



AREX FIBER IR SYSTEM

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 machine 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 machine 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 machine.



Note:

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

REVISION INDEX

Revision	Date	Number of added or edited pages
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821002170A	29/01/2014	57

FOREWORD

Information included in this manual are indicated to a qualified installer able to integrate the equipment into a system, accomplishing with all the protection features required from international rules and local legislations. Please refer to Appendix for further information.

Following manual is referred to an Arex Fiber 1PWX-TLSV system in Class 4 configuration.

In addition to being professionally trained in their role, personnel assigned to work on the machine must be informed and made acquainted with the risks inherent 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 his responsibility.

The workers assigned to the machine can be identified as:

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



NOTE:

Datalogic Automation S.r.l. declines any and all responsibility for improper use of its device.



NOTE:

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

OVERVIEW

The Fiber Laser marking system developed and manufactured by Datalogic Automation employs the most advanced technologies with regards to the mechanical-optical part, the electronic control of laser beam power, communication and the overall safety of the entire system.

OPERATION OF A LASER SYSTEM WITH GALVANOMETRIC SCANNING

In pulsed or continuous operation mode, the laser generates an invisible, high-energy infrared beam. 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 beam 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 lens before it hits the surface of the product. Generally speaking, the marking is carried out within the focus of the beam.

LASER SOURCE

On AREX system it is used a sealed fiber laser source. This source is based on the new fiber solid state technology. It guaranties high stability, lower sensitivity on optical misalignment and a longer product lifetime.

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.

GALVANOMETRIC SCANNING HEAD

The scanning head features two deflection mirrors that deflect the beam in an X and Y direction, depending on the graphics to be reproduced.

The **Arex** laser system features a power supply unit whose size is compatible with the standard 19" 2,5U in varnished steel, and a laser head whose compact dimensions make it easy to integrate into a system that comprises safety systems required by applicable regulations, the management of marking signals and the customer's complementary modules, if any.

All laser system connections are found on the rear of the rack: power supply, safety, electrical signals, communication ports, patch cord to the scanner head, while the front features key and enable command devices, status led in addition to a USB connector for the communication with the internal embedded controller.



Figure 1: Arex Control Rack and Scan Head.

NOTE:



Laser marking may strongly interact with materials through a thermal carbonization process with the emission of fumes and vapours.

Adequate fume extractor and fume treatment must be provided for, especially when working on plastic materials such PVC.

IMPORTANT WARNINGS

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

Datalogic Automation S.r.l. declines any and all responsibility for work carried out on live parts by untrained or unauthorized personnel.

NOTE:



It is forbidden to change the intended use for which the system was designed and developed.

Datalogic Automation S.r.l. declines any and all responsibility for improper use of its equipment.

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1 TECHNICAL SPECIFICATIONS AND ACCESSORIES



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

1.1 TECHNICAL CHARACTERISTICS

CONTROL RACK MECHANICAL CHARACTERISTICS

Weight	16 Kg
Height	111 mm
Width	430 mm
Depth	370 mm
IP Degree	IP20

SCAN HEAD MECHANICAL CHARACTERISTICS

Weight	2 Kg
Height	102,5 mm
Width	112 mm
Depth	298,4 mm
IP Degree	IP54



NOTE:
Please refer to Appendix for detailed drawings.

STORAGE CONDITIONS

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



NOTE:

Since this product includes precision parts, please avoid vibration & shocks: marking quality may deteriorate.

ENVIRONMENTAL OPERATING CONDITIONS

	AREX 10W – 20W	AREX 30W
Environmental temperature	5°C to 50°C (41° to 122°F)	5°C to 40°C (41° to 104°F)
Humidity	< 90% without condensation	
Altitude	< 2000 m	
Pollution Degree	2	
Overvoltage Category	II	

ELECTRICAL POWER SUPPLY

Input Voltage	100 to 240 Vac
Input Current	3 to 1,25A max (@100VAC)
Max Power	300W

PERFORMANCES

Arex Model		10W	20W	30W
LASER SOURCE (specification @25°C)				
Laser Type		Class 4 Pulsed Fiber Laser		
Average Power	W	10	20	30
Pulse energy (max)	mJ	0,5	1	
Peak power (max)	kW	5	10	
Central emission wavelength	nm	1070		
Repetition Rate	kHz	20 ÷ 100		30 ÷ 100
Laser aiming beam		Class 2 1mW @ 635nm		Class 3R 5mW @ 635nm
Cooling		Forced Air		
Noise	dB(A)	70		

OTHER

HEAD CABLE minimum bending radius	150 mm (fixed installation) 300 mm (mobile installation)
Marking head cable length	3 meters
Laser Focus Beam	Class 2 : 1 mW @ 635 nm
Beam deflection	High speed galvanometer scanning system
Marking Speed ¹	Up to 2000 mm/sec -500 car/sec
MOF (Marking on the fly)	YES [constant speed or encoder]
Line speed ~ Productivity ²	Up to 75 m/min – 3 Pcs/Sec
Control	EMC embedded control
Control Software	Lighter Suite
Communication	RS232, USB, Ethernet (TCI/IP 10, 100 Mbit), digital I/O Dedicated Inputs for Encoders and detectors

¹ May vary: measured with f= 160mm

² Single line string, Roman-s font

* for 100% power at 25°C.

1.2 SEALS

Several seals have been applied to the Arex source, to both the control rack and the scan head.



Figure 2: Example of a seal.

The engraving 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 engraving system.



NOTE:

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



WARNING!

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

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



NOTE:

Access to the internal parts of the electrical equipment 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!



NOTE:

Access to the internal parts of the scan head 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!

1.3 CONTENTS OF THE PACKAGING

MAIN HARDWARE

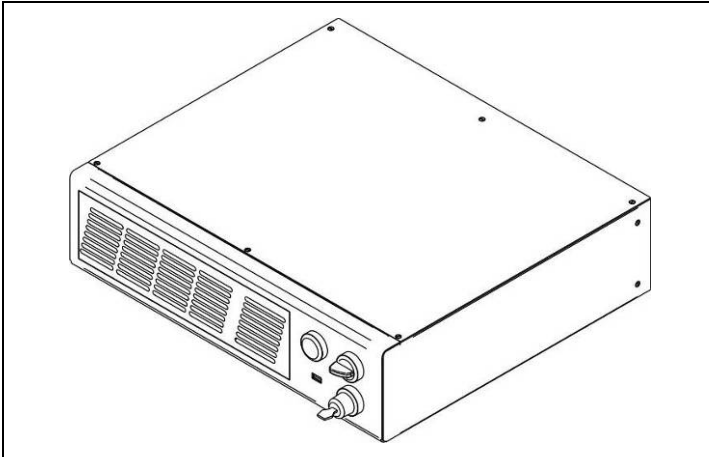


Figure 3: Control Rack.

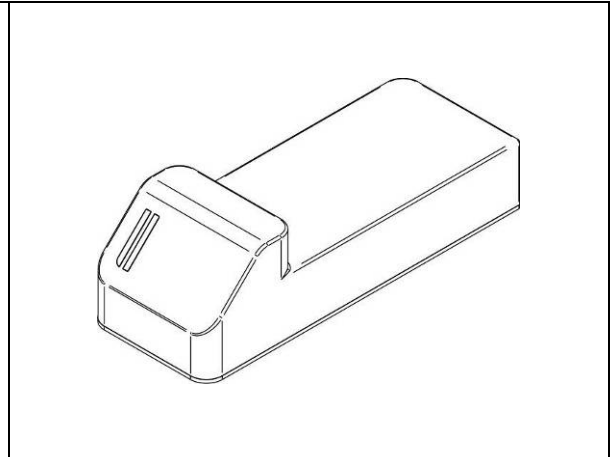


Figure 4: Scan Head



NOTE:

Rack and Scan Head are joined by a connection cable 3 meters long, referred as Head Cable. Rack and Scan Head are **NOT** separable.



WARNING!

To avoid damaging or breaking the optical fiber, never subject it to a bending radius below the limits specified in the technical specification table.

CABLE AND ACCESSORIES

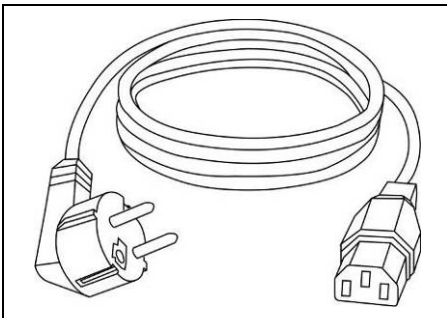


Figure 5: Power Supply cable.

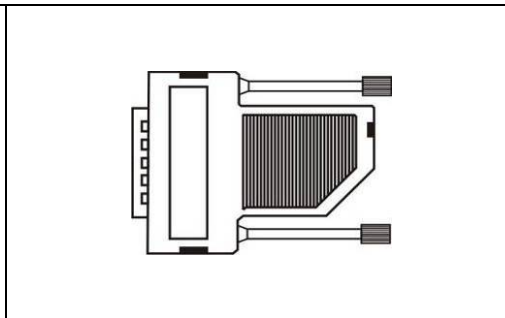


Figure 6: Command Box Connector.

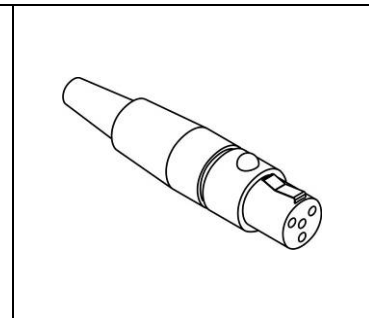


Figure 7: Interlock.

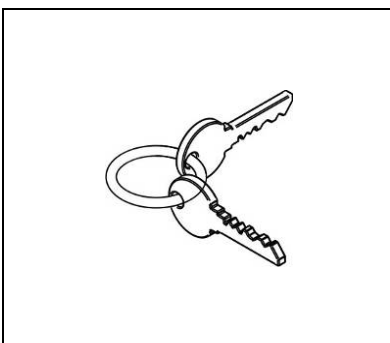


Figure 8: System Key.

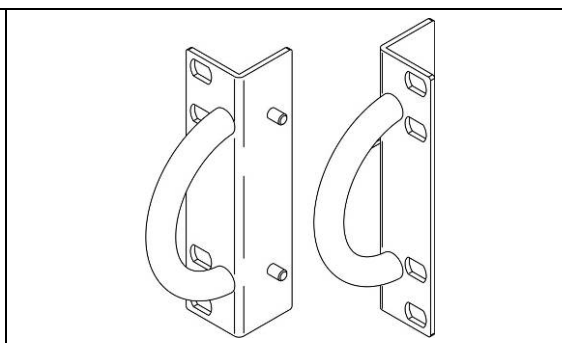


Figure 9: Support shoulders and handles

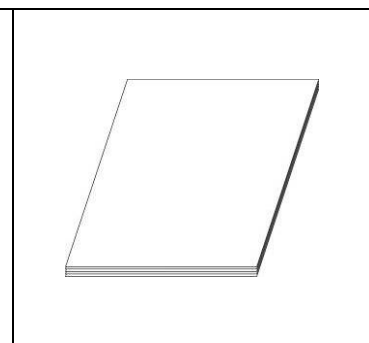


Figure 10: Quick guides.

1.3.1 FOCAL OBJECTIVES (F-Theta)

F-Theta Scanning Lenses are commonly used in laser marking, engraving, and cutting systems. F-Theta lenses are designed to provide a flat field at the image plane of the scanning system. Various F-Theta lens models are available upon request to allow different marking areas and to find the best compromise between marking field (or marking areas) and resolution (marking line width) of the marked string or logo, depending on specific needs. AREX Scanning head is compatible with M39 and M85 F-Theta lenses through specific adapters; other solutions concerning both the scan head and F-Theta lenses have to be evaluated on a case-by-case basis.

Standard F-Theta lenses performance:

F-Theta Lens		<i>f</i> = 160S (M39)	<i>f</i> = 254S (M39)
Lens diameter	mm	39	39
Working Distance	mm	181*	290*
Fixing Distance	mm	196**	309**
Marking Area	mm ²	100 x 100	140 x 140

* Tolerance: ± 1 mm

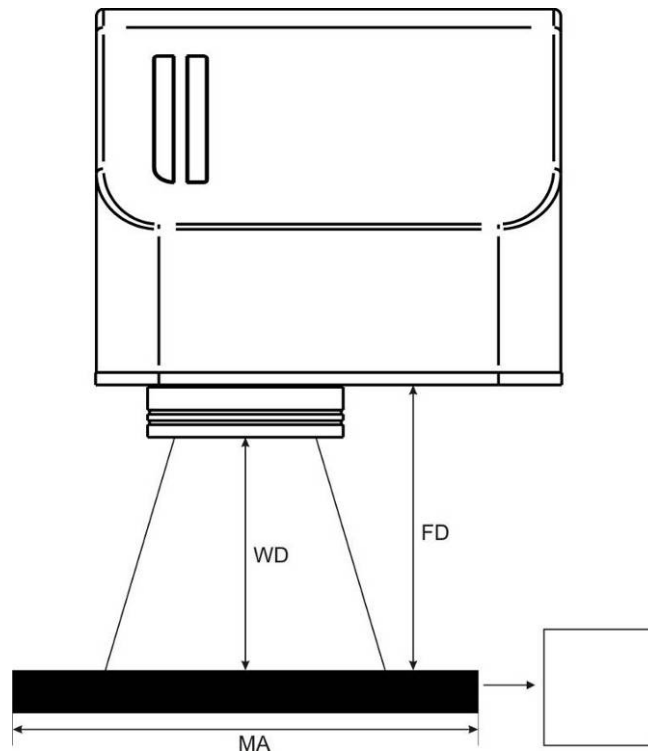
** Tolerance: ± 1,5 mm



NOTE:

Other F-Theta lenses available on request!

Note: Working Distance is defined as the distance between the center of the working area (defined in the focal plane) and the last mechanical edge of the F Theta. Refer to the following figure:



WD: Working Distance

FD: Fixing Distance

MA: Marking Area

2 INSTALLATION AND SET UP



NOTE:

Arex is a **Class 4** laser source.

For proper and safe use, it must be brought down to **Class 1**.

Arex laser marking device must be installed in a suitable environment specifically dedicated to laser jobs.

The person in charge of the area assigned to laser marking (the Laser Safety Officer), has to isolate this area from the other work areas and signal through suitable hazard warnings that the area assigned to laser marking can be accessed by authorized personnel only.

2.1 DESCRIPTION OF THE LASER MODULES

2.1.1 CONTROL RACK

The control rack is described here below in order to provide the right information for proper device installation.

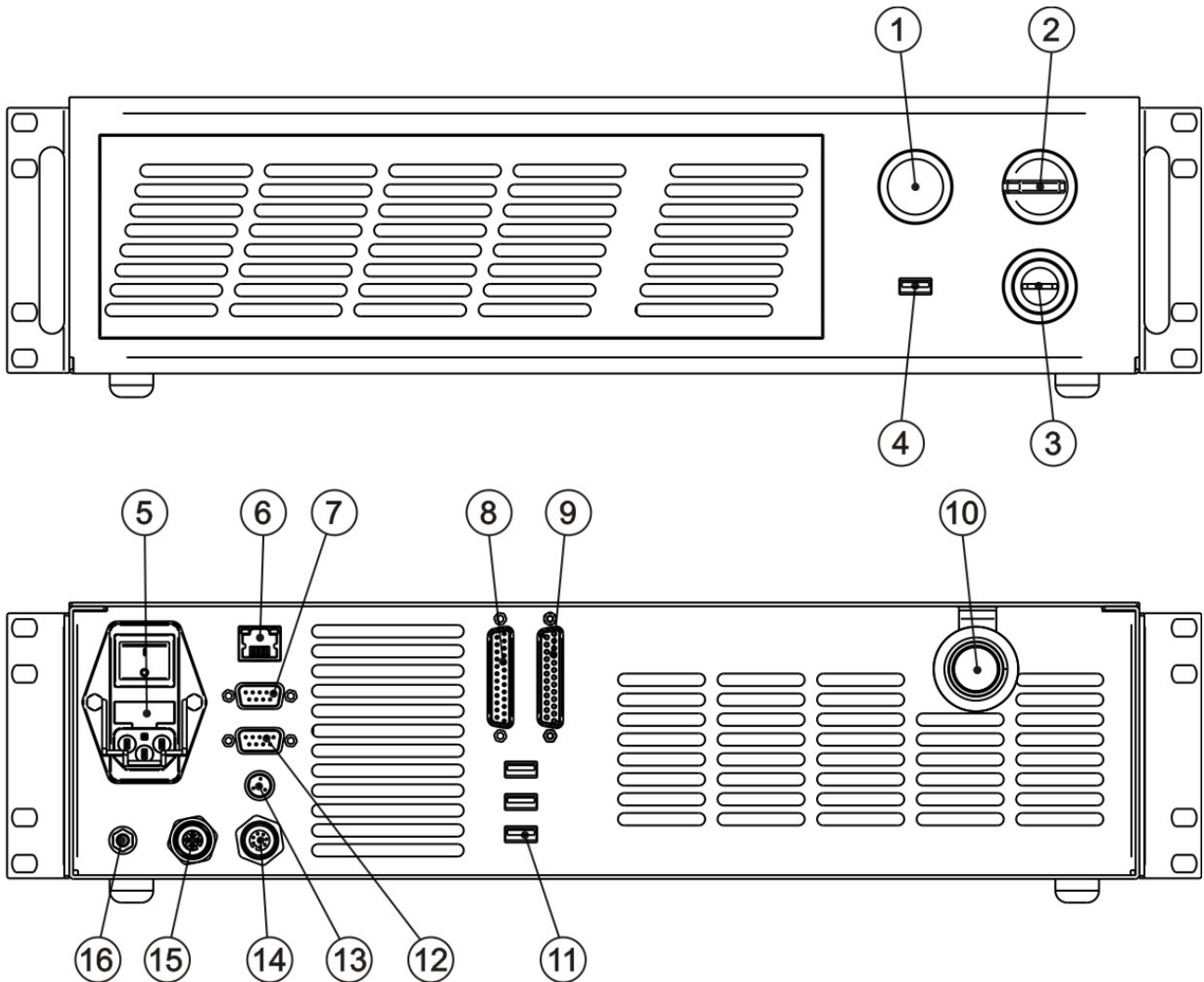


Figure 11: Control rack overview.

1) Status led	9) I/O connector (axis control)
2) Enable selector	10) Main connection to Scan Head
3) Key selector	11) 3x USB connectors
4) USB connector	12) RS232 connector
5) Main power supply connection	13) Interlock connector
6) LAN connector	14) Photocell connector
7) VGA connector	15) Encoder connector
8) Command Box connector	16) Earth ground

2.1.2 SCAN HEAD

A description of the main parts of the Scan Head unit is provided here below:

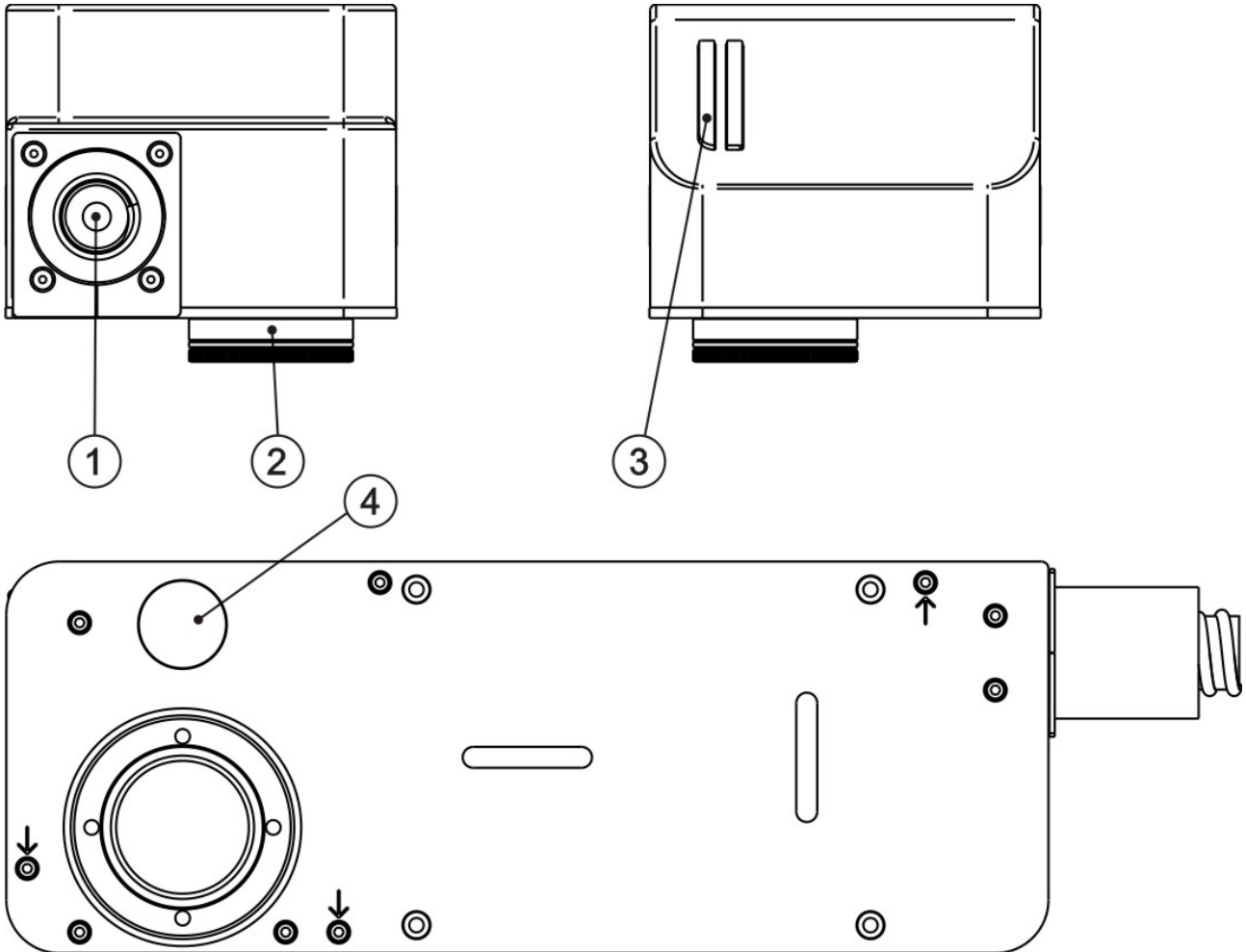


Figure 12: Scan Head overview

1) Main connection Rack-Scan Head	3) Status led bar
2) F-Theta lens	4) Focusing Beam

2.2 INSTALLATION PRE-REQUISITES

Once it is installed in a suitable environment, the Arex marking system is already set for use since it is equipped with Embedded PC with marking software preloaded.

If the system is not used in remote mode, a monitor and input peripheral devices (not included) are needed nevertheless.

2.3 AREX TRANSPORT

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



NOTE:

Rack and Scan Head are joined by a connection cable 3 meters long. Rack and Scan Head are **NOT** separable!



WARNING!

To avoid damaging or breaking the optical fiber, never subject it a bending radius below the limits specified in the technical specification table.

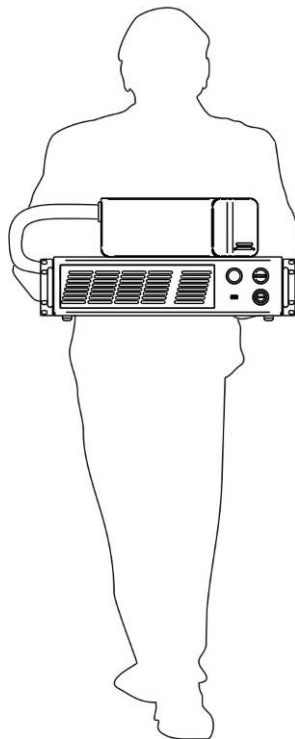


Figure 13: Arex transport.



NOTE:

The Arex laser system is a delicate opto-electronic device, avoid damaging it with shock and vibrations.



NOTE:

Be extremely careful to not damage the connection cable between Scan Head and Rack.

2.4 FIXING AND POSITIONING

The Arex marker must be positioned in a safety manner and must be followed the precautions listed below.

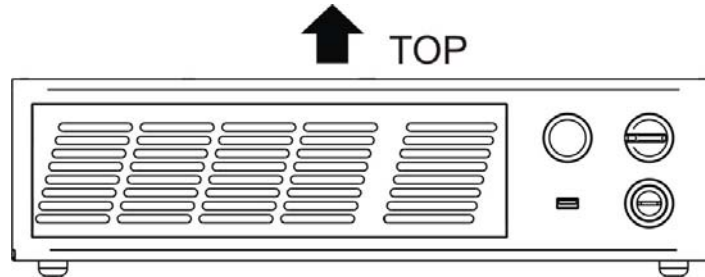


Figure 14: Positioning rack.

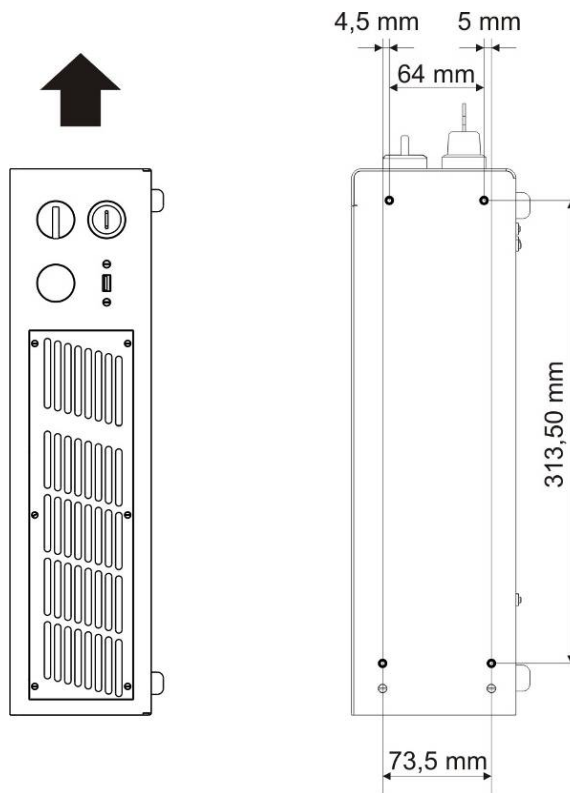


Figure 15: Vertical positioning (need additional fixing).

Don't fix the system in manner not shown in figure.

The machine can be fitted inside a special rack cabinet equipped with special support shoulders and handles, available on request. Here are the odds of the mounting points for mounting in rack:

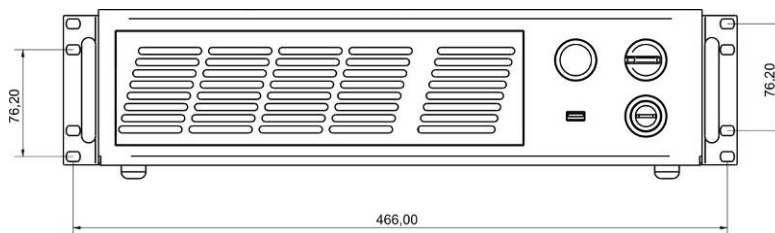


Figure 16: Fixing points on shrug rack (cabinet assembly).

The Scan Head must be fixed to a suitable base (not supplied by Datalogic Automation S.r.l.) using the four M6 threaded holes and the two slotted seats:

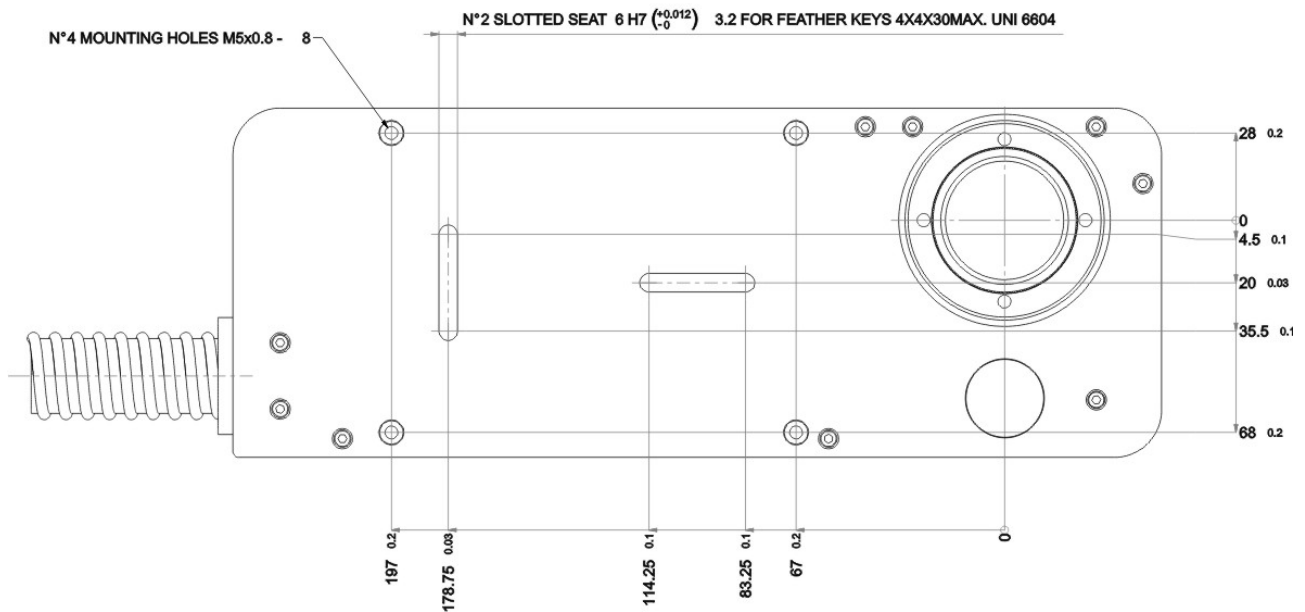


Figure 17: Fixing points on Scan Head (vertical mount).

The Scan Head unit, just like the control rack, must be safely positioned and fixed to a stable surface, vibration-free. The Scan Head can be fixed either vertically or horizontally. In order to prevent marking distortions, avoid any vibration between Scan Head and piece to be marked.

2.5 INSTALLATION ENVIRONMENT

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

Arex is an air cooled device, an adequate air flow is necessary to guarantee correct cooling of the system. Please install in order to not stop the flow of air cooling. Moreover, please do not install an heat source near. Clean air filter when it is dirty. If the air filter is dirty, the air-flow might become not sufficient to ensure correct cooling and might stop marking operation. Exchange air filter periodically.

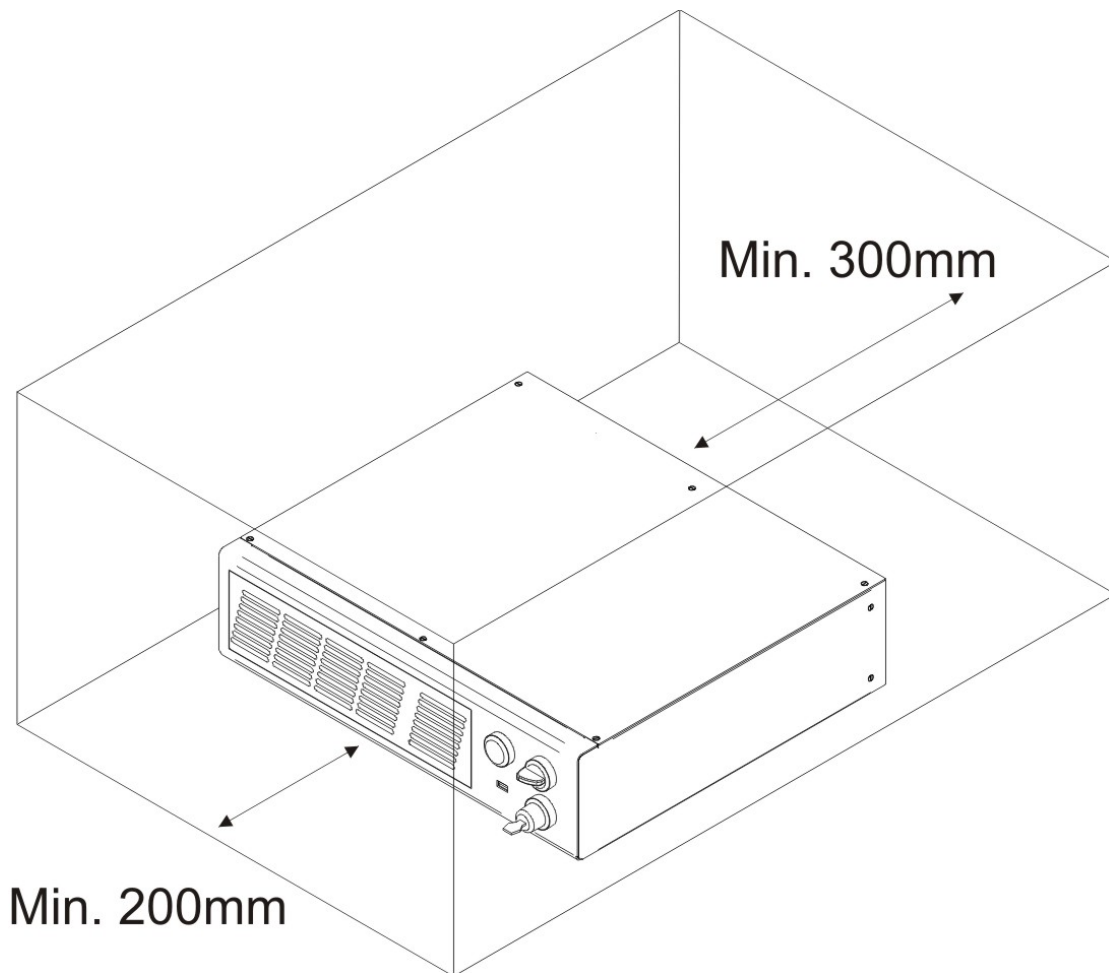


Figure 18: Rack installation environment.

2.6 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.



NOTE:

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

2.7 WIRING

The machine wiring is described here below. Follow the wiring operations as described.



NOTE:

Rack and Scan Head are joined by a connection cable 3 meters long. Rack and Scan Head are **NOT** separable!



CAUTION:

Wire the devices one to the other **WITHOUT** voltage in order to avoid risks for the operator and for the laser source.

2.7.1 WIRING COMMAND BOX CONNECTOR

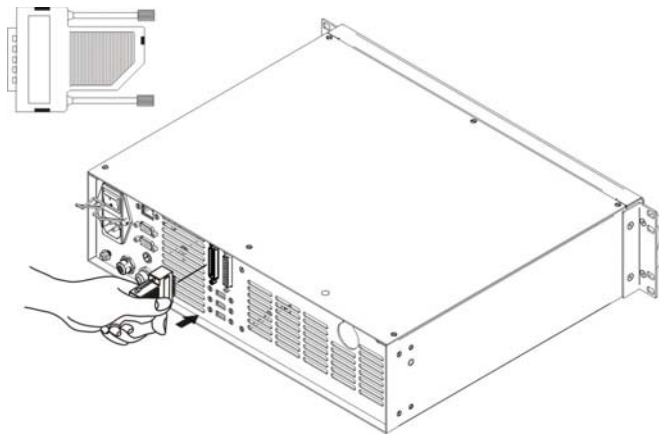


Figure 19: Wiring Command Box connector.



NOTE:

The Command Box connector must always be inserted in order to use Enable and Key on the front panel of the rack.

2.7.2 WIRING I/O CONNECTOR (CONTROL AXES)

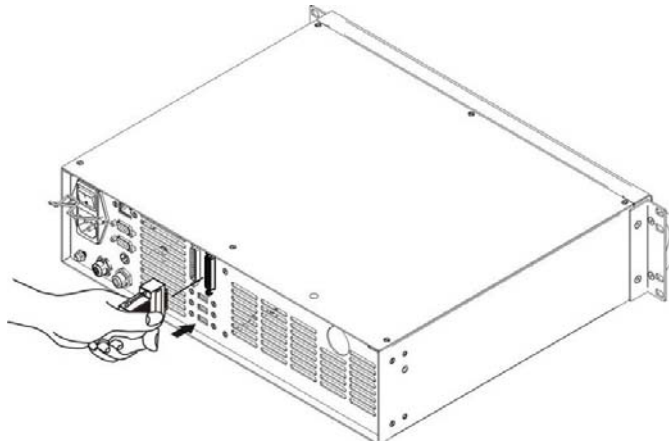


Figure 20: Wiring I/O connector.

2.7.3 INTERLOCK CONNECTOR

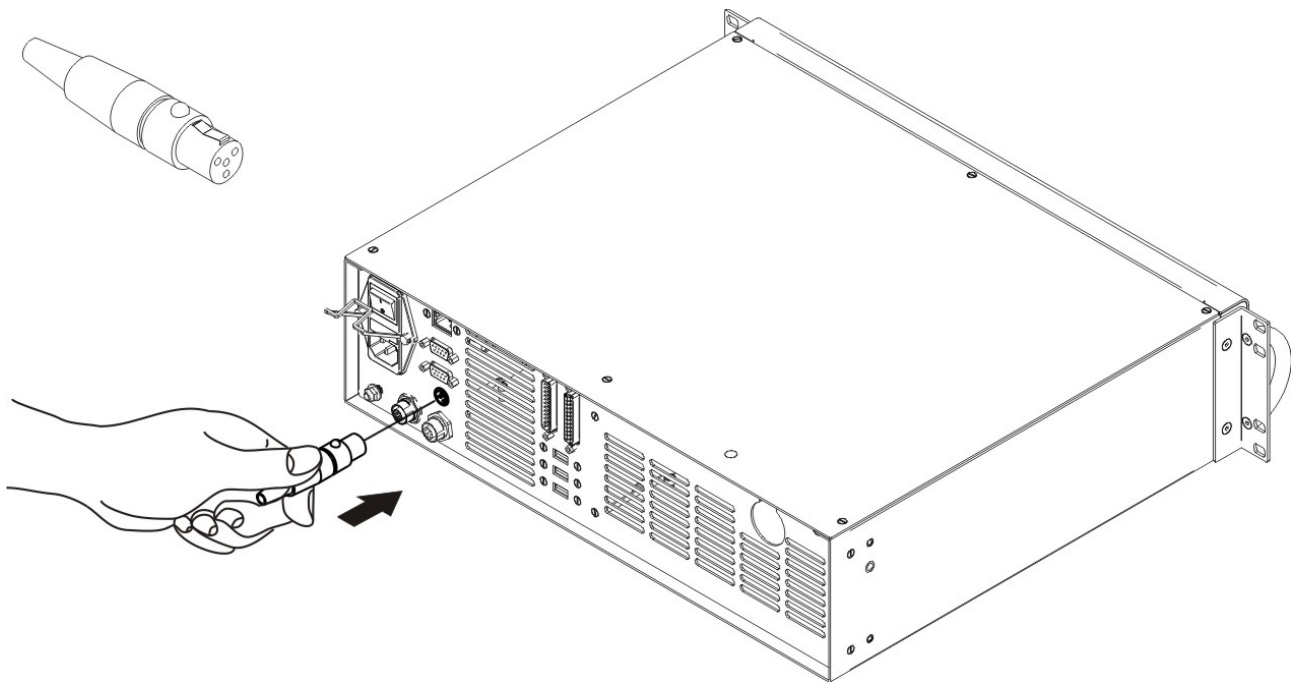


Figure 21: Interlock connector.



NOTE:

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



NOTE:

The 4 way **interlock connector** implements the **double and redundancy safety interlock** (60825 compliant).

2.7.4 POWER SUPPLY CABLE CONNECTION

Wiring power supply cable.

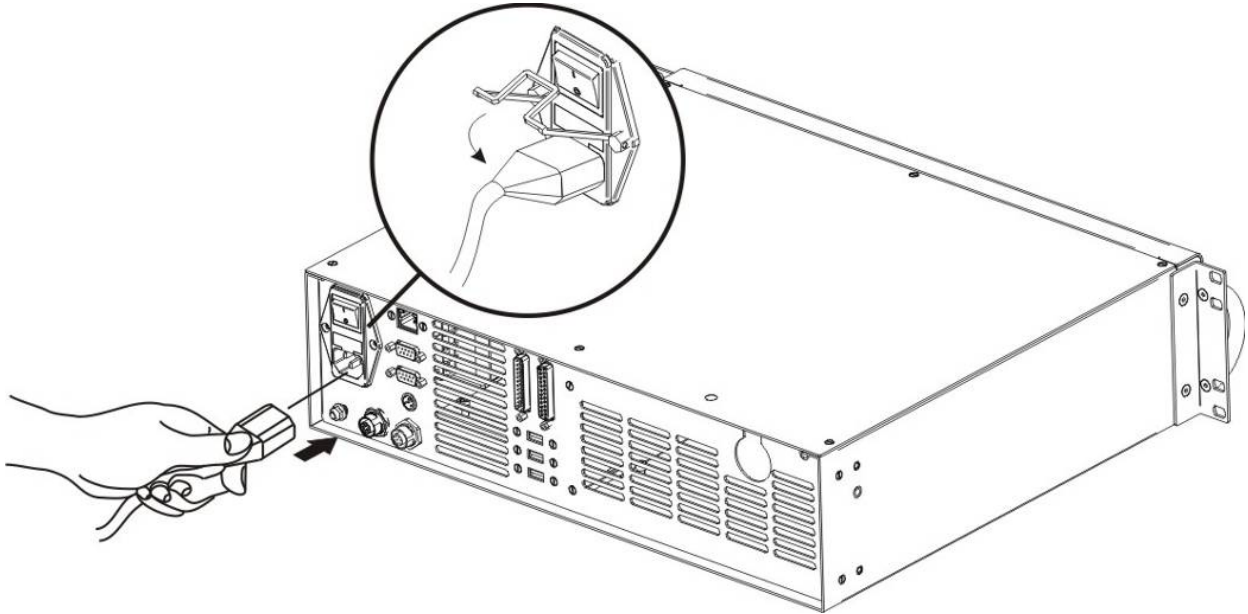


Figure 22: Wiring power supply cable.



NOTE:

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

2.7.5 GROUND CONNECTION

To ensure high electrical noise immunity it is strongly recommended to connect Arex chassis to earth plant.

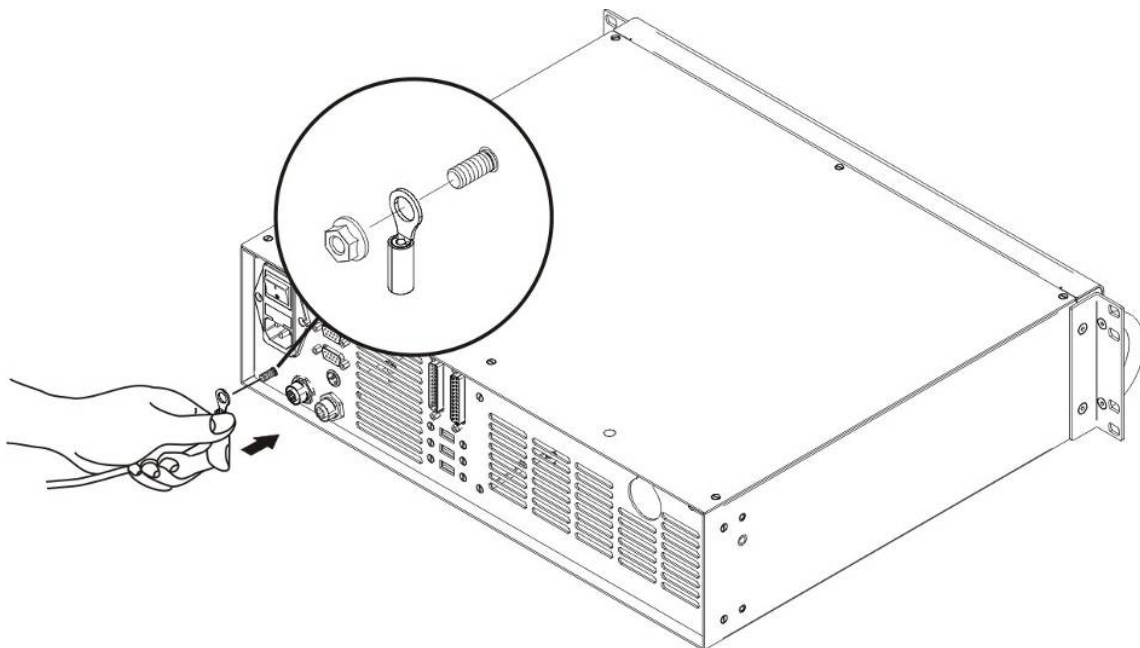


Figure 23: Ground connection.

2.7.6 LOCAL CONTROL MODE CONNECTION

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

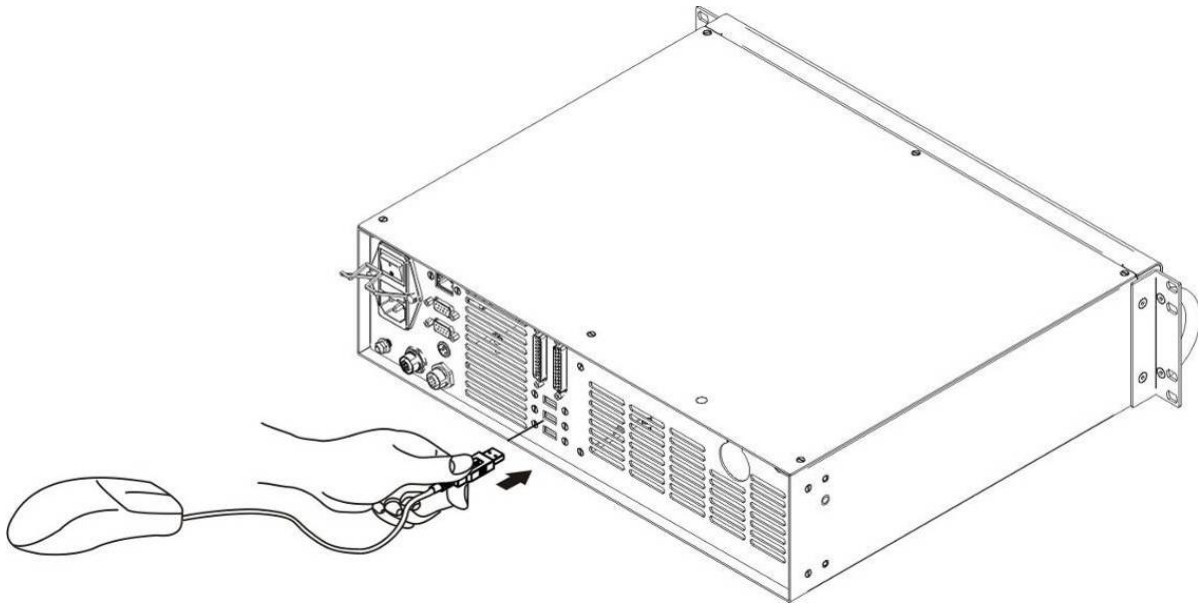


Figure 24: USB mouse connection.

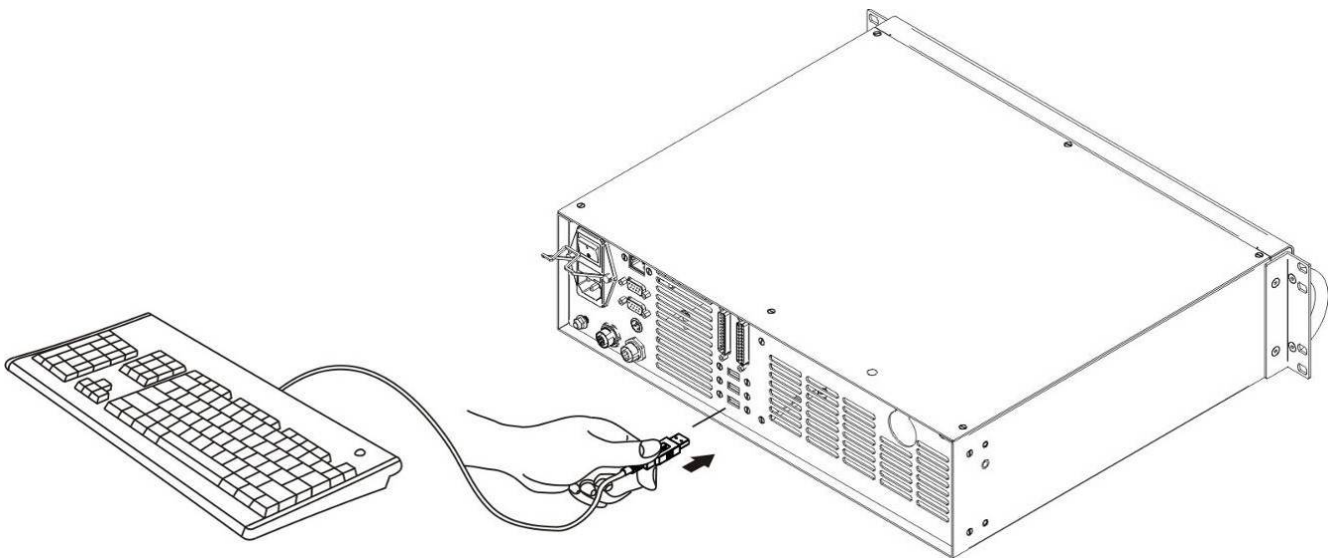


Figure 25: USB keyboard connection.

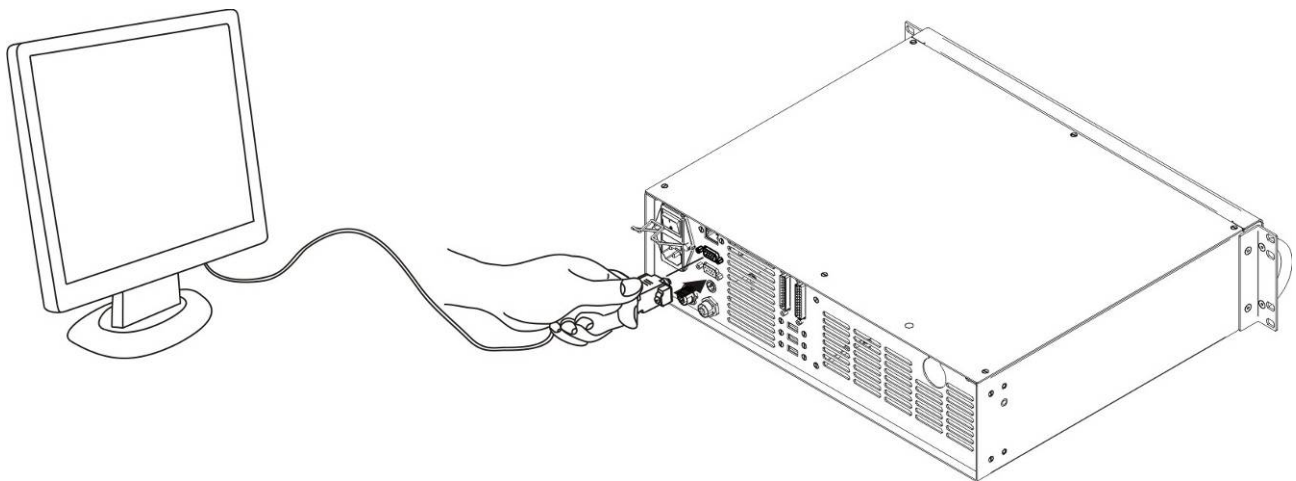


Figure 26: VGA monitor connection.



NOTE:

Minimum resolution 800 x 600.

2.7.7 REMOTE CONTROL MODE CONNECTION

To use the laser device in “Remote Control” mode is necessary to connect a network cable:

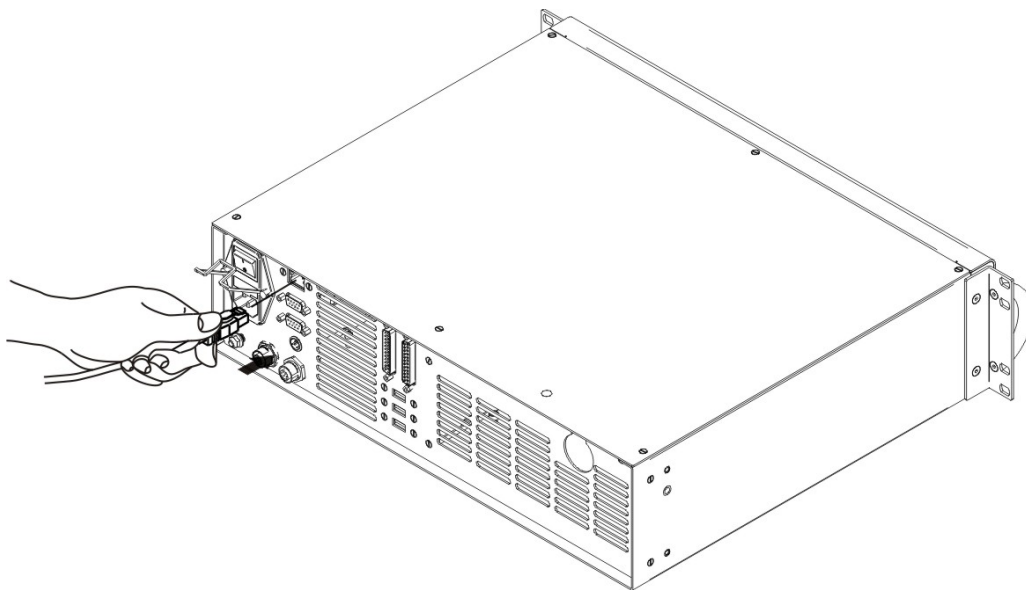


Figure 27: RJ45 Ethernet connection.



NOTE:

Ethernet TC/IP 10, 100 Mbit.

3 FUNCTIONAL SPECIFICATIONS

3.1 MANUAL TURNING ON SEQUENCE

1ST step: before turning on the Arex laser system, be sure that the devices are connected as previously described. Check presence of voltage power supply connection, interlock connector and Command Box connection as described in the previous chapter. Check that “KEY” and “ENABLE” commands on the rack front panel are disabled. (see figure 29)

2ND step: turn on the main switch in the back of the control rack:

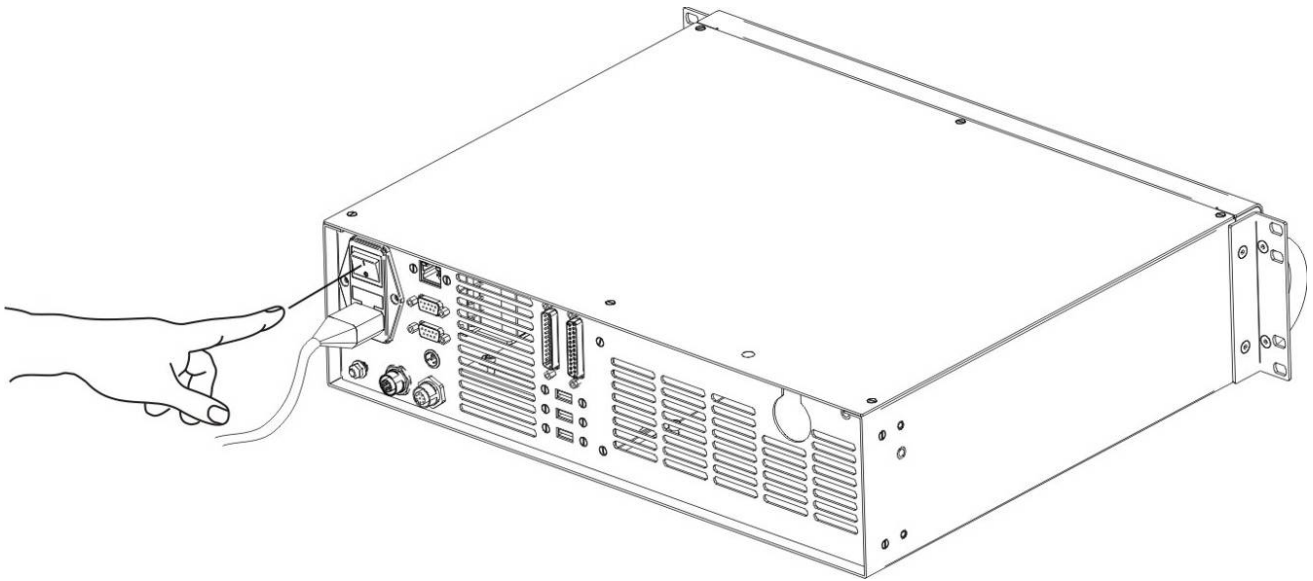


Figure 28: Power on.

During booting-up, status led on the rack front panel and the led bar on Scan Head will be blinking green.

3RD step: wait the end of the booting-up. The status led on the rack and the led bar on the Scan Head will be steady green.

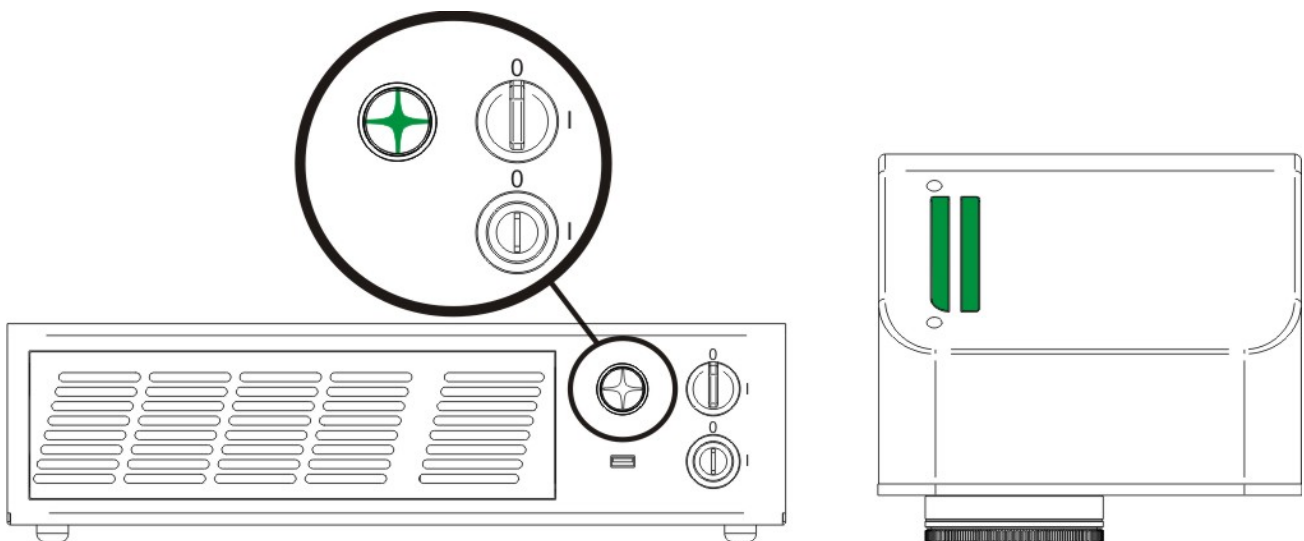


Figure 29: Status leds display.

4TH step: activate the command “KEY”, by rotating it clockwise:

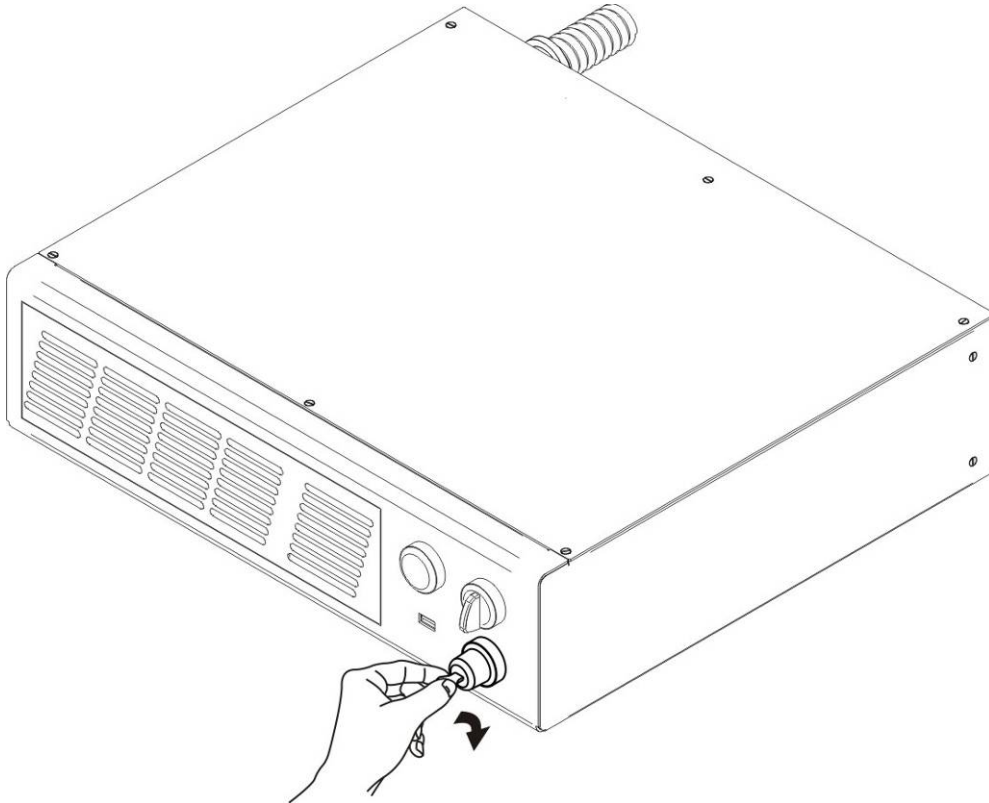


Figure 30: Enable command KEY.

When the “KEY” command is enabled, the status LED on the rack and the status LED bar on the Scan Head will be blinking orange for about 20 sec. (laser source warm-up).

5TH step: wait the end of the laser source warm-up. The status led on the rack and the led bar on the Scan Head will be steady orange.

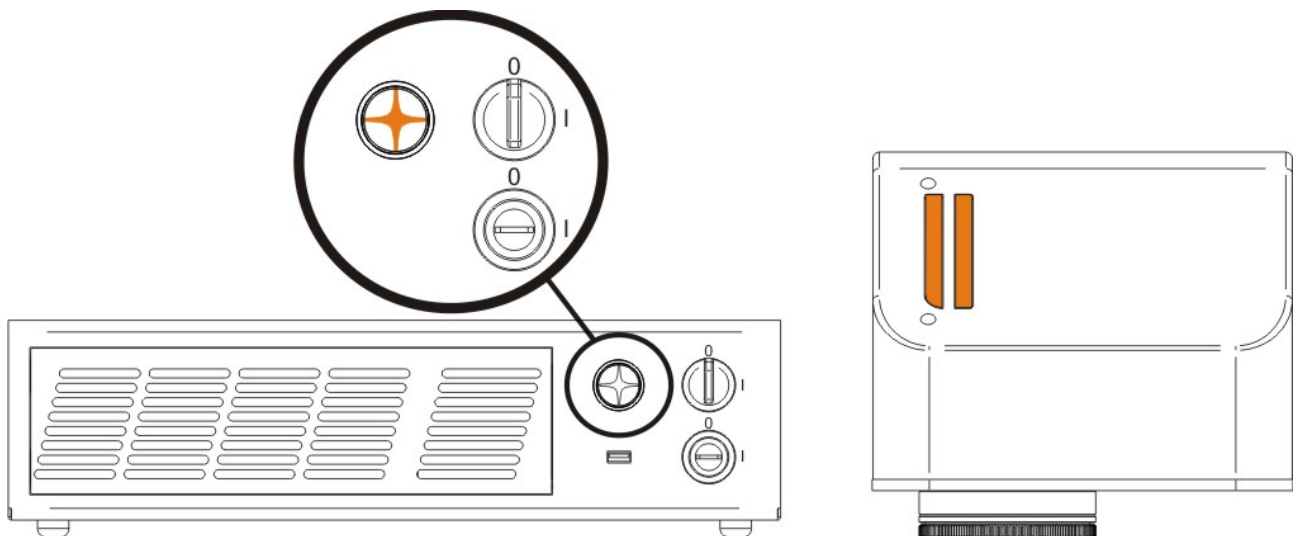


Figure 31: Status leds display.

6TH step: activate the “*ENABLE*” command by rotating it clockwise:

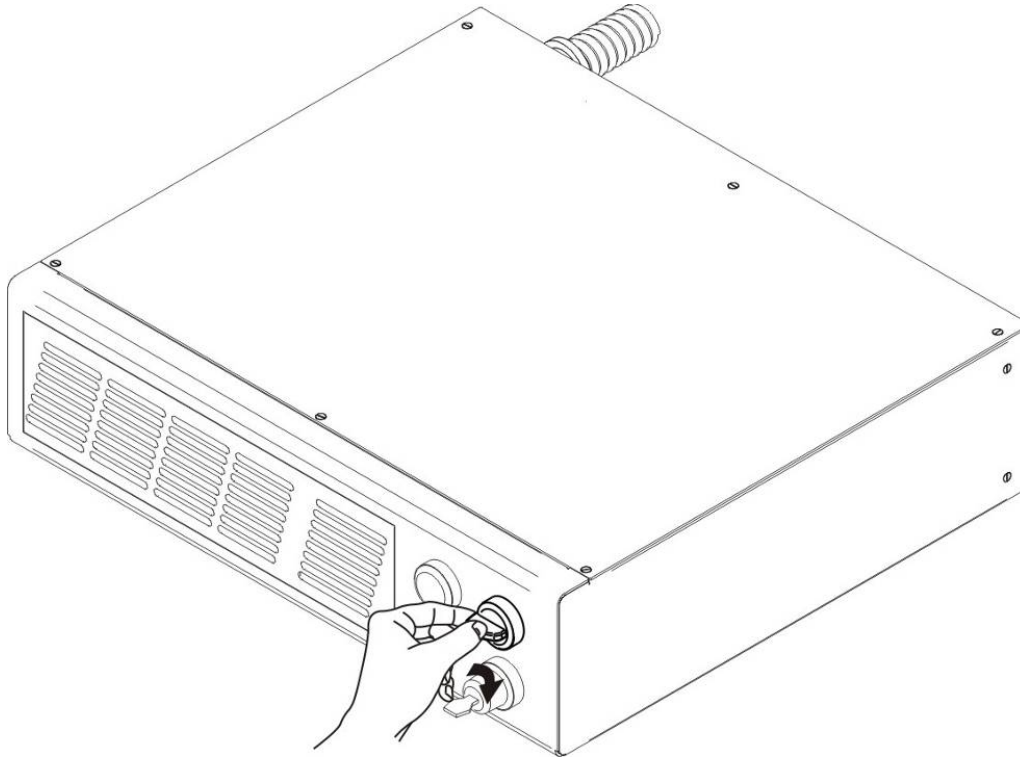


Figure 32: Enable command ENABLE.

The system is ready to mark. The status led on the rack and led status bar on the Scan Head will turn red.

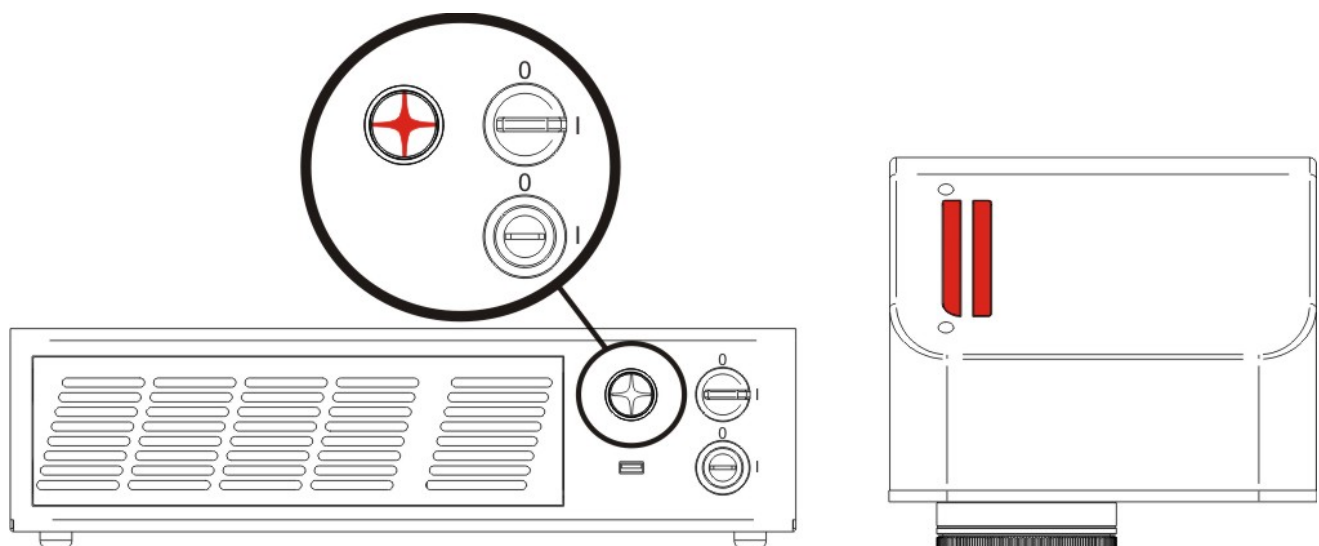


Figure 33: Status leds display.

RESUME TABLE

STATUS	STATUS LED	INPUT	OUTPUT
SYSTEM BOOTING UP	BLINKING GREEN (1Hz)	KEY 0 ENABLE 0	ALARM 1 POWER ON 0 ENABLE OUT 0 LASER BUSY 0
WAIT FOR START	STEADY GREEN	KEY 0 ENABLE 0	ALARM 0 POWER ON 0 ENABLE OUT 0 LASER BUSY 0
WARMING UP	BLINKING ORANGE (1Hz)	KEY 1 ENABLE 0	ALARM 0 POWER ON 0 ENABLE OUT 0 LASER BUSY 0
STANDBY SHUTTER CLOSED	STEADY ORANGE	KEY 1 ENABLE 0	ALARM 0 POWER ON 1 ENABLE OUT 0 LASER BUSY 0
READY	STEADY RED	KEY 1 ENABLE 1	ALARM 0 POWER ON 1 ENABLE OUT 1 LASER BUSY 0
EMISSION	STEADY RED	KEY 1 ENABLE 1	ALARM 0 POWER ON 1 ENABLE OUT 1 LASER BUSY 1

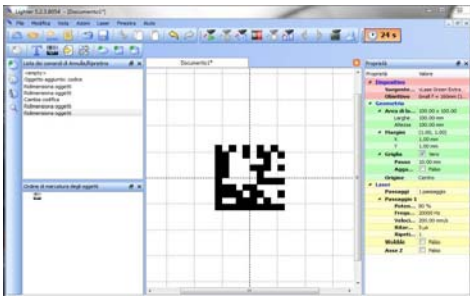
3.1.1 ADVICE ON USING THE SYSTEM

If the system is used in manual mode you need to connect Command Box connector as described before. In this way you are able to control laser system directly on rack front panel.

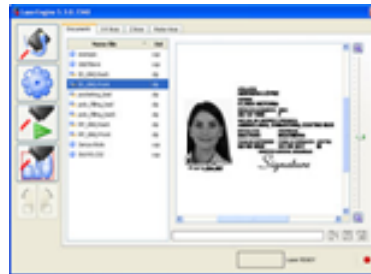
If the system is used in automatic mode it is recommended to enable permanently KEY and ENABLE commands positioned on rack front panel and to use remote signals (EXT_KEY and EXT_ENABLE) available on Command Box connector. This part is supplied with the product and you can connect external controls wiring connector contacts following pins description on next chapter.

STAND-ALONE mode

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



+



=

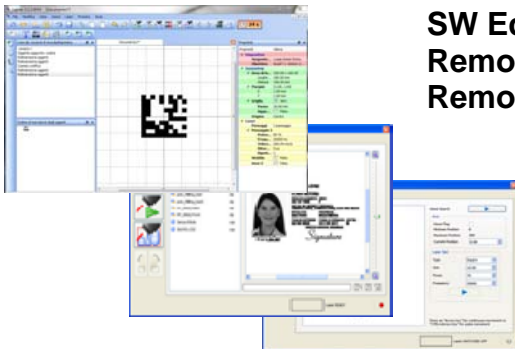
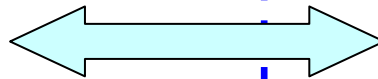
**SW Editor
SW Engine
Correction Matrix
Laser Control
Galvo Control**

MASTER-SLAVE mode

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



LAN



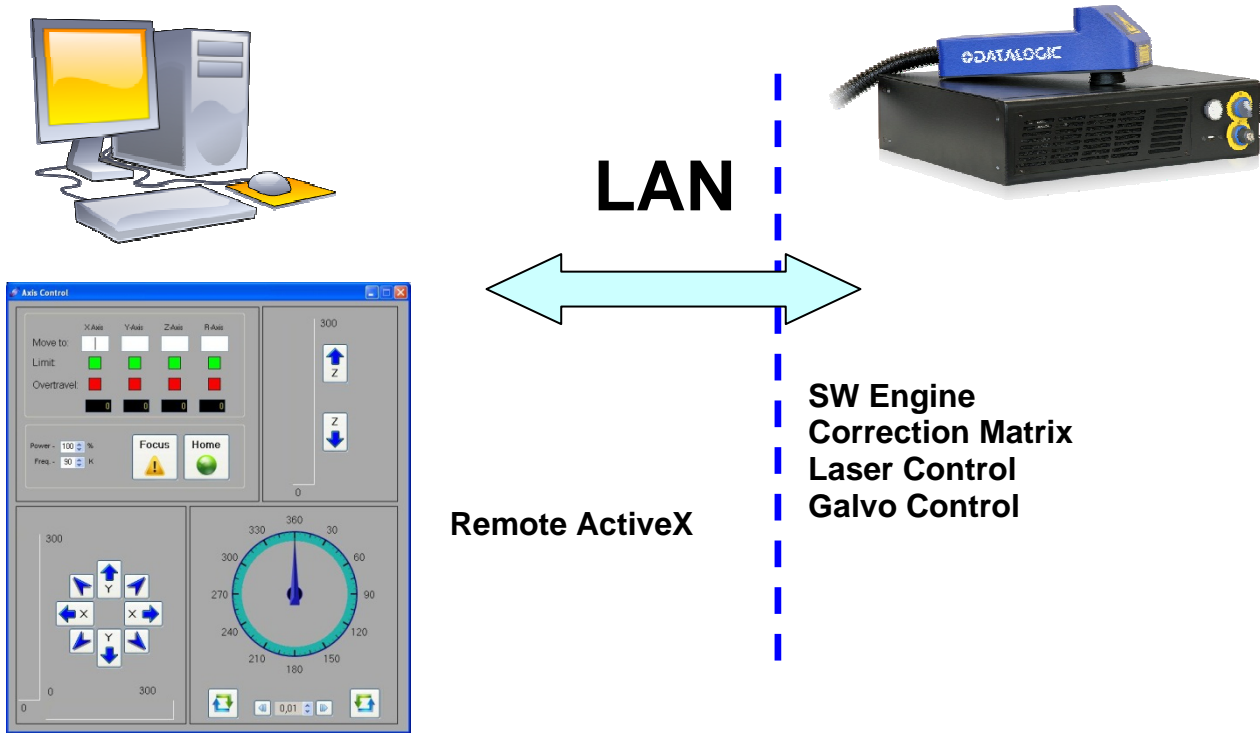
**SW Editor
Remote SW Engine
Remote Active-X**

**SW Engine
Correction Matrix
Laser Control
Galvo Control**

CHAPTER 3

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.



3.1.1.1 Customize the operating system language and keyboard layout

Arex laser 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.



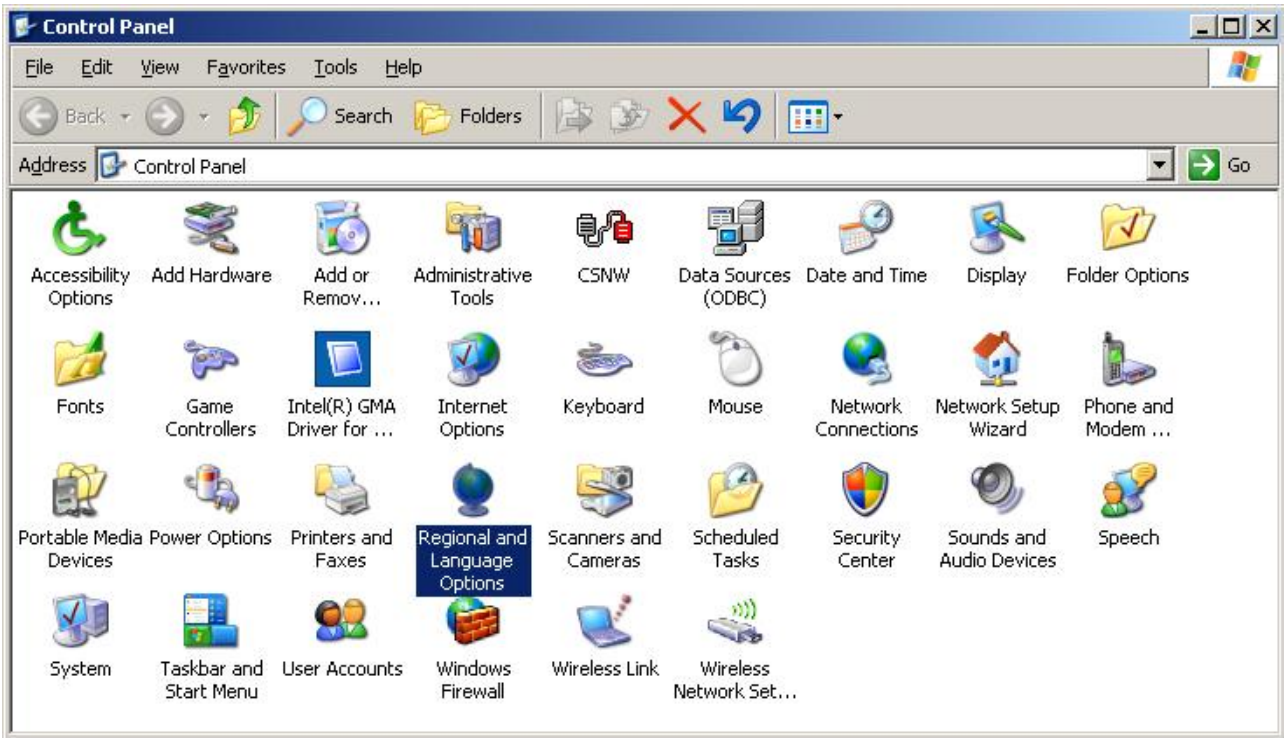
NOTE:

In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the AREX laser system (2.7.6).

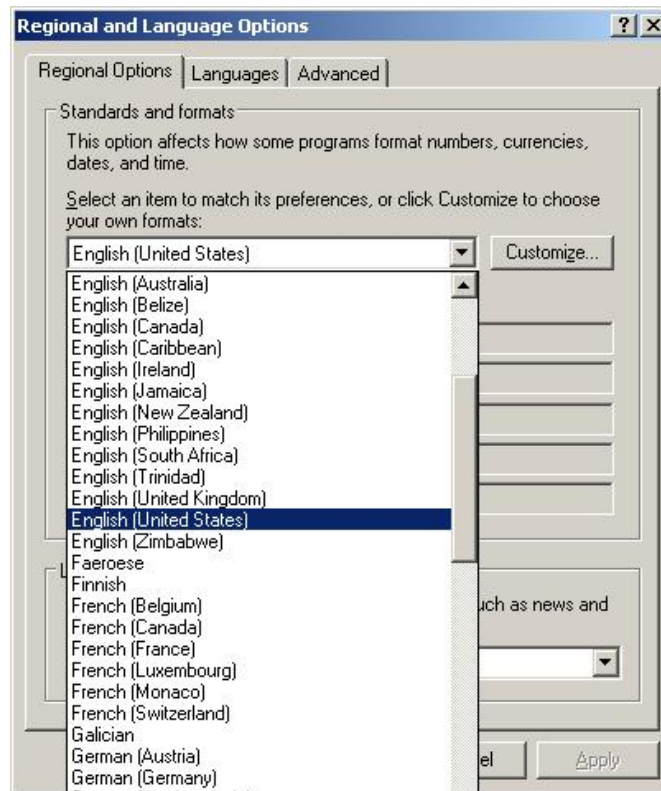
- o Turn OFF and ON the Arex laser system and wait the end of the booting-up (the status led on the rack must be steady green)
- o From the main screen click on *START/Control Panel*



- o Double click on *Regional and Language Option* icon:



- o In the *Regional and Language option* screen select the *Regional Options* tab to choose how some programs format numbers, currencies, dates, and time.



- o In the Regional and Language option screen select the *Languages tab/Details* to view or change the languages and methods you can use to enter text. You can set the default input language as the keyboard layout for the selected language:



- o In the Regional and Language option screen select the *Languages tab* to change the *Language used in menus and dialogs* used by the operating system:



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



- o Restart the system in order to save the new settings:



3.1.1.2 Change the LAN configuration and IP address

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



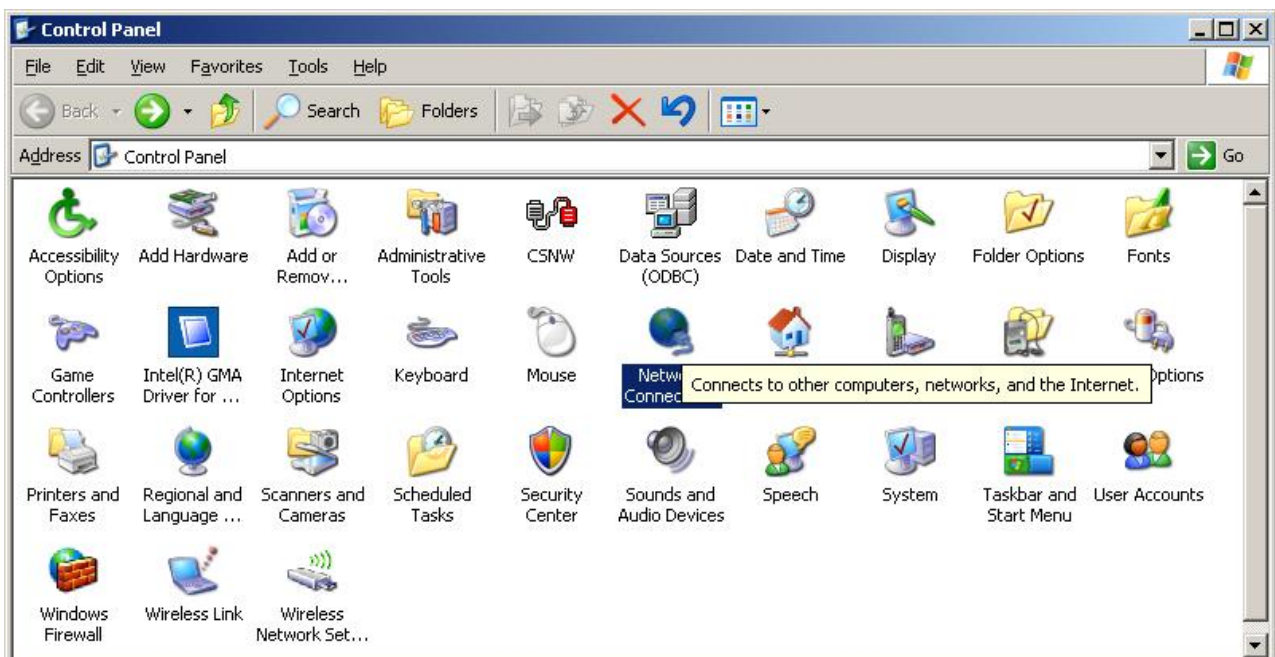
NOTE:

In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the AREX laser system (2.7.6).

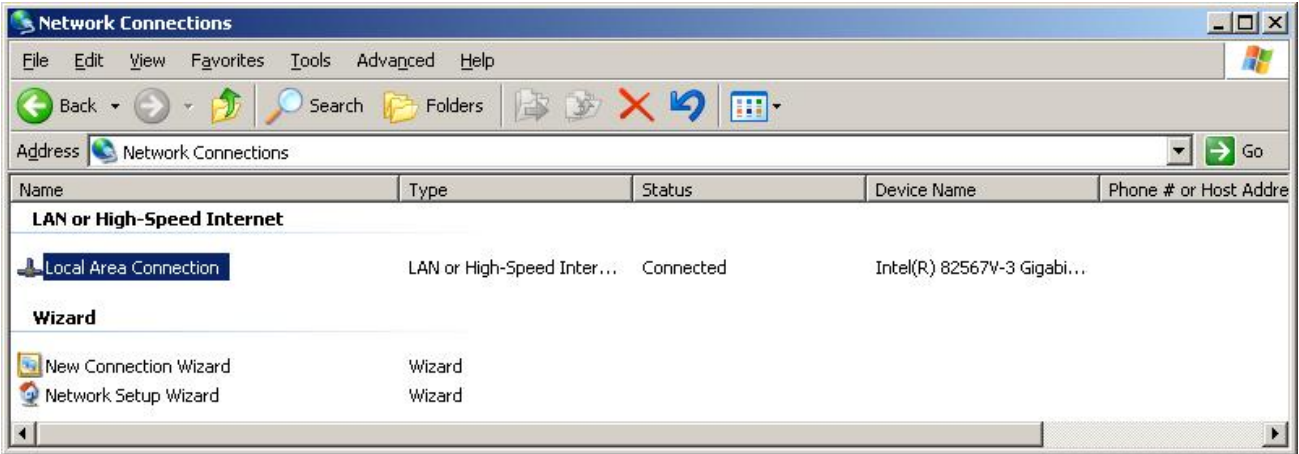
- o Turn OFF and ON the Arex laser system and wait the end of the booting-up (the status led on the rack must be steady green)
- o From the main screen click on *START/Control Panel*



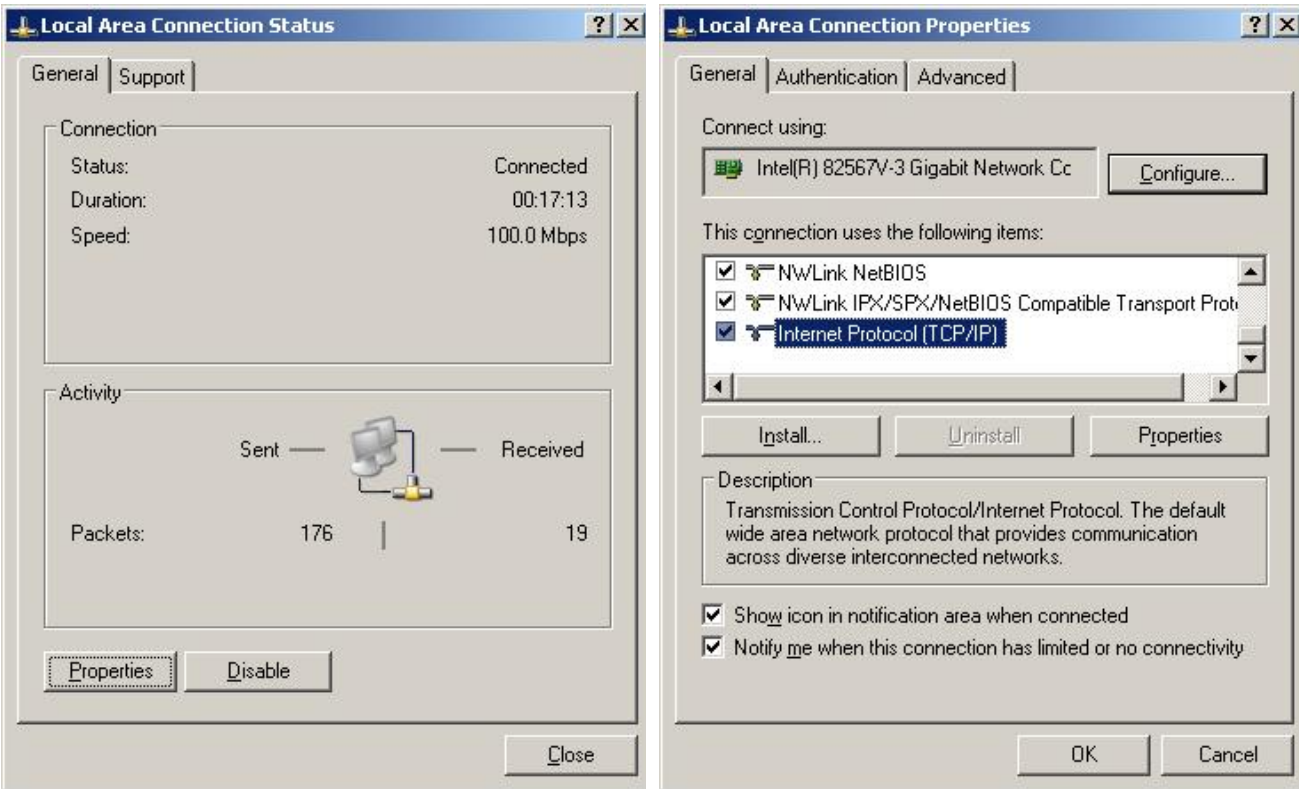
- o Double click on *Network Connections* icon:



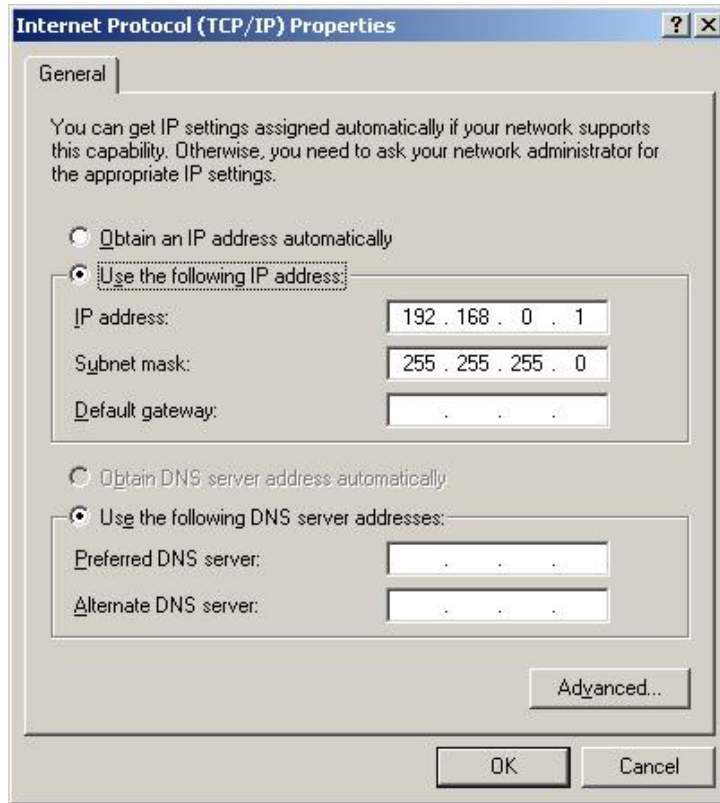
- o In the Network Connection screen double click on the *Local Area Connection*:



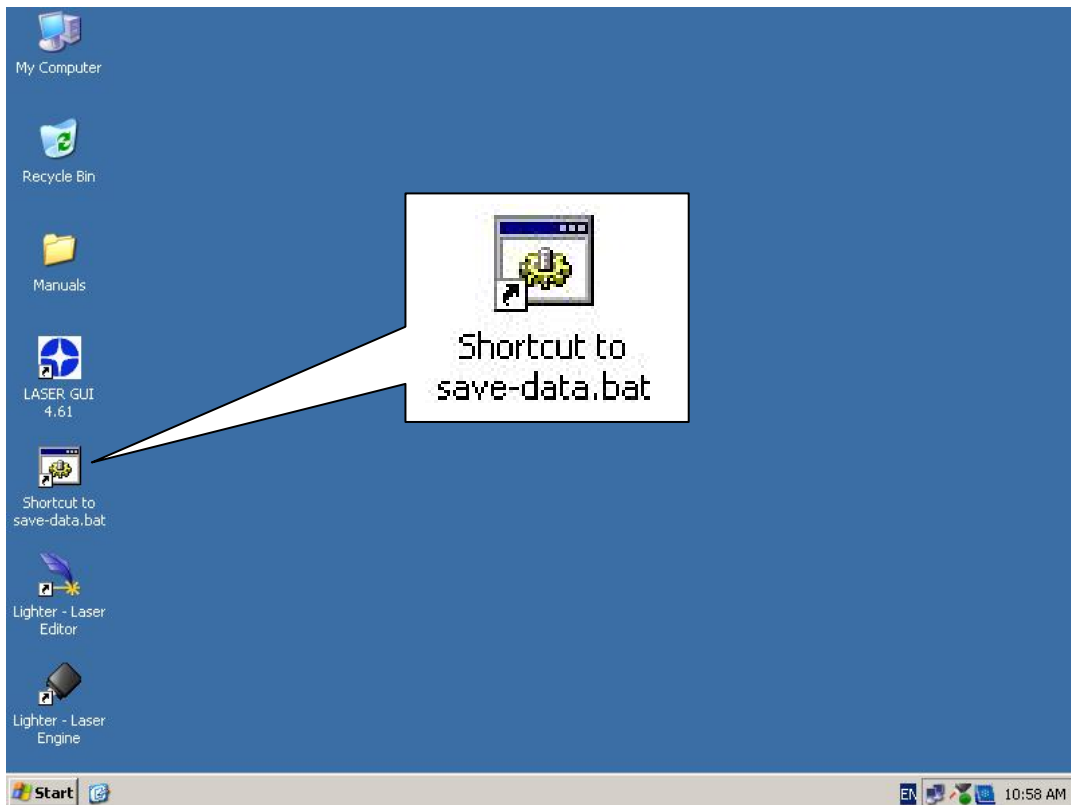
- o In the Local Area Connection Status screen select *Properties* button
- o In the Local Area Connection Properties screen double click on *Internet Protocol (TCP/IP)*



- o In the Internet Protocol (TCP/IP) Properties you can change the IP address and configuration:



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



- Restart the system in order to save the new settings:



3.1.1.3 Change the Video setting

Arex laser system allows you to change the Video setting.



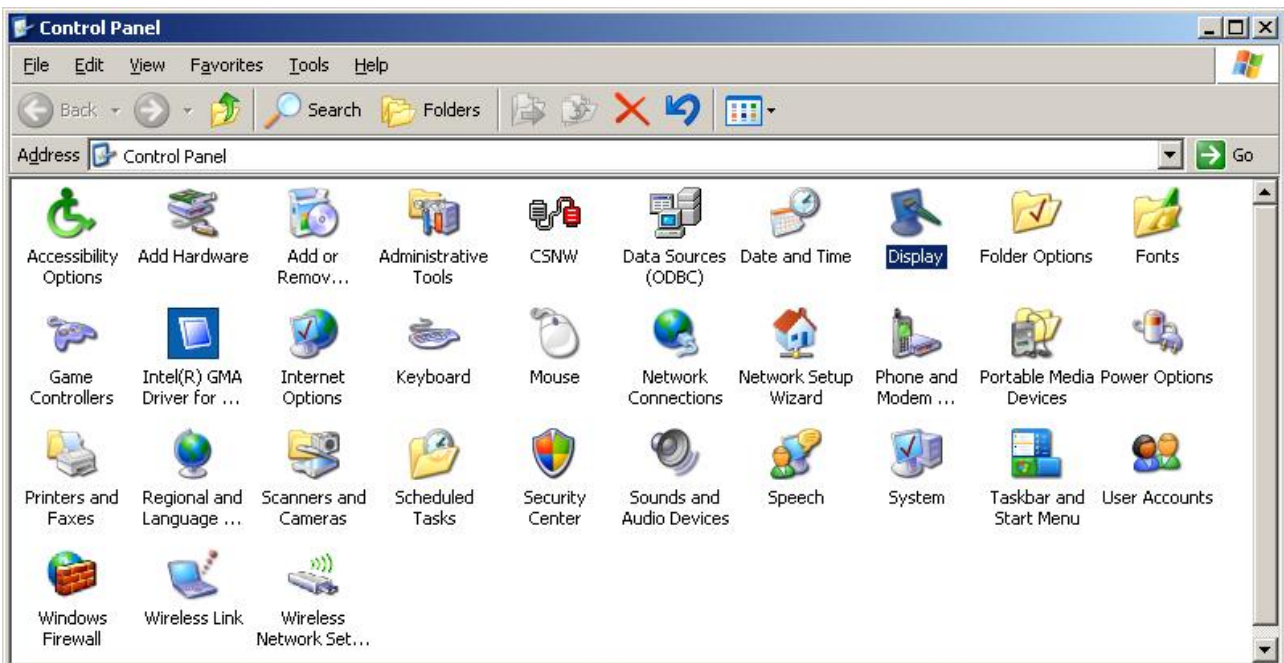
NOTE:

In order to perform this setting it is necessary to connect mouse, keyboard and monitor to the AREX laser system (2.7.6).

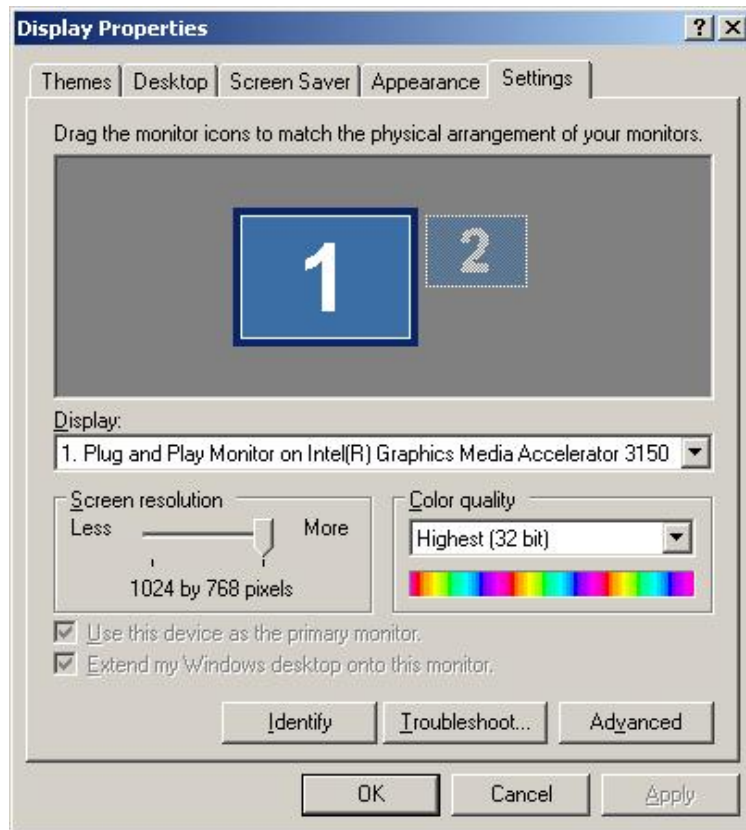
- Turn OFF and ON the Arex laser system and wait the end of the booting-up (the status led on the rack must be steady green)
- From the main screen click on *START/Control Panel*



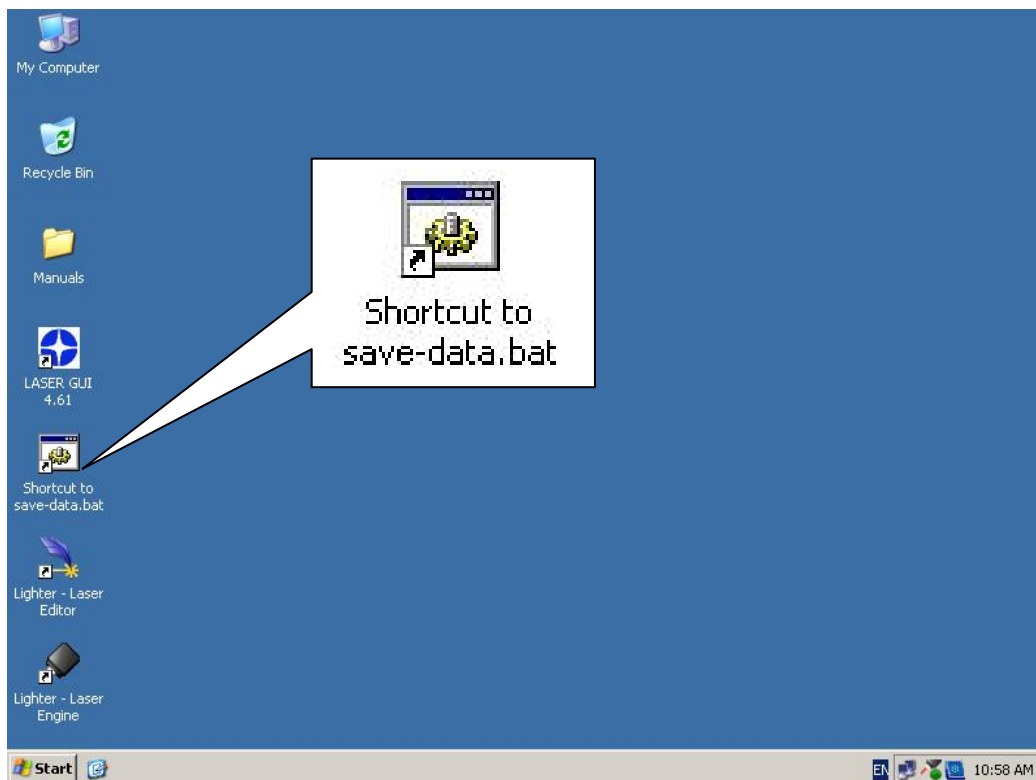
- Double click on *Display* icon:



- o In the Display Properties screen select the desired Screen resolution and Color quality:



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

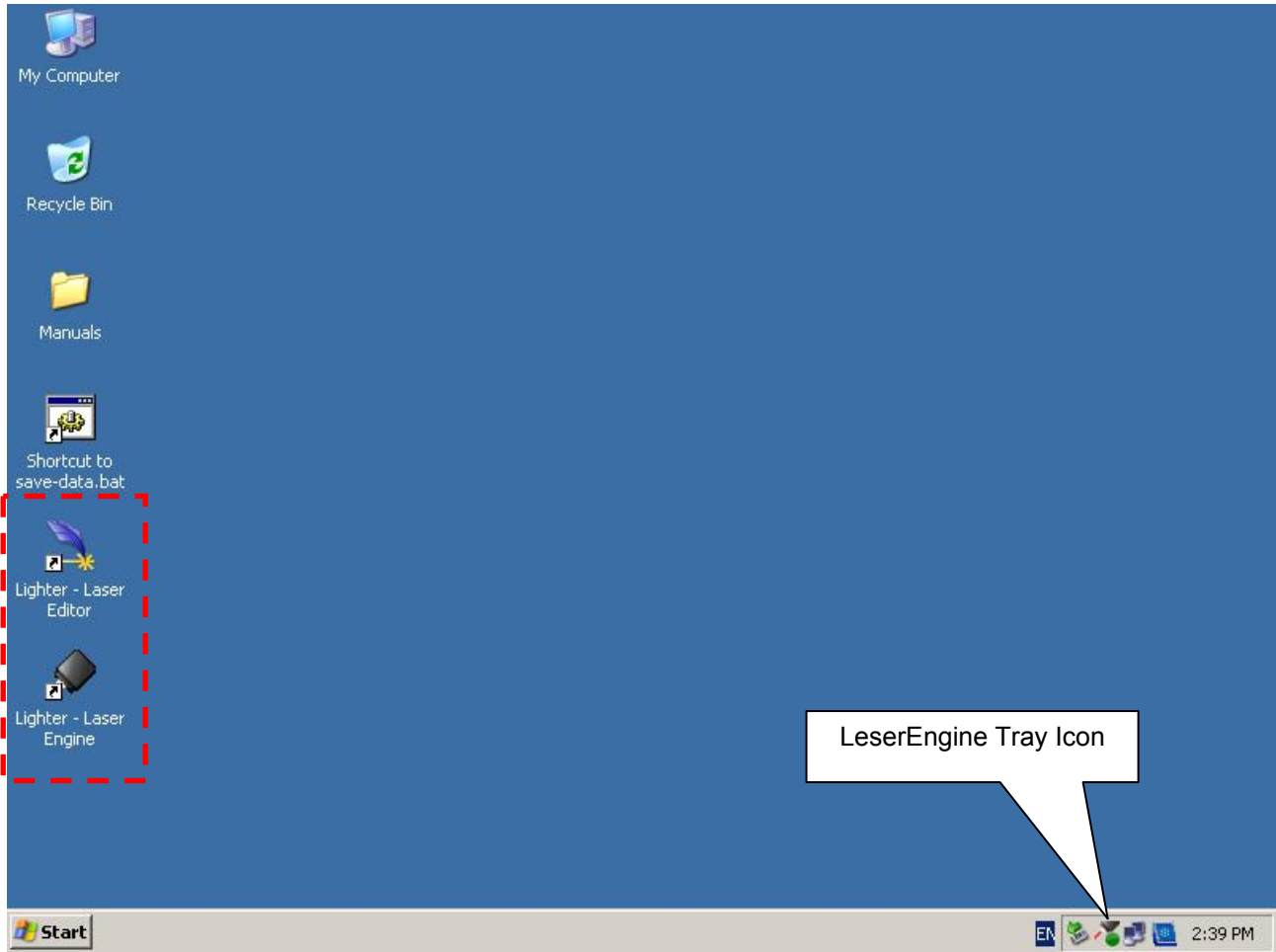


- Restart the system in order to save the new settings:



3.1.1.4 Starting operating in Local Control mode

Connecting monitor, mouse & keyboard to the device (see page 26) allows the operator to access the console witch contains the instruments to operate with laser.



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.

With Laser Editor you can:

- edit graphic layouts
- set laser parameters
- set device configuration
- control the integrated I/O module for axis management
- create automated procedures
- create programs using Lighter programming language



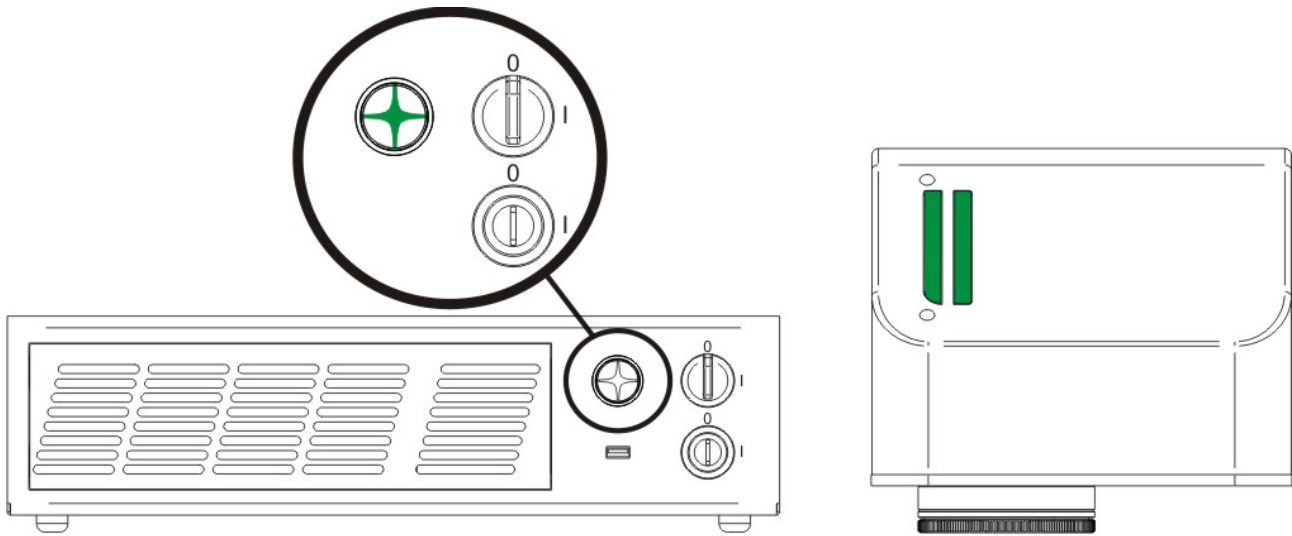
Laser Engine is an application automatically loaded at start-up that allows to operate on the laser device. Laser Engine is present in the tray icon.

With Laser Engine you can:

- watch the device 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)

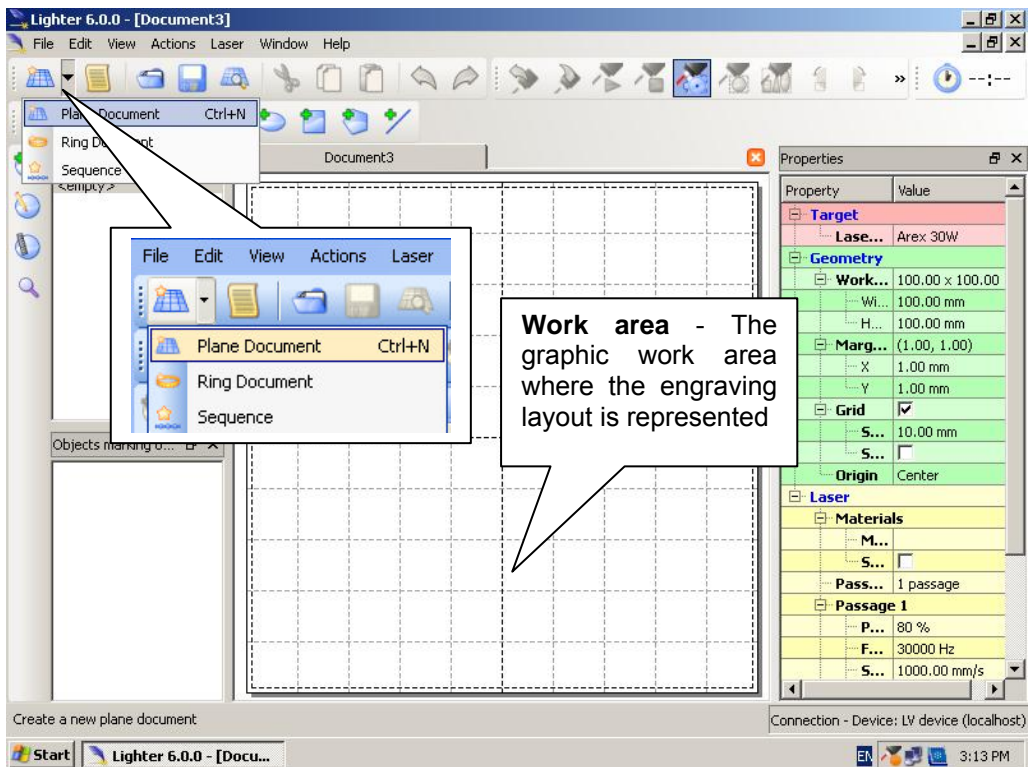
CHAPTER 3

How to create and edit your first graphic document

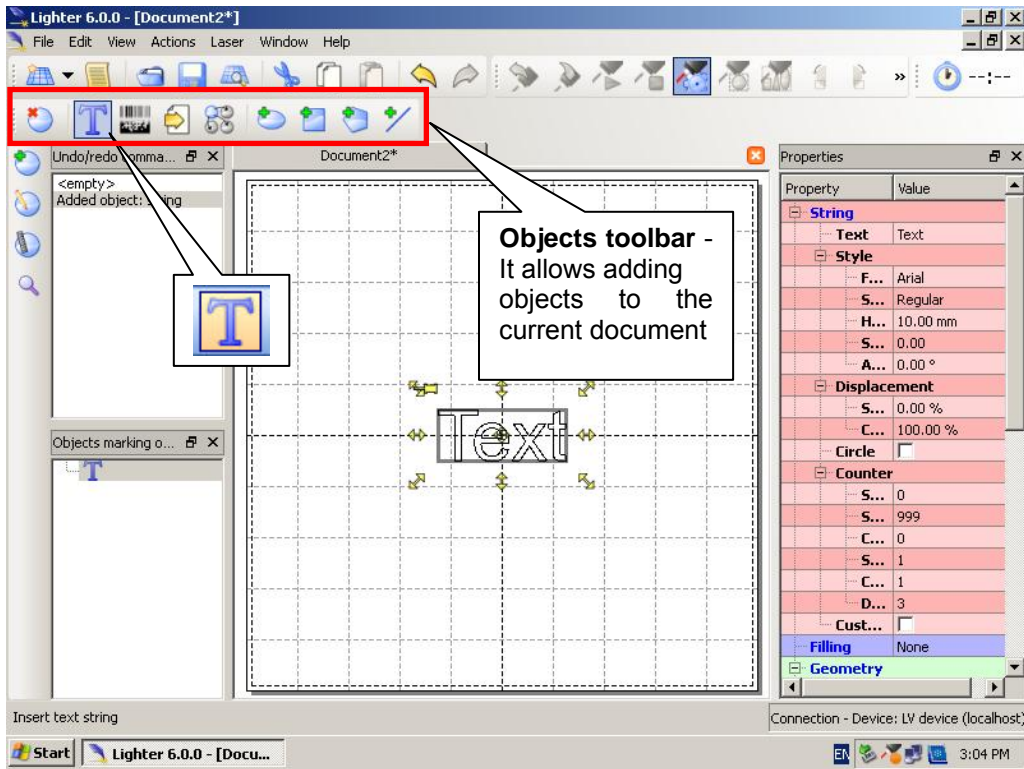


Double click on LaserEditor icon to start the layout editor application

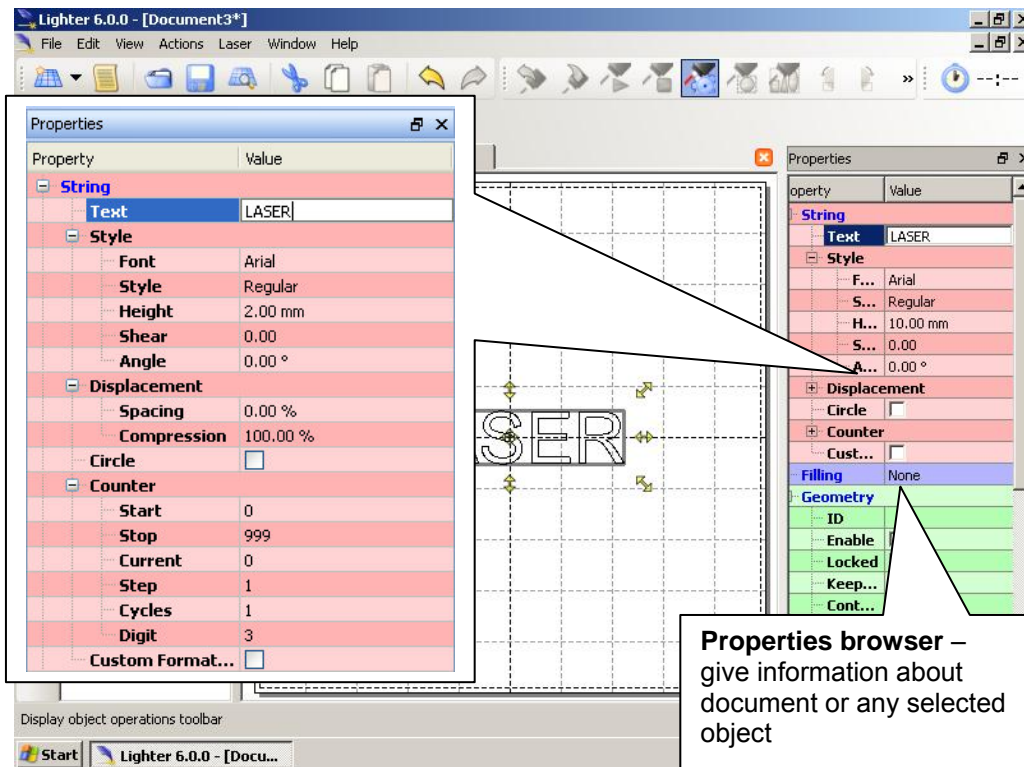
Click on the document type selector and choose *Plane Document*:



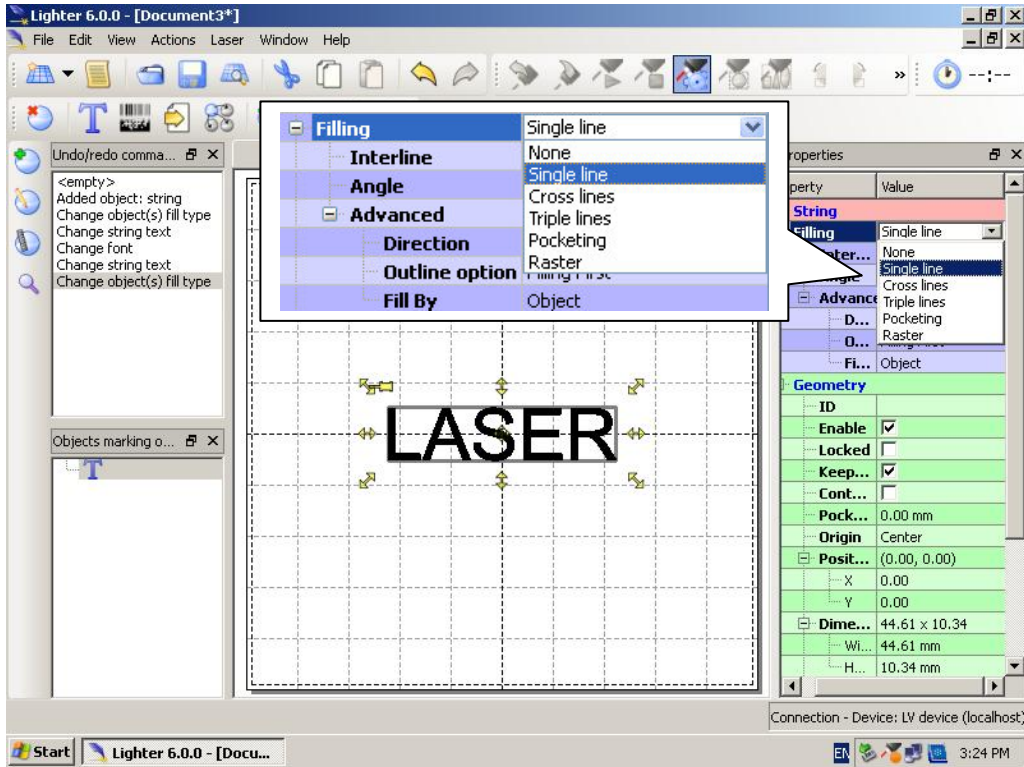
Click on the *Text String* icon in the Object toolbar to add a string object to the plane:



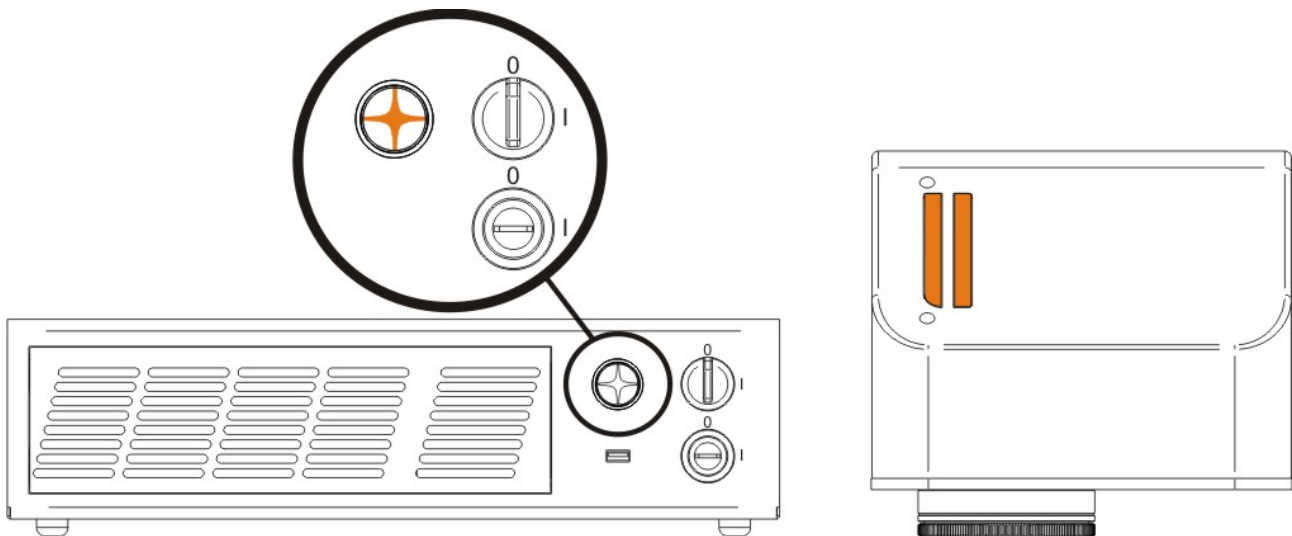
Edit String property like value, font, style, etc using the *Properties browser*.



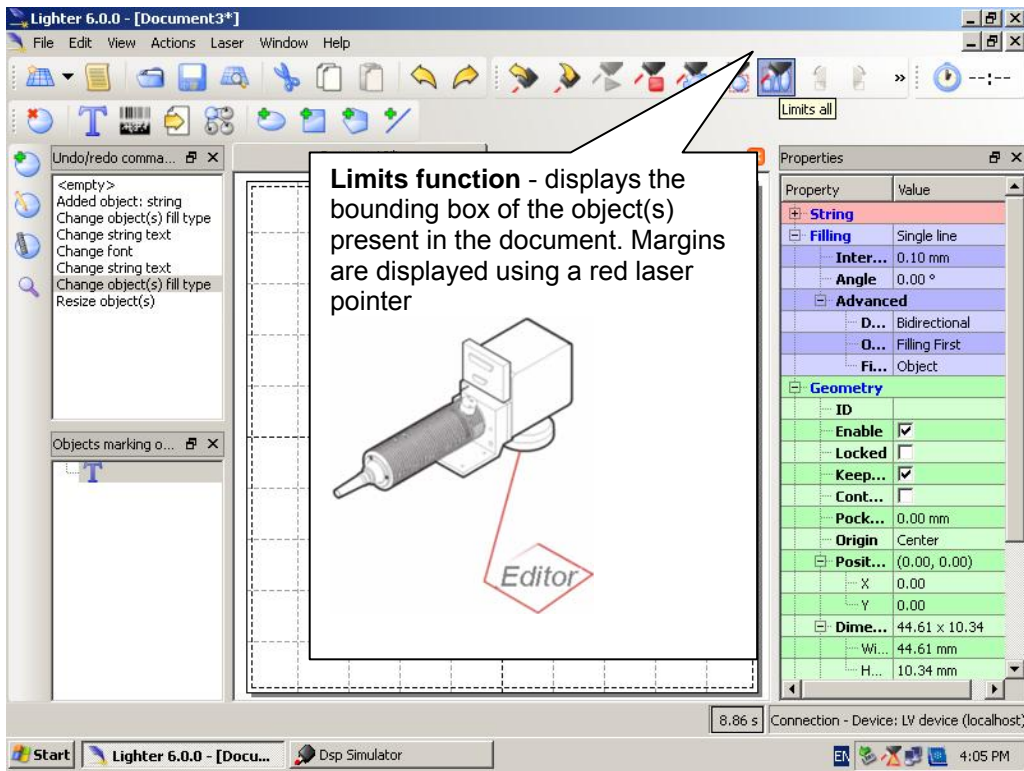
Edit Filling property like filling type, interline, etc using the *Properties* browser.



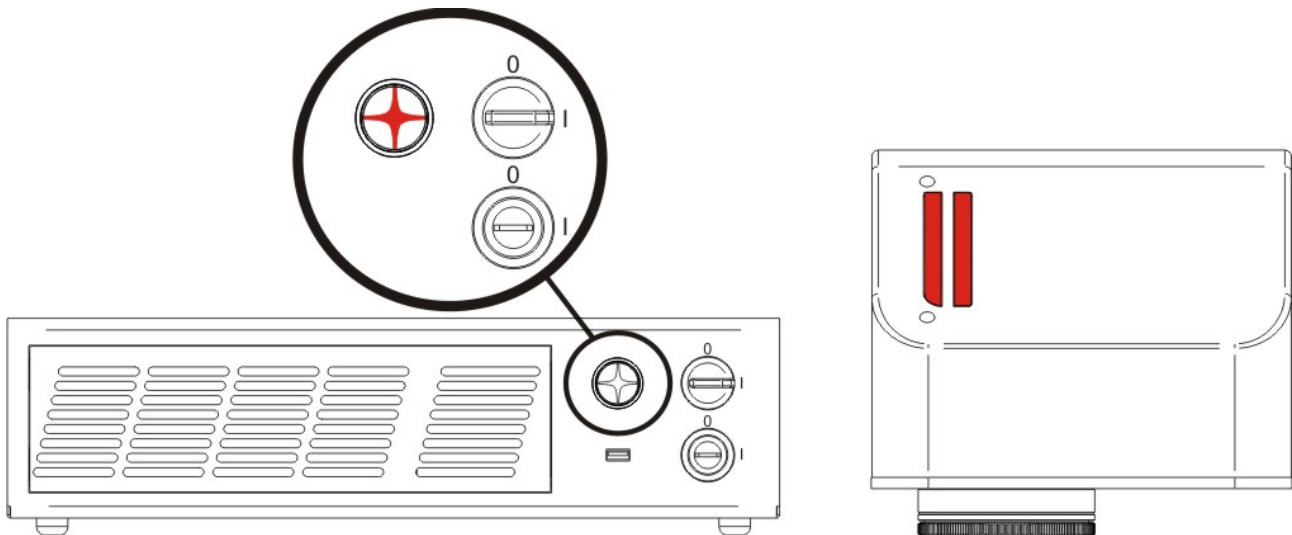
How to Test and engrave your document



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

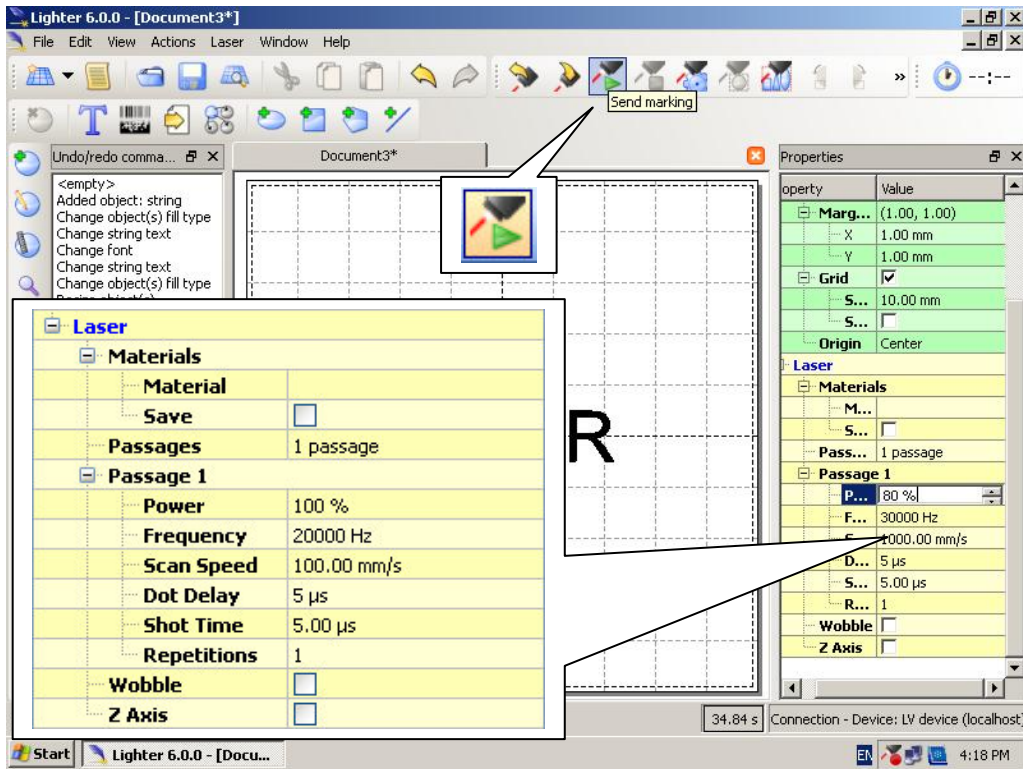


Adjust the Laser parameters using the *Properties browser*



CHAPTER 3

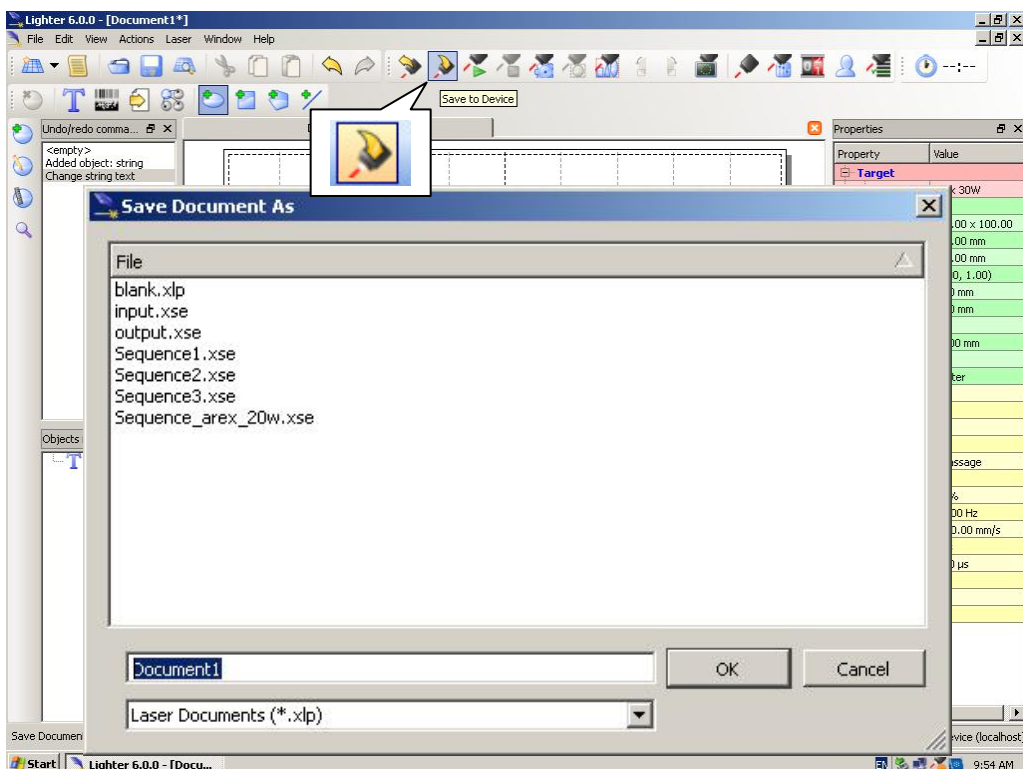
Press *Send Marking* button in the *Laser Toolbar* to start the engraving process:



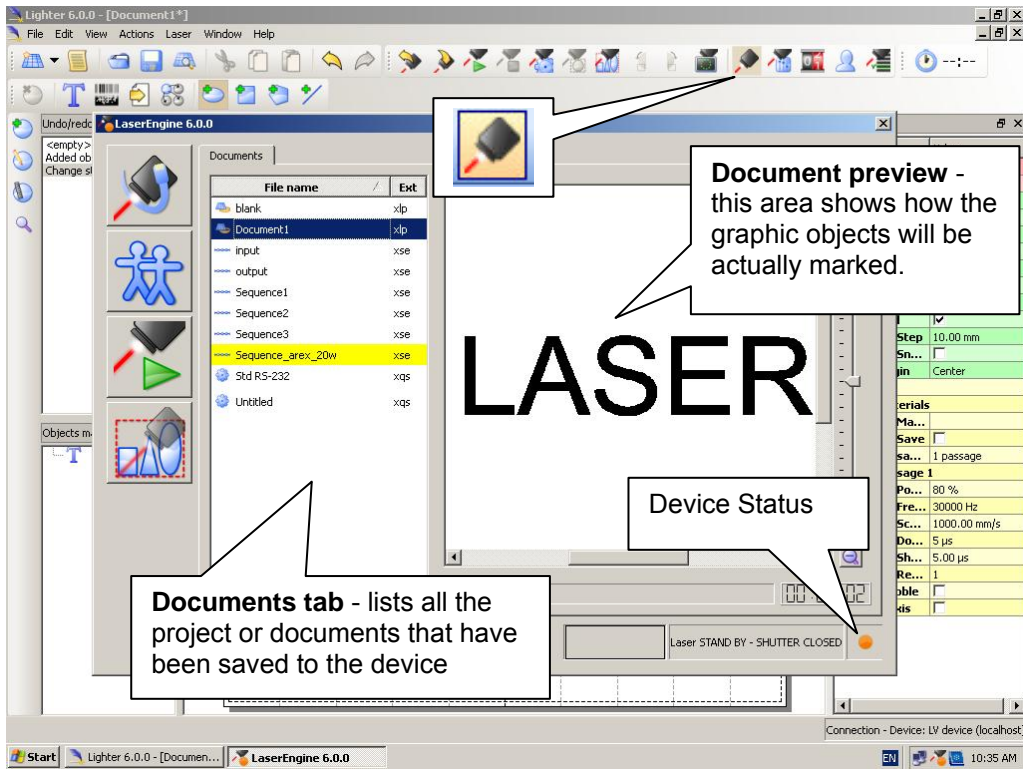
How to use external signals to engrave your document

Automate the marking process means that documents are 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:



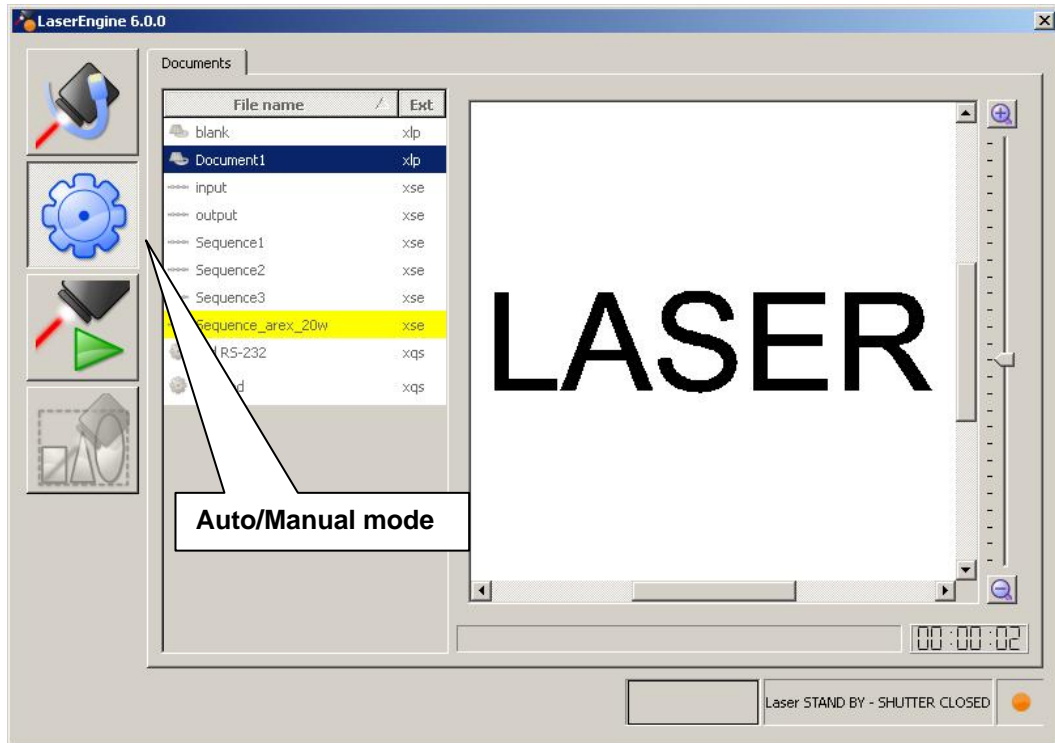
Click on *Show LaserEngine* button to display LaserEngine window:



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:



Device is ready to mark document using external START & STOP signals:



4 TECHNICAL SPECIFICATION

4.1 EXTERNAL CONNECTORS SPECIFICATIONS

4.1.1 INTERLOCK PANEL CONNECTOR

Interlock **disable** the Class4 laser source inside the Arex.
 Interlock internal circuit is designed to comply with the single fault condition. Type SWITCHCRAFT TB Series male Tini Q-G (Mini XLR) panel mount connector, 4 ways.

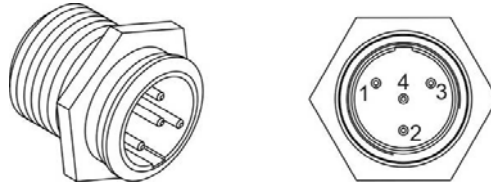


Figure 34: Male panel plug cod. TB4M (front view).

PIN	SYMBOL	TYPE	DESCRIPTION
1	VCC	OUTPUT	5V DC power supply
2	INTERLOCK A	INPUT	Interlock signal A
3	GND	GND	Ground
4	INTERLOCK B		Interlock signal B

Table: Interlock plug Pin-out.



NOTE:

The 4 way **interlock connector** implements the **double and redundancy safety interlock** (60825 compliant). See figure 43.

4.1.2 INTERLOCK CONNECTOR

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

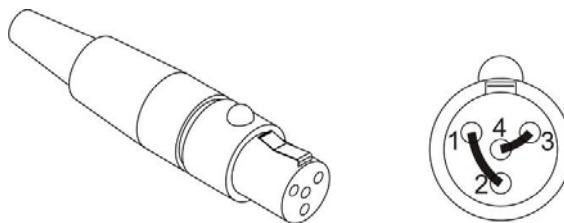


Figure 35: Female cable mount connector cod. TY4F (solder view).



NOTE:

To restore the machine is necessary repeat the “Turning on sequence” without shutting down the machine. See Chapter 3.1 for more details.

4.1.3 COMMAND BOX CONNECTOR – PANEL SOCKET

Panel socket SUB-D, 25 ways, female.

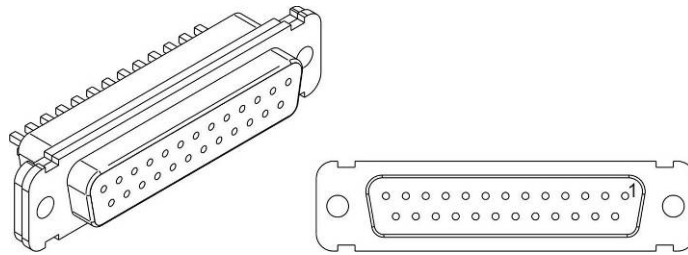


Figure 36: Female panel socket SUB-D 25 (frontal view).

PIN	SIGNAL	TYPE	DESCRIPTION
1	EXT_12V	Output power supply	12Vdc output supply (max 250mA)
2	EXT_ENABLE_B	Digital Input	Secondary external enable contact (see paragraph 4.1.5)
3	GOOD/BAD	Digital Output	Not used
4	EXT_12V	Output power supply	12Vdc output supply (max 250mA)
5	EXT_12V	Output power supply	12Vdc output supply (max 250mA)
6	EXT_12V	Output power supply	12Vdc output supply (max 250mA)
7	EXT_12V	Output power supply	12Vdc output supply (max 250mA)
8	EXT_ENABLE_A	Digital Input	Primary external enable contact (see paragraph 4.1.5)
9	BUSY	Digital Output	Laser Busy signal (active during marking) Closed = ON ; Open = OFF
10	REMOTE INTERLOCK	Digital Input	Remote Interlock Presence (High = OK ; Low = FAULT) (see paragraph 4.1.5)
11	START MARKING	Digital Input	Start marking external command (High Level pulsed signal) (see paragraph 4.1.5)
12	EXT_KEY	Digital Input	System enable signal (KEY) (High = System ON ; Low = OFF) (see paragraph 4.1.5)
13	STOP MARKING	Digital Input	Stop marking external command (High Level pulsed signal) (see paragraph 4.1.5)
14	RESERVED	Digital Input	Not used
15	RESERVED	Digital Input	Not used
16	RESERVED	Digital Input	Not used
17	END	Digital Output	End marking signal (active at the end of marking) Closed = ON ; Open = OFF
18	POWER_ON	Digital Output	Open when laser is OFF Close when laser is STAND-BY
19	GND	GND	GND
20	SYSTEM_ALARM	Digital Output	Main alarm signal (source laser is "ready to mark") Closed = System Error; Open = System Ready
21	GND	GND	GND
22	ENABLE_OUT	Digital Output	Open when enable contact is OPEN Closed when enable contact is CLOSED
23	SW_READY *	Digital Output	Software Ready (See Paragraph 4.1.6.3 for more information)
24	GND	GND	GND
25			

TABEL 1: Pin-out command box connector.

NOTE: Connection example in paragraph 4.1.9

4.1.4 AXES CONNECTOR (I/O CONTROL)

Panel socket SUB-D, 25 ways, male.

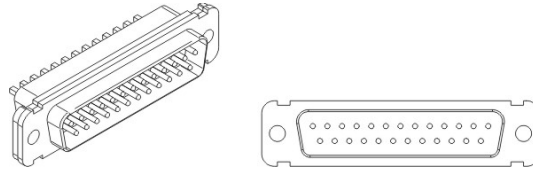
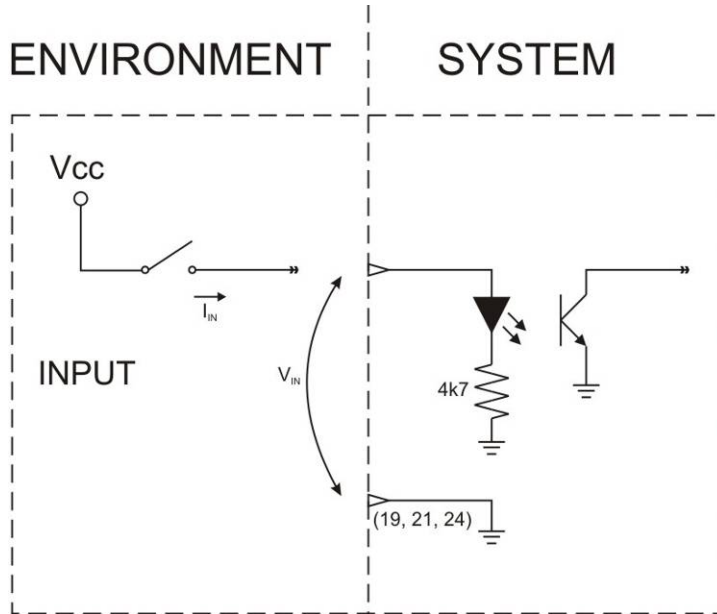


Figure 37: Male panel socket SUB-D 25 (frontal view).

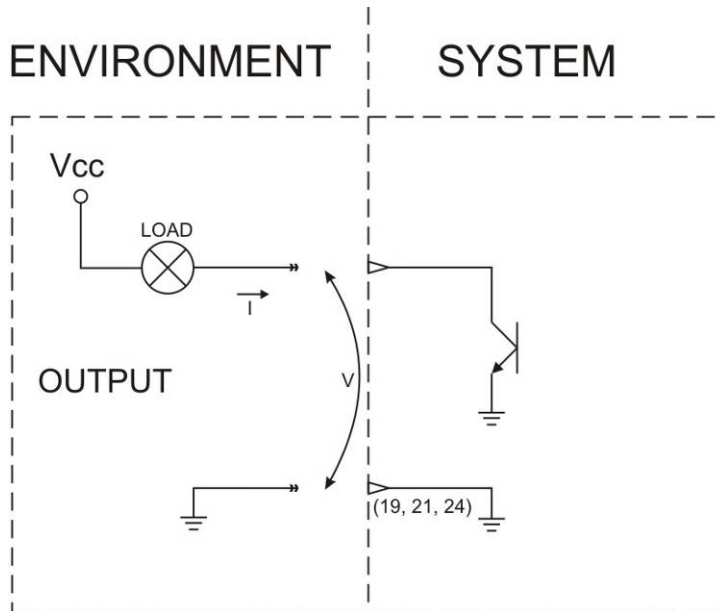
PIN	SIGNAL	TYPE	DESCRIPTION
1	EXT_12V	Output Power supply	12VDC output supply (max 250mA)
2	STEP Y (or OUTPUT_0*)	Digital Output	Y-Axis drive step signal (Clock) for axis control or generic output (see paragraph 4.1.5)
3	STEP Z (or OUTPUT_2*)	Digital Output	Z-Axis drive step signal (Clock) for axis control or generic output (see paragraph 4.1.5)
4	BRAKE X (or OUTPUT_4*)	Digital Output	X-Axis Electromechanical brake release signal (optional). Active (high) during drive motion or generic output
5	BRAKE Y (or OUTPUT_6*)	Digital Output	Y-Axis Electromechanical brake release signal (optional). Active (high) during drive motion or generic output
6	BRAKE Z (or OUTPUT_8*)	Digital Output	Z-Axis Electromechanical brake release signal (optional). Active (high) during drive motion or generic output
7	ZERO X (or INPUT_0*)	Digital Input	Mechanical zero sensor input. The X-Axis reference mechanical zero search is stopped when this signal is activated (positive voltage)
8	ZERO Y (or INPUT_1*)	Digital Input	Mechanical zero sensor input. The Y-Axis reference mechanical zero search is stopped when this signal is activated (positive voltage)
9	ZERO Z (or INPUT_2*)	Digital Input	Mechanical zero sensor input. The Z-Axis reference mechanical zero search is stopped when this signal is activated (positive voltage)
10	DISABLE X (or INPUT_3*)	Digital Input	X-Axis disable signal. When active, the corresponding step signal remains in the status prior to activation or generic input.
11	DISABLE Y (or INPUT_4*)	Digital Input	Y-Axis disable signal. When active, the corresponding step signal remains in the status prior to activation or generic input.
12	DISABLE Z (or INPUT_5*)	Digital Input	Z-Axis disable signal. When active, the corresponding step signal remains in the status prior to activation or generic input.
13	GND	Ground	GND
14	STEP R (or OUTPUT_12*)	Digital Output	R-Axis drive step signal (Clock) for axis control or generic output
15	STEP X (or OUTPUT_1*)	Digital Output	X-Axis drive step signal (Clock) for axis control or generic output
16	DIR Z (or OUTPUT_3*)	Digital Output	Z-Axis drive direction signal or generic output
17	DIR Y (or OUTPUT_5*)	Digital Output	Y-Axis drive direction signal or generic output
18	DIR X (or OUTPUT_7*)	Digital Output	X-Axis drive direction signal or generic output
19	INPUT 9	Digital Input	Generic Input
20	INPUT 8	Digital Input	Generic Input
21	ZERO R (or INPUT_7*)	Digital Input	Mechanical zero sensor input. The R-Axis reference mechanical zero search is stopped when this signal is activated (positive voltage)
22	DISABLE R (or INPUT_6*)	Digital Input	R-Axis disable signal. When active, the corresponding step signal remains in the status prior to activation or generic input.
23	BRAKE R (or OUTPUT_9*)	Digital Output	R-Axis Electromechanical brake release signal (optional). Active (high) during drive motion or generic output
24	DIR R (or OUTPUT_11*)	Digital Output	R-Axis drive direction signal or generic output
25	GND	Ground	GND

*these input/outputs can be configured as “generic” I/O signals if step axis controller is not used.

4.1.5 INPUT/OUTPUT SIGNAL SPECIFICATIONS



	MIN	TYP	MAX
Logic Low (Off State)	0.0 VDC	0.0 VDC	2.0 VDC
Logic High (On State)	5.0 VDC	12.0 VDC	24.0 VDC
I_{IN} max	2.5mA type (@ 12VDC)		
Pulse Width	≥ 1ms (debounce)		



	MIN	TYP	MAX
V	-	12 VDC	48 VDC
I max	250mA		

4.1.6 COMMAND BOX LASER SIGNALS

4.1.6.1 Timing laser control signals

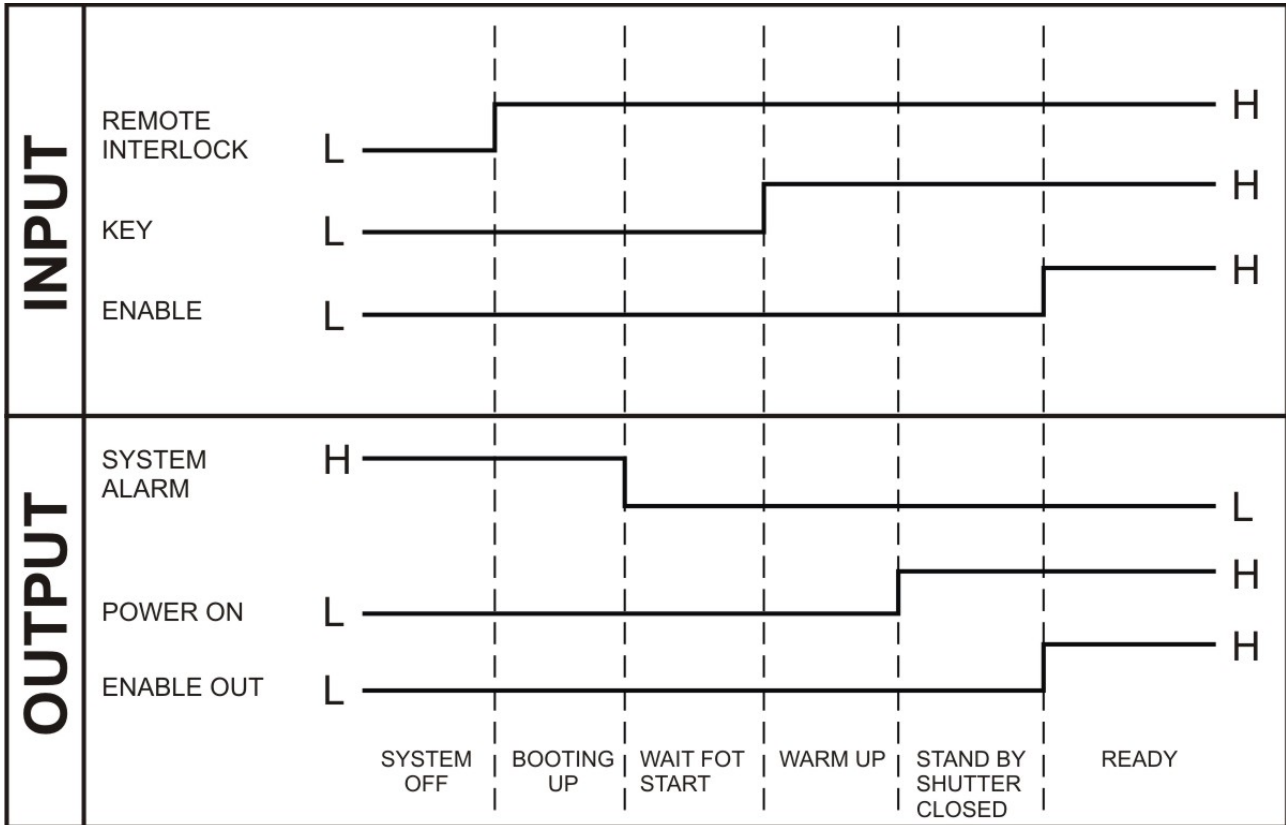


Figure 38: Timing control signals

4.1.6.2 Key and enable signal's scheme

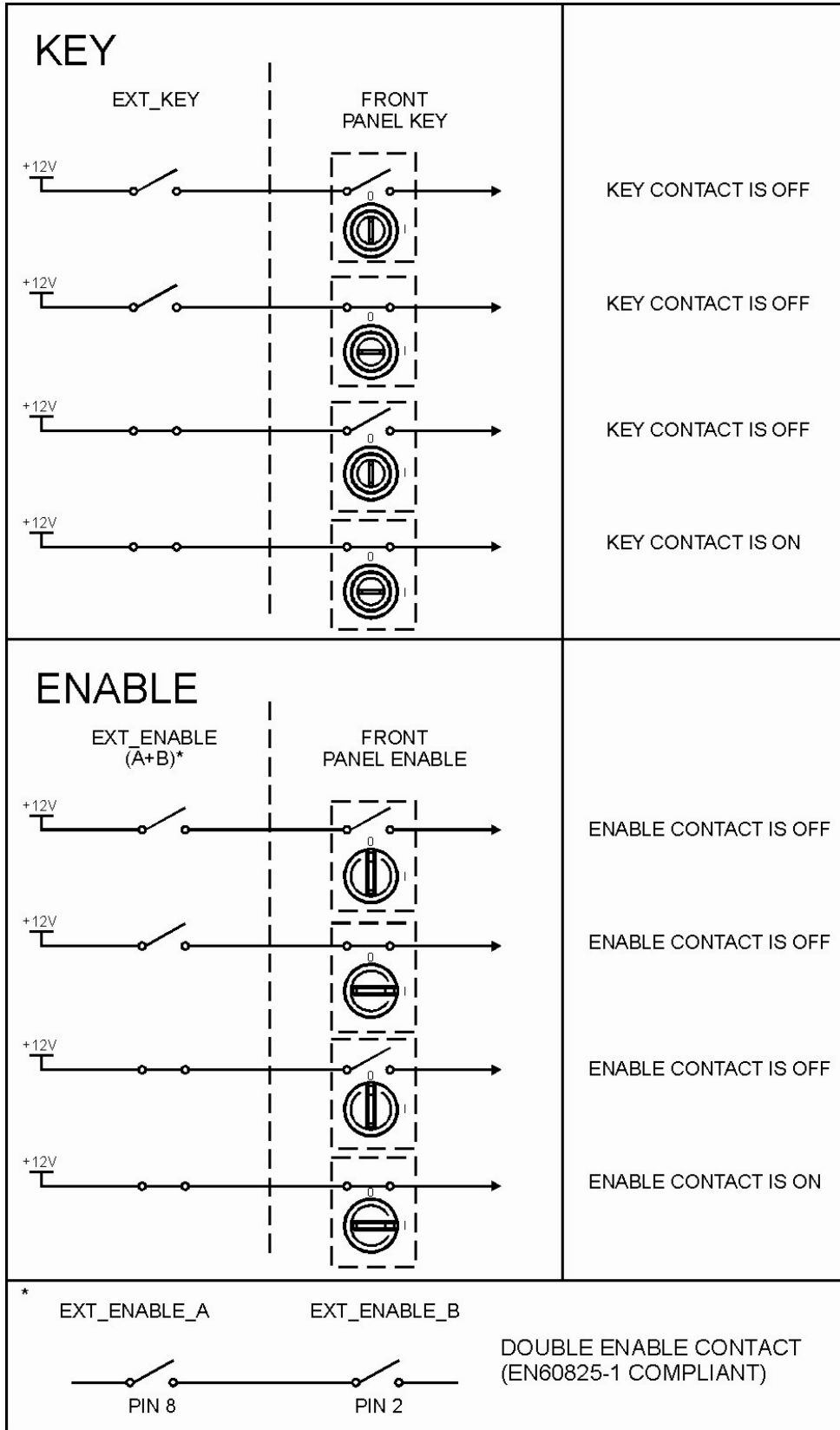


Figure 39: Key and Enable signal's scheme

4.1.6.3 Timing marking process signals

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

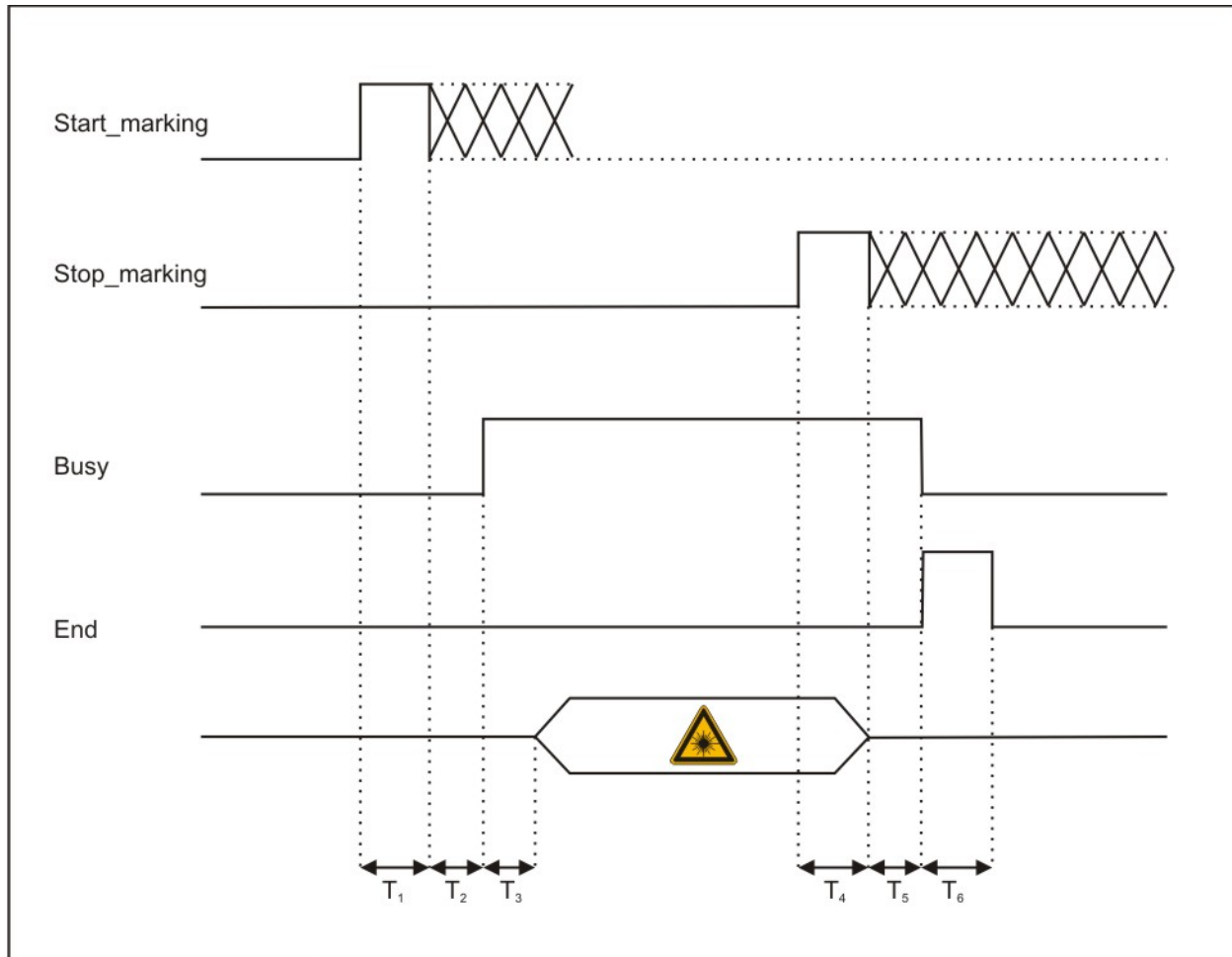


Figure 40: Timing signals

The time intervals in the diagram can all be programmed by a resolution of 1 ms.

T ₁	Start Time	For setting the minimum acceptable time for the start engraving signal
T ₂	Start Delay	For delaying engraving start
T ₃	Busy Advance	Busy signal corresponding to mark progress
T ₄	Stop Time	The minimum time for stop signal to stop the marking process
T ₅	End Delay	For delaying the Laser End signal with respect to laser emission
T ₆	End Time	For setting the Laser End activation time

NOTE:

The **SW_READY** signal is active in the following situations:

- document or sequence in AUTO mode (SW_READY_COMPATIBILITY = true)
- document or sequence in AUTO mode, KEY_ACTIVE, ENABLE_ACTIVE (SW_READY_COMPATIBILITY = false)
- script in AUTO mode and activation with "IoPort.setReady(true)".



CHAPTER 4

4.1.7 ENCODER CONNECTOR

Panel socket BINDER, 8 ways female, 763 series.

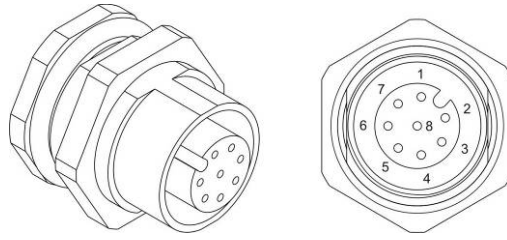


Figure 41: Female panel socket cod. 09-3482-87-08 (front view).

PIN	SYMBOL	TYPE	DESCRIPTION
1	Vcc	OUTPUT	12V DC power supply
2	GND	GND	Ground signal
3	ENC_A	INPUT	Encoder HTL A channel signal
4	GND	GND	Return signal for ENC_A
5	ENC_B	INPUT	Encoder HTL B channel signal
6	GND	GND	Return signal for ENC_B
7	NC	NC	NC
8	PAUSE	INPUT	Reporting stop encoder
BODY	SHIELD	SHILED	SHIELD

4.1.8 PHOTOCELL CONNECTOR

Panel socket BINDER, 4-way female, 763 series, M12. This layout allows to connect exclusively a PNP photocell in “dark-mode” configuration.

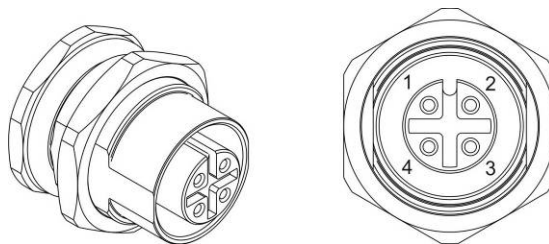


Figure 42: Female panel socket cod. 09-3482-87-04 (front view).

PIN	SYMBOL	TYPE	DESCRIPTION
1	GND	GND	Ground signal
2	VCC	POWER OUTPUT	12V DC power supply
3	VCC	POWER OUTPUT	12V DC power supply
4	PHOTOCELL	DIGITAL INPUT	PNP photocell signal

4.1.9 CONNECTION EXAMPLES

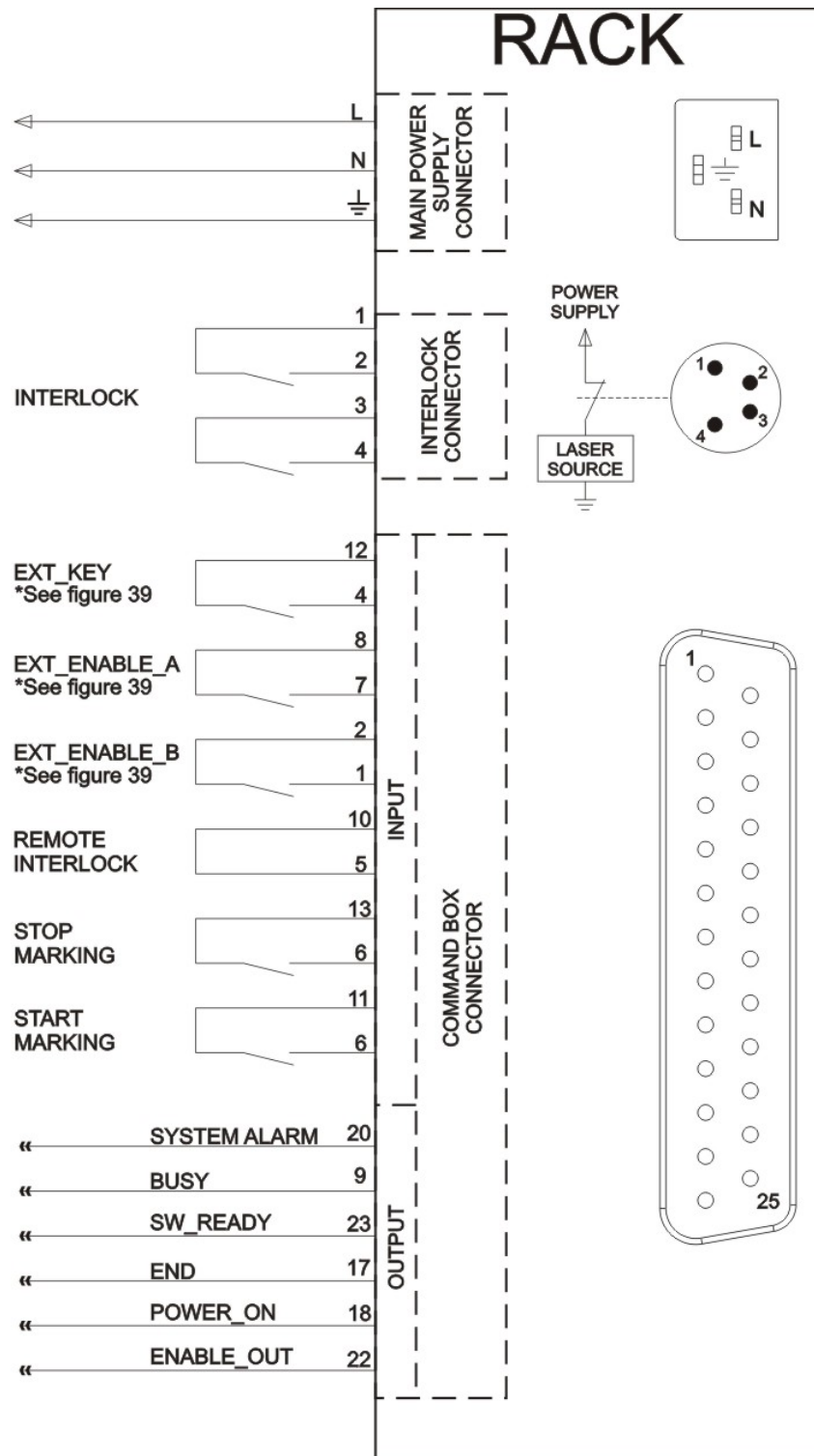


Figure 43: Connection examples.



NOTE:

The 4 way **interlock connector** implements the **double and redundancy safety interlock** (60825 compliant).

EXAMPLE OF APPLICATIONS AND EXTERNAL CONNECTIONS

Handy and simple installation of Arex allow to make it easy to use also in line production applications.

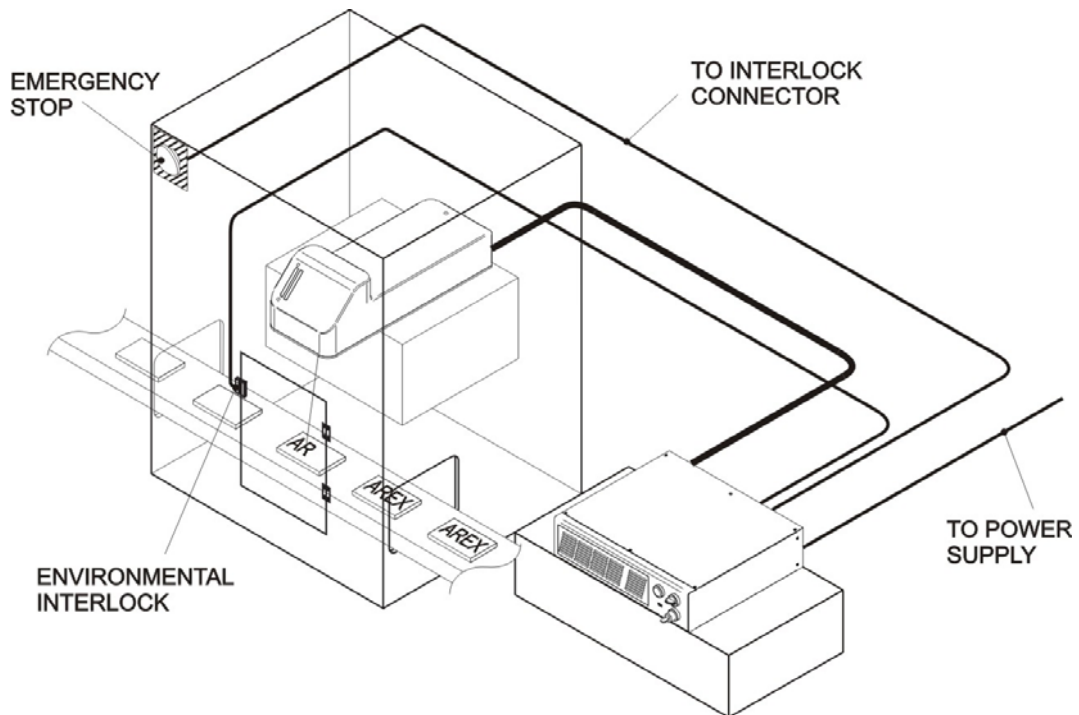


Figure 44: Example of application.

According to have a device in safety mode (see Appendices for more details) we recommended to install Arex device like figure below in order to limit laser output area. 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.

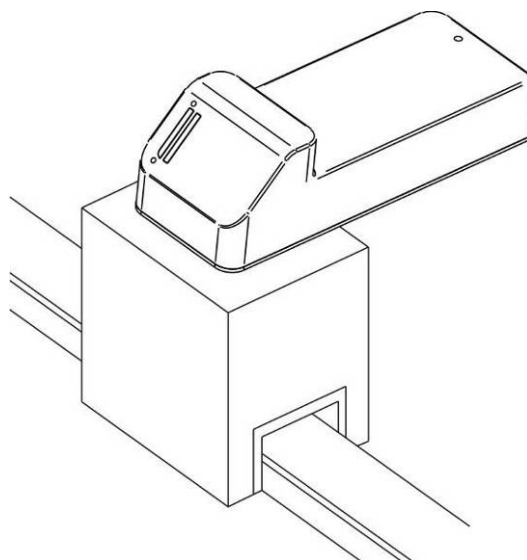


Figure 45: Safety mode example.

4.2 MAINTENANCE

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

The maintenance activities must be done in respect of 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
Scan Head lens	Check / Clean	Weekly: wipe gently with a dry cloth (or acetone / ethanol) or clean it with air blowing
Rack Air filters	Clean / Replace	Every 3 months (according to the environment and frequency of use)

4.2.1 SCAN HEAD LENS CLEAN PROCEDURE

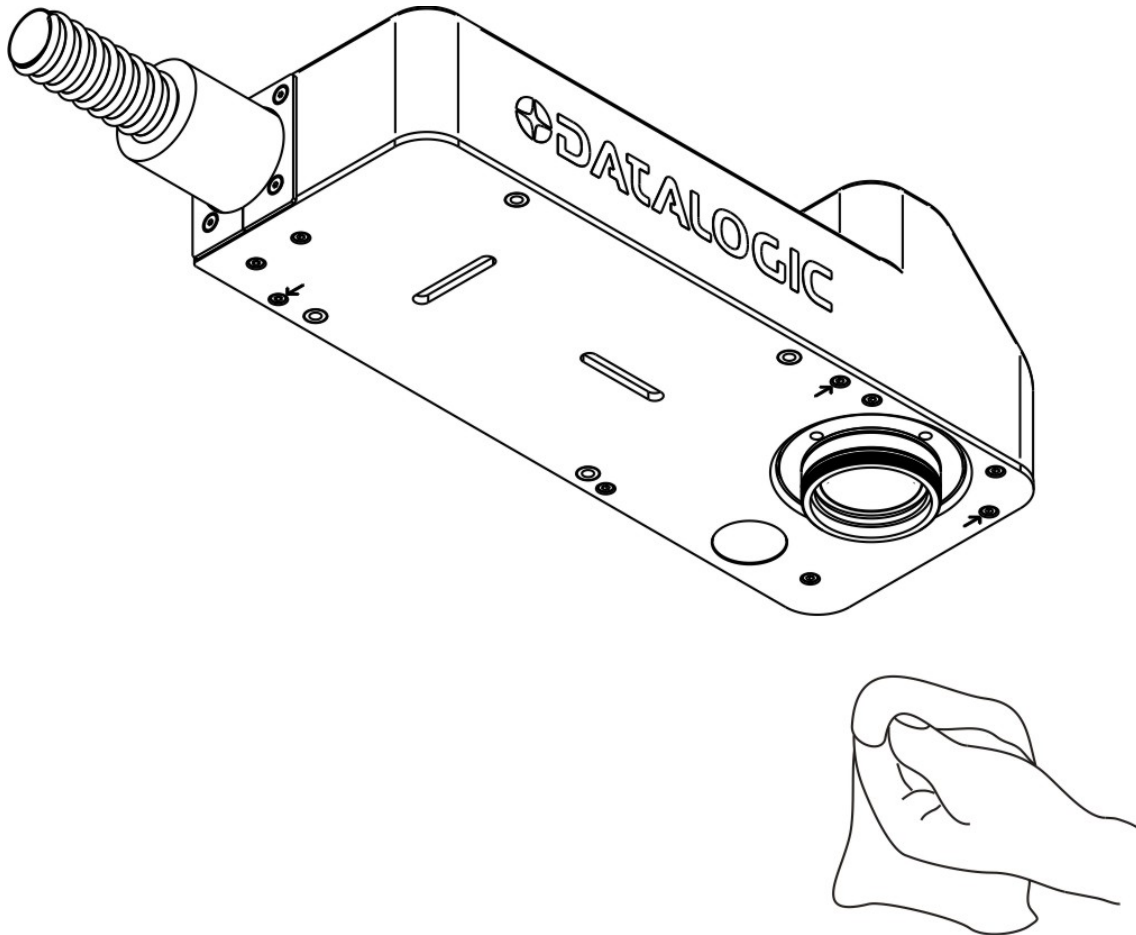


Figure 46: Cleaning laser output.

4.2.2 CLEAN AIR FILTER PROCEDURE

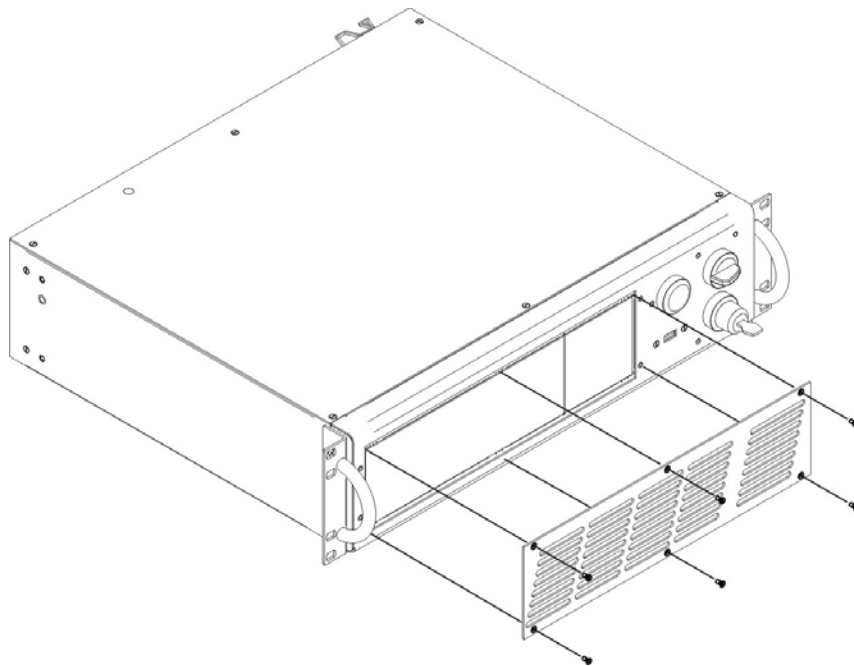


Figure 47: Clean air filter procedure.



WARNING:
Disconnect AC power cable before starting this operation!



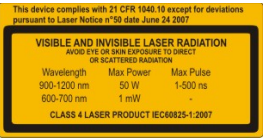




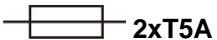
1. Turn off key switch on controller unit
2. Disconnect AC power cable
3. Loosen screws of front panel and remove them
4. Remove filter
5. Clean filter with air blow or with neutral detergent and air-dry it
6. Reinstall the filter and protective cover



NOTE:
DO NOT install wet filter!

7. If filter cannot be cleaned, replace the filter
8. Suitable filter area available as spare parts

APPENDIX A

LABEL	DESCRIPTION
	<p>Identification label</p>
	<p>Warning logotype (Laser)</p>
	<p>Laser Label (Scan Head) 30 W*</p>
	<p>Aperture Label</p>
	<p>Label for non-interlock protective housing</p>
	<p>Caution, possibility of electric shock</p>
	<p>USB plug.</p>
<p>0 - I</p>	<p>KEY/ENABLE Positions</p>
<p>COMMAND BOX</p>	<p>Command Box connector.</p>
<p>AXES (I/O)</p>	<p>Control Axes connector.</p>
<p>INTERLOCK</p>	<p>Interlock connector.</p>
<p>LAN</p>	<p>LAN connector.</p>
<p>RS232</p>	<p>RS232 connector.</p>
<p>VGA</p>	<p>VGA connector.</p>
<p>KEYB</p>	<p>Keyboard connector.</p>
<p>PHOT</p>	<p>Photocell connector.</p>
<p>ENC</p>	<p>Encoder connector.</p>
	<p>Fuses.</p>

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

APPENDIX A

POSITIONING OF EXTERNAL LABELS

Positioning of labels on the Arex control rack:

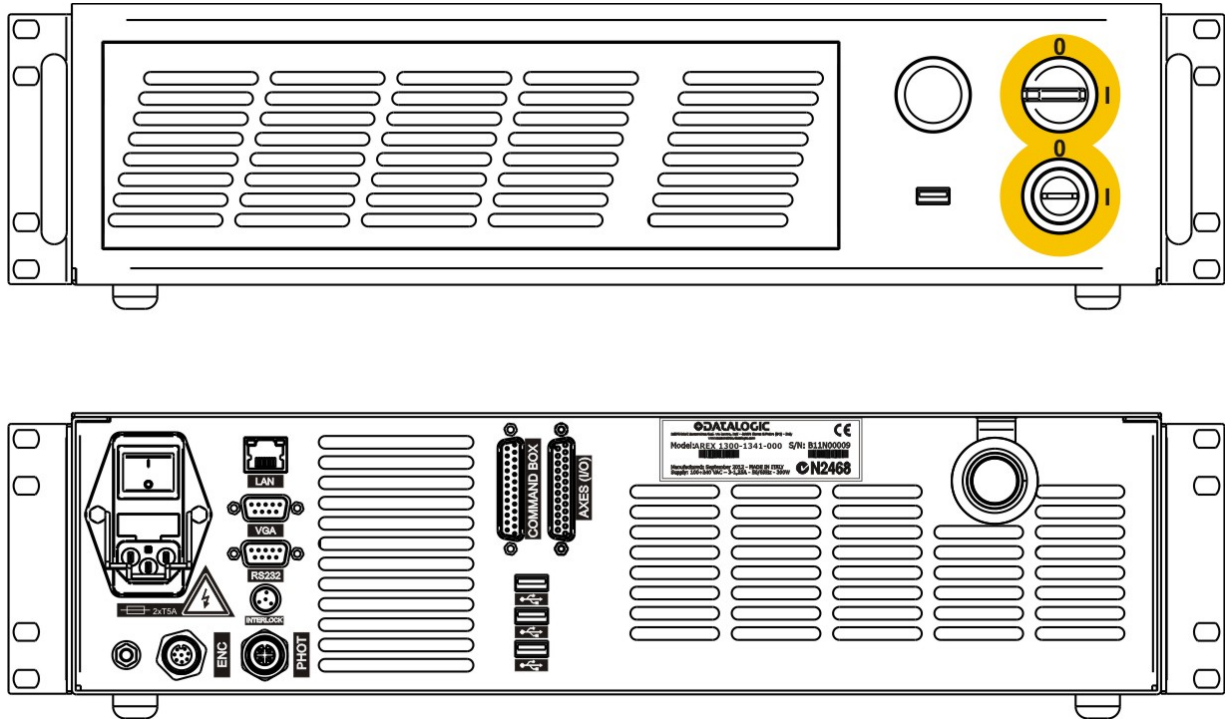


Figure 48: External labels rack location.

Positioning of labels on the Scan Head:

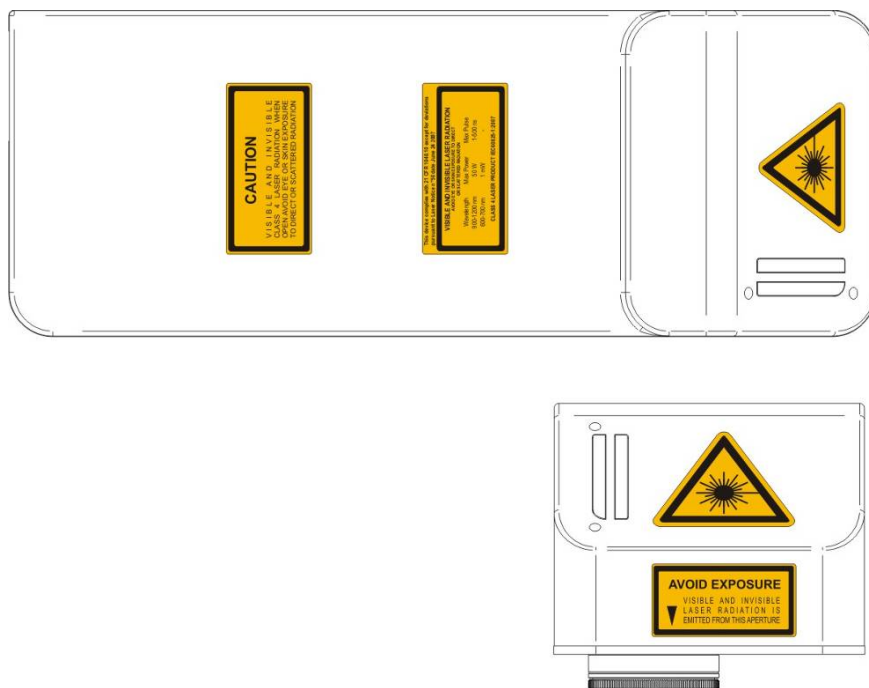


Figure 49: External labels Scan Head location.

APPENDIX B: STANDARDS

LASER STANDARDS

The Arex is designed to comply with the applicable sections of these laser standards:

EU : EN60825-1
USA : 21 CFR 1040.10

Arex is classified as Class 4 Laser Product.

Datalogic Automation S.r.l., as manufacturer of Arex laser source, provides a laser device 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 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

See Declaration of Conformity.



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 equipment without the expressed written approval of Datalogic could void the authority to use the equipment.

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

This equipment has been tested and found to Comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment 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 equipment 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: GUIDE FOR SYSTEM INTEGRATOR

Arex products are classified as Class 4 Laser product. They are intended to be installed in a system by system integrator/OEMs which has the final responsibility of the end product Classification.

Final system MUST comply to all requirements in order to classify the system as:

- CLASS 1 LASER PRODUCT if end user could be exposed to a radiation not exceed the AEL for Class 1 during marking operation (1070nm).
- CLASS 2 LASER PRODUCT if end user is not exposed to a radiation during marking but could be exposed to the radiation not exceeding the AEL for Class 2 during focusing and aiming (700nm).

Arex products are designed to easily fulfil all the requirement as per EU/USA standards.

Below a YES/NO table for features of Class 4 Laser. A "NO" in the Arex column means that the feature is available through dedicated connector and MUST be completely implemented by the system integrator/OEM.

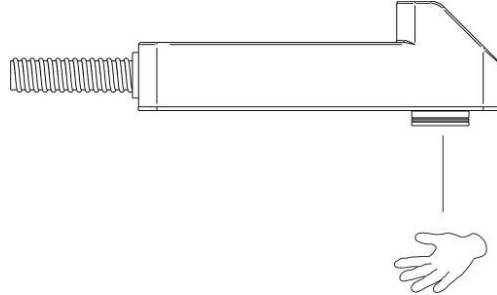
FEATURE	LOCATION/DESCRIPTION	required by USA STANDARDS	required by EU STANDARDS	AREX
KEYSWITCH	RACK On/Off key switch controls power to laser electronics. Key can not be removed from switch in "On" position	YES	YES	YES
SHUTTER FUNCTION	OUTPUT WINDOW Beam stop or attenuator	YES	YES	NO
LASER ON INDICATOR	- Panel Indicator (RED) - Scan head (RED) Indicates that laser is ready to emit according to the state	YES	YES	YES
	- Panel Indicator (RED) - Scan head (RED) Indicates that laser is actively lasing	YES	YES	YES
DELAY	RACK User selectable delay after ENABLE INPUT	YES	NO	YES
Power Fail Lockout	RACK Disable current driver/laser output if input power is removed then later reapplied (AC or DC power supply failure or remote interlock actuation) while key switch is in "ON" position	YES	NO	YES
Remote Interlock	Panel connection Disables current driver/laser output when a remote interlock switch on an equipment door or panel is opened	YES	YES	YES
Warning Label	External / Internal	YES	YES	YES*

* Arex labels comply with Class 4 Laser Product Requirement. The labels to be used in the machine where Arex are installed MUST comply with the requirements for the Laser Class of the machine itself.

APPENDIX D: NOTE ABOUT LASER

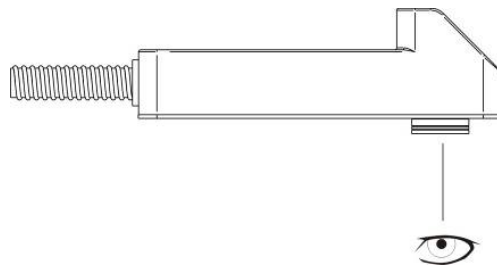
LASER SAFETY

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



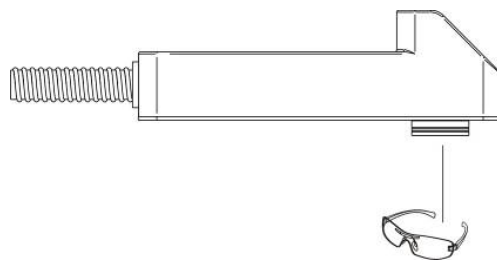
NOTE:

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



NOTE:

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



NOTE:

Wear safety goggles while using the machine!



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:Yag, Nd:YVO₄), visible (He:Ne or Argon) and ultraviolet (excimer laser).

It should be considered non-Ionizing Radiation. In Arex laser, the emission of a crystal bar 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 radiation of Arex laser is 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.



NOTE:

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.



NOTE:

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.



NOTE:

This laser 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 Arex 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.

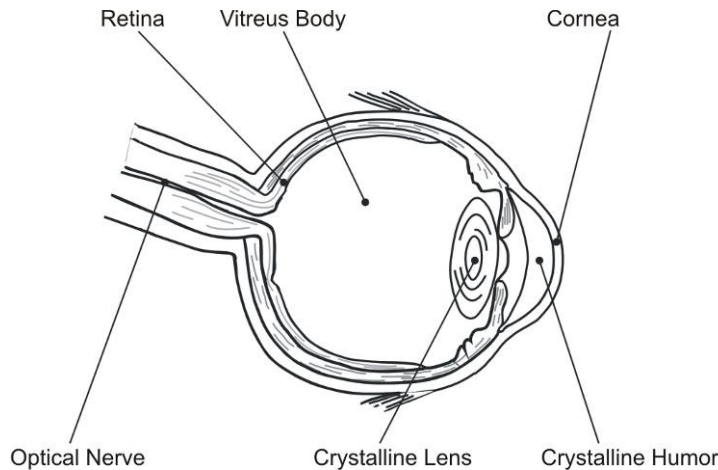


Figure 50: Eyeball section.

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.



NOTE:

The Arex marker laser device contains a **class 4 invisible** source.

RADIATION VIEWING CONDITIONS

The Laser output by the Scan Head is to be considered as a highly collimated and intense monochromatic light source. Due to these characteristics it can be seen as a “punctiform 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 Scan Head. 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 Arex is showed in the next paragraph.



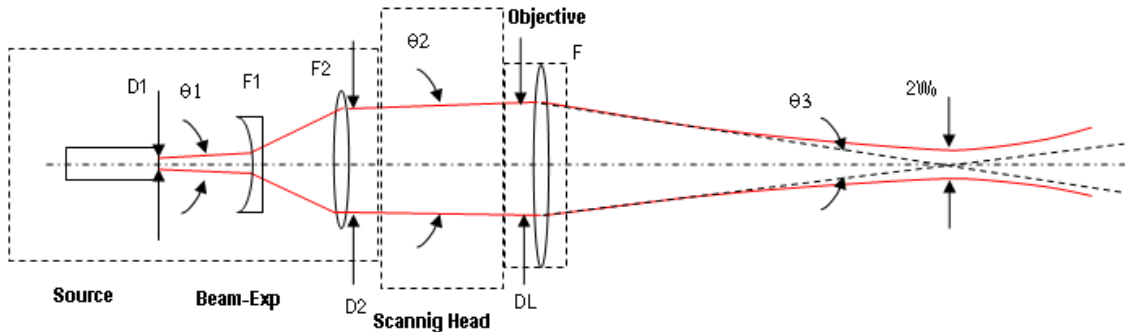
NOTE:

Always use goggles with conformity certificate.

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

DNRO 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.



It is very important to know the real divergence of the beam in output from the focalization lens (F-Theta). With all these optical data it is possible to do the calculate the nominal distance of optical risk (DNRO) and the optical density (DO) requested to the protection filters of the laser radiation.

Calculations have been done following the CEI EN 60825-1 (2007) Normative regarding nominal distance and optical risk in the worst condition and in case of accident exposition of 10s for direct radiation and 100s for diffused radiation.

Wavelength	RIF	1070 nm (± 10 nm) 1120 nm (raman emission)
Laser Type		Q-Switched fiber laser
Observation type		Direct radiation
Pulse energy		1 mJ @ 20 kHz
Pulse duration		100 ns
Beam Diameter at F-Theta lens exit	DL	~ 6.0 mm
Beam divergence on the lens	θ_2	0.8 mrad
Focal of the F-Theta lens	F	160 mm
Real divergence after the lens	θ_3	31,2 mrad
Exposition time		10 s
Max beam scanning angle		$\pm 20^\circ$ each axis

ACCIDENTAL CONDITION OF VISION OF THE DIRECT REFLECTED RADIATION

Assuming a direct exposition of 10 sec at a nominal distance of 0,5 m (worst case considered), with Ftheta Lens 160mm Model installed, it is possible to calculate the suitable optical density OD) for safety goggles.

The OD (optical Density) in last column assure to reduce laser radiation below max acceptable exposition:

OD= log (H/EMP) where EMP is the Maximum Permissible Exposure and H is the radiant exposure.

Source	DNRO (Nominal Ocular Hazard Distance)	OD (Optical Density)
Arex Marker 10W	16 m	> 2,5
Arex Marker 20W	22 m	> 2.8
Arex Marker 30W	26 m	> 2.9

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 UNI EN 207.

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 exposition period.

In case of exposition 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 machine 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 equipment. 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 source is 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.



NOTE:

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 equipment was designed for.



NOTE:

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



NOTE:

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

The most serious collateral risk associated with laser equipment, 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.



NOTE:

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



NOTE:

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

For example, during the intended use of the Laser source, 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 equipment was designed for.



NOTE:

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



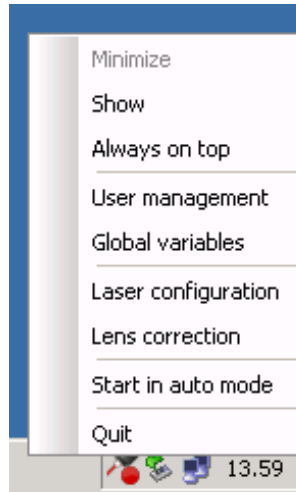
NOTE:

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 machine is commissioned and follow the instructions in the **Collateral Risks** section.

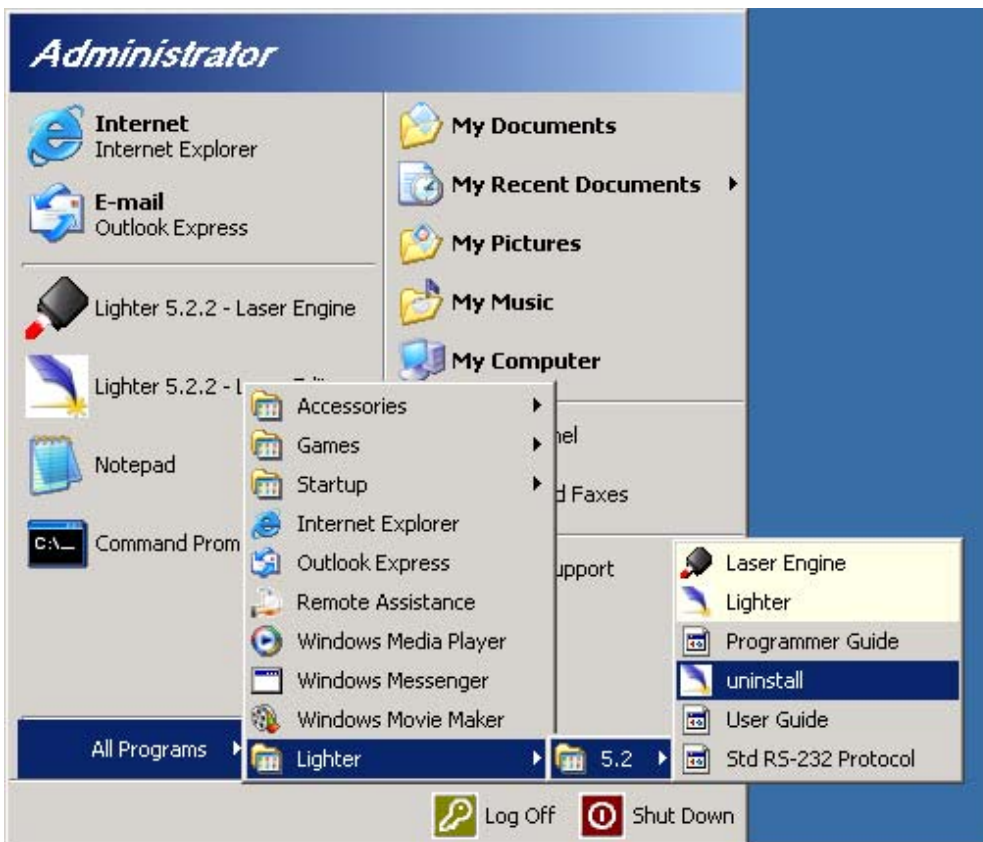
APPENDIX E: SOFTWARE UPDARE

This document describe how to update SW version on AREX systems.

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

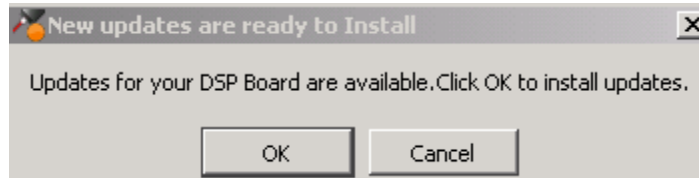


2. Do Lighter "UNINSTALL": you can't run the new installer before having removed the old SW version

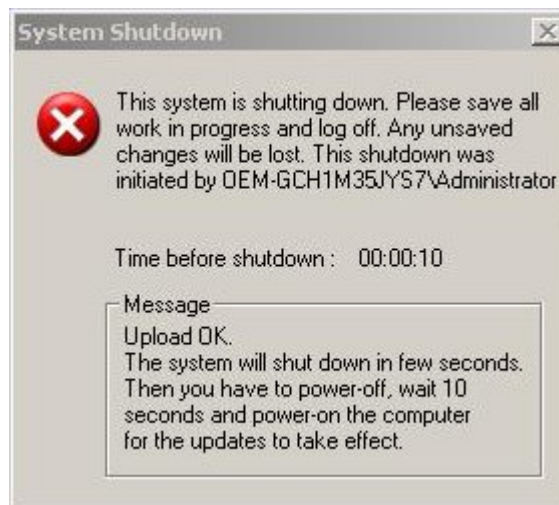


APPENDIX E

3. Wait the end of unistall 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



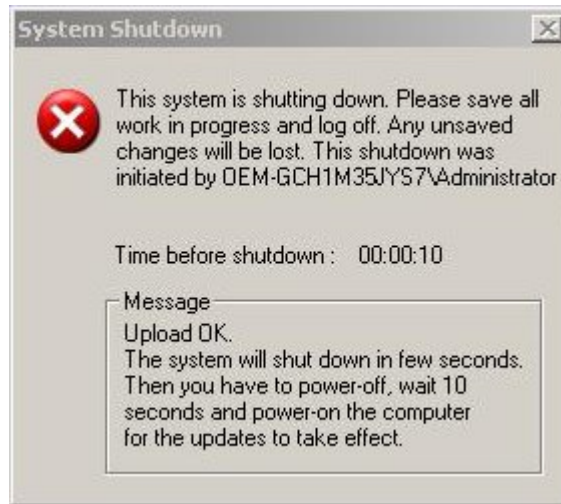
- system will be shut down automatically within the next 10 seconds



WARNING:
DO NOT restart the system or turn off AREX!

- 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



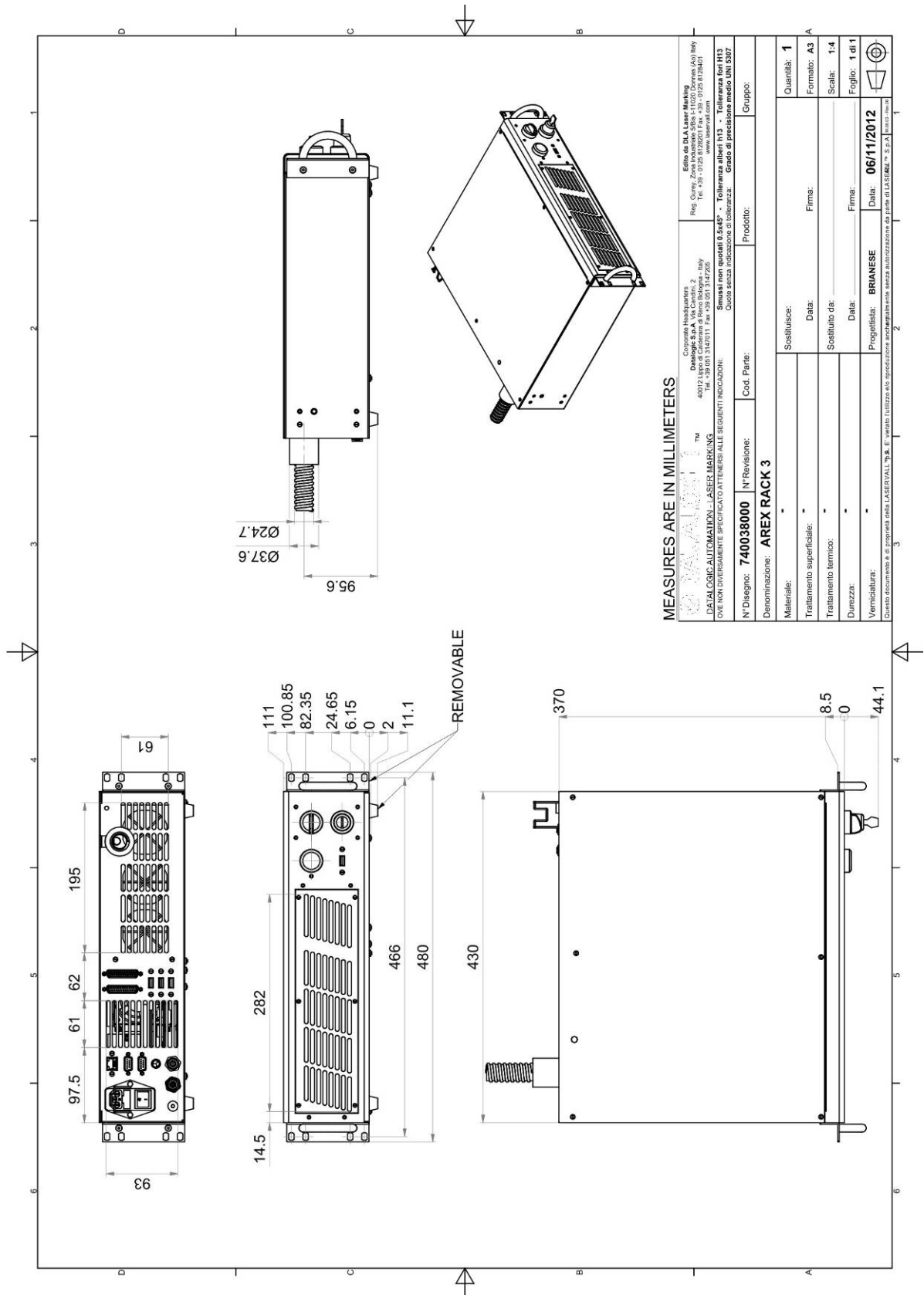
- system will be restarted automatically within the next 10 seconds



WARNING:
DO NOT restart the system or turn off AREX!

- wait until system is restarted automatically

APPENDIX F: MECHANICAL DRAWS



APPENDIX G: DECLARATION OF CONFORMITY



Datalogic Automation S.r.l.
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 40050 Monte San Pietro
 Bologna - Italy
www.automation.datalogic.com

Laser Marking Business Unit
 Via Le Gorrey 10 – 11020 Donnas (AO)
 Via dell'Industria 20 – 21018 Sesto Calende (VA)

declares that the

AREX FIBER IR SYSTEM

and all its models

are in conformity with the requirements of the European Council Directives listed below:

2004 / 108 / EC EMC Directive
2006/95/EC Low Voltage Directive

This Declaration is based upon compliance of the products to the following standards:

EN 61000-6-2, SEPTEMBER 2005:

*ELECTROMAGNETIC COMPATIBILITY (EMC)
 PART 6-2: GENERIC STANDARDS –
 IMMUNITY FOR INDUSTRIAL ENVIRONMENTS*

EN 61000-6-4, JANUARY 2007:

*ELECTROMAGNETIC COMPATIBILITY (EMC)
 PART 6-4: GENERIC STANDARDS –
 EMISSION STANDARD FOR INDUSTRIAL ENVIRONMENTS*

EN 61010-1, OCTOBER 2010:

*SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR
 MEASUREMENT, CONTROL, AND LABORATORY USE –
 PART 1: GENERAL REQUIREMENTS*

EN 60825-1, OCTOBER 2007:

*SAFETY OF LASER PRODUCTS –
 PART 1: EQUIPMENT CLASSIFICATION, REQUIREMENTS AND
 USER'S GUIDE*

Monte San Pietro, January 26th, 2012

Paolo Morselli
 Quality Manager




FIGURES

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