph 2.4.1) | |
| | | CONNECTOR PRESENCE ERROR | Check CONNECTOR PRESENCE input signal of the Command Box connector (see paragraph 2.5): o HIGH level: normal operation; o LOW level or disconnected: system error | |
| | | | Check Command Box connector presence | |
| Blinking RED (2Hz) after KEY activation | System error | LASER SOURCE ERROR: o Temperature error o Master Oscillator Error o Back reflection error | Use DLA Fiber Configurator application to connect to the laser source and report the error status code to Datalogic Technical Support | ALARM ON POWER_ON OFF ENABLE_OUT OFF |

7.3.2 LIST OF POSSIBLE PROBLEMS RELATED TO SYSTEM STATUS

| PROBLEM DESCRIPTION | STATUS LED | POSSIBLE CAUSE | ACTION | OUTPUT STATUS COMMAND BOX CONNECTOR |
|--|----------------|---|--|---|
| System doesn't turn ON | Turned OFF | POWER SUPPLY CABLE disconnected | Check POWER SUPPLY CABLE connection | ALARM OFF POWER_ON OFF ENABLE_OUT OFF |
| | | POWER SUPPLY main switch | Check that POWER SUPPLY main switch is turned ON | |
| | | POWER SUPPLY fuses | Check fuses on the main power supply connection | |
| System never exit BOOTING UP status | Blinking GREEN | Lighter Suite marking SW corrupted | Restore the system using USB recovery disk (see APPENDIX F) | ALARM OFF POWER_ON OFF ENABLE_OUT OFF |
| | | Compact Flash or Solid State Disk corrupted | | |
| System never go to STANDBY SHUTTER CLOSED status | Steady GREEN | EXT_KEY contact opened | Check EXT_KEY input signal on the Command Box connector (see paragraph 2.4.2): o HIGH level: contact closed; o LOW level or disconnected: contact opened | ALARM OFF POWER_ON OFF ENABLE_OUT OFF |
| System never go to READY status | Steady ORANGE | EXT_ENABLE_A and/or EXT_ENABLE_B contact opened | - Check EXT_ENABLE_A & EXT_ENABLE_B input signals on the Command Box connector (see paragraph 2.4.2): o HIGH level: contact closed; o LOW level or disconnected: contact opened - System goes in READY state if EXT_ENABLE_A = HIGH and EXT_ENABLE_B = HIGH | ALARM OFF POWER_ON OFF ENABLE_OUT OFF |

7.3.3 LIST OF POSSIBLE GENERIC PROBLEMS

| PROBLEM DESCRIPTION | POSSIBLE CAUSE | ACTION |
|--|---|---|
| System doesn't engrave | System not in READY state | <ul style="list-style-type: none"> - Check EXT_KEY contact on the Command Box connector is CLOSED - Check EXT_ENABLE_A & EXT_ENABLE_B contacts are CLOSED |
| | F-Theta Lens protection not removed | <ul style="list-style-type: none"> - Check that lens protection has been removed |
| | Wrong F-Theta Lens focus distance | <ul style="list-style-type: none"> - Check the working distance (refers to paragraph 2.3) |
| | Wrong laser parameters | <ul style="list-style-type: none"> - Check that laser parameters are appropriate for the selected material |
| System doesn't engrave using external START & STOP signal | STOP_MARKING signal is active | <ul style="list-style-type: none"> - Check the STOP_MARKING signal on the Command Box connector (see paragraph 2.4.2) <ul style="list-style-type: none"> o HIGH level signal stop the marking process |
| | START_MARKING signal wrong timing | <ul style="list-style-type: none"> - Check the START_MARKING signal on the Command Box connector (see paragraph 2.4.2) <ul style="list-style-type: none"> o 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 function to test external START and STOP signals |
| | Wrong photocell type or connection | <ul style="list-style-type: none"> - Check that the photocell is compatible with the system (see paragraph 2.4.11) <ul style="list-style-type: none"> o 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 | <ul style="list-style-type: none"> - Check that Laser Engine is set in AUTO MODE or that Laser Editor is set in WORK MODE |
| System doesn't work in Marking On Fly mode | Laser Engine is not set in MOF working mode | <ul style="list-style-type: none"> - Use the Laser Engine MOF wizard to setup the system (refers to Lighter User's Manual) - Check that Laser Engine is set in MOF MODE (refers to Lighter User's Manual) |
| | Laser Engine is not set in AUTO MODE | <ul style="list-style-type: none"> - Check that Laser Engine is set in AUTO MODE (refers to Lighter User's Manual) |
| | Wrong encoder's type or connection | <ul style="list-style-type: none"> - Check that the encoder is compatible with the system (see paragraph 2.4.10) - Check that the encoder is working using Laser Engine MOF wizard (refers to Lighter User's Manual) |
| | Wrong photocell type or connection | <ul style="list-style-type: none"> - Check that the photocell is compatible with the system - Check that the photocell is working using Laser Engine MOF wizard (refers to Lighter User's Manual) |
| | Inappropriate layout | <ul style="list-style-type: none"> - Check that the layout to engrave is compatible, in terms of marking time, with the MOF application |
| Impossible to use Command Box control signal to monitor and automate the marking process | Wrong integration | <ul style="list-style-type: none"> - Check that the control signals are compatible with the external devices used for integration (refers to paragraph 2.5) |
| SW_READY output signal doesn't rise in AUTO MODE or WORK MODE | Wrong Laser Engine setting | <ul style="list-style-type: none"> - Check SW_READY COMPATIBILITY property in Laser Engine Configuration "Setting I/O parameters": <ul style="list-style-type: none"> o SW_READY COMPATIBILITY = true: SW_READY signal goes ON when a document or a sequence is running in AUTO MODE or WORK MODE not depending on system state o SW_READY COMPATIBILITY = false: SW_READY signal goes ON when a document or a sequence is running in AUTO MODE or WORK MODE and system is in READY state |

| | | |
|--|-------------------------------------|---|
| Red Aiming beam not visible | System is not in the correct status | - Check that the system status is coherent with the AIMING BEAM TYPE property in Laser Engine Configuration "LASER" (refers to Lighter User's Manual) |
| | Wrong Laser Engine setting | <ul style="list-style-type: none"> - 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) <ul style="list-style-type: none"> o ON: active both during STANDBY SHUTTER CLOSED state and READY state o OFF: always OFF o AUTOMATIC: active only during STANDBY SHUTTER CLOSED state |
| Red Focus beam not visible | System is not in the correct status | - Check that the system status is coherent with the FOCUSING BEAM TYPE property in Laser Engine Configuration "LASER" (refers to Lighter User's Manual) |
| | Wrong Laser Engine setting | <ul style="list-style-type: none"> - Check FOCUSING BEAM TYPE property in Laser Engine Configuration "LASER" (refers to Lighter User's Manual) <ul style="list-style-type: none"> o ON: active both during STANDBY SHUTTER CLOSED state and READY state o OFF: always OFF o AUTOMATIC: active only during STANDBY SHUTTER CLOSED state |
| X, Y, Z, R Axis doesn't work | Wrong integration | - Check that the control signals are compatible with the external devices used for integration (refers to paragraph 2.5) |
| | Axis not enabled | - Check that the selected Axis is enabled in Laser Engine Configuration (refers to Lighter User's Manual) |
| I/O signals doesn't work | Wrong integration | - Check that the control signals are compatible with the external devices used for integration (refers to paragraph 2.5) |
| | I/O already used by Axis | <ul style="list-style-type: none"> - Check that the selected I/O are not used by an Axis that is enabled (refers to paragraph 2.4.2) - Check that the Axis that use the selected I/O is disabled in Laser Engine Configuration (refers to Lighter User's Manual) |
| Optical distortion on marking object | Wrong F-Theta Lens | - Check that F-Theta Lens installed in the system is the same set in Laser Engine Configuration (refers to Lighter User's Manual) |
| | Wrong F-Theta Lens focus distance | - Check the working distance (refers to paragraph 2.3) |
| Windows settings are not saved at system restart | C:\ drive is write protected | - Follow the procedure present in CUSTOMIZE THE SYSTEM SOFTWARE (see chapter 5) |

7.4 PRODUCT SUPPORT AND CUSTOMER SERVICE

Warranty Information

Datalogic Automation S.r.l. reserves the right to change the information and specification contained in this manual without prior notice.

Product Support

In the unlikely event that the marking system does not function normally and that it requires attention, contact Datalogic Automation S.r.l. for advice on further on-site fault diagnosis and/or module return.

If the marking system is to be returned to Datalogic Automation S.r.l., ensure that all relevant return documentation is in place before shipment. Details of documentation requirements and copies can be obtained where required from Datalogic Automation S.r.l.

Pack the marking system in the original packing and include all original accessories and documentation as detailed in the original inventory. It is advised that the correct and original packaging is used to prevent transit damage to the marking system. If part or all of the original packaging is unavailable, please contact Datalogic Automation S.r.l. for replacement items. Please take time to complete all return documentation. This can be obtained from Datalogic Automation S.r.l. and accurate details, diagnosis and comments in the documentation can help reduce turnaround time for module repair at Datalogic Automation S.r.l.

Product Support and Customer Service Contacts

Product Support

support-dla-lasermarking@datalogic.com

Tel: +39 051-6765611

Customer Services

service-dla-lasermarking@datalogic.com

Tel: +39 0331-918001

Company Web Site



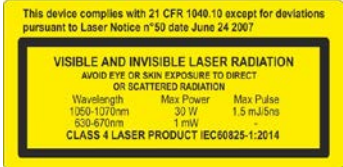





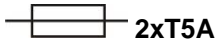
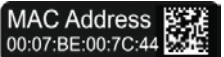
www.datalogic.com

Or contact your local distributor

Sales and Customer Service Contacts

| | |
|--|---|
| IT Corporate Office Datalogic Automation S.r.l. Via Lavino, 265 40050 Monte San Pietro (BO) Italy Tel: +39 051-6765611 Fax: +39 051-6759324 | US Corporate Office Datalogic Automation Inc. 511 School House Road Telford, PA 18969-1196 USA Tel: +1 800-BAR-CODE Fax: + 215-799-1646 |
| Laservall China Co. Ltd. 3/F, West, Tower E Tongfang Information Harbor, No. 11 Langshan Rd., North Area, Hi-tech Park, Nanshan District, Shenzhen China Tel: +86 755-86281638 Fax: +86 755-86281738 | Datalogic Automation PTY Ltd Unit 130, 45 Gilby Rd Mount Waverley, VIC 3149 Australia Tel: +61 3/9558 9299 Fax: +61 3/9558 9233 |

APPENDIX A: LABEL IDENTIFICATION

| LABEL | DESCRIPTION |
|---|--|
|  | Identification label |
|  | Warning logotype (Laser) |
|  | Laser Label * |
|  | Aperture Label |
|  | Label for non-interlock protective housing |
|  | Caution, possibility of electric shock |
|  | General Warning |
|  | USB plug |
|  | Fuses |
|  | MAC Address |

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

| | |
|--------------------|-------------------------------|
| COMMAND BOX | Command Box connector |
| AXES (I/O) | Control Axes connector |
| INTERLOCK | Interlock Connector |
| SHUTTER OUT | Shutter OUT Connector |
| LAN | LAN connector |
| RS232 | RS232 connector |
| VGA | VGA connector |
| PHOT | Photocell connector |
| ENC | Encoder connector |

EXTERNAL LABEL PLACING

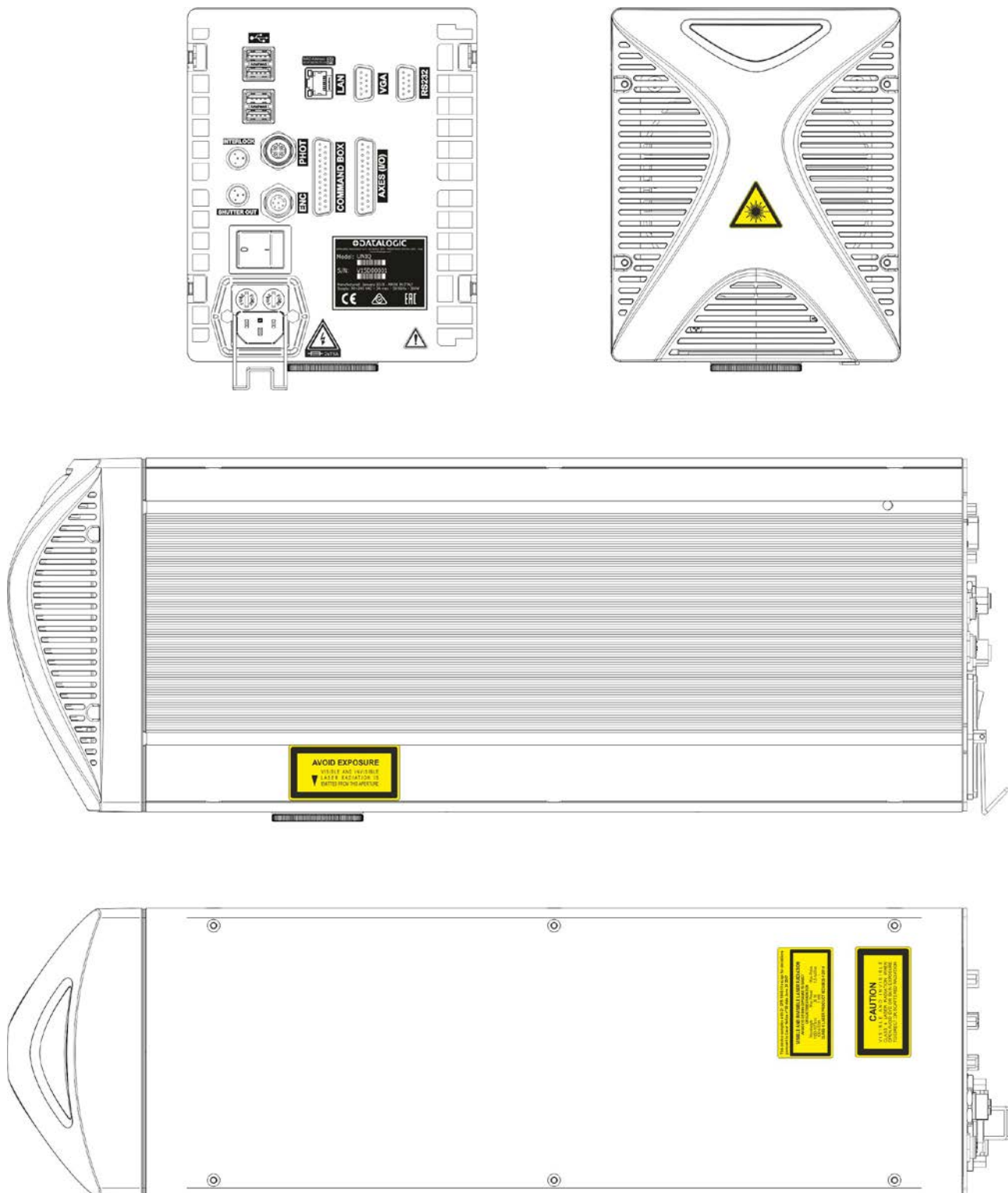


Figure 38: Positioning of external labels.

APPENDIX B: STANDARDS

LASER STANDARDS

The marking system UniQ™ is designed to comply with the applicable sections of these laser standards:

EU : EN60825-1

USA : 21 CFR 1040.10

The marking system is classified as Class 4 Laser Product.

Datalogic Automation S.r.l., as manufacturer of laser source, provides a marking system 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 Automation S.r.l. is available for providing to the system integrator/OEM all the information in its possession to help in complying with applicable standards.

CE COMPLIANCE

European directive.

Since the directives and applicable standards are subject to continuous updates, and since Datalogic promptly adopts these updates, therefore the EU declaration of conformity is a living document.

The EU declaration of conformity is available for competent authorities and customers by Datalogic commercial reference contacts.

Since 20th April 2016 the main European directives applicable to Datalogic products require to include an adequate analysis and assessment of the risk(s). This evaluation was carried out in relation to the applicable points of the standards listed in the Declaration of Conformity.

Datalogic Automation products are mainly designed for integration purposes, into more complex systems. For this reason it is under the responsibility of the system integrator to do a new risk assessment regarding the final installation.



WARNING!

This is a Class A product. In a Class B environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC COMPLIANCE

Modifications or changes to this marking system without the expressed written approval of Datalogic could void the authority to use the system.

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

This marking system 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 system is operated in a commercial environment. This marking system 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 marking system in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

APPENDIX C: SAFETY CONSIDERATION ACCORDING TO EN ISO 13489-1:2008

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:

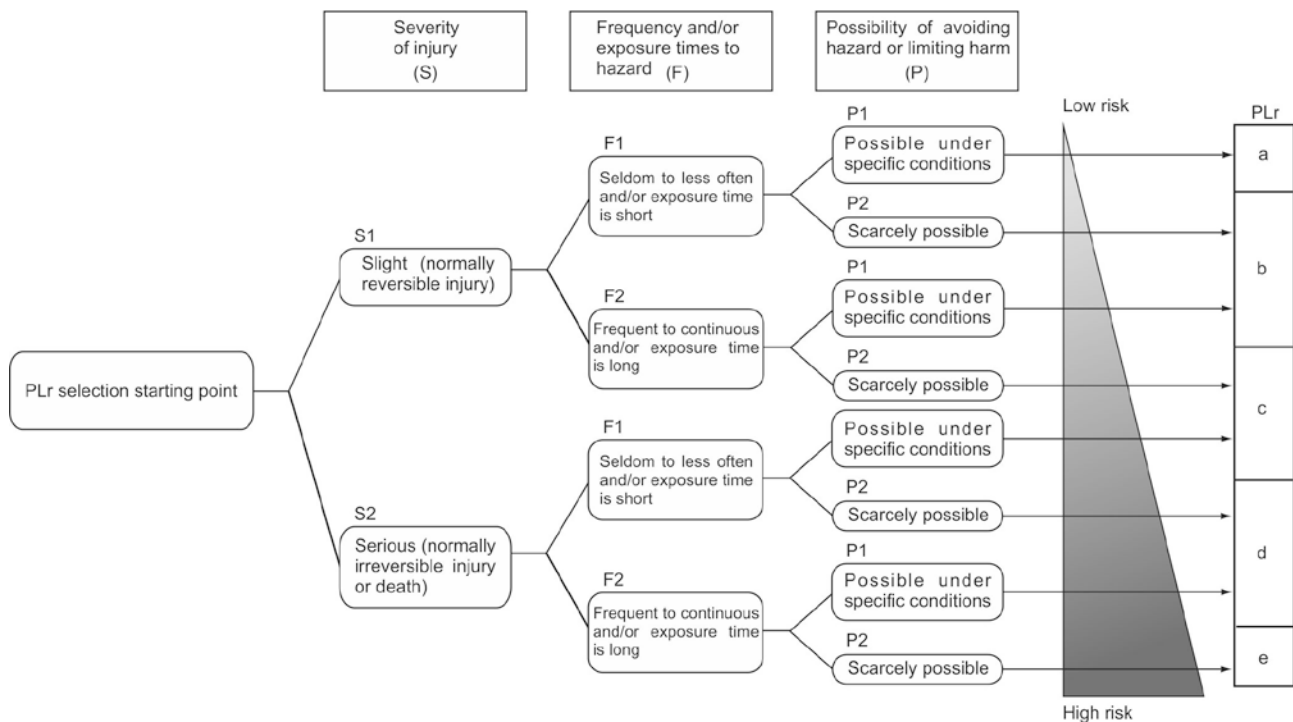


Figure 39: Determining the required Performance Level (PLr).

APPLICATION EXAMPLES

WARNING!

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.

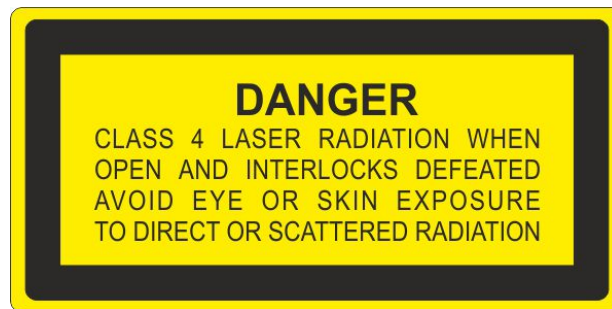
WARNING!

These examples are based on the parameters indicated on paragraph "Safety Functions of UniQ™"

EXAMPLE AUTOMATIC PRODUCTION LINE

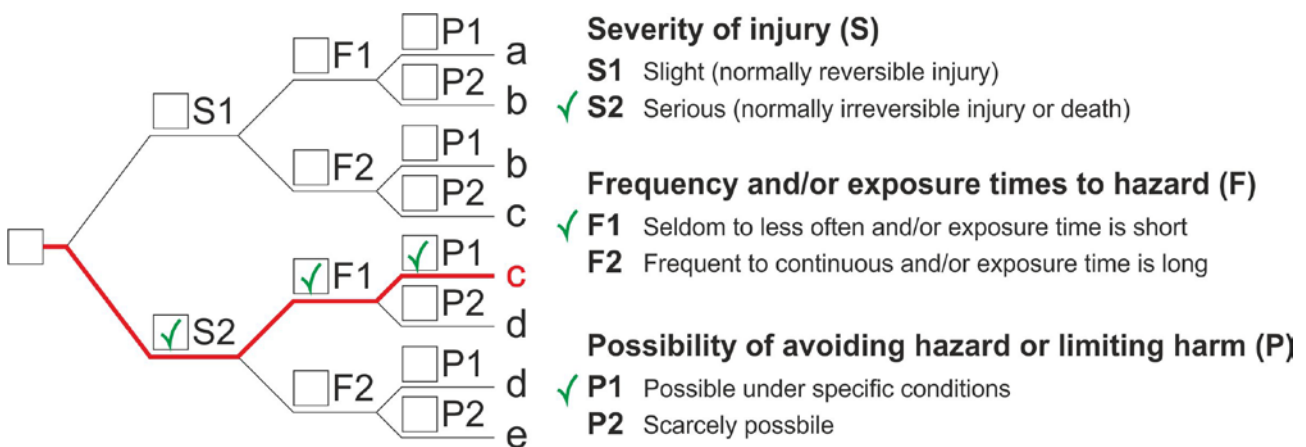
In this case the Protective Housing may have a guard capable of being opened or removed typically only for service operation (frequency: seldom or occasional):

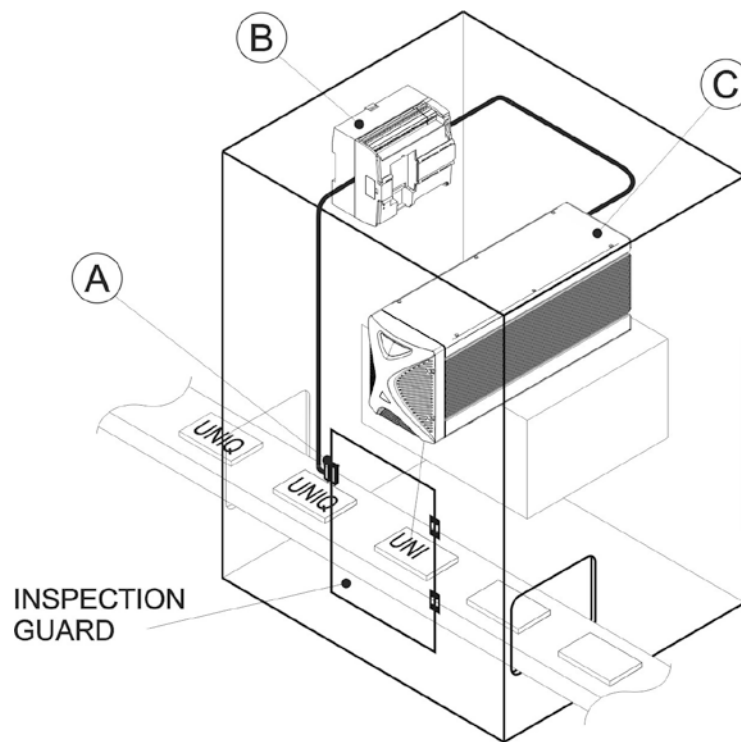
- Guard opening should only be possible with the aid of a tool.
- Guard interlock is connected as input of a safety logic (e.g. safety PLC) and UniQ™ interlock system as output/input of that PLC.
- Warning label for access panel according EN60825-1 is provided.



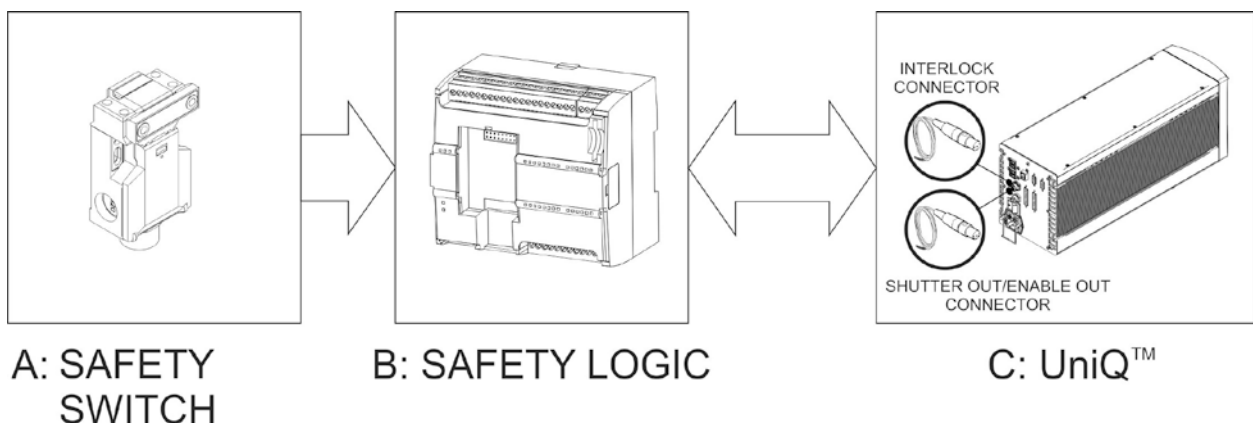
Since the frequency is LOW (F1) and the removal of the guard is intentional, the MINIMUM REQUIREMENT as per IEC13849-1 is PLc.

Target: PLr = c

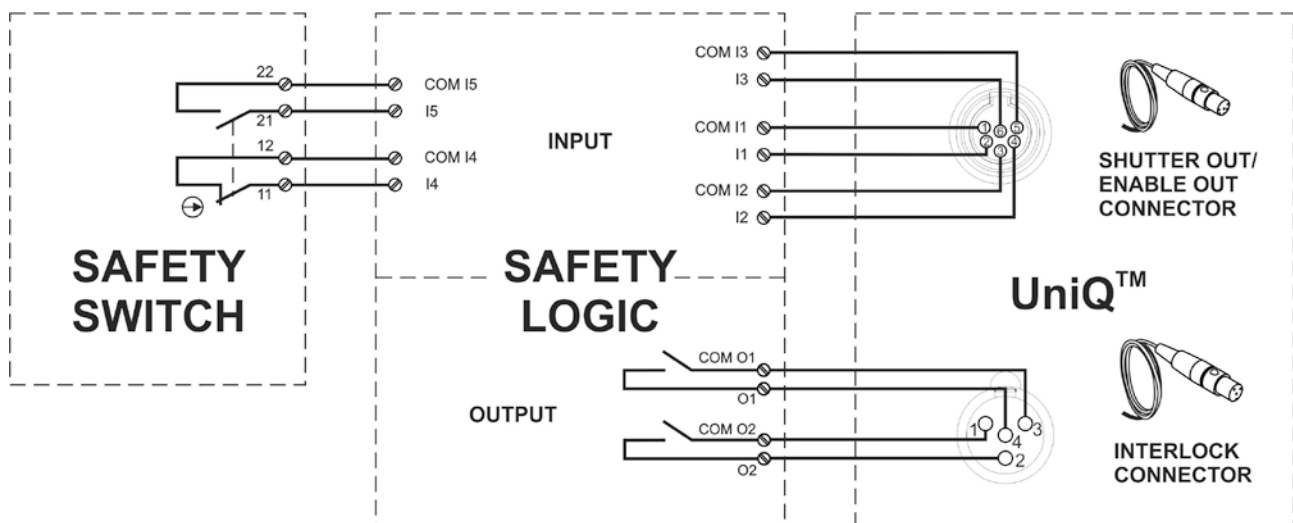




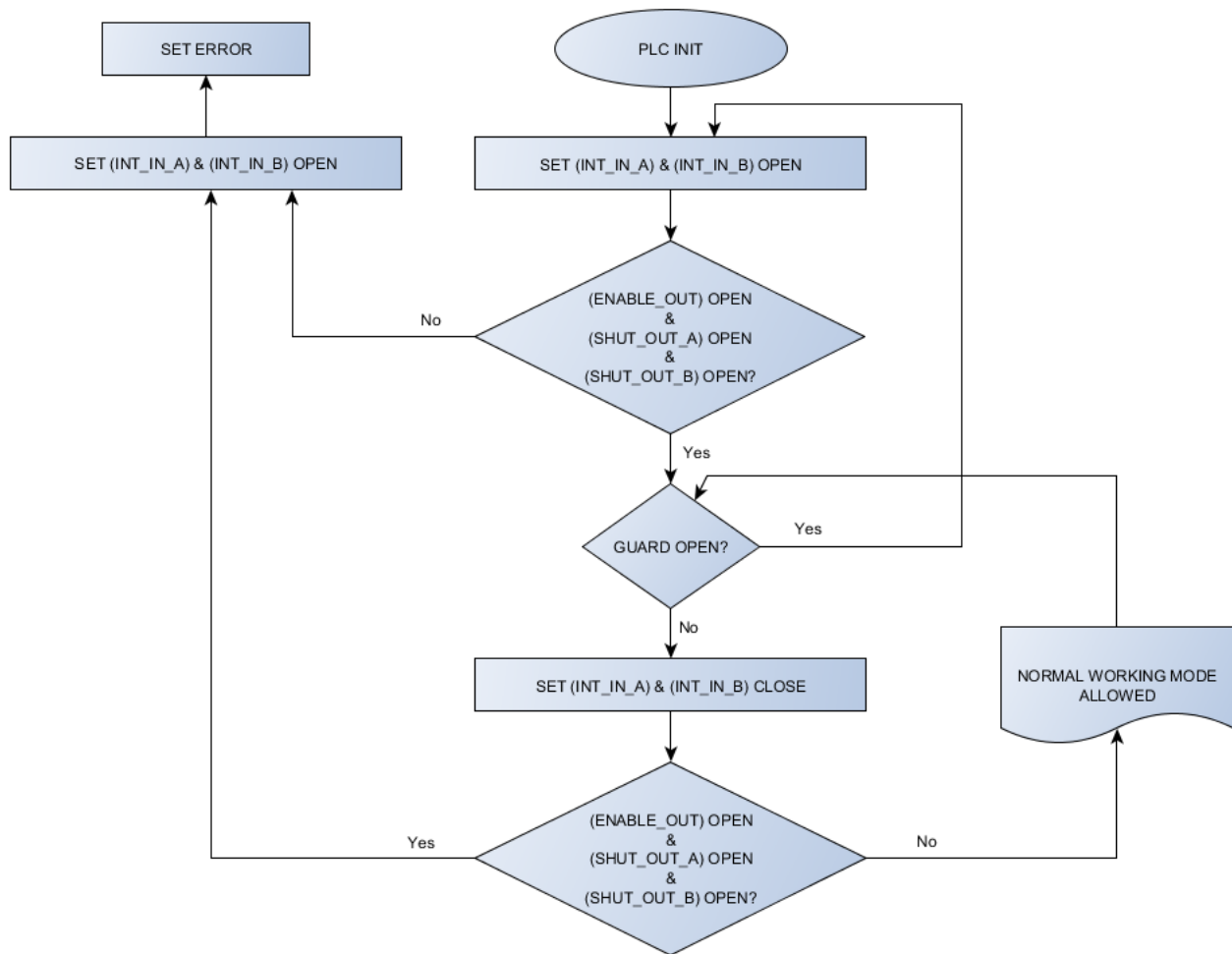
BLOCK DIAGRAM



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.

CONCLUSIONS

SAFETY FUNCTION of this example meets the quantitative requirements of PLr = c.

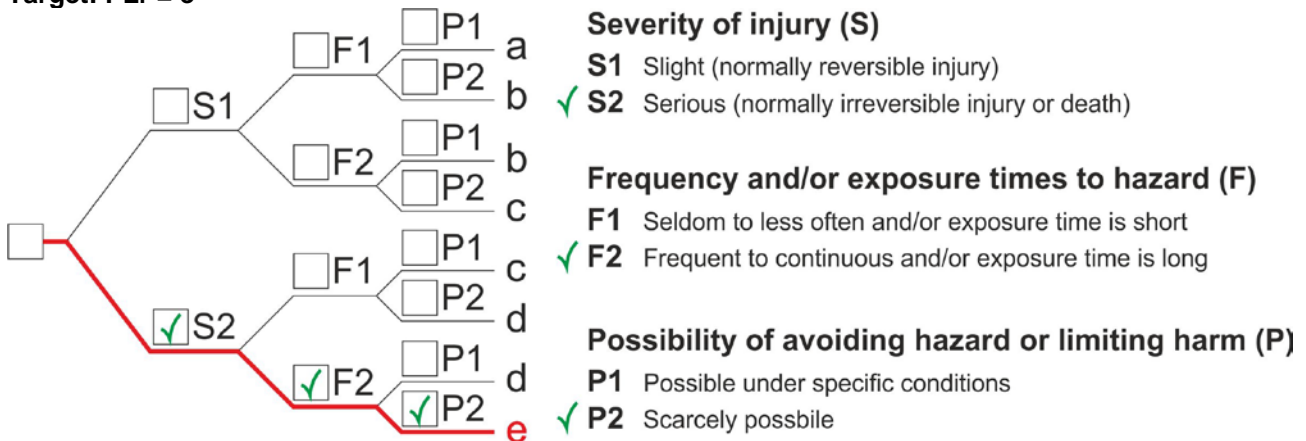
EXAMPLE MANUAL PRODUCTION LINE

In this case the Protective Housing have one moveable 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.

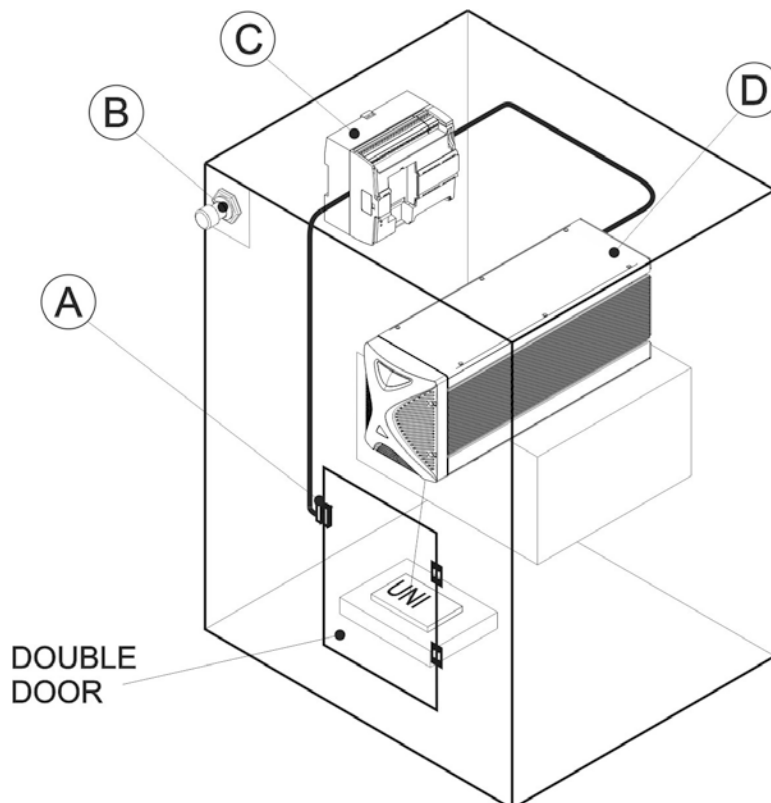
Since the severity of injury is Serious (S2), frequency is HIGH (F2) and possibility of avoiding hazard is scarcely possible (P2), the MINIMUM REQUIREMENT as per IEC13849-1 is PL e.

Target: PLr = e

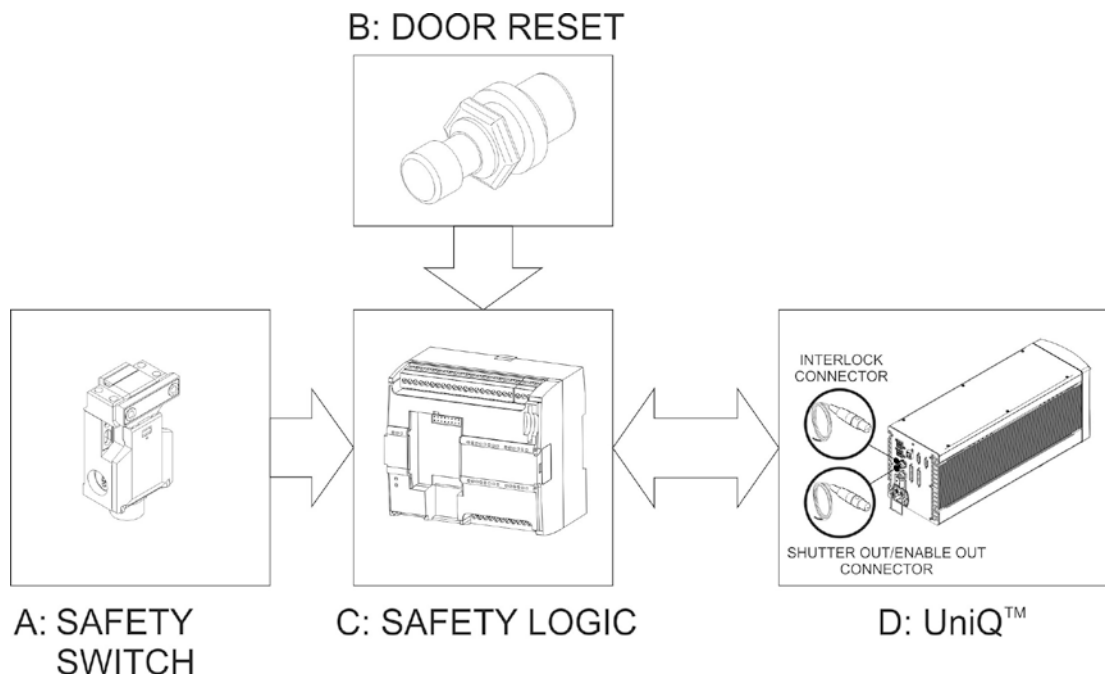


NOTE:

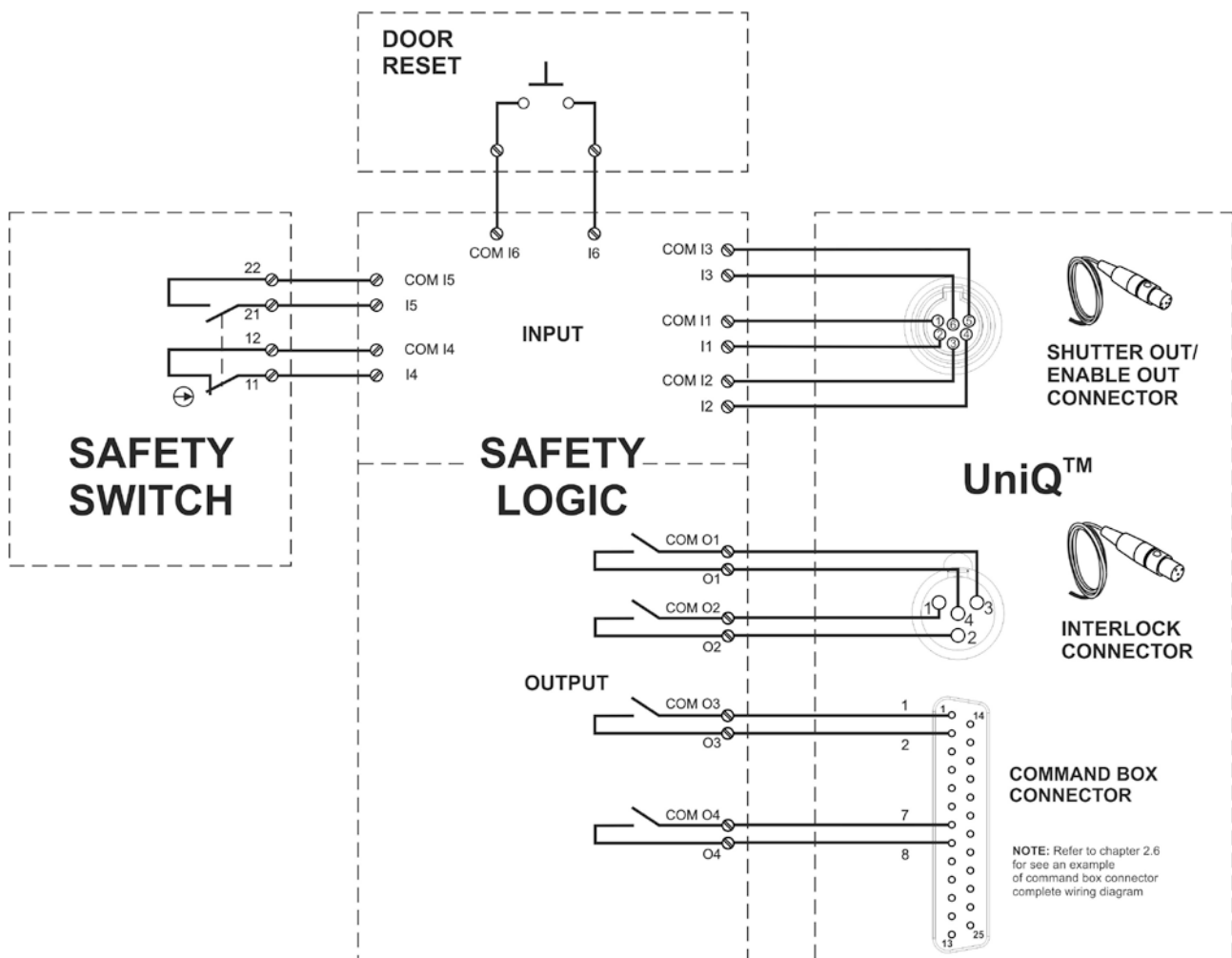
Considering the switching response time of I/O, it must prevent access in a time less than 500 ms.



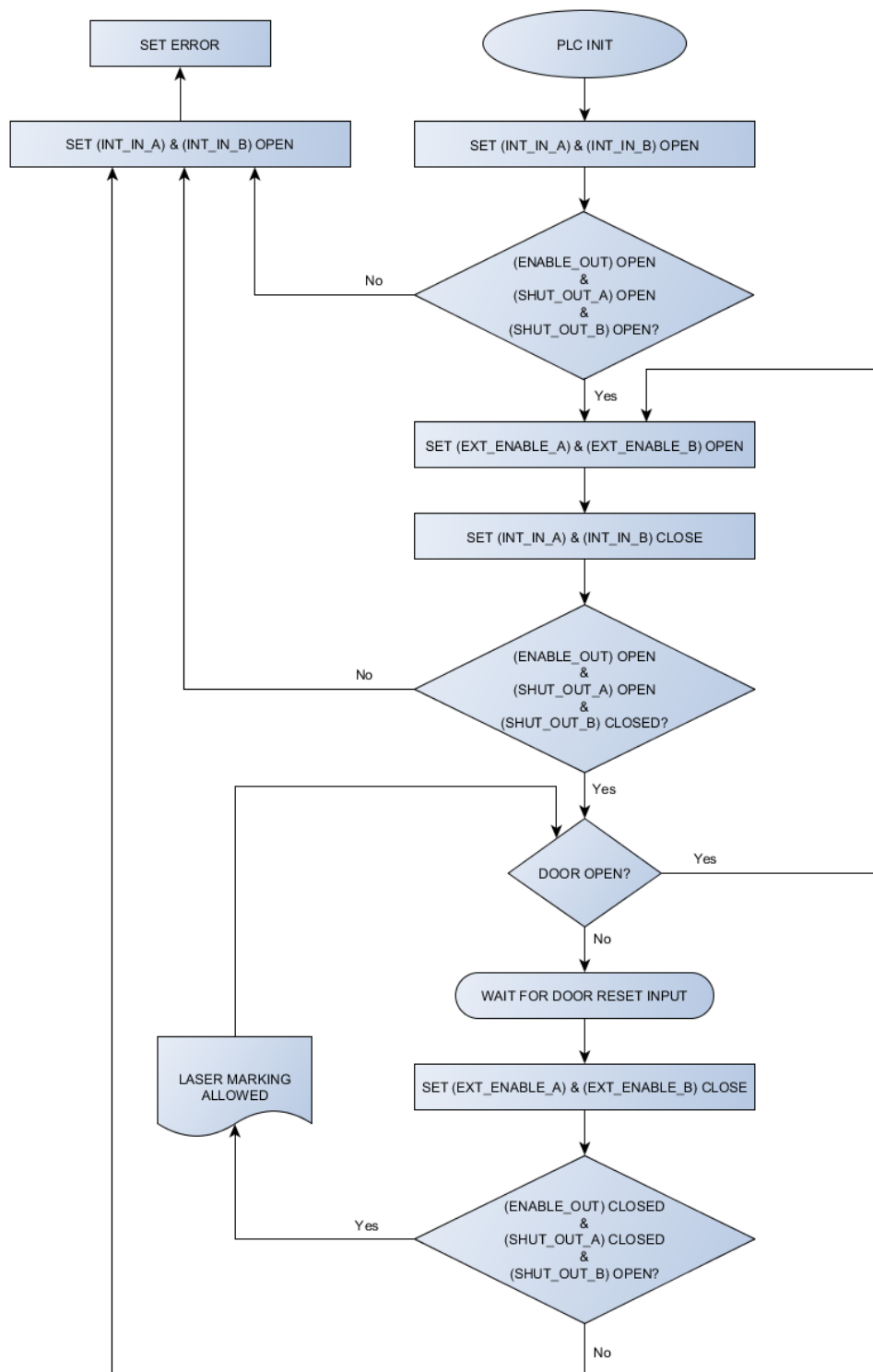
BLOCK DIAGRAM



SAFETY LOGIC TO UniQ™ DETAILS FOR MANUAL PRODUCTION LINE



SAFETY LOGIC DIAGRAM SUITABLE FOR A DC=90%



DOOR SWITCH: SAFETY INTERLOCK SWITCH, designed in compliance with the standard currently in effect IEC60947, EN292, EN60204, EN1088. Two redundant contacts. IP67.B10d=5.000.000 operation

SAETY LOGIC: SAFETY PLC min. PLe 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 contacts open)
- SF.2 INTERLOCK (e.g. no IR laser output if "INT_IN_A" or "INT_IN_B" are disabled, where "disabled" means contacts open)

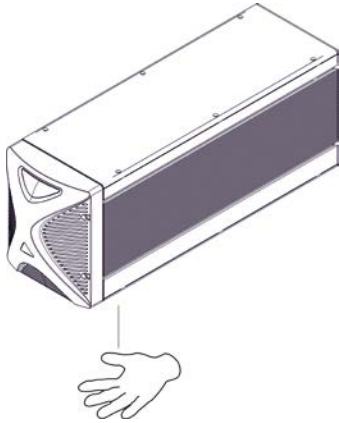
These functions has been evaluated according to UNI EN ISO 13849-1. The results are:

- SF.1:
 - Category: 3
 - MTTFd = 114 years (dop = 286 days, hop = 9h, Tcycle = 20s)
 - 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.
 - Response time: 500ms
- SF.2:
 - Category: 3
 - MTTFd = 114 years (dop = 286 days, hop = 9h, Tcycle = 20s)
 - 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.
 - Response time: 10ms

APPENDIX D: NOTE ABOUT LASER

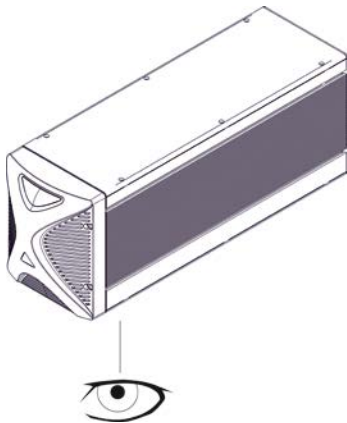
LASER SAFETY

The following information is provided in compliance with regulations set by International Authorities, and it refers to the correct use of marking system.



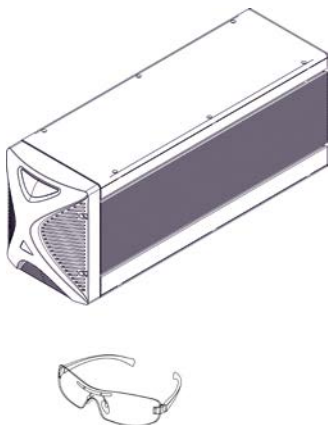
WARNING!

It is crucial that you protect yourself against beams of reflected or direct light as they cause permanent damage to your skin.



WARNING!

Staring directly at a laser beam may cause irreversible damage to your eyes.



WARNING!

Wear safety goggles while using the system!



NOTE:

BEFORE INSTALLING AND USING THE LASER, READ CAREFULLY THE APPENDIX CONCERNING LASER SAFETY.

LASER RADIATION

Laser radiation is an electromagnetic emission with a micrometric wavelength which ranges from the long infrared (CO₂ Laser), close infrared (Nd Laser: Yag, Nd: YVO₄), visible (He Laser: Ne or Argon) and ultraviolet (excimer laser).

It should be considered non-ionizing Radiation. In UniQ™ marking system, the 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 Focalized 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™ marking system 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 vision.

To prevent permanent damage to vision, a few precautions must be taken.

All individuals who may be exposed to dangerous levels of laser radiation, must know that the laser is active and wear protective goggles if necessary.

Due to its high power, the laser integrated in the Datalogic Automation system provokes reflected laser light from flat surfaces. Reflected light is potentially dangerous for the eyes and skin. Electromagnetic emission with a micrometric wave length is placed in long infrared, and is therefore invisible, thus it is not clear where reflected beams are aimed.



WARNING!

It is indispensable to protect yourself from reflected light beams, because they can be sufficiently intense to create permanent injury to the eyes or skin.

In addition to possible injury to the eyes or skin, direct laser emission can cause flammable materials to burn like organic solvents (alcohol, acetone) or gasoline and cause fabric and clothing to burn.



WARNING!

This marking system is classified as **class 4**. Class 4 includes lasers which can produce risks, not only from **direct** or **reflected** radiation, but also from **scattered** radiation! The laser sources may be a significant risk for the skin and risk of burning flammable materials.

ABSORPTION OF LASER RADIATION

Human skin absorbs electromagnetic radiation in different ways depending on the wave length of the radiation. Both the eye and skin have a “predisposition” for accepting certain wave lengths, and are more unresponsive to absorbing others. In the specific case of the Eye, the Cornea and Crystalline lens let all the wave lengths from 400 to 1400 nm pass and reach the Retina, even with various attenuations. They include the range from visible light to IRA infrared. Thus Nd:YVO₄ laser radiation (1064 nm wavelength) is included in this range and **leads to direct Retina exposure!**

In terms of the Skin, the “biological window” has different absorption percentages but is not dissimilar in terms of wave length. The maximum exposure values for Skin are much different compared to those tolerated by the Eye.

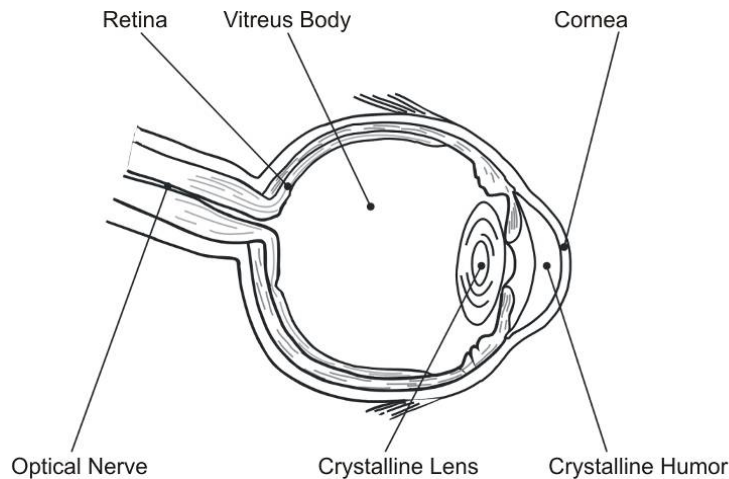


Figure 40: Eyeball section.

In terms of the damage mechanism that absorbed radiation can cause, it also depends on the wave length. Short lengths (ultraviolet: UV-C 180-280nm; UV-B 280-315 nm, UV-A 315-400 nm) generally cause photo-chemical effects:

- cataract, or opacification of the crystalline lens
- melanic coloring, or reddening of the skin

Greater wavelengths (infrared: IR-A 780-1400 nm; IR-B 1400 3000 nm; IR-C 3000-10^{E6} nm) generally cause thermal effects:

- detachment or photocoagulation of the retina
- burning of the skin

The degree of injury obviously depends on the **amount of absorbed radiation** and the **instantaneous power** of the radiation source.

CLASSIFICATION AND DANGER LEVEL

Regulations have established different classes of Laser danger based on the ability to injure people, from Laser class 1 (basically safe in all conditions) to Laser class 4 dangerous in various conditions.

Lasers which can produce risks, not only for direct or reflected radiation, but also for scattered radiation belong to class 4. These Laser sources can also have a significant risk for the Skin and fire risk for flammable material. For these reasons, the User must put into effect all measures aimed at containing the radiation to make sure that it is terminated at the end of its useful path. The operator must also be informed of the risks from exposure to Laser radiation and must wear specific I.P.D. (individual protection devices) including goggles that protect against radiation and are certified as suitable for this use.



WARNING!

The UniQ™ marking system contains a **class 4 invisible** laser source.

RADIATION VIEWING CONDITIONS

The Laser output by the resonator is to be considered as a highly collimated and intense monochromatic light source. Due to these characteristics it can be seen as a “point source” of high luminosity. This means that its image is then focalized on the Retina in a very small spot with a dangerously high power density! If the beam becomes divergent and scatters to a non-reflecting screen, then there is an “extended vision” of the image, with a decisively less dangerous power density. So there are different types of radiation viewing based on the access to the radiation and consequently different degrees of dangerousness.

DIRECT VIEWING OF THE LASER BEAM

This type of viewing is the most dangerous and can occur at the outlet of the laser aperture after having removed the lens. It is to be avoided at all costs! No protective goggles represent a valid means against direct viewing of the beam.

DIRECT VIEWING OF THE BEAM AFTER MIRROR REFLECTION

This may occur by directing the beam on a reflecting surface.
Viewing of a mirror reflected beam from a flat surface is very dangerous and equal to direct viewing.

DIRECT VIEWING OF THE BEAM OUTPUT BY AN OPTICAL FIBER

This happens if an Optical Fiber disconnects from the resonator. Viewing of the beam is dangerous up to a significant distance. Filters and Goggles do not ensure safety.

DIRECT VIEWING OF THE BEAM AFTER FOCUSING

This occurs if the laser beam is not extinguished with an opportune absorber at the end of its useful path. Looking at the beam is dangerous up to a considerable distance. Filters and goggles can ensure safety for brief exposure, as long as they are the right size and certified.

SCATTERED VIEWING OF THE BEAM AFTER FOCUSING

This is the most frequent viewing, but opportune Filters and Goggles can ensure safety, even for prolonged exposure.

The Optical Risk Nominal Distance O.R.N.D. for UniQ™ marking system are showed in the next paragraph.



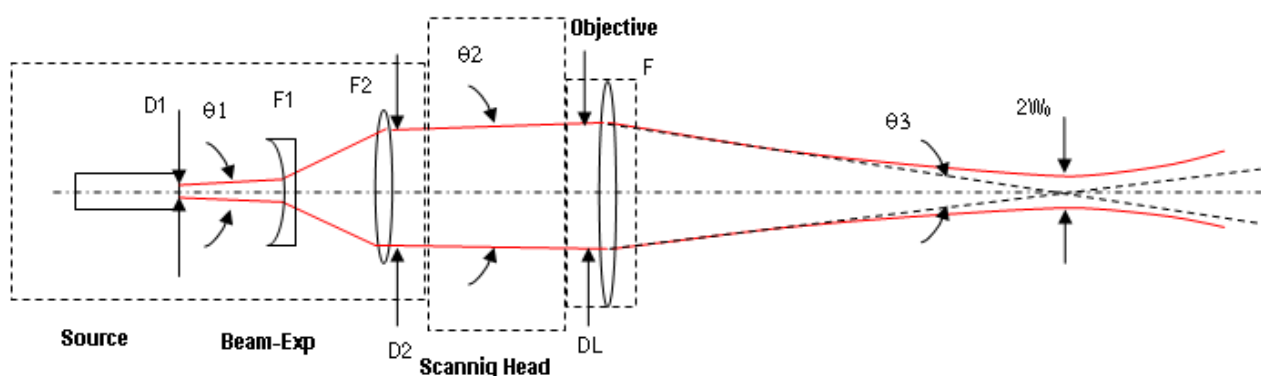
WARNING!

Always use goggles with conformity certificate.

Remember that **no goggles can provide prolonged protection from direct or mirror-reflected radiation!**

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

In order to determinate 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.



In particular, it is very important to know the real divergence of the beam in output from the Scan lens (F-Theta).

With all these optical datas it is possible to calculate of the nominal distance of optical risk (O.R.N.D.) and of the optical density (OD) requested to the protection filters of the laser radiation.

Calculations have been done following the CEI EN 60825-1 (2014) Normative regarding nominal distance and optical risk in the worst condition and in case of accident exposure of 10s for direct radiation and 100s for diffused radiation.

| | |
|---------------------------------------|---------------------------------------|
| Wavelength | 1064 nm |
| Application type | Marking |
| Emission type | Q-Switched |
| Observation type | Direct radiation |
| Subtended angle of the source | $\alpha < \alpha_{\min}$ |
| Pulse energy | UniQ™ 1PWX-TFSV: 750 μ J @ 15 kHz |
| Pulse duration | UniQ™ 1PWX -TFSV: 70 ns |
| Beam Diameter at Beam Expander Output | UniQ™ 1PWX -TFSV: 6.0 mm |
| Beam divergence on the lens | UniQ™ 1PWX -TFSV: 0.5 mrad |
| F-Theta Scan Lens | 160 mm |
| Real divergence after the lens | UniQ™ 1PWX -TFSV: 37,5 mrad |
| Exposure time | 10 s |

ACCIDENTAL CONDITION OF VISION OF THE DIRECT REFLECTED RADIATION

Assuming a direct exposure of 10 sec at a nominal distance of 0,5 m (worst case), with F-Theta Scan Lens 160mm model installed, is possible to calculate the suitable optical density for safety goggles.

The OD (Optical Density) in last column assures the reduction of laser radiation below max acceptable exposure:

O.D.= $\log (H/EMP)$ where EMP is the Maximum Permissible Exposure and H is the radiant exposure.

| Source | NOHD (Nominal Ocular Hazard Distance) | OD (Optical Density) |
|--|---------------------------------------|----------------------|
| UniQ™ 10 W Marker With F-Theta 160 mm | 22.0 m | 3.94 |

SCALE INDEX OF THE PROTECTION GOGGLES FILTER

The scale index L of the filters indicates the stability to the radiation, that means the ability of the filter to maintain its characteristics unchanged.

This stability is certified by the producer according to the EN 207 with tests conducted for 10s or 100 pulses.

It is then necessary to verify that the scale index of the adopted filter is stable for this period and foreseen an adequate over dimensioned in order to make sure that it could last longer than the accidental exposure period.

In case of exposure at 0,5 m for 10 sec the suggested optical density for safety goggles is CLASS L3.

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 forever. This consequence is completely realistic in the event of direct viewing of a class 4 Laser beam.

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

In addition, it is necessary to bear in mind that a collateral ultraviolet radiation may exist with the main radiation: long exposure may cause skin cancer.

GENERAL SAFETY REGULATIONS

The User must comply with the regulations and work in the best possible safety conditions to prevent decreasing the degree of marking system safety. Therefore it is necessary to develop a Standard Operating Procedure (S.O.P.) related to maneuvers to effect for turning on and off the marking system. This procedure, which shall be prepared around the 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.)

COLLATERAL RISK

If the intended use of the marking system changed, for example for material processing applications, collateral risks may arise represented by the production of fumes and vapors which may be irritating or toxic, if not removed and adequately filtered before being released into the air again.



WARNING!

It is advisable **not to change the intended use** without previously contacting the Manufacturer.

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



WARNING!

When processing **flammable material**, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the system is commissioned.



WARNING!

Do not subject **materials other** than those the marking system was designed for to radiation.

The most serious collateral risk associated with laser marking system, which may be fatal, is electricity. This may occur when the manufacturer's warning and procedures are not followed. Unauthorized and untrained personnel must never do any work on the electrical part. The safety devices must never be removed and their operation must be periodically checked.



WARNING!

Do not work on the electrical part if you are not trained to do so. **Do not remove protection devices.**

For example, during the intended use of the marking system, if a material being processed undergoes alterations and produces irritating and/or toxic fumes, it may be necessary to remove the fumes from processing before releasing them into the air.

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



WARNING!

Do not subject **materials other** than those the marking system was designed for to radiation.



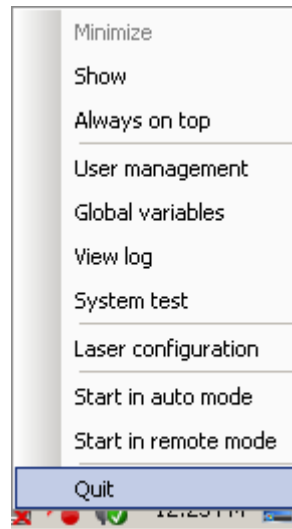
WARNING!

When processing **flammable material**, such as plastic, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the system is commissioned and follow the instructions in the **SAFETY** Chapter, in the **Collateral Risks** section.

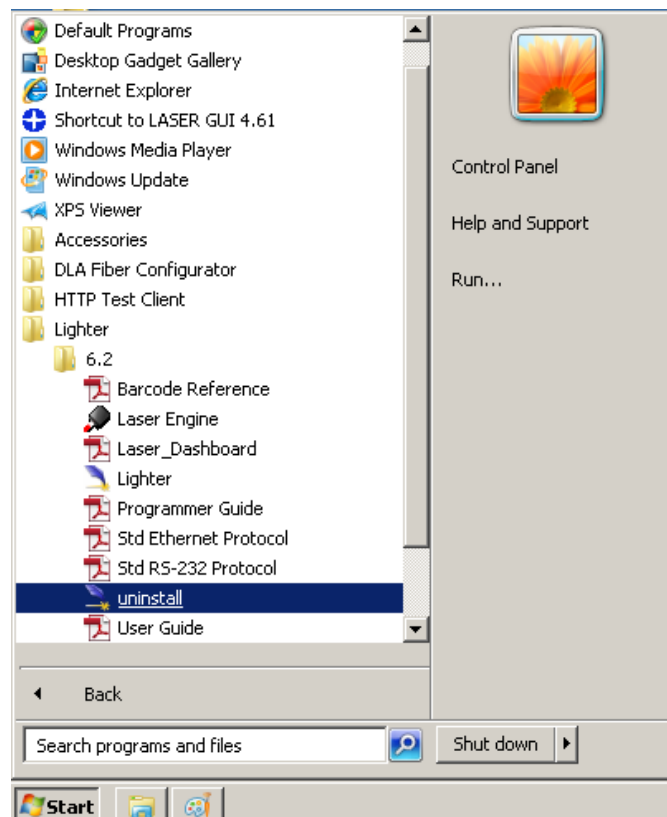
APPENDIX E: SOFTWARE UPGRADE

This document describes how to update SW version on UniQ™ marking system:

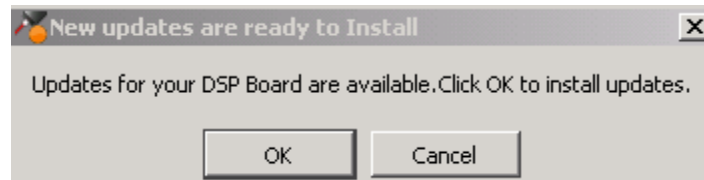
1. Close the Lighter and Laser Engine (Click on “QUIT”)



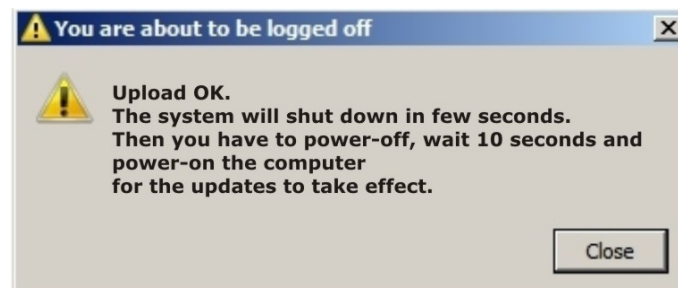
2. Do Lighter “UNINSTALL”: you cannot run the new installer before having removed the old SW version



3. Wait the end of uninstall procedure.
4. Run new Lighter installer from an external device (USB dongle).
5. Wait until installation procedure is completed.
6. Depending on whether the Lighter update includes any control board updates, the following screen may appear:



- Procedure with control board update:
 - press OK to execute control board update
 - upon completion, a window informs user that data is automatically saved in the system



- system will be shut down automatically within the next 10 seconds

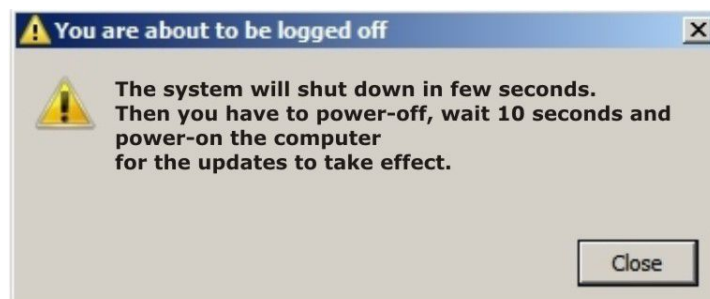


WARNING!

DO NOT restart or turn off the system!

- wait until system shuts down automatically (black screen)
- power off the system to complete installation

- Procedure without control board update:
 - a window informs user that data is automatically saved in the system



- system will be shut down automatically within the next 10 seconds



WARNING!

DO NOT restart or turn off the system! wait until system is restarted automatically



APPENDIX F: RECOVER THE SYSTEM USING USB RECOVERY DISK

The laser system is provided with a **USB recovery disk** able to restore the system to the factory settings. The **USB recovery disk** should be used if the *Operating System is corrupted* or disks are *corrupted*.



WARNING!

All the existing data in the system will be overwritten. All existing data will be lost!

| STORAGE CONFIGURATION | |
|---|--|
| C:\ drive: <i>CF disk</i> (compact flash) <ul style="list-style-type: none">○ Operating system○ Lighter Suite | D:\ drive: <i>SSD disk</i> (solid state disk) Lighter DATA folder: configuration files, license, layouts, projects, sequences, etc |
|  |  |

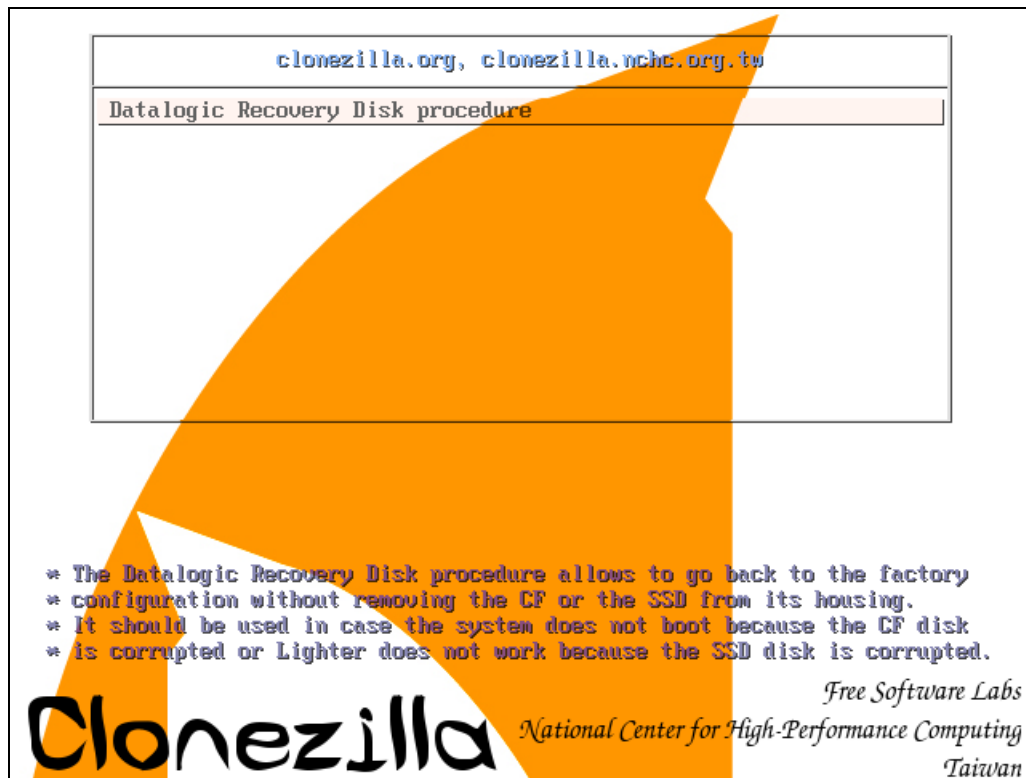
The recovery procedure requires the **USB recovery disk** which is included in the standard equipment.

Procedure:

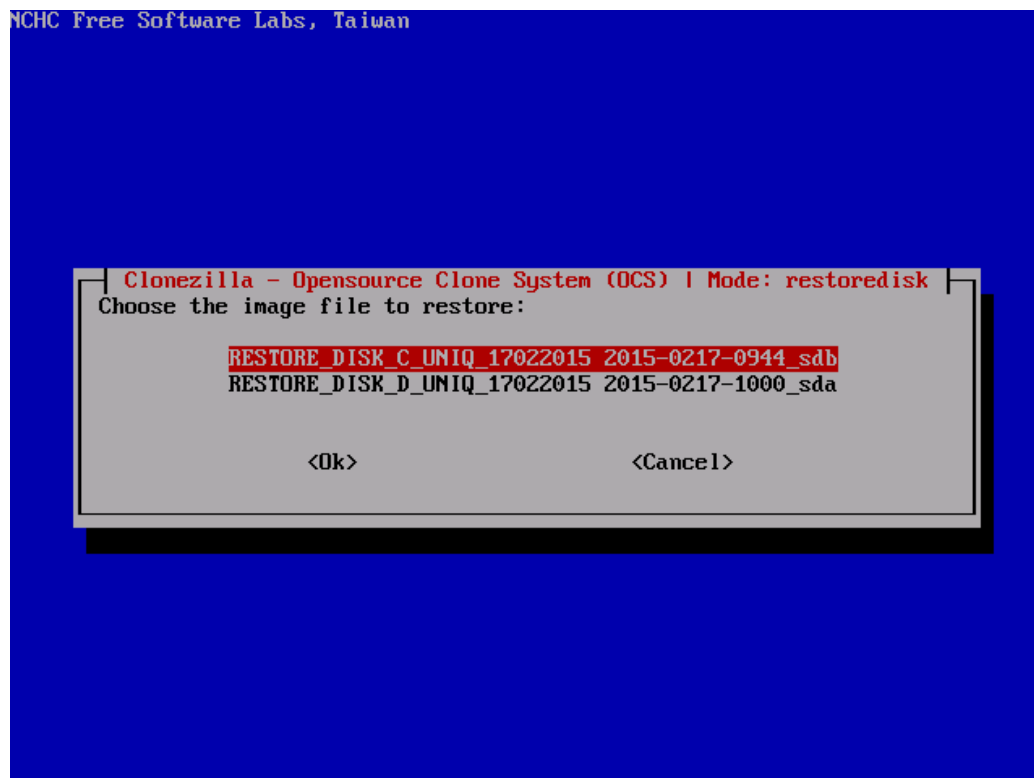
- Turn **OFF** the marking system
- Insert the **USB recovery disk** provided with the marking system in the USB port
- Turn **ON** the marking system and press **F11** key to enter **Boot Device** menu
- Select the **USB** device in the list and press **ENTER** key



- The system will restart and **Clonezilla live** will boot from the USB disk
- **Datalogic Recovery Disk procedure** screen will appear:



- Press **ENTER** key to continue
- Choose **RESTORE_DISK_C_UNIQ** to restore **disk C:** and press **ENTER** key



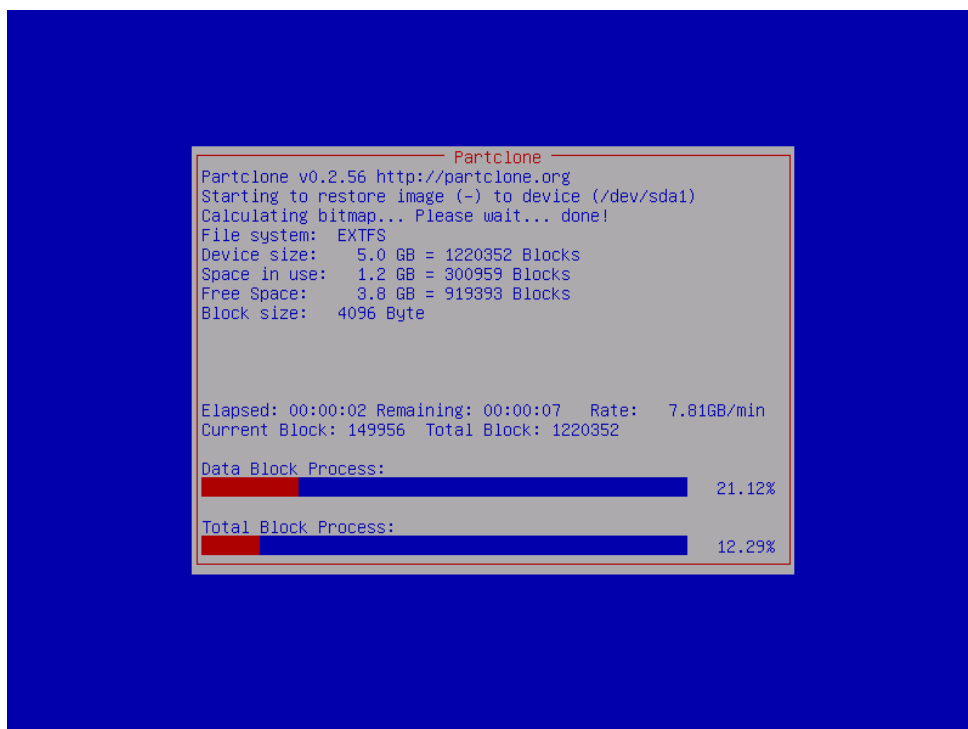
- Choose **Compact Flash disk drive** as target disk and press **ENTER** key
- Clonezilla will ask you to **confirm twice**:
 - **Press Y** key and then **ENTER** key to confirm the 1st time
 - **Press Y** key and then **ENTER** key to confirm the 2st time

```

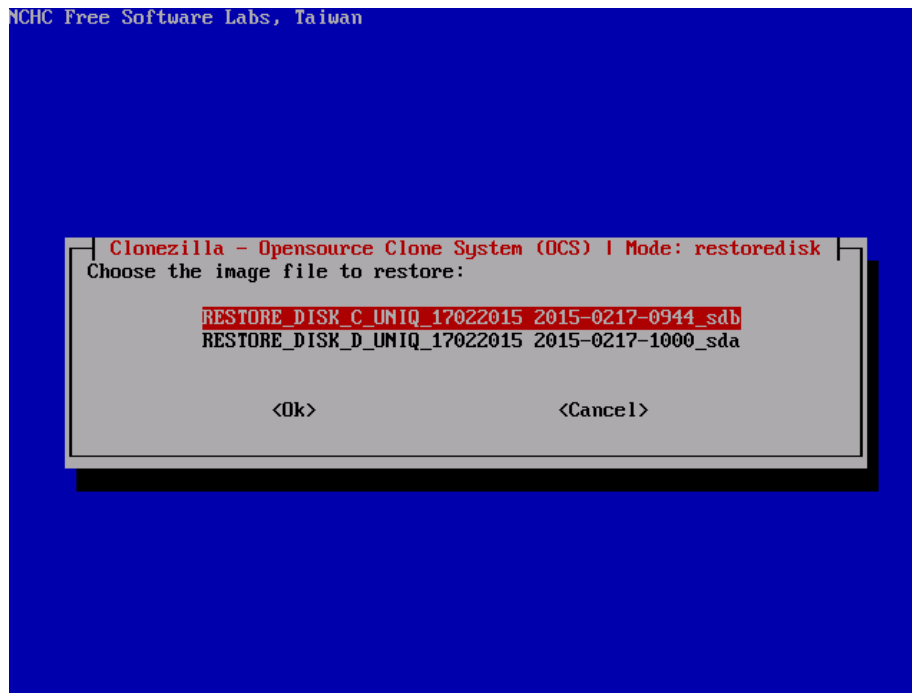
/usr/sbin/ocs-sr -g auto -e1 auto -e2 -c -r -j2 -p true restoredisk precise-2012-11-27-img sda
This command is also saved as this file name for later use if necessary: /tmp/ocs-precise-2012-11-27-
img-2012-11-28-00-46
Press "Enter" to continue...
Activating the partition info in /proc... done!
Getting /dev/sda1 info...
Getting /dev/sda2 info...
Getting /dev/sda3 info...
Getting /dev/sda5 info...
*****
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/precise-2012-11-27-img" -> "sda sda1 sda5"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
BE LOST:
*****
Machine: VMware Virtual Platform
sda (8590MB_VMWare_Virtual_S_No_disk_serial_no)
sda1 (4999MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
sda5 (3077MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
*****
Are you sure you want to continue? ? (y/n) y
OK, let's do it!!
This program is not started by clonezilla server.
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/precise-2012-11-27-img" -> "sda (sda1 sda5)"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
BE LOST:
*****
Machine: VMware Virtual Platform
sda (8590MB_VMWare_Virtual_S_No_disk_serial_no)
sda1 (4999MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
sda5 (3077MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
*****
Let me ask you again. Are you sure you want to continue? ?
[y/n] y_

```

- **Wait** for the end of the procedure (about 10 minutes):



- Press **ENTER** key to continue
- Choose **(3) Start over**
- Choose **RESTORE_DISK_D_UNIQ** to restore **disk D:** and press **ENTER** key



- Choose **SSD disk drive** or **Flash Disk drive** to restore **disk D:** and press **ENTER** key
- Clonezilla will ask you to **confirm twice**:
 - Press **Y** key and then **ENTER** key to confirm the 1st time
 - Press **Y** key and then **ENTER** key to confirm the 2st time

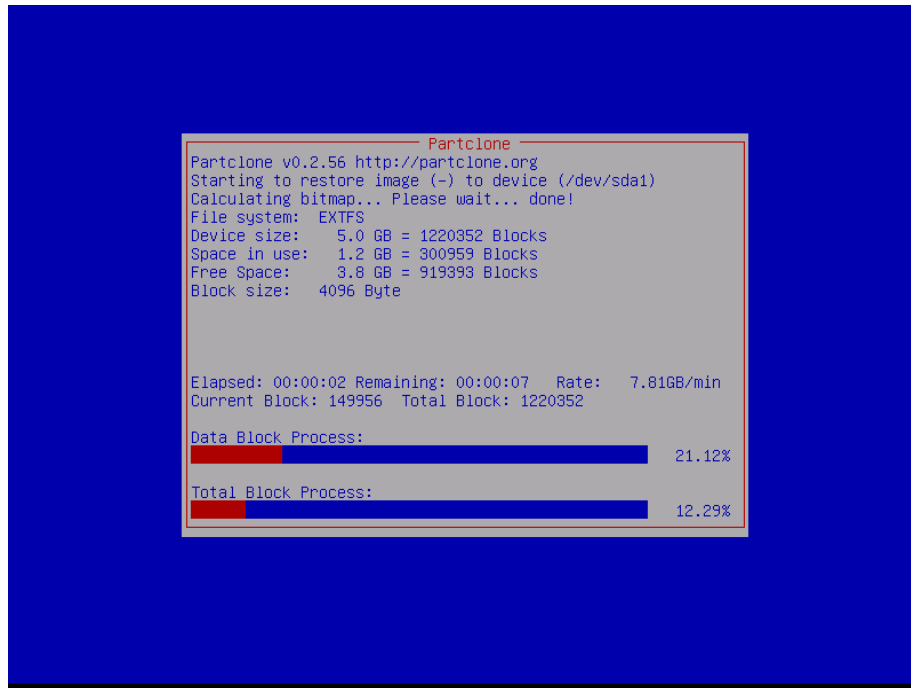
```

/usr/sbin/ocs-sr -g auto -e1 auto -e2 -c -r -j2 -p true restoredisk precise-2012-11-27-img sda
This command is also saved as this file name for later use if necessary: /tmp/ocs-precise-2012-11-27
~img-2012-11-28-00-46
Press "Enter" to continue...
Activating the partition info in /proc... done!
Getting /dev/sda1 info...
Getting /dev/sda2 info...
Getting /dev/sda3 info...
Getting /dev/sda5 info...
*****
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/precise-2012-11-27-img" -> "sda sda1 sda5"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
BE LOST:
*****
Machine: VMWare Virtual Platform
sda (8590MB_VMWare_Virtual_S_No_disk_serial_no)
sda1 (4999MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
sda5 (3077MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
*****
Are you sure you want to continue? ? (y/n) y
OK, let's do it!!
This program is not started by clonezilla server.
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/precise-2012-11-27-img" -> "sda (sda1 sda5)"
WARNING!!! WARNING!!! WARNING!!!
WARNING! THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
BE LOST:
*****
Machine: VMWare Virtual Platform
sda (8590MB_VMWare_Virtual_S_No_disk_serial_no)
sda1 (4999MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
sda5 (3077MB_ext4(In_VMWare_Virtual_S)_No_disk_serial_no)
*****
Let me ask you again, Are you sure you want to continue? ?
[y/n] y_

```

○

Wait for the end of the procedure (about 2 minutes):



- Press **ENTER** key to continue
- **Choose (0) Power off** to exit Clonezilla
- **Wait** until the shutdown process is done (black screen)
- **Turn OFF** the system using the main switch
- **Remove the USB recovery disk** from the USB port

Customize the system



NOTE:

All the images used to restore disks are generic and must be customized with the correct configuration and license files.

- **Turn ON the system** using the main switch
- An **error message** about Lighter user database could appears at system restart:



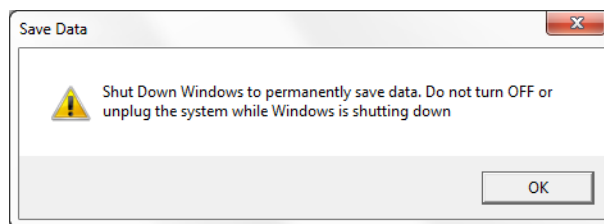
- Press **ENTER** key to continue
- Recreate the Lighter user database **double click on** file C:\user_db.bat



- If **disk D:** has been restored (SSD which contain the Lighter DATA folder), **replace the generic license.dat** and **laser.inz** files in D:\DATA\CONFIG **with the custom ones** present into the folder **Fileinz and report** in the **USB recovery disk**
- Double click on Shortcut to **save-data.bat** icon in the Desktop



- A message advise you to shut the system in order to permanently save data. Press OK:



- **Shut down** the system in order to save the new settings:

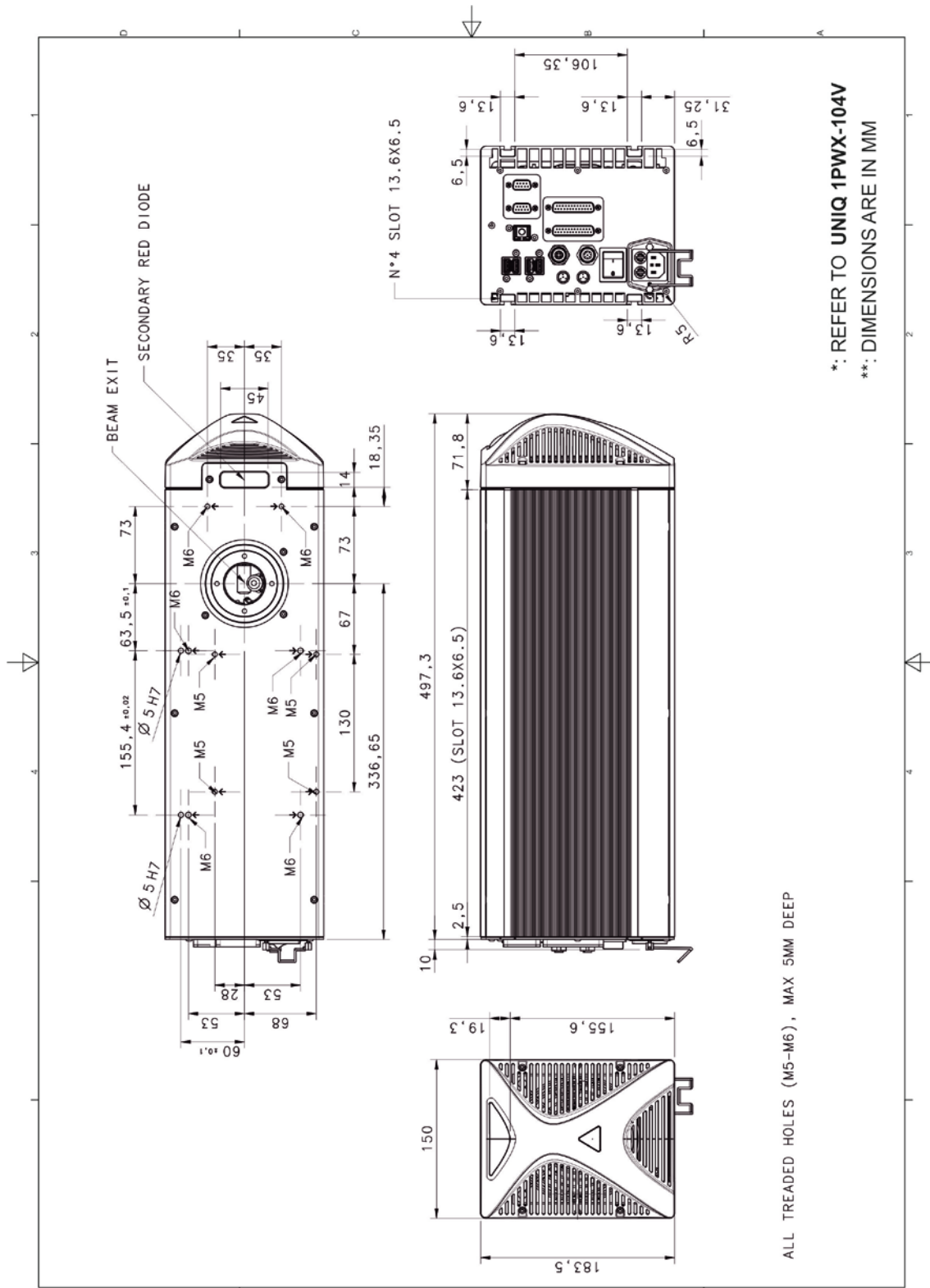


WARNING!

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

- **WAIT** until system shuts down automatically (black screen)
- Power off the system to complete installation

APPENDIX G: MECHANICAL DRAWINGS



NOTE:

Please refer to Datalogic website for detailed drawings.

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