DATALOGIC

DATALOGIC AUTOMATION

VLASE GREEN SYSTEM

USER'S MANUAL

821002100
NOVEMBER 2011

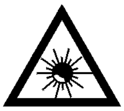
Published 25 November 2011
Printed in Donnas (AO), Italy.

SYMBOLS

The symbols used in this manual along with their meaning are shown below. The symbols 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, 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:
First to use laser system must be read marking software user manual.

REVISION INDEX

Revision	Date	Number of added or edited pages
0.0	2011-25-11	Release

FOREWORD

Information included in the following manual are indicated to a qualified installer able to integrate the equipment in a system, accomplishing with all the protection systems required from internationals rules and local legislations.
Following manual is referred to an Vlase 2PWX-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. shall not be held responsible for any non conforming use of equipment 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 Vlase product families, which aim to satisfy new market evolutions, and especially the integration industrial laser sources.

Vlase belong to the family of DPSS (Diode Pump Solid State) laser sources in the “end pumped” and “Q-Switched” configuration.
The mechanical and electrical characteristics satisfy standardization and connectivity needs of the industrial field, such as the new 19” rack and different solutions for laser system control. Moreover, new firmware and software characteristics provide useful and easy procedures for the monitoring and diagnostics of laser sources, aimed at improving their reliability.

Based on the optical layout of the Datalogic VIOLINO laser source, the Vlase family guarantees significant improvements in terms of performances thanks to the new laser diode current and temperature controllers, developed by the Datalogic Automation laboratories, which short warm-up time and improve the stability of emitted laser power.
Greenlase is a brand new product family offered by Datalogic Automation for applications requiring green laser radiation (532 nm) with excellent stability. The new optical layout based on “intracavity second harmonic generation” architecture and the thermostatation algorithms enhance the modal quality of the laser beam, the average power and pulse stability.

NOTE:
Device installation in secure environment is responsibility of the system integrator!

Figure 1: Vlase control rack and resonator with scan head.

Main features:

- Power stability and reduced warm-up time
- Compact design on 19’’ rack and air cooled laser source
- High efficiency switching electronics
- Self-diagnostics and monitoring tools
- Beam Expander with different magnifications available
- 24 V DC – 600 W power supply
- RS232, Ethernet connections for monitoring and testing purposes
- Compatibility with control signals of the VIOLINO series
- Excellent beam quality

The operator can easily interact with and monitor the laser status and its function through user-friendly LCD control display and by means of the Vlase Configurator monitoring and diagnostics software.
Vlase comprises all devices to prevent laser radiation leakage that could be potentially dangerous.

These devices actuation is demanded to the system integrator.

NOTE:
In certain applications Vlase device without marking kit platform could be used for process operation. Refer to appendix for detail about special applications.

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

NOTE:
It's not allowed modify destination use of the system in different way of its functions.
Datalogic Automation S.r.l. declines any responsibility and liability for irregular and improper use of the machinery witch it manufactures.

SUMMARY

1 : TECHNICAL SPECIFICATIONS AND ACCESSORIES

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

1.1 TECHNICAL CHARACTERISTICS

CONTROL RACK MECHANICAL CHARACTERISTICS

Weight	12 Kg
Height	87 mm
Width	437 mm
Depth	500 mm
IP Degree	IP20

RESONATOR MECHANICAL CHARACTERISTICS

Weight	4,7 Kg
Height	142,2 - 165,4 mm
Width	155,7 – 162,7 mm
Depth (*)	569,5 – 582,85 mm
IP Degree (**)	IP64

(*) Vary from models.

(**) Related to the laser cavity up to the beam expander.

NOTE:
Please refer to Appendix for detailed drawings of the different models and configurations!

STORAGE CONDITIONS

Storage temperature	Min. -5°C (23°F) / Max. +55°C (131°F)
Shocks and vibrations	The components are not designed to withstand shocks and vibrations
Maximum sustainable acceleration	0.5 G

ENVIRONMENTAL OPERATING CONDITIONS

Environmental temperature	Min. 10 °C (59°F) / Max 35 °C (95°F)
Humidity	< 70% without condensate
Altitude	< 2000 m
Suspended matter	< 3 mg/m^3
Vibrations	None allowed

ELECTRICAL POWER SUPPLY

Power supply	24 V DC
Input current	25 A MAX

VLASE PERFORMANCES

MARKING LASER	
Laser class	Class 4
Power	VLASE 204X-TFSV : 04 W @ 50kHz VLASE 210X-TFSV : 10 W @ 50kHz
Laser source	DPSSL (Diode Pumped Solid State Laser)
Active Mean	$Nd:YVO_4$
Wavelength	532 nm
Modulation Frequency*	VLASE 204X-TFSV: 20 kHz ÷ 200 kHz VLASE 210X-TFSV: 20 kHz ÷ 100 kHz
Emission radiation	Pulsed (Q-switched)
AIMING LASER	
Laser class	Class 3R
Aiming beam	3 mW
Laser source	Solid State
Wavelength	635 nm
Cooling	Air
Noisiness	< 70 dB

** for 100% power at 25°C.*

1.2 SEALS

Several seals have been applied to the Vlase source, to both the control rack and the resonator.

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. <u>Breakage of these seals by a customer shall result in immediate cancellation of the warranty on the entire engraving system.</u>

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 resonator 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

1.3.1 MAIN HARDWARE

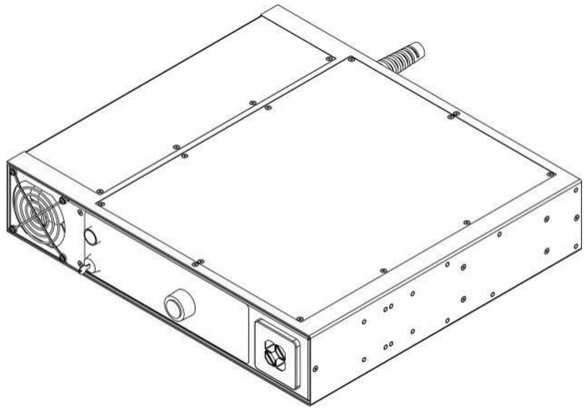


Figure 3: Control rack.

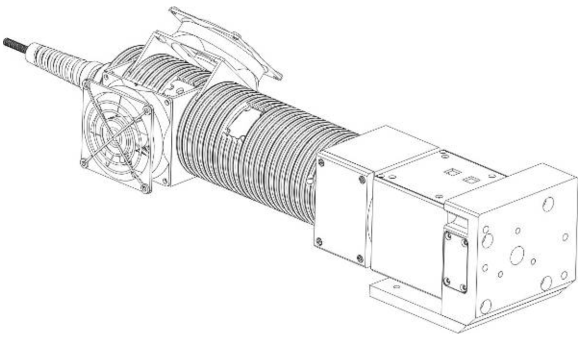


Figure 4: Resonator.

1.3.2 COMMON CABLE AND OTHER COMPONENTS

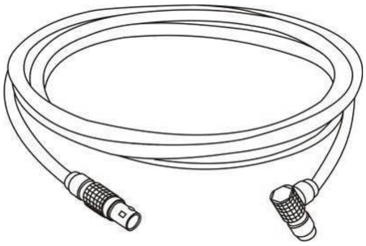


Figure 5: Laser bus cable.

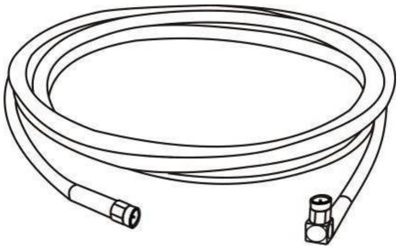


Figure 6: RF cable.

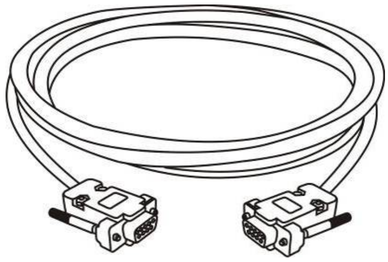


Figure 7: RS232 cable.

Figure 8: Optical fiber cable.

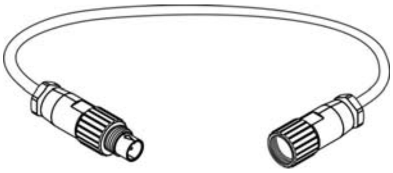


Figure 9: SHG Cable.

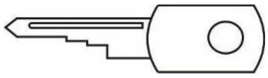


Figure 10: Safety key.

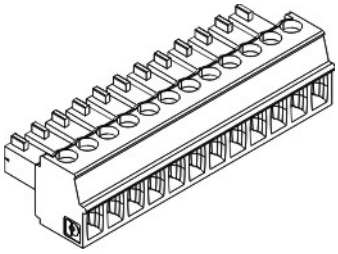


Figure 11: X1 terminal block.

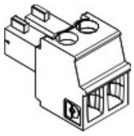


Figure 12: X2 terminal block.

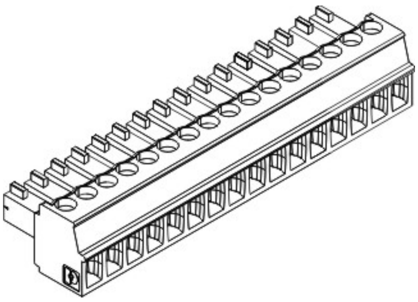


Figure 13: X3 terminal block.

1.3.3 MARKING KIT

1.3.3.1 iMARK MARKING KIT

This kit consists of premounted scanner head Miniscanner 8, PCI-E cards iMark laser control board and Advance I/Omodule, to be installed inside a PC, and marking software Lighter 5.

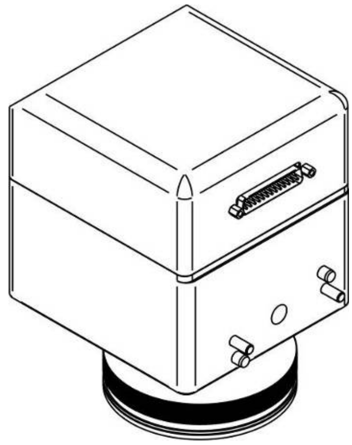


Figure 14: Scanner Head.

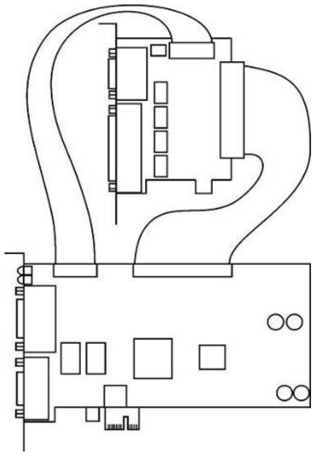


Figure 15: iMark boards.

Figure 16: Lighter Marking SW.

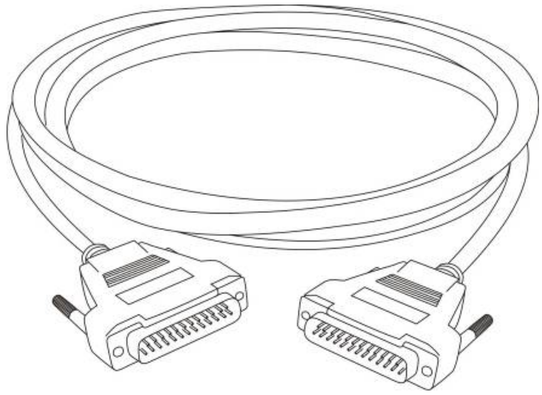


Figure 17: Rack cable.

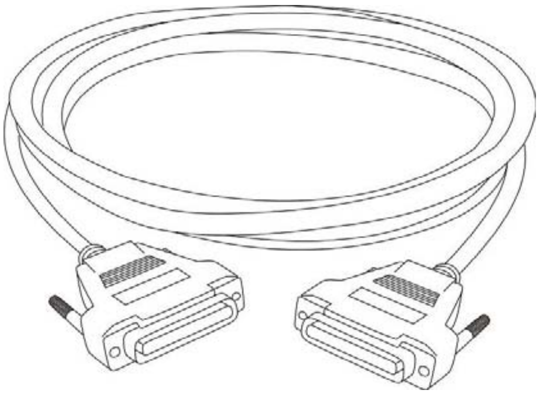


Figure 18: Head cable.

WARNING:
For more information on installing and using the kit marking iMark refer to related manuals and Lighter 5 Software manual.

1.3.3.2 DSP2 MARKING KIT

This kit consists of premounted scanner head Miniscanner 8, PCI cards DSP2 and IOMOD, to be installed inside a Tower PC, and marking software Smartist.

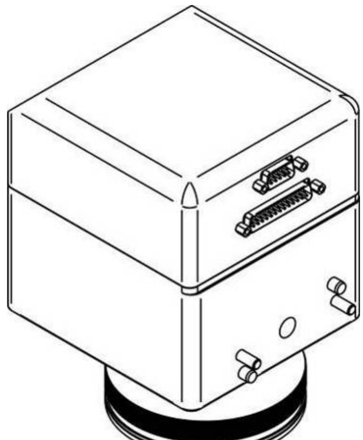


Figure 19: Scanner Head.

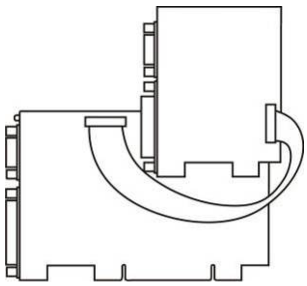


Figure 20: DSP2 boards.

Figure 21: Smartist Marking SW.

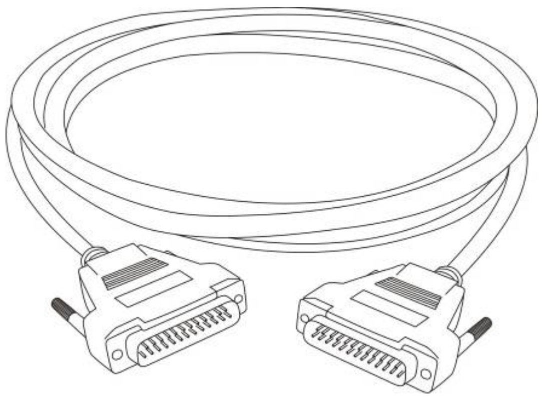


Figure 22: Head cable.

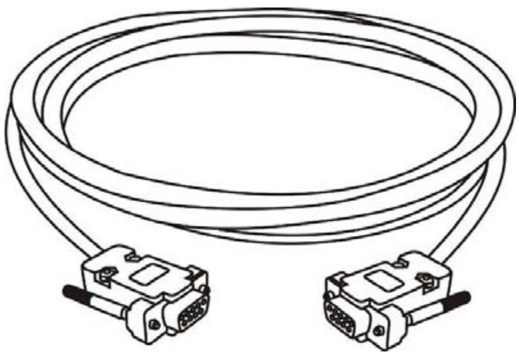


Figure 23: Head power cable.

WARNING:
For more information on installing and using the kit marking DSP2 refer to related manuals and Smartist software manual.

1.4 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 1.3.

1.4.1 SHELL FOR RACK CABINET ASSEMBLY

The shell can be used to install the Vlase control rack in horizontal position in a rack cabinet according to the 19'' standard.

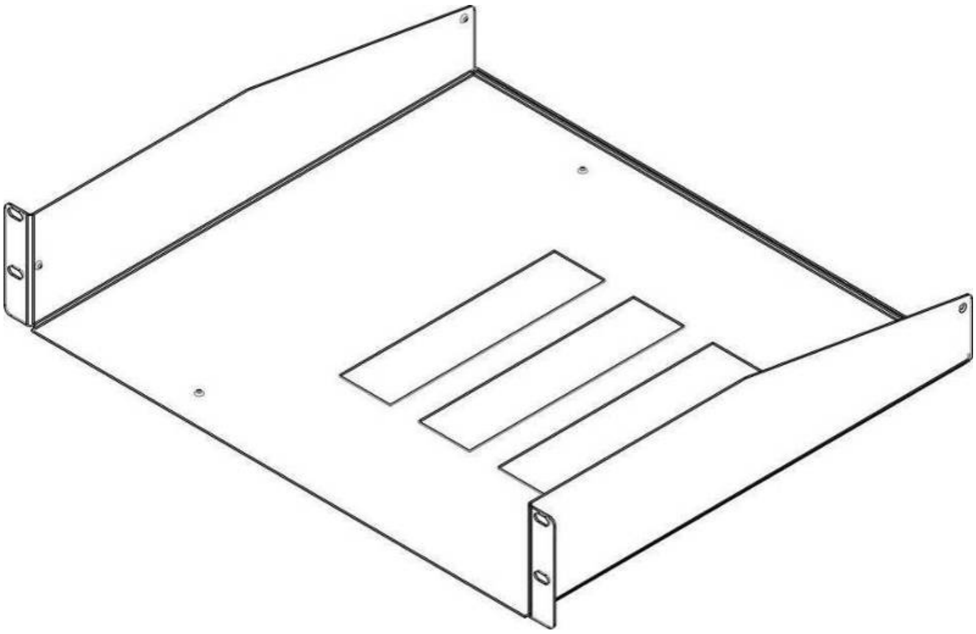


Figure 24: Rack shell.

1.4.2 ETHERNET KIT

This kit allows the system to be monitored from a remote position; it consists of an electric module to be fitted inside the control rack and of a cross-patch cable for connection to the local network.

The kit can be installed at the Datalogic Automation facilities or even on the field, while the IP address must be necessarily configured on the field since the settings of the LAN network to which the connection is made must be known.

As of today, the connection via Ethernet can be used instead of the serial connection via RS232 and not simultaneously. Furthermore, only one remote position at a time can be connected via Ethernet to the machine to be monitored.

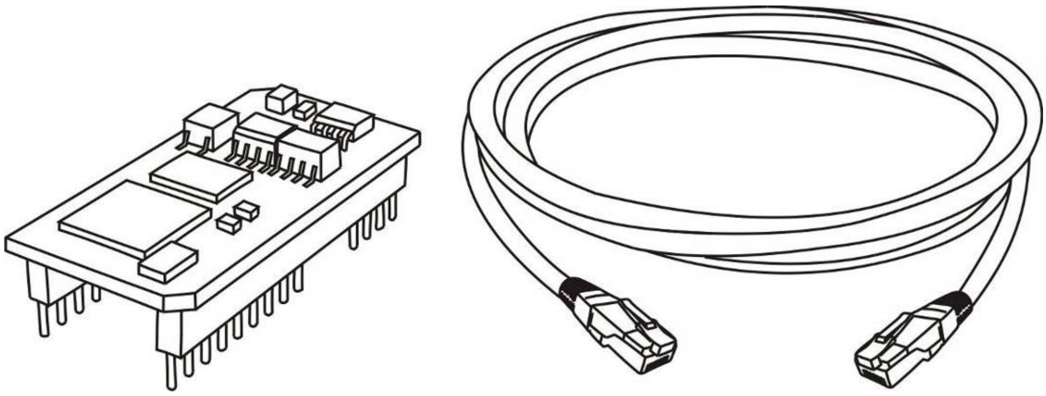


Figure 25: Ethernet kit.

1.4.3 CABLE KIT 5-7 mt

Kits are available on request cable lengths of 5 meters and 7 meters.

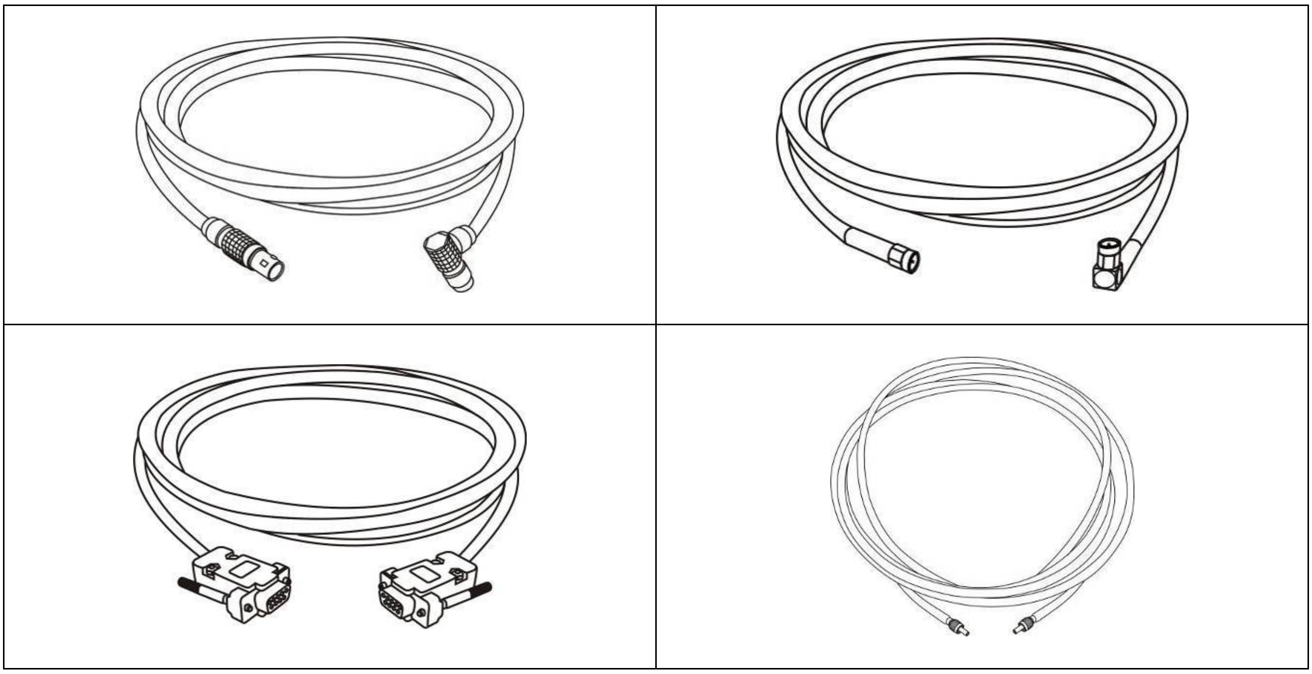


Figure 26: Cable Kit lenght plus.

1.4.4 FOCAL LENSES (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.Different 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 of the marked string or logo, depending on specific needs. These F-Theta lenses are compatible with the standard scanner head supplied by Datalogic Automation; other solutions concerning both the scanner head and the lenses can be evaluated on a case-by-case basis.

F-Theta 532nm	**63S**	**100S**	**160S**	**254S**
Lens diameter (mm)	**47**	**47**	**47**	**47**
Working Distance* (mm)	71	115	181	282
Working Area (mm^2)	35 x 35	50 x 50	110 x 110	180 x 180

* Theoretical value

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. Reference to the following figure

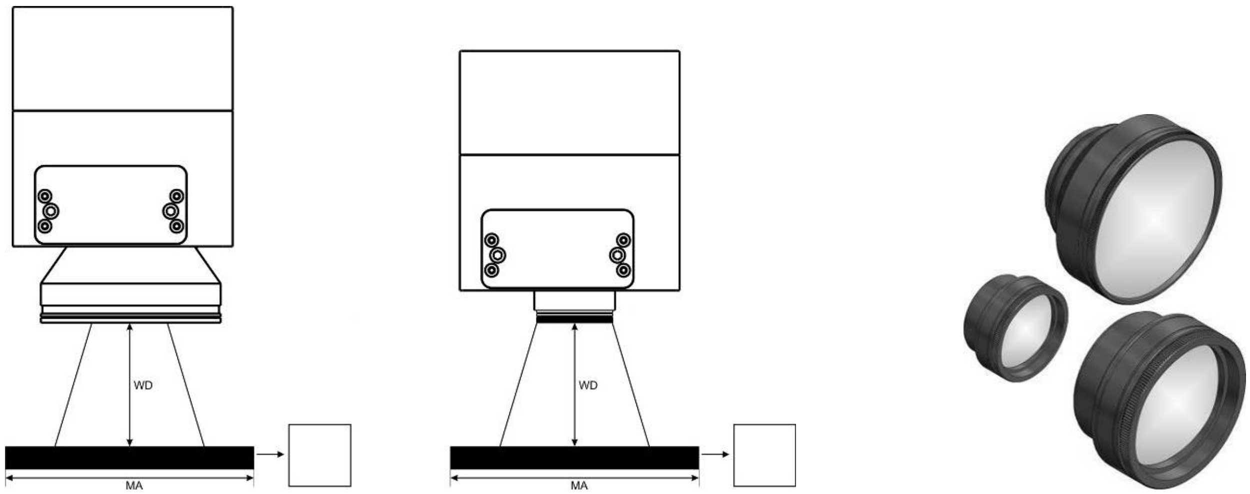


Figure 27: F-Theta Lenses.

WD: Working Distance

MA: Marking Area

1.4.5 RECCOMENDED POWER SUPPLY OUTPUT 24VDC 600W

- Excelsys Xgen cod. XLC 4444000P0
- TDK-Lambda HWS600-24
- TDK-Lambda SW600-24

2 : INSTALLATION AND SET UP

NOTE:
Vlase is a **Class 4** laser source.
For proper use under conditions of safety they must be brought to **Class 1**.

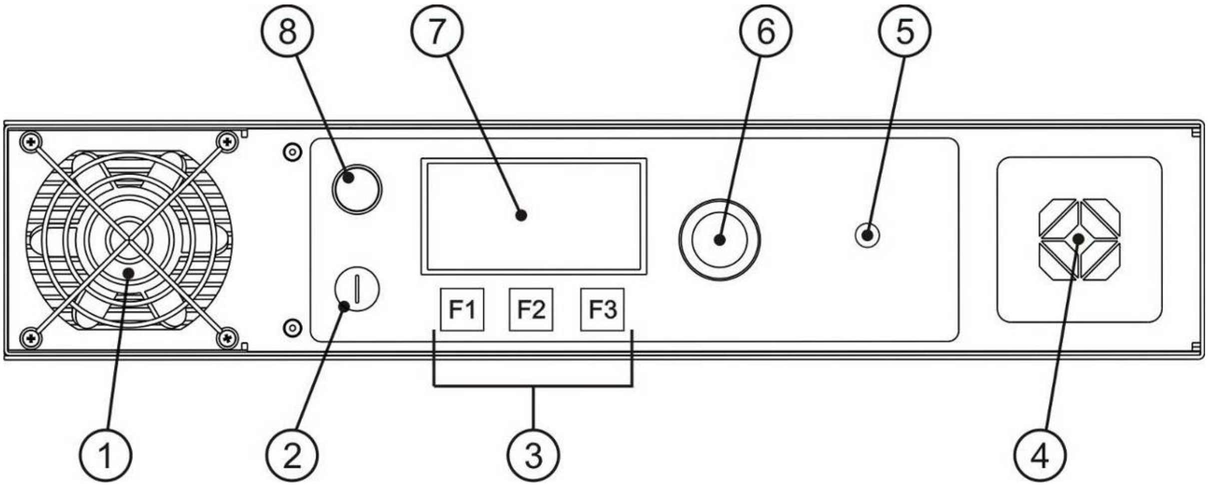
Vlase must be installed in a suitable environment, especially reserved to laser operations. The person in charge of the area used for the Laser Marking (the Laser Safety Officer), has to isolate this area from the other work areas and use appropriate warning signs to indicate that unauthorized people are not allowed to access the area where laser marking is carried out.

See Appendixes for additional information.

2.1 DESCRIPTION OF THE LASER MODULES

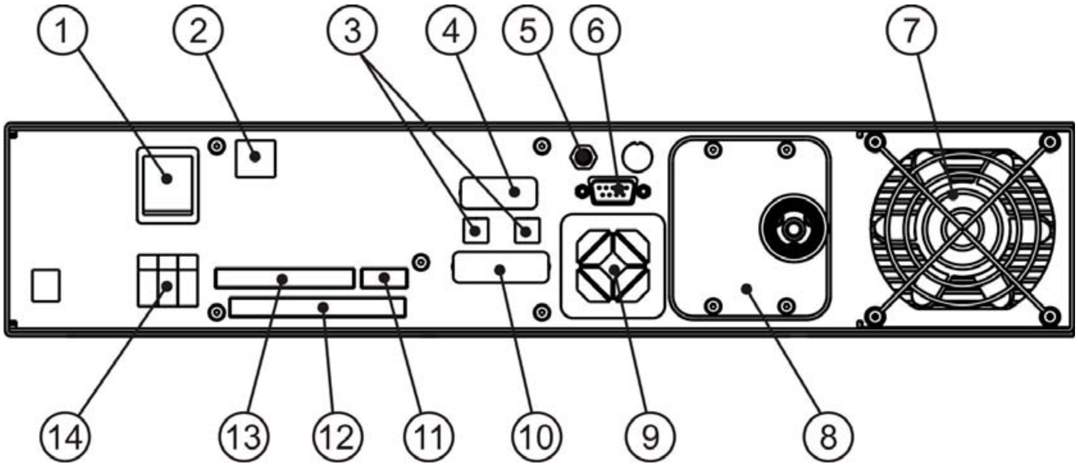
2.1.1 VLASE CONTROL RACK

A description of the control rack is provided here below for the purpose of obtaining the right information for proper installation of the device.



1) Laser diode cooling inlet fan	5) Laser emission status LED
2) Safety key	6) Selection knob
3) Keyboard	7) Display
4) Auxiliary input fan	8) Status Lamp

Figure 28: Control rack front view.

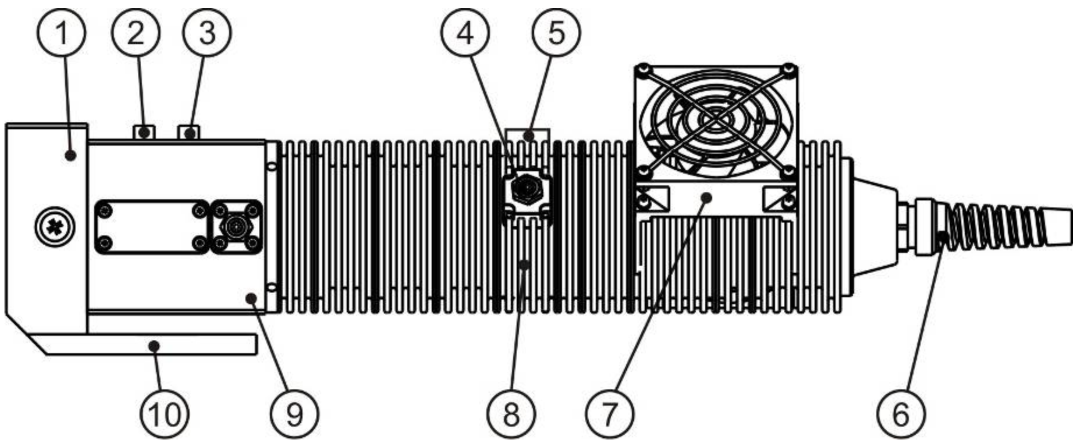


1) Power switch
2) Ethernet port connection (optional)
3) Laser Bus connection
4) RS232 connection
5) RF connector for Q-Switch
6) Scanner head power supply (15 V dual)
7) Laser diode cooling outlet fan
8) Optic fiber inlet
9) Auxiliary fan outlet
10) VMARK connector for iMARK Marking kit
11) X2 Auxiliary Interlock hardware
12) X3 I/O connector
13) X1 I/O connector
14) 24 VDC connection and ground

Figure 29: Control rack rear view.

2.1.2 RESONATOR

A description of the main parts of the Vlase resonator unit is provided here below:



1) Aiming diode module
2) Laser Bus connector
3) Fans connector
4) Cable for SHG sector thermostatation
5) RF connector
6) Optic fiber inlet hole
7) Fans
8) SHG crystal holder sector
9) Beam Expander module
10) Securing base

Figure 30: Resonator view.

2.2 INSTALLATION PREREQUISITES

The following must be available in order to work:

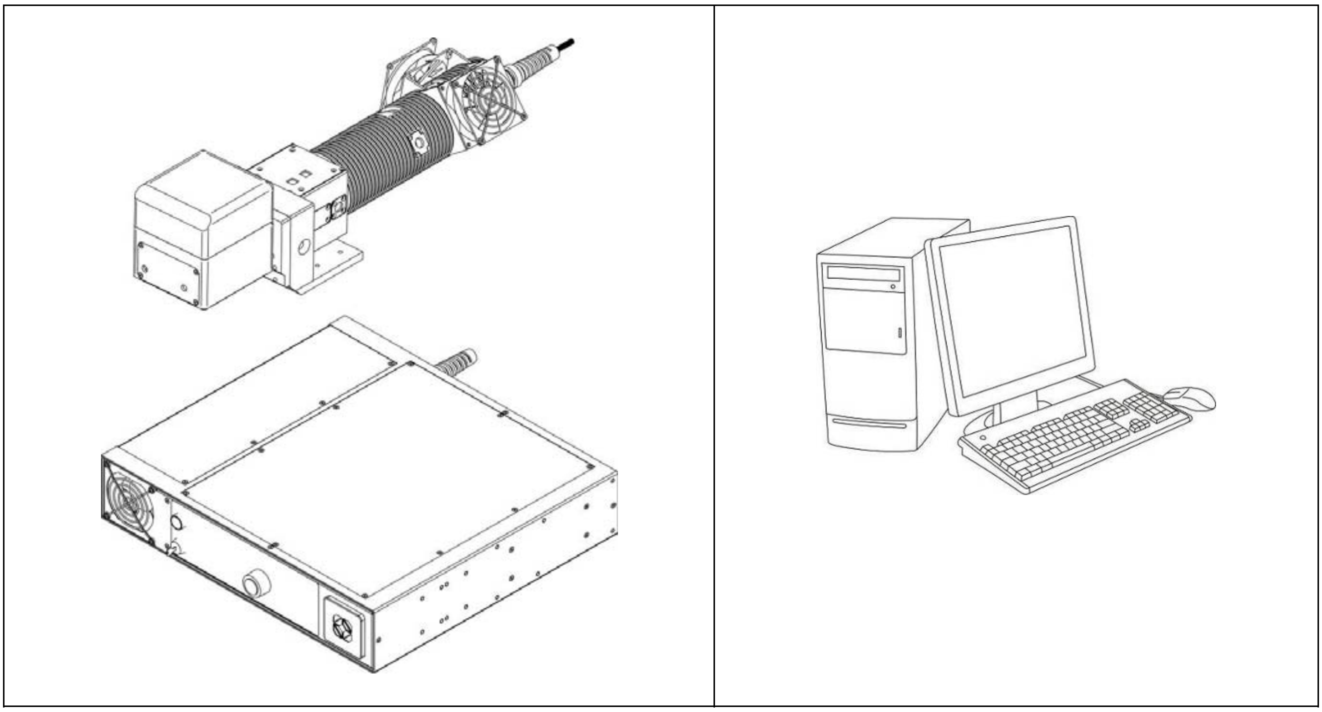


Figure 31: Installation prerequisites.

The marking software must be installed on the PC that will host the interface boards and which will monitor both laser emission and scanner head movements.

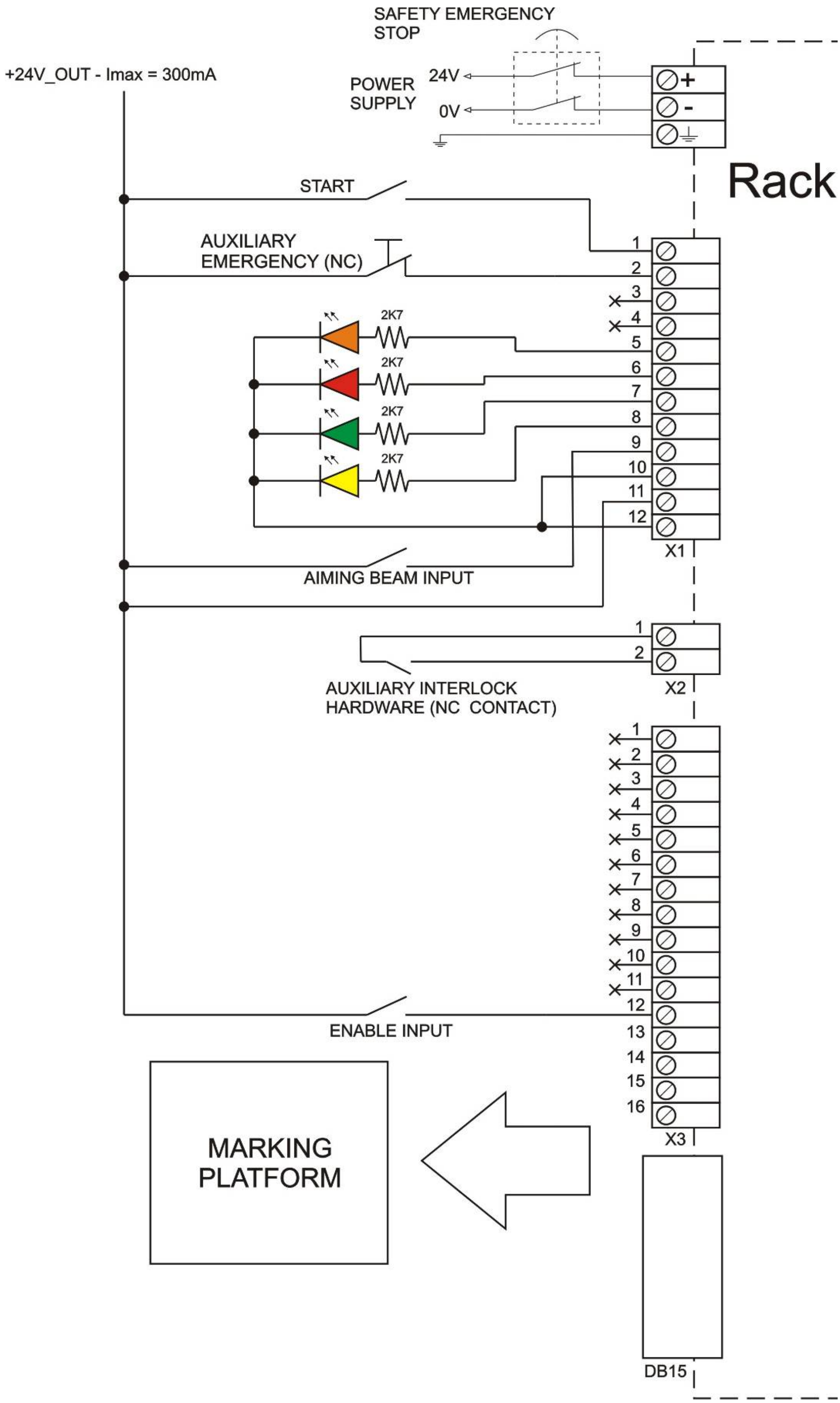
The PC is connected to both the Vlase control rack and the scanner head through special wirings supplied by Datalogic Automation S.r.l.

The Vlase Configurator diagnostics software can be installed in case you wish to monitor one or more laser sources via serial cable or via Ethernet during their operation.

The following minimum requisites are needed in order to be able to install and use Vlase Configurator:

Processor	32 bit (x86) processor or 64 bit (x64) at 1GHz or highest
Operating System	Windows® XP SP1 Professional; Windows® Vista Business or Ultimate and Windows® 7 Professional or Ultimate
RAM memory	1 Gb (32 bit) or 2 Gb (64 bit)
Hard Disk	1 Gb of free space on hard disk (32 bit) or 2 GB (64 bit)
Graphics card	Minimum resolution 1280 x 1024
Ports	1 Serial RS232, 1 USB 2.0
Power Supplier needed	450W

NOTE:
Refer to chapter 4 for any further information on the connections.


SAFETY EMERGENCY
STOP
+24V_OUT - Imax = 300mA
POWER
SUPPLY
24V
0V
+
-
Rack
START
AUXILIARY
EMERGENCY (NC)
2K7
2K7
2K7
2K7
1
2
3
4
5
6
7
8
9
10
11
12
X1
AIMING BEAM INPUT
1
2
X2
AUXILIARY INTERLOCK
HARDWARE (NC CONTACT)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
X3
ENABLE INPUT
MARKING
PLATFORM
DB15

2.3 TRANSPORTATION OF VLASE

The Vlase source can be easily lifted and handled by a single person since it is compact in size and light weight.

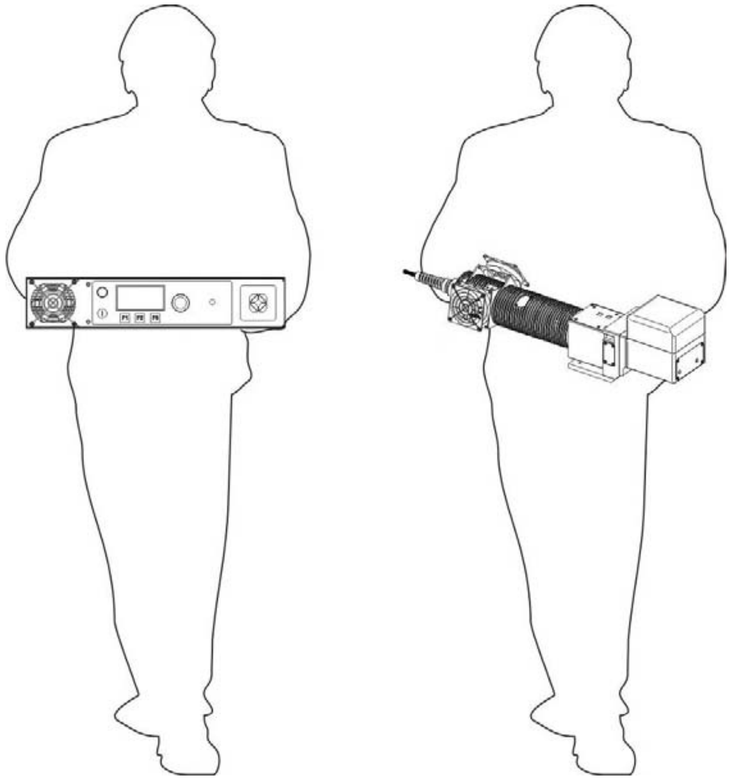


Figure 32: Transportation of Vlase source.

<u>Be careful</u> to avoid any damage to the machine when handling it. Do not drop.

2.4 SECURING AND POSITIONING

The Vlase control rack must be safely positioned and secured on a special surface, parallel to the ground and absolutely vibration-free. The rack can be secured either in a horizontal or vertical position. To prevent marking distortions, it is recommended to install a vibrometer at the base of the piece being marked and check for the absence of vibrations during the marking process.

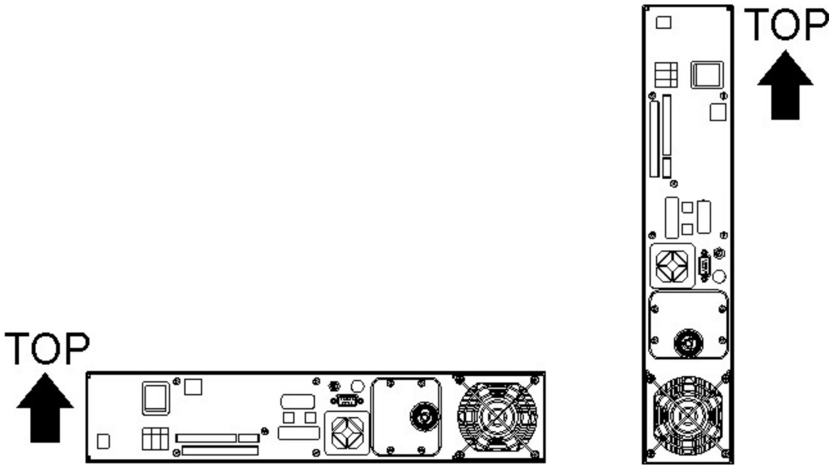


Figure 33: Possible ways in which to secure the control rack.

The Vlase control rack can be secured by using a special shell for installation in a 19” rack cabinet. The shell is available as an accessory with pre-drilled holes for assembly with the control rack and securing to a rack cabinet by means of 4 holes on the front and 2 on the side.

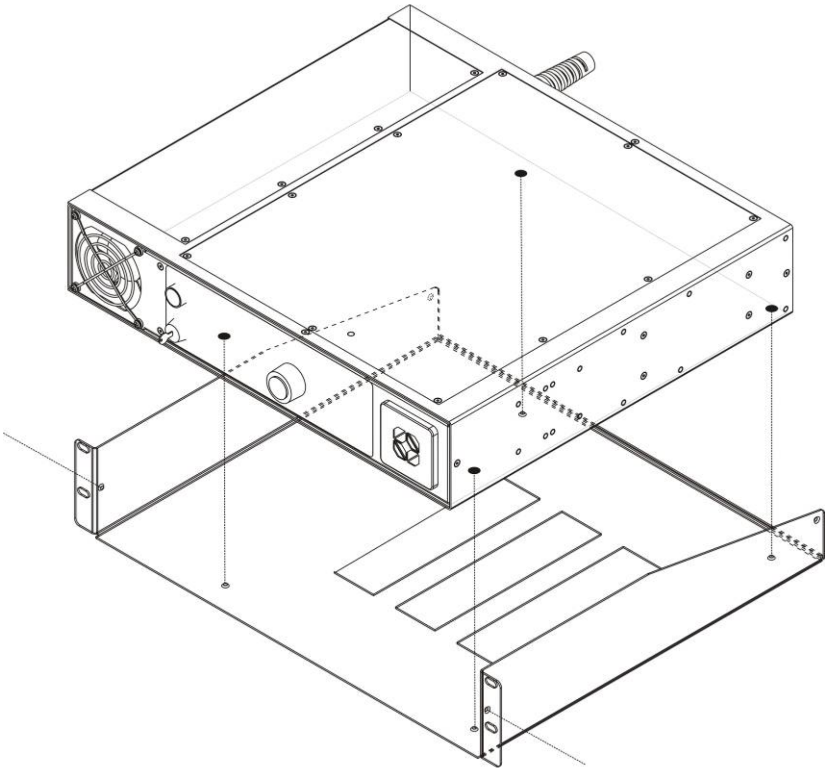


Figure 34: Securing the control rack to a special shell.

In case no shell is available, the Vlase control rack must be secured to a special surface using the 4 threaded holes found at the bottom, as indicated.

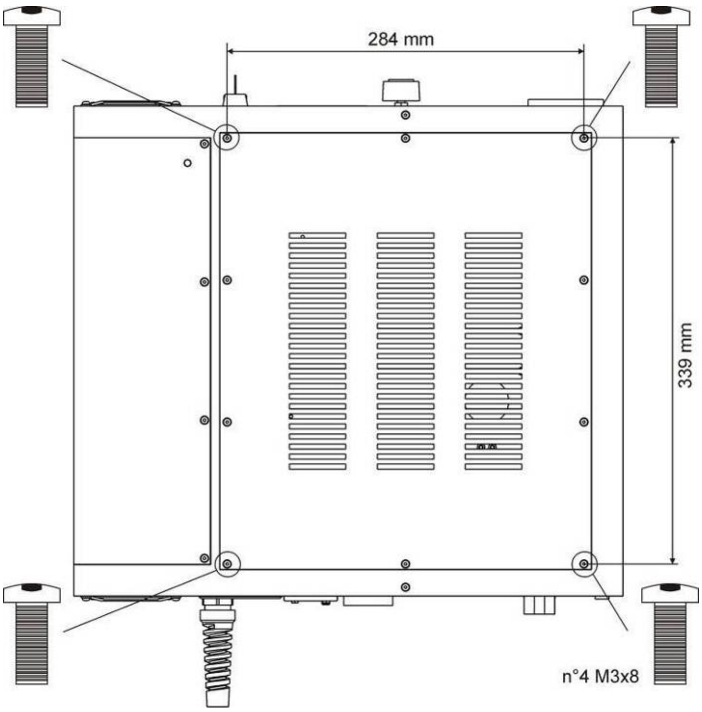


Figure 35: Securing points and relevant measurements.

The Vlase resonator module, just like the control rack, must be safety positioned and secured on a special surface, parallel to the ground and absolutely vibration-free. The resonator can be secured both horizontally and vertically. In order to prevent marking distortions, install a vibrometer on the base of the piece to be marked and check for the absence of vibrations during the marking process.

The Vlase resonator must be secured to a special base (not supplied by Datalogic Automation S.r.l.) using the four M6 threaded holes.

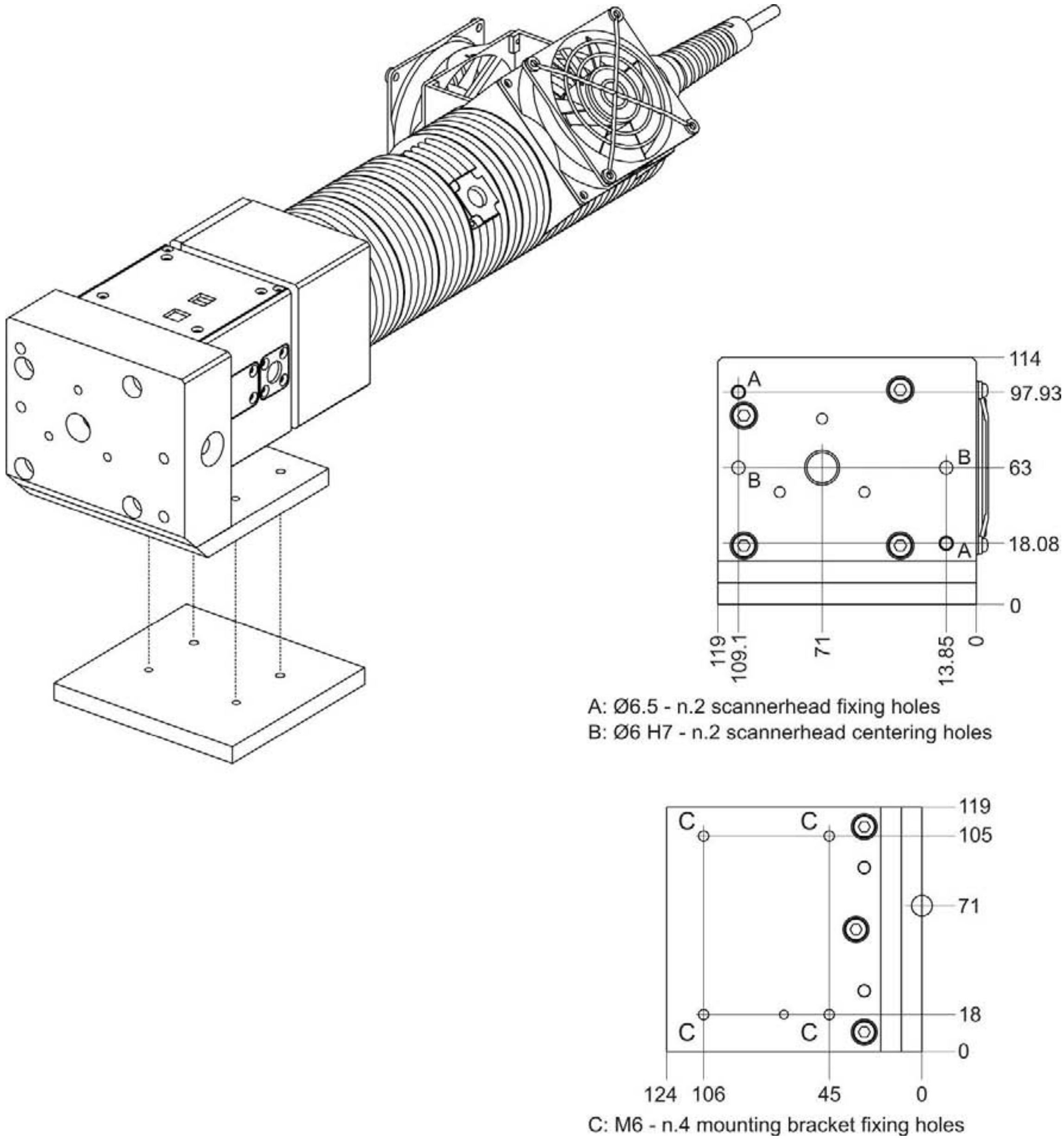


Figure 36: Securing points and relevant measurements.

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

NOTE:
Please refer to Appendix for detailed drawings of the different models and configurations!

2.4.1 FANS INSTALLATION

The fans supplied with the device must be accurately positioned and fixed on the resonator so that they can work properly.
The fans must be assembled so that the air flow is aimed at the unit containing the crystal (gold-coloured section on the resonator).

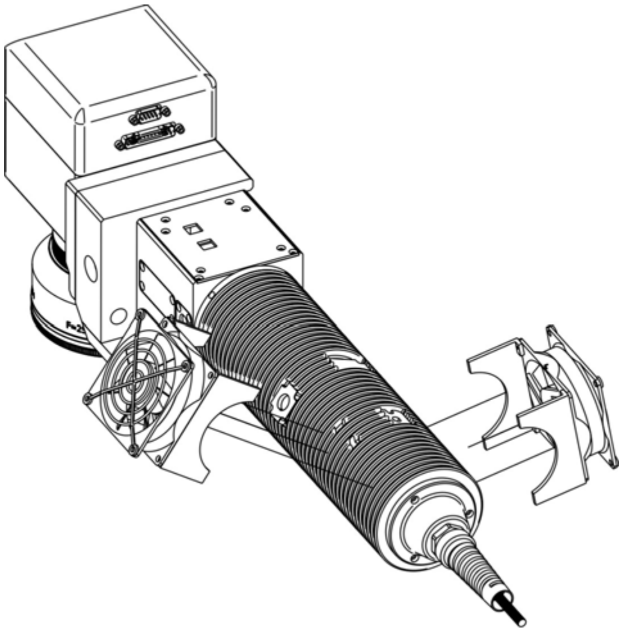


Figure 37: Fans installation.

2.5 SECURING AND POSITIONING

The Vlase control rack must be installed in a suitable environment in order to allow proper airflow and in order for the cables to be properly housed, as shown in the Figure below:

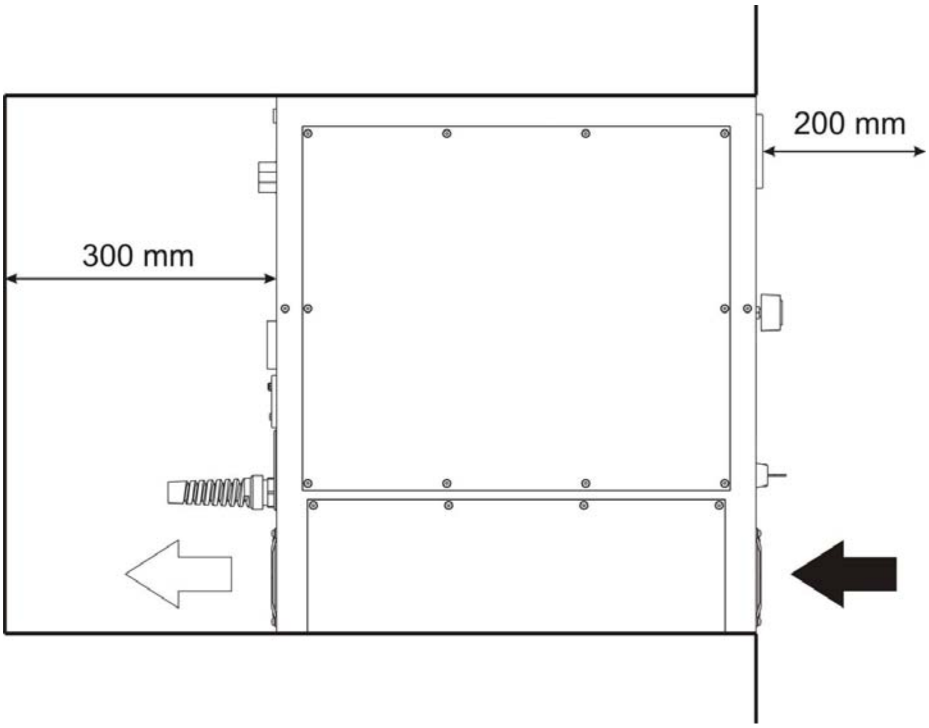


Figure 38: Installation environment.

2.6 WIRING

This section of the manual describes the machine wiring. Carry out the wiring operations as described below.

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

2.6.1 RADIOFREQUENCY CABLE WIRING

Screw in SMA connectors, starting at resonator side (90° end) then at the rack side.

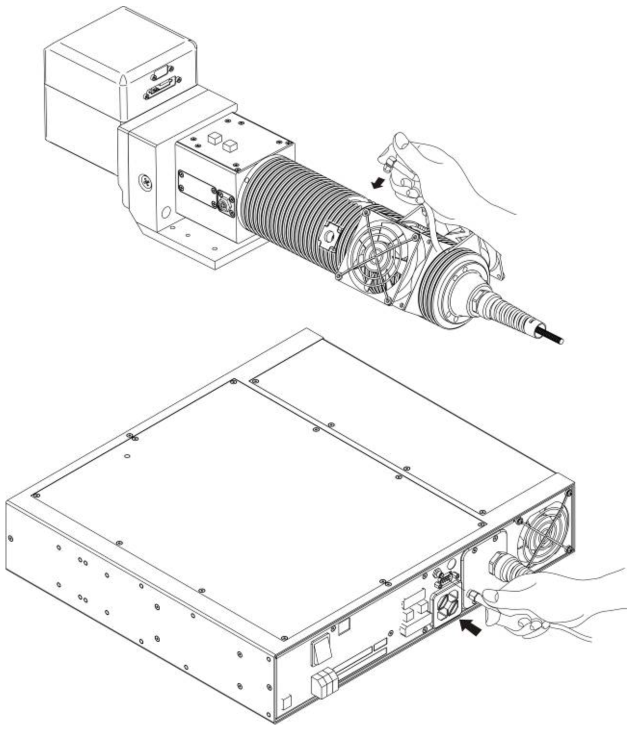


Figure 39: RF cable wiring.

After inserting the cable, tighten the connectors using an 8-mm wrench as shown below.

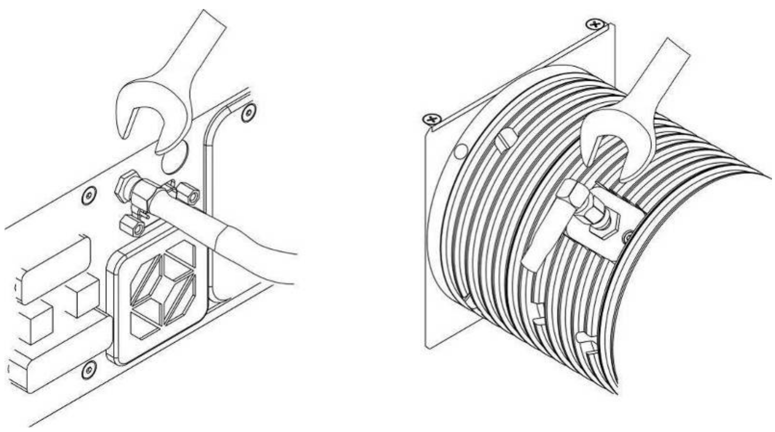


Figure 40: Tightening the RF cable.

2.6.2 LASER BUS WIRING

Insert the 9-pole connectors first from the resonator side (90° end) and then from the rack side, being careful to comply with the mechanical fixing tab. On the rack side it does not matter which one of the two connectors found on the panel is used.

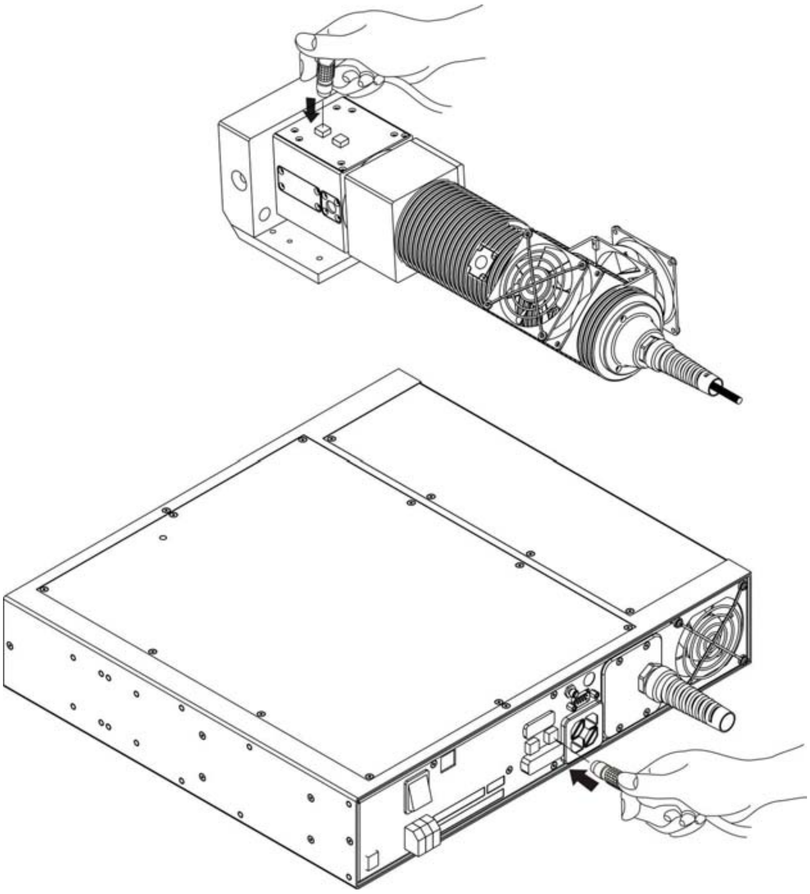


Figure 41: Wiring the Laser Bus cable.

2.6.3 SHG WIRING

Wiring SHG cable.

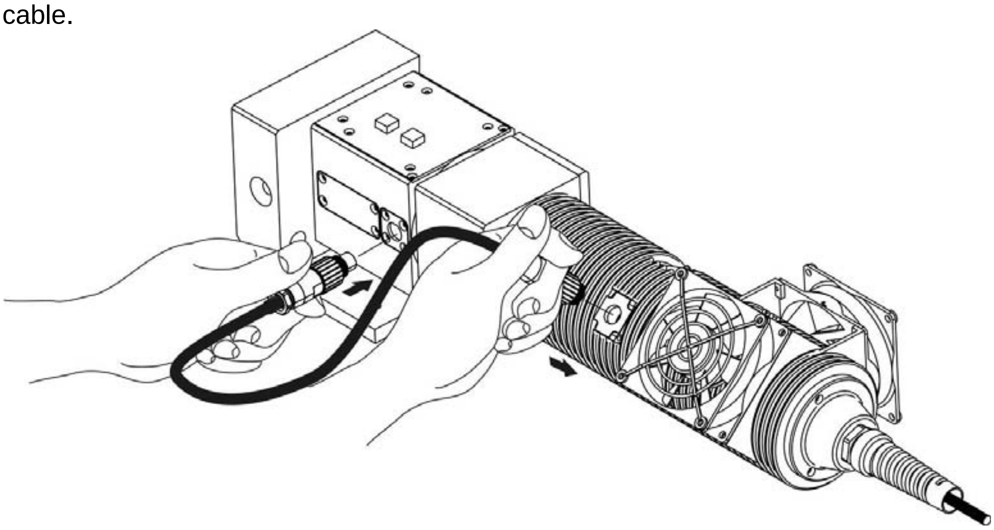


Figure 42: SHG cable wiring.

2.6.4 WIRING THE OPTICAL FIBER FROM THE RESONATOR SIDE

Follow the steps listed here below to wire the optical fiber to the resonator:

1) unscrew the three screws that secure the metallic cover and cable gland to the resonator.

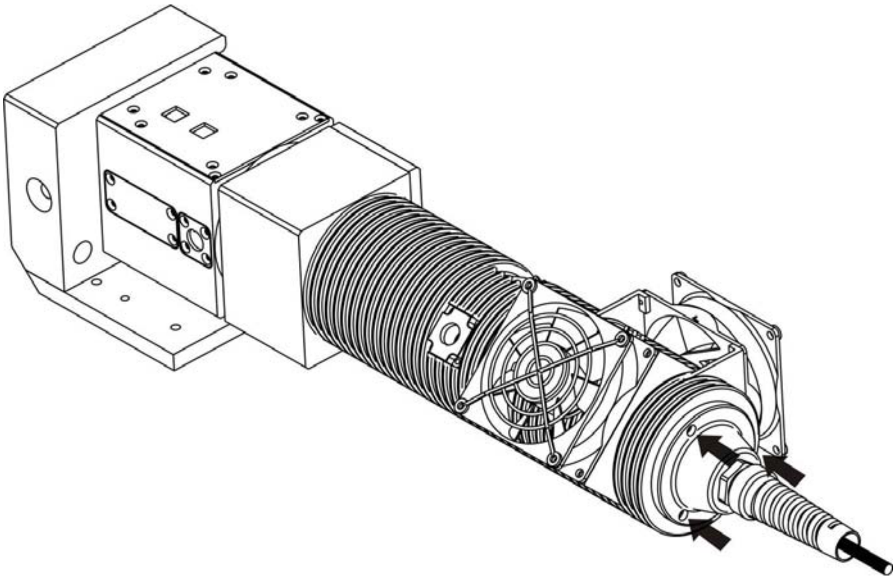


Figure 43: Disassembling the optical fiber cable gland from the resonator.

2) insert the optical fiber in the cable gland without removing the **protection cap.**

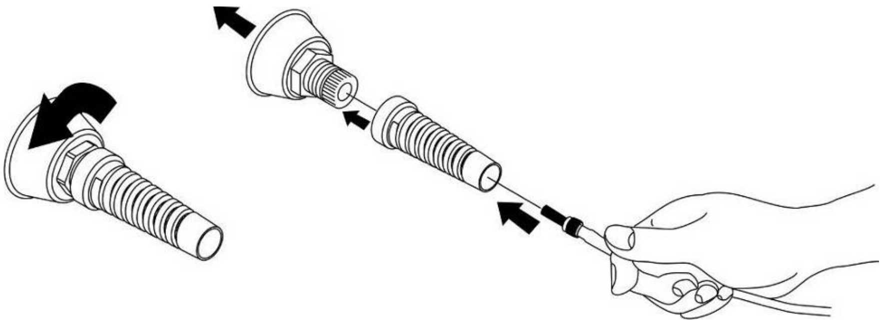


Figure 44: Passing the optical fiber through the cable gland.

3) remove the protection cap and insert the optical fiber in the resonator, being careful not to damage the end of the fiber or getting it dirty.

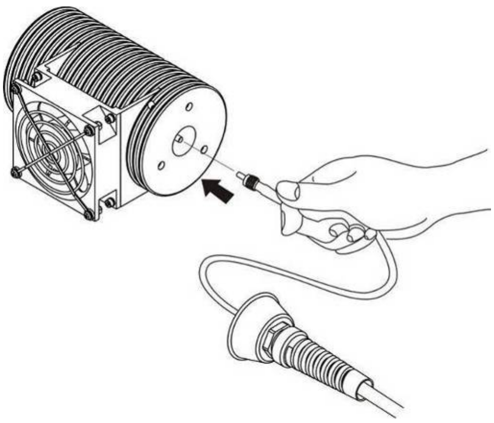


Figure 45: Connecting the optical fiber to resonator.

4) screw the protection cap back on the resonator.

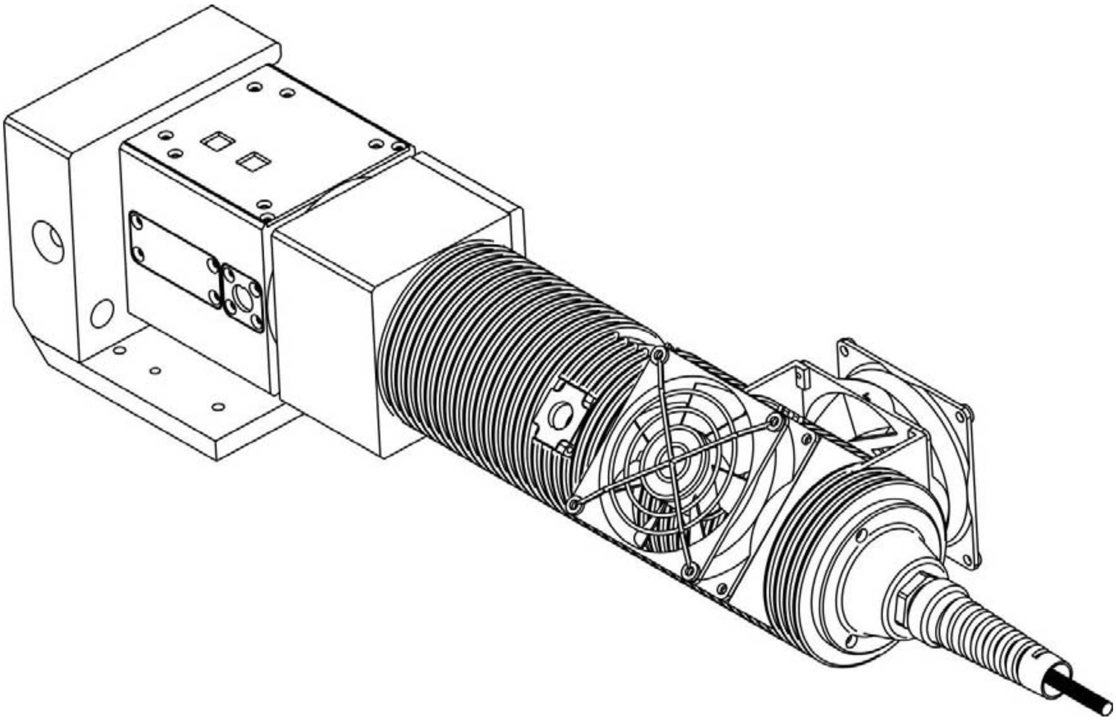


Figure 46: Final closing.

2.6.5 WIRING THE OPTICAL FIBER TO THE CONTROL RACK

Follow the steps listed here below to wire the optical fiber to the control rack:

1) unscrew the four screws that secure the plate and the cable gland to the rack.

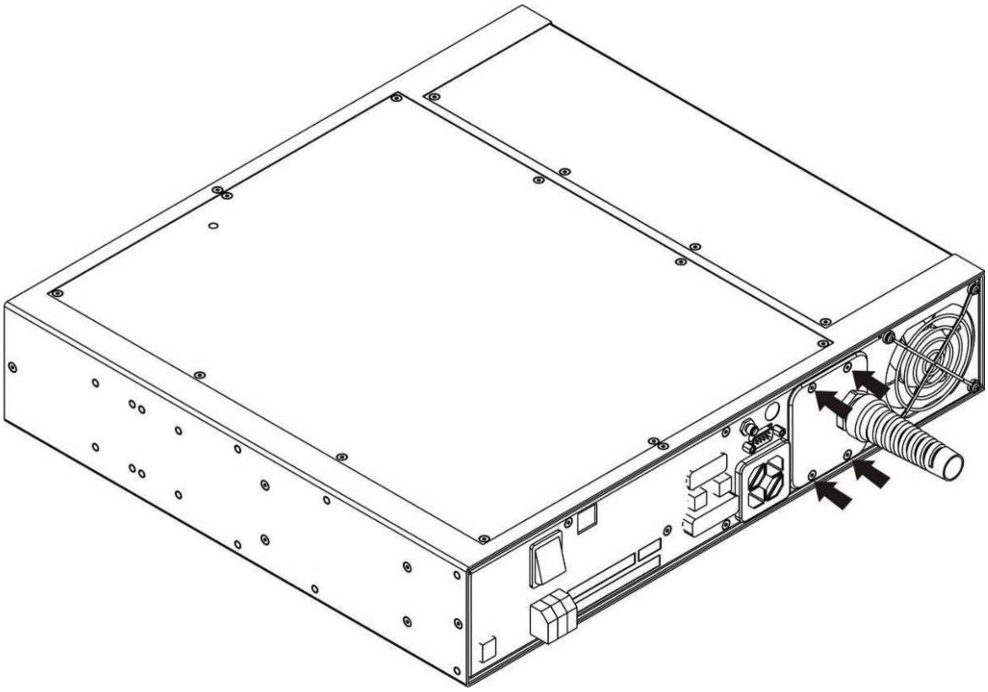


Figure 47: Disassembling the plate and optical fiber cable gland from the rack.

2) unscrew the cable gand and insert the optical fiber into the cable gland without removing its protection cap.

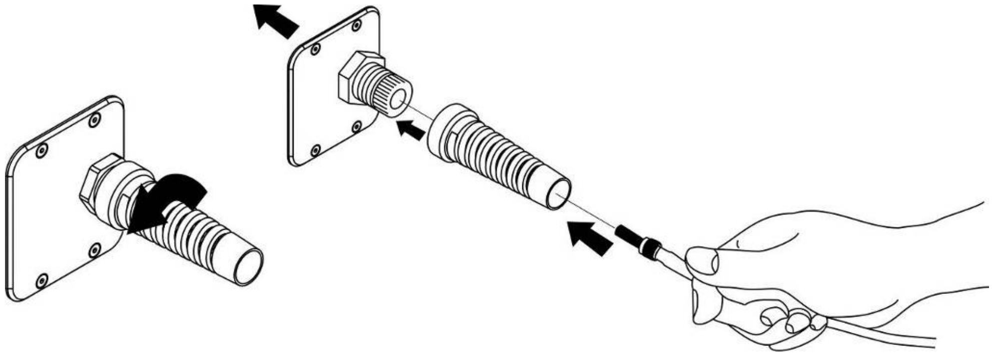


Figure 48: Passing the optical fiber through the cable gland.

3) remove the protection cap and insert the optical fiber in the laser diode coupler, being careful not to damage the end of the optical fiber or getting it dirty.

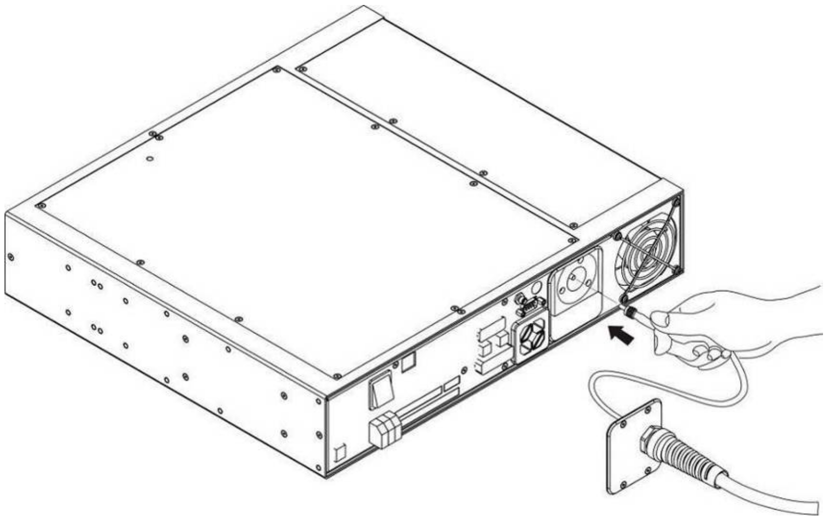


Figure 49: Connecting the optical fiber to the diode.

4) screw the plate and the cable gland back on the control rack.

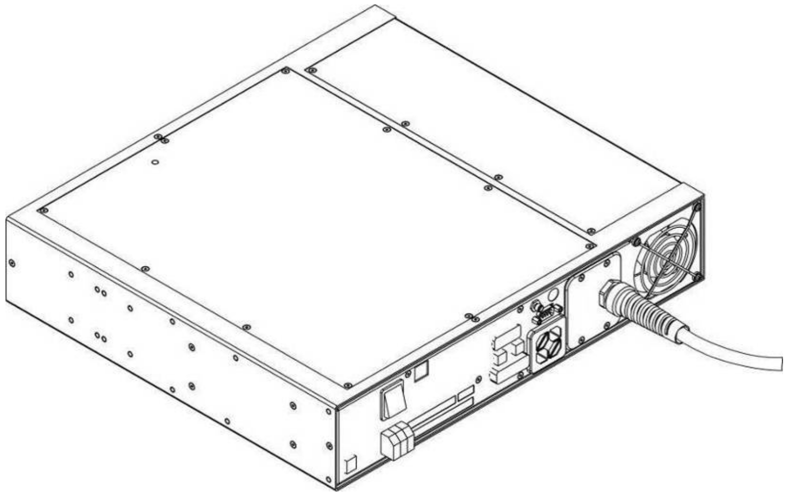


Figure 50: Final closing.

2.6.6 RS232 WIRING

For monitoring and diagnostics purposes, connect the RS232 serial cable between the control rack and a serial port (COM) of the control PC.

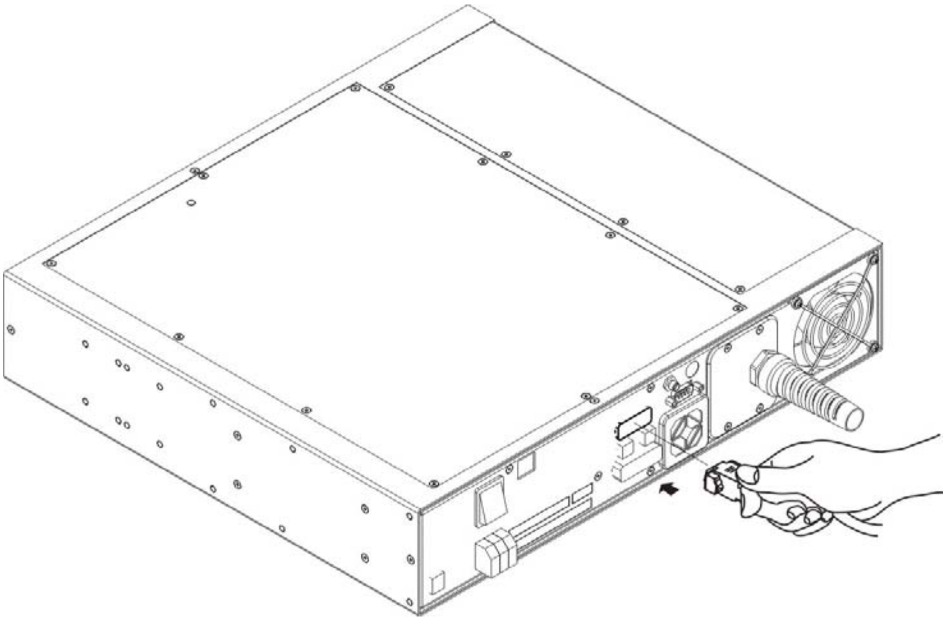


Figure 51: RS232 cable wiring.

2.6.7 INSERTING THE AUXILIARY INTERLOCK TERMINAL

In order to be able to use the device, the auxilary interlock connector (connector X2 on the rear panel) must be closed.

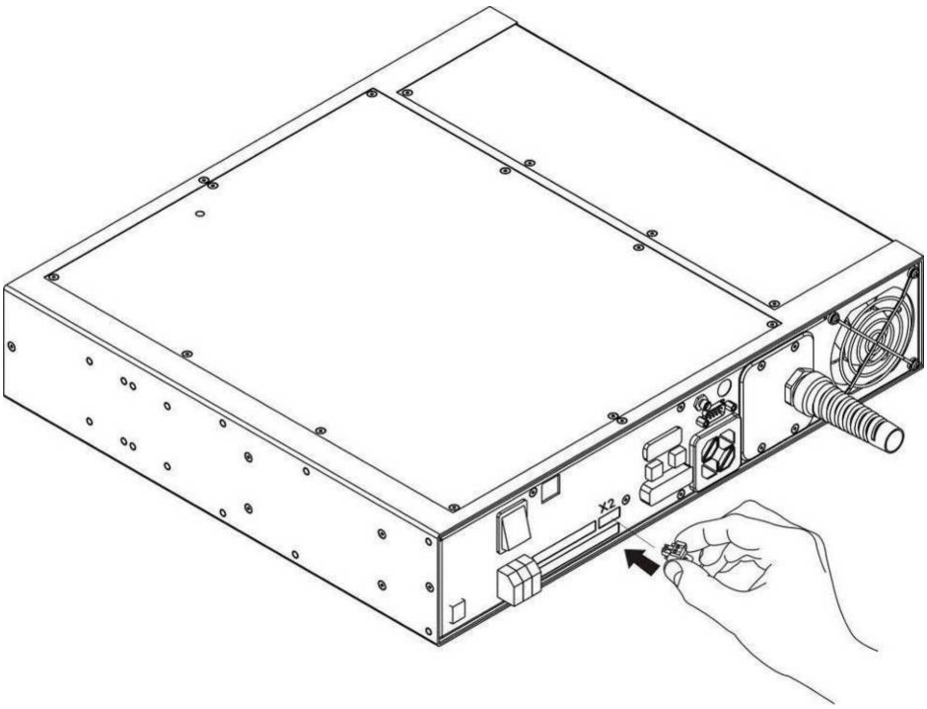


Figure 52: Auxiliary Interlock connector wiring.

2.6.8 INSERTING TERMINALS X1 AND X3

Instert X1 and X3 terminal blocks.

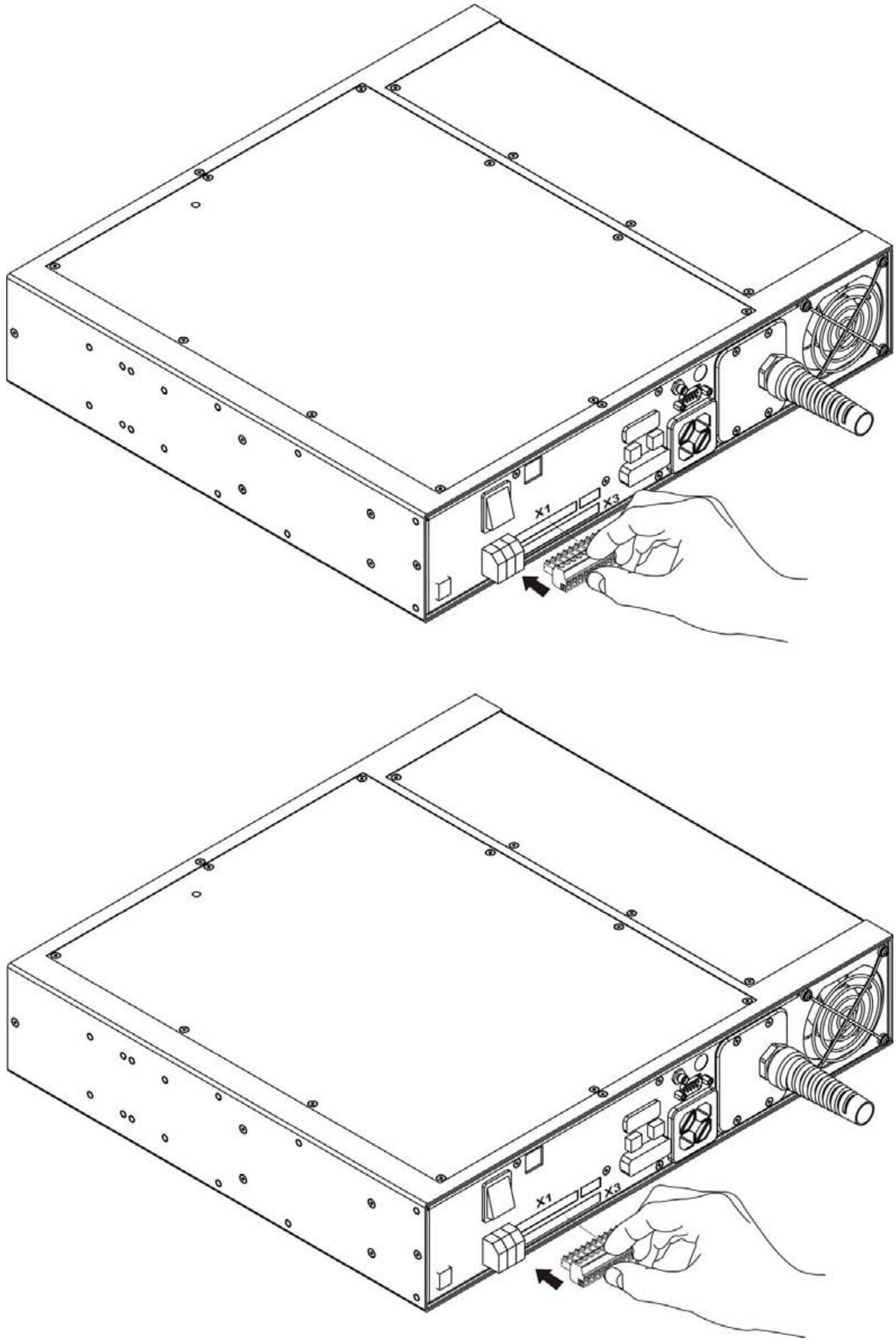


Figure 53: Inserting X1 and X3 terminal blocks.

2.6.9 POWER SUPPLY WIRING

CAUTION:
First of all, make sure that the power supply upstream the Vlase control rack is turned off and that no voltage is present in the connection cables between the power supply and the rack.

Using a slotted screwdriver, connect the power supply and earth cables following the right polarity indicated on the terminal board: +, - and GND (24 V DC – 25 A).

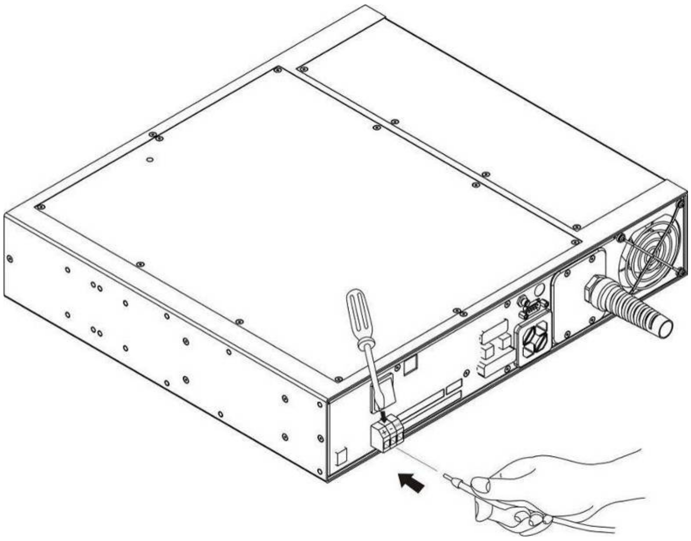


Figure 54: Wiring the power supply cables.

NOTE:
Vlase needs a **safety circuit** for emergency.

2.6.10 RESONATOR FAN WIRING

Connect the fan cable to the resonator module, complying with the mechanical fixing tab of the connectors.

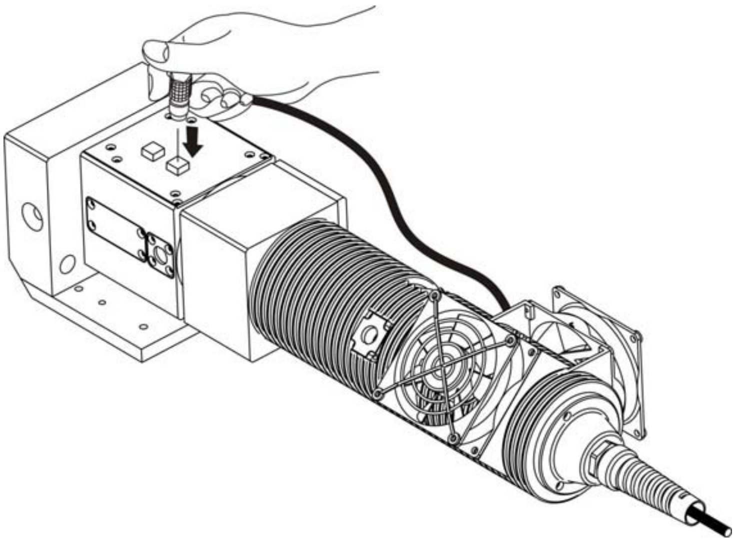


Figure 55: Wiring the fan resonator.

2.6.11 MARKING KIT CONNECTION

2.6.11.1 iMARK WIRING

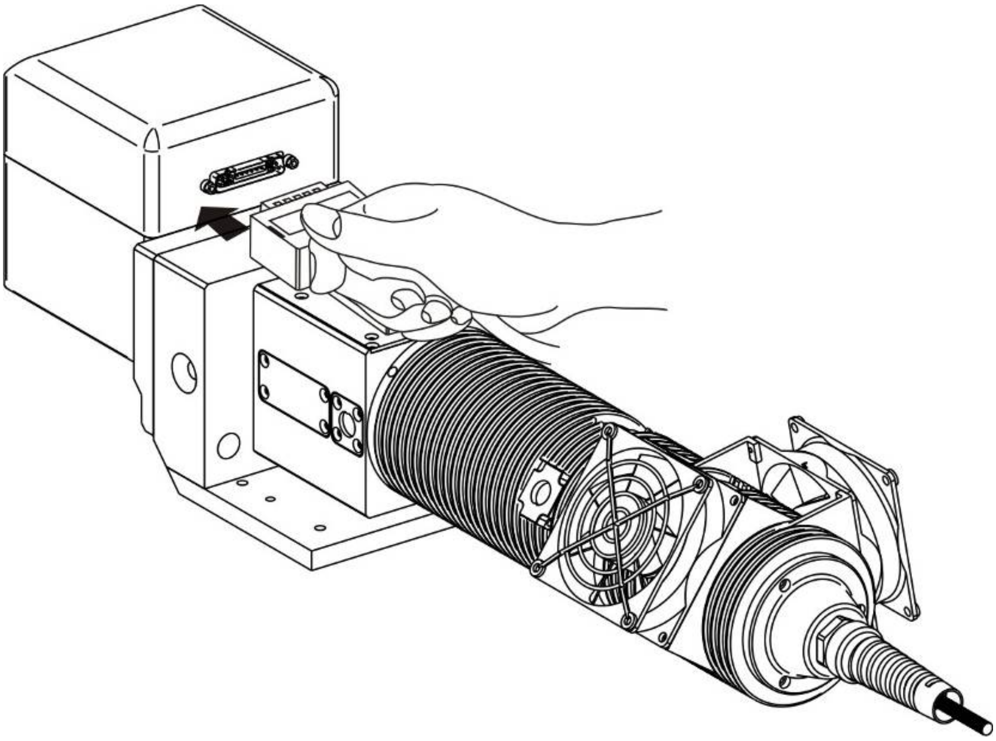


Figure 56: Wiring head cable.

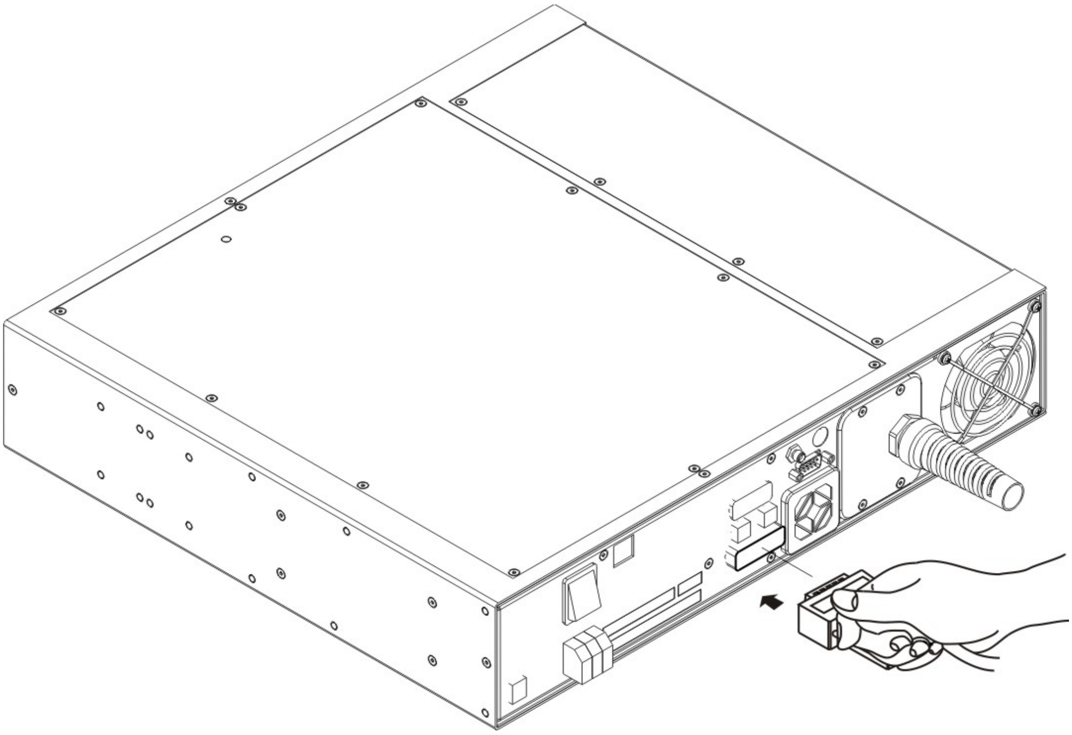


Figure 57: Wiring rack side.

iMARK CONNECTIONS EXAMPLE

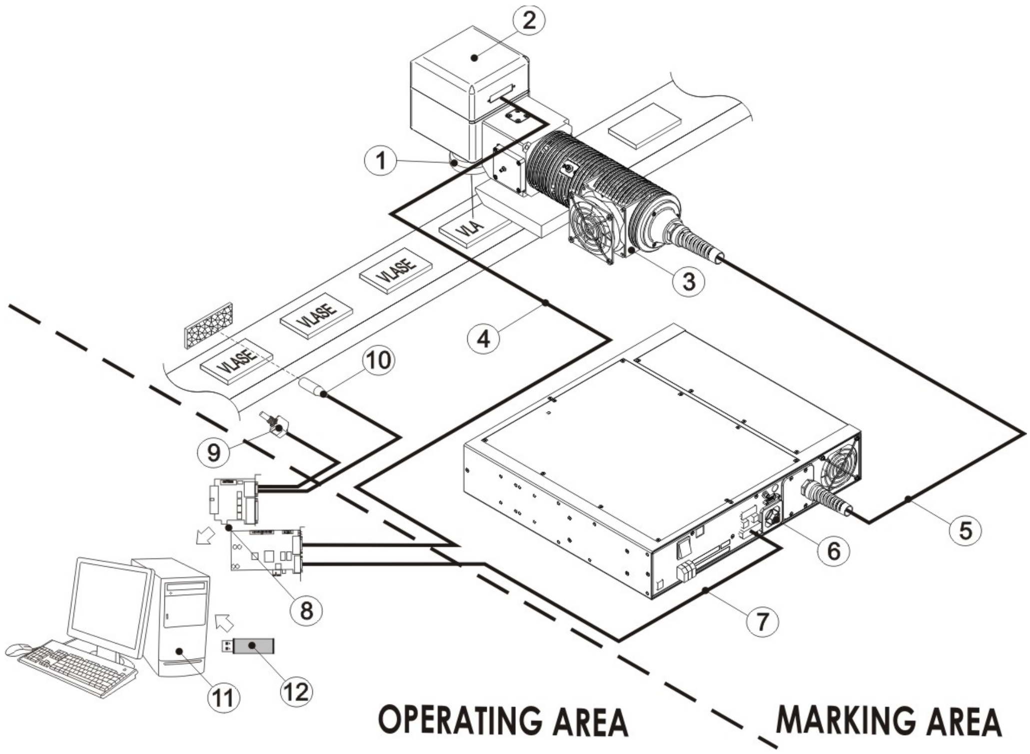
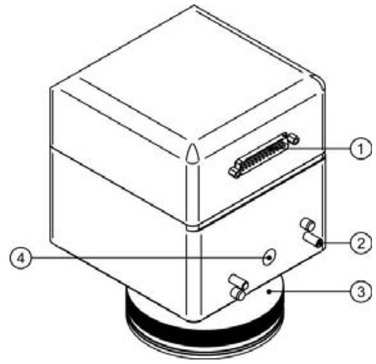


Figure 58: iMark with Vlase system

1	Optical Lens	**7**	iMark/Rack Cable
2	Scanner Head	**8**	iMark Boards
3	Resonator	**9**	Encoder (for marking on fly)
4	Signal cable for Galvo motors	**10**	Photocell (for marking on fly)
5	Optical Fiber	**11**	PC
6	Control Rack	**12**	Lighter Software

SCANNER HEAD

The scanner head is used to deflect the laser beam on the marking plane, moving two mirrors by means of galvanometric motors.



1) Power Supply and Galvo signals	3) F-Theta scanning lens
2) Centering referencing	4) Laser beam inlet

Figure 59: Scanner head view.

iMARK BOARDS AND LIGHTER SOFTWARE INSTALLATION

The electronics which control the laser system and the related I/O signals is composed of a board with iMark controller (laser controller) which is inserted in a PCI-E slot of a standard PC. One type of expansion board can be connected to this board to control I/O signals.

General procedure (please refer to the relevant manual for the complete procedure):

- Turn OFF the PC
- Install the iMark board inside the PC
- Turn ON the PC
- Insert CD or Pen Drive containing Lighter and install the software
- Upload the file `LASER.INZ` provided by Datalogic Automation Srl contains the settings of the laser.
- Restart the PC

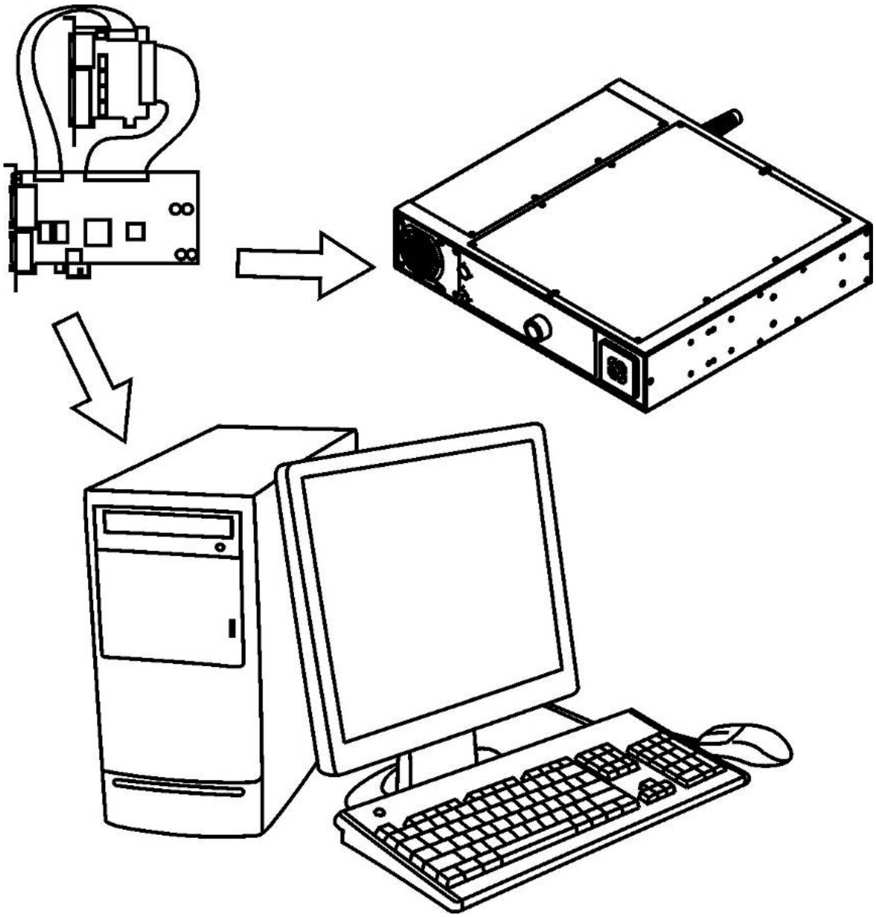


Figure 60: iMark installation.

NOTE:
In order to install the **iMark** hardware, please refer to the **relevant installation manual**.

NOTE:
In order to install the **Lighter** software, please refer to the **relevant installation manual**.

iMARK CONNECTIONS EXAMPLE

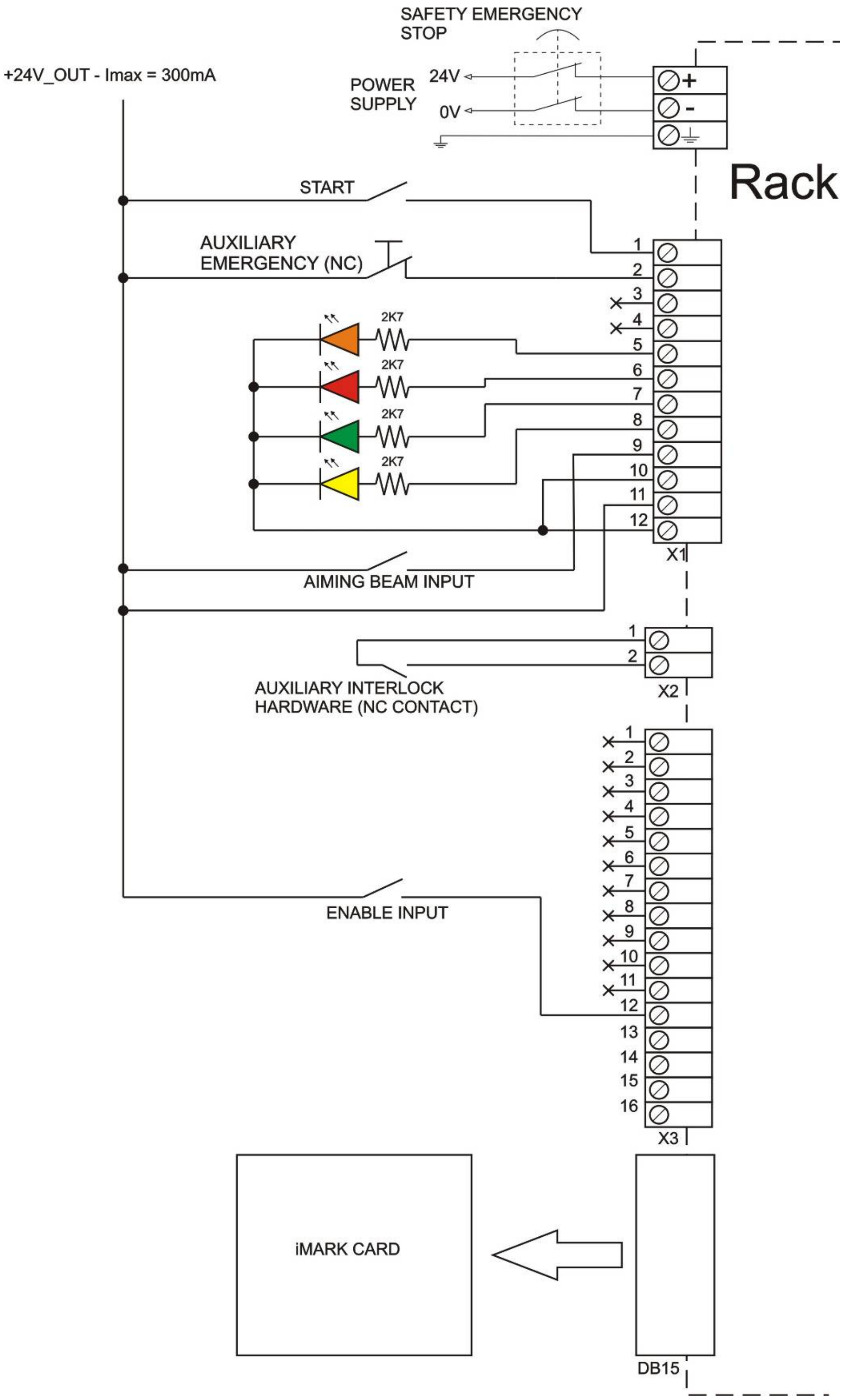


Figure 61: iMARK connections.

2.6.11.2 DSP2 WIRING

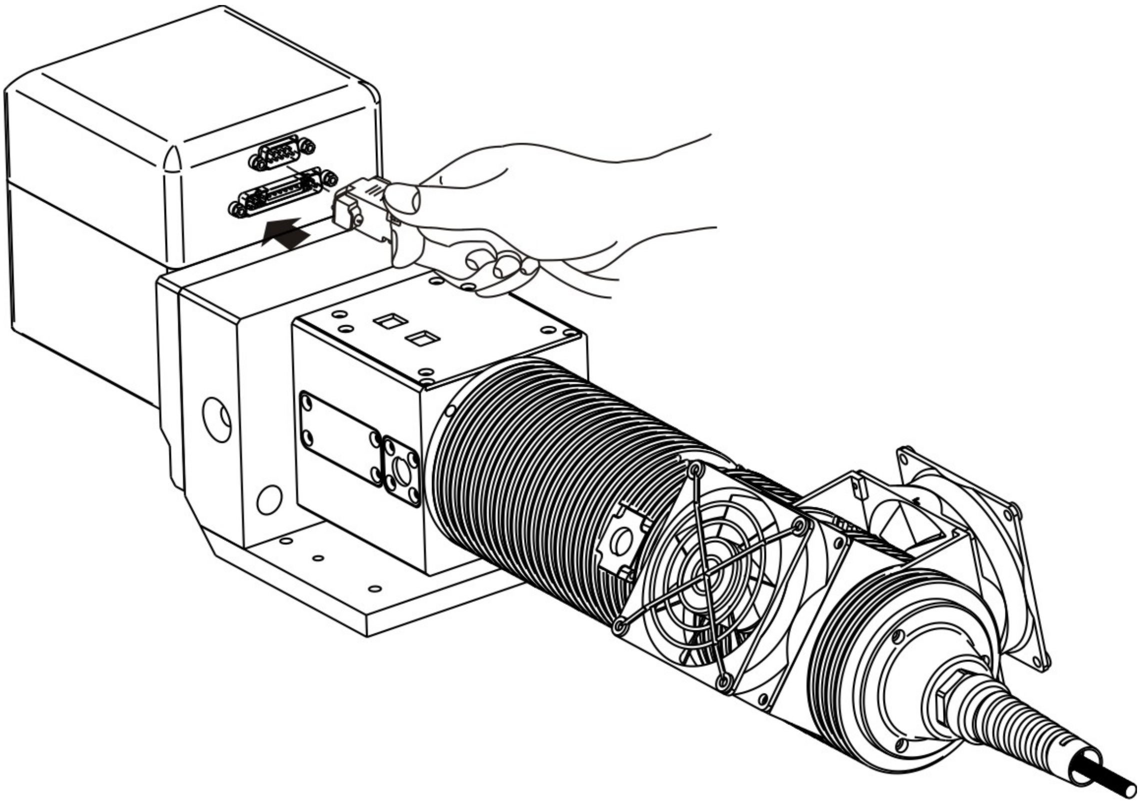


Figure 62: Head power cable wiring resonator side.

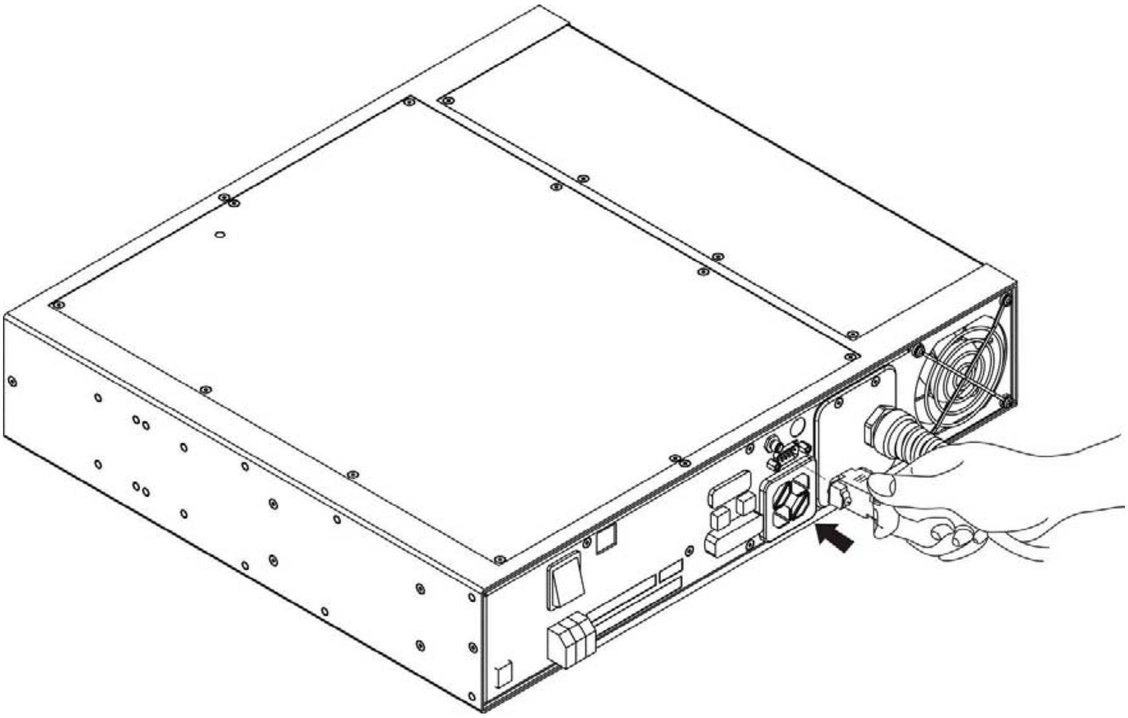


Figure 63: Head power cable wiring rack side.

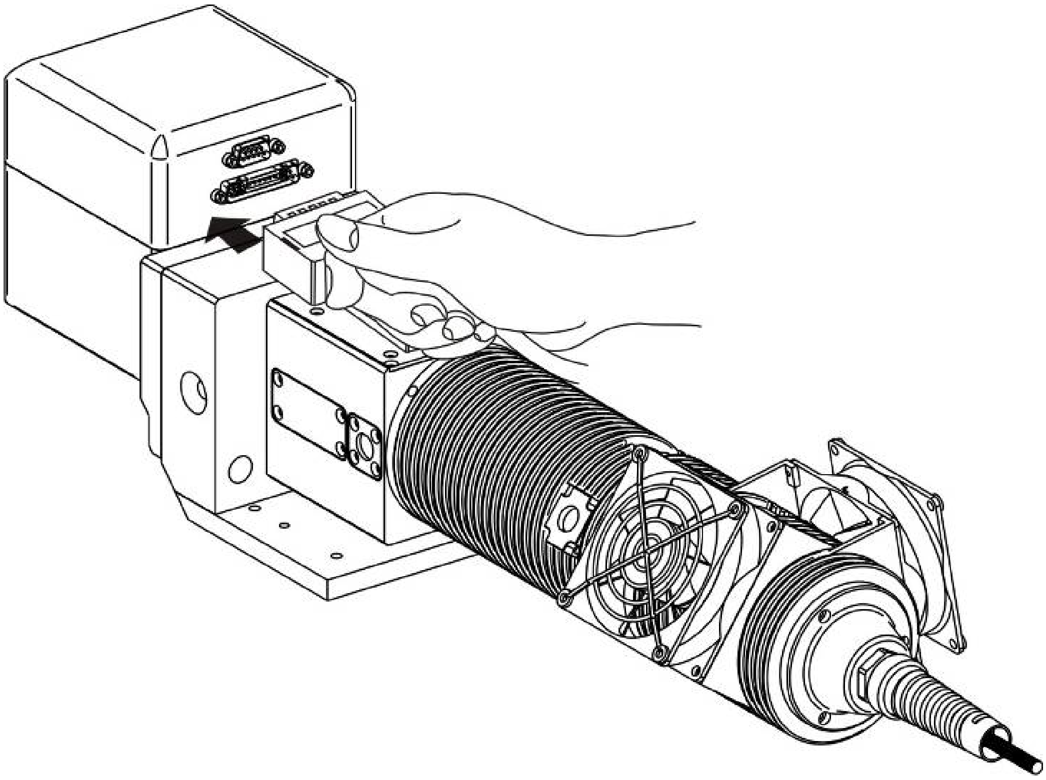


Figure 64: Scan Head signals wiring resonator side.

DSP2 CONNECTIONS EXAMPLE

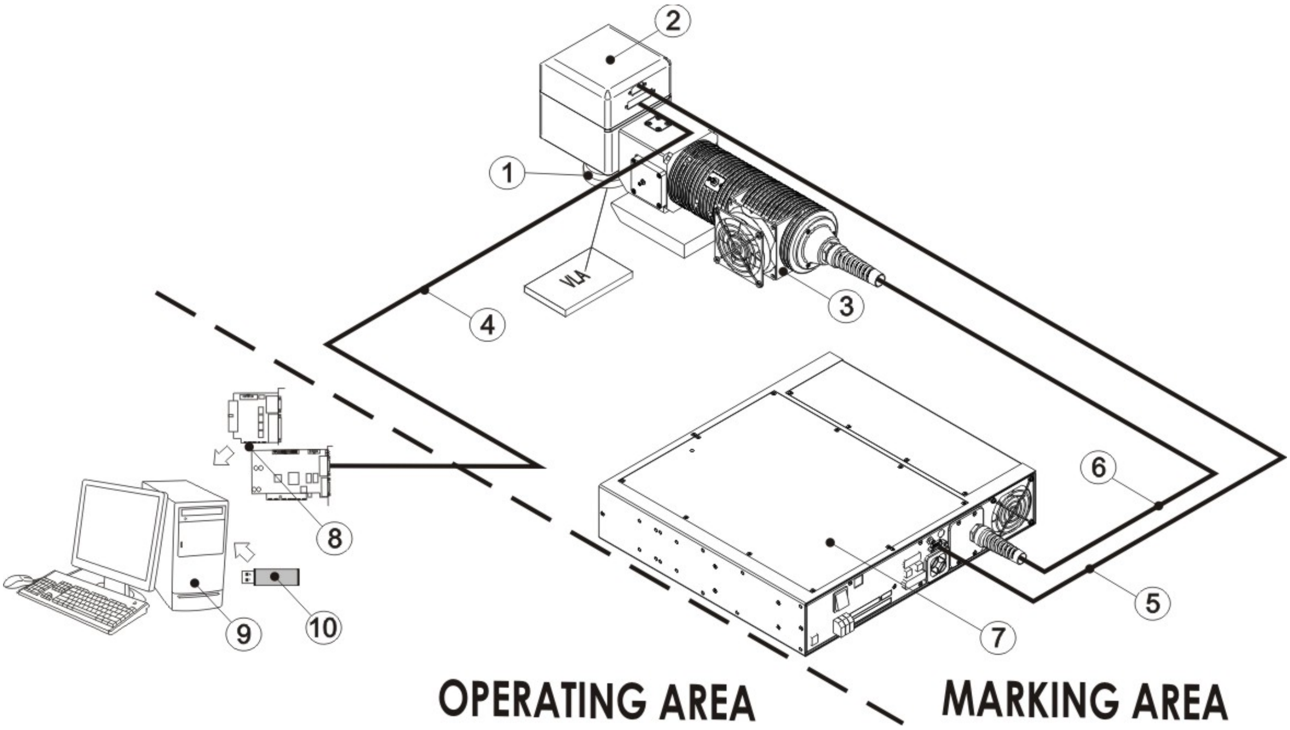
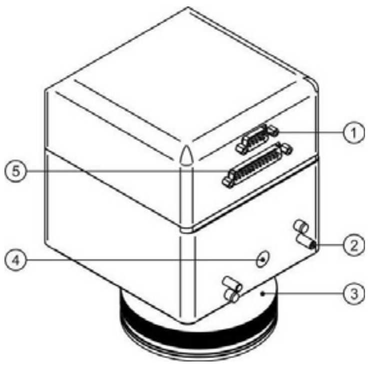


Figure 65: DSP2 with Vlase system

1	Optical Lens	**6**	Optical Fiber
2	Scanner Head	**7**	Control Rack
3	Resonator	**8**	DSP2 Boards
4	Signal cables for Galvo motors	**9**	PC
5	Power supply cable for Galvo motors	**10**	Smartist Software

The scanner head is used to deflect the laser beam on the marking plane, moving two mirrors by means of galvanometric motors.
Also F-Theta scanning lens is specific for each wavelength, manufactured in order to have best possible transmission of the laser radiation.



1) Galvo power supply (15V dual)	4) Laser beam inlet
2) Centering referencing	5) Galvo signals from DSP2
3) F-Theta scanning lens	

Figure 66: Scanner head view.

DSP2 BOARDS AND SMARTIST SOFTWARE INSTALLATION

The DSP2 card consists of two separate parts. The main part must be inserted in the PCI slot of a standard or industrial PC and satisfies the Plug & Play version 1.1a requirements.

General procedure (please refer to the relevant manual for the complete procedure):

- Turn OFF the PC
- Install the DSP2 board inside the PC
- Turn ON the PC
- Insert the Pen Drive containing Smartist and install the software
- Copy in directory **X:\xxxxxx\laservall\bin** the file `LASER.INI` stored on the Pen Drive provided with Vlase, overwriting the pre-installed filed. This operation must be carried out with the DSP2 monitor program (yellow triangle-shaped icon in the tray area) closed
- Restart the PC

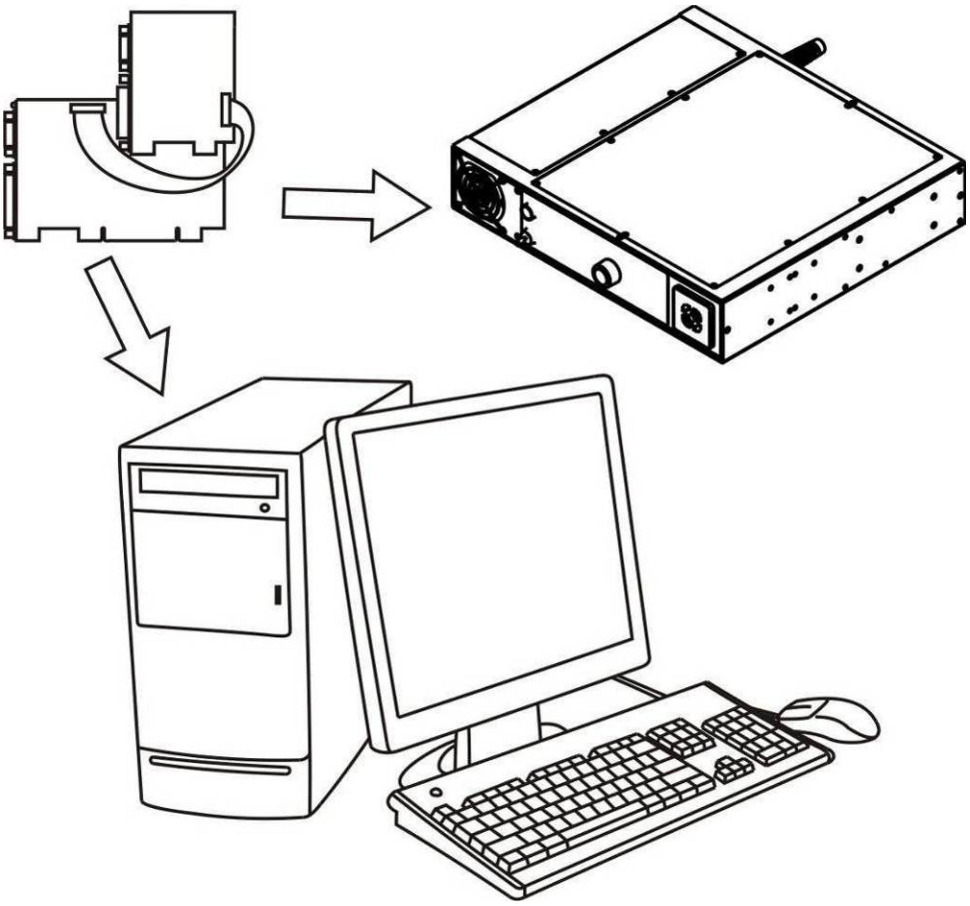


Figure 67: DSP2 installation.

NOTE:
In order to install the **DSP2** hardware, please refer to the **relevant installation manual**.

NOTE:
In order to install the **Smartist** software, please refer to the **relevant installation manual**.

DSP2 CONNECTIONS EXAMPLE

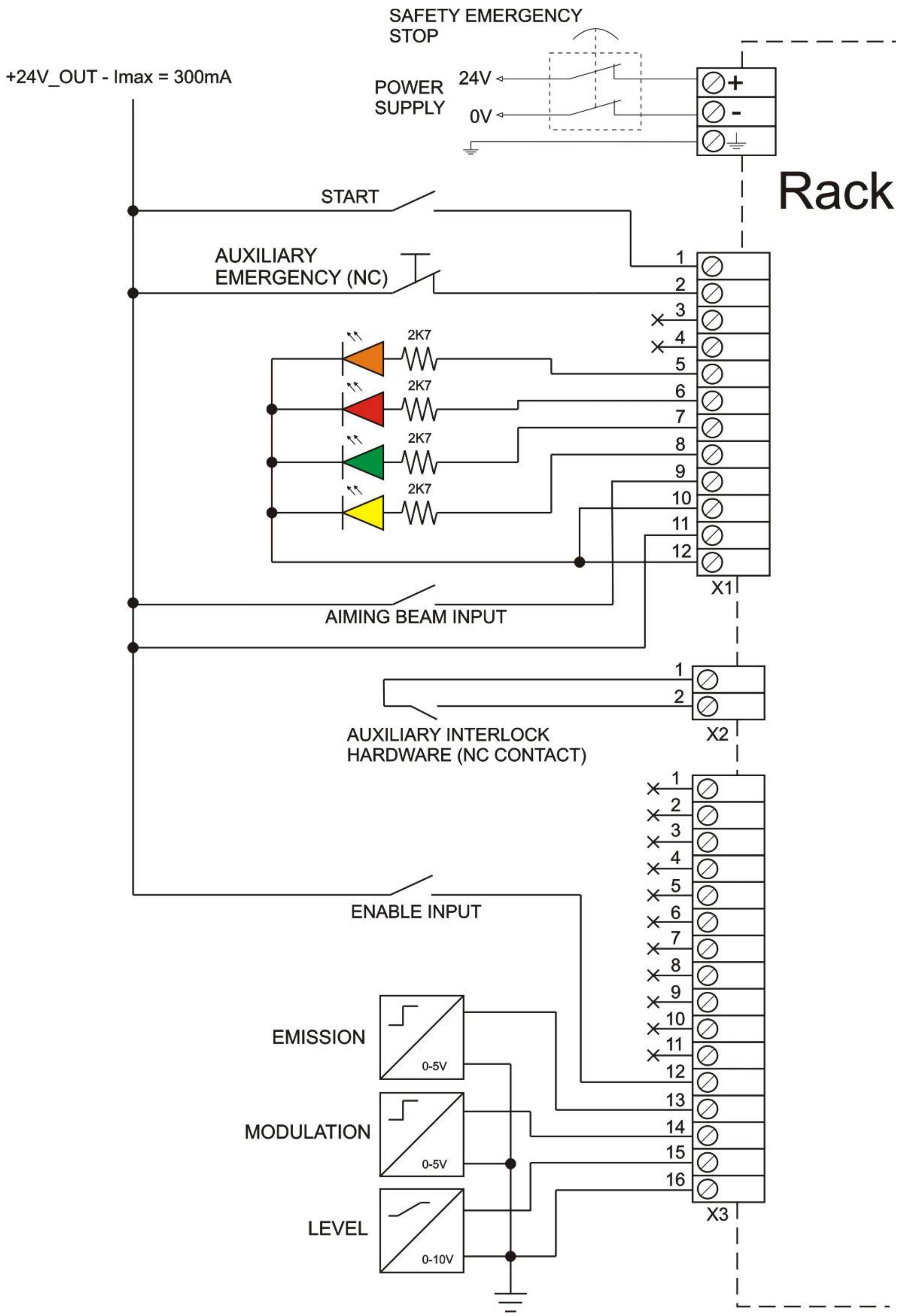


Figure 68: DSP2 connections.

2.6.12 ETHERNET CABLE WIRING (OPTIONAL)

For remote product monitoring, instead of the serial connection via RS232, the control rack can be connected to a mains outlet through the Ethernet cable provided.

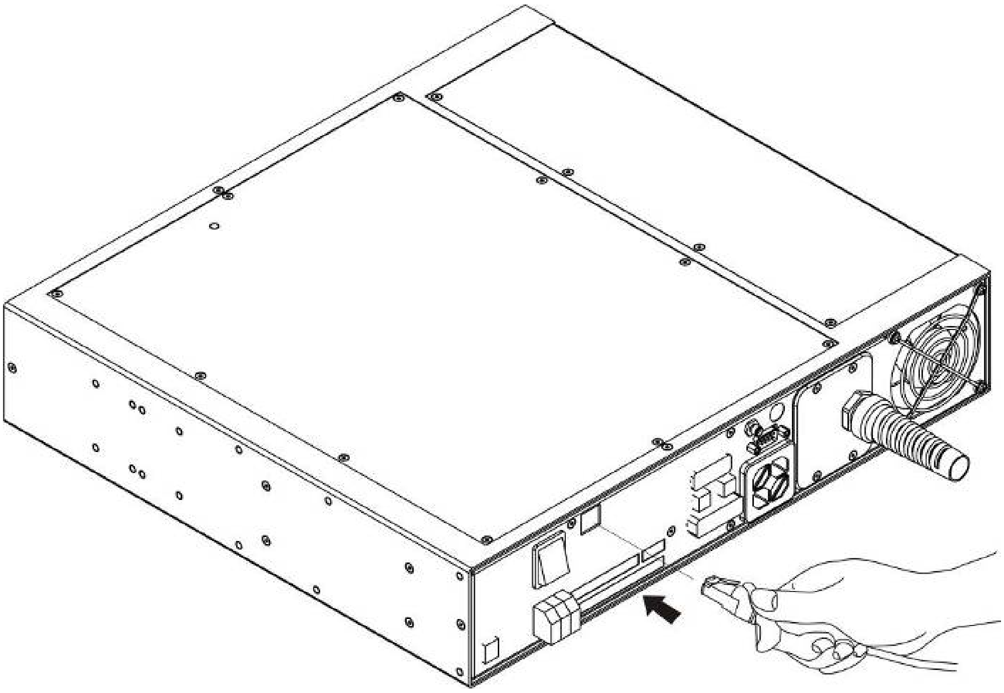


Figure 69: Ethernet cable wiring.

3 : USE AND OPERATION

3.1 TURNING ON SEQUENCE

1st step: First to proceed with turn on the Vlase, **insure to a right device connection like descripted previously.**

2st step: Switch on the main switch in the back of the control rack

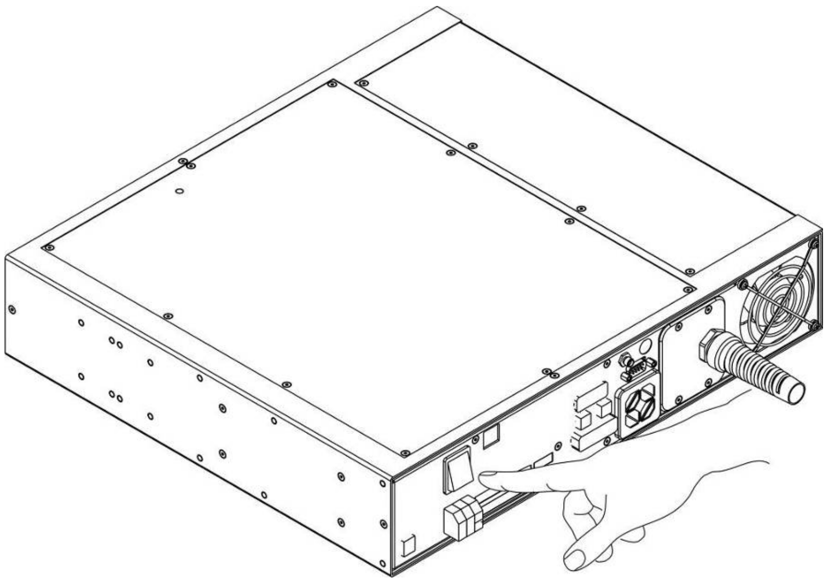


Figure 70: Switching on the main switch.

This operation power on part of the system power board.

3nd step: Rotate the safety key clockwise (in the ON position). The status lamp is on.

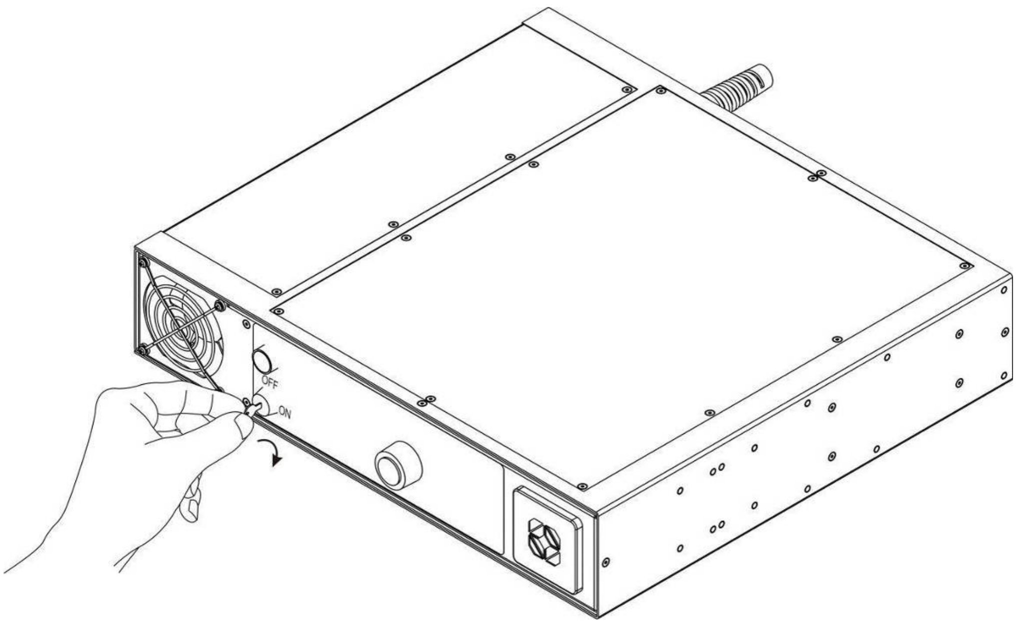


Figure 71: Turning on the safety key.

The electronic cards are now powered and the display shows the following message, provided there are no alarms, and the status LED is GREEN.

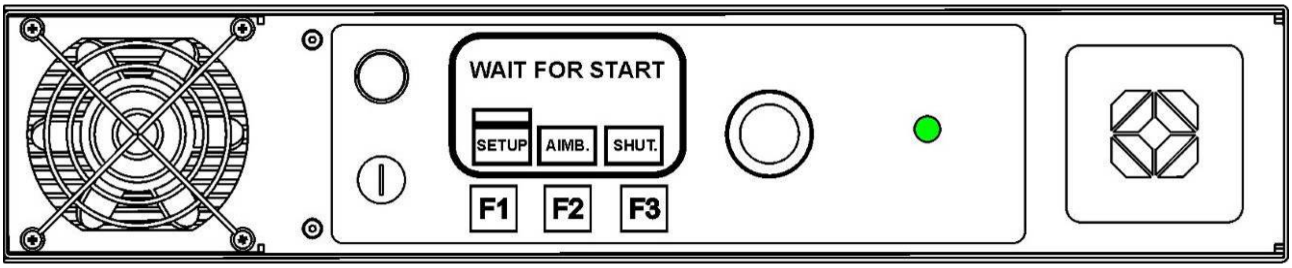


Figure 72: Start-up waiting screen.

4rd step: Turn on the START input (terminal 1 of **X1**): the warm-up procedure is started and the status LED will be flashing ORANGE.

After the warm-up procedure, the machine goes into the LASER STAND-BY status.

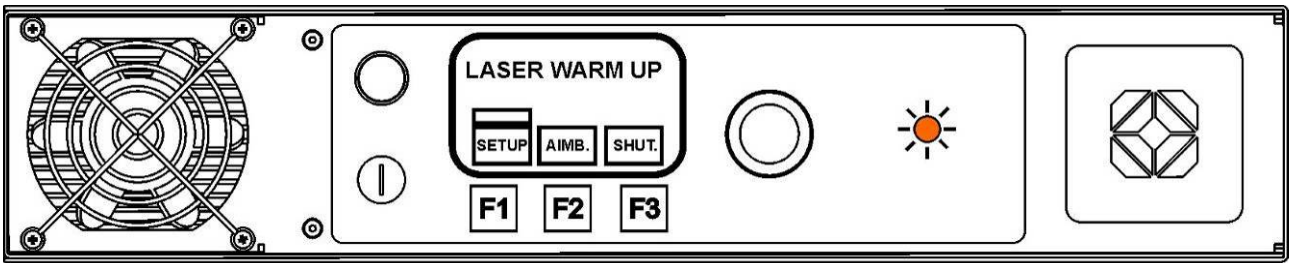


Figure 73: Warm-up screen.

After the warm-up procedure, the machine goes into the LASER STAND-BY status and the status LED will be steady ORANGE.

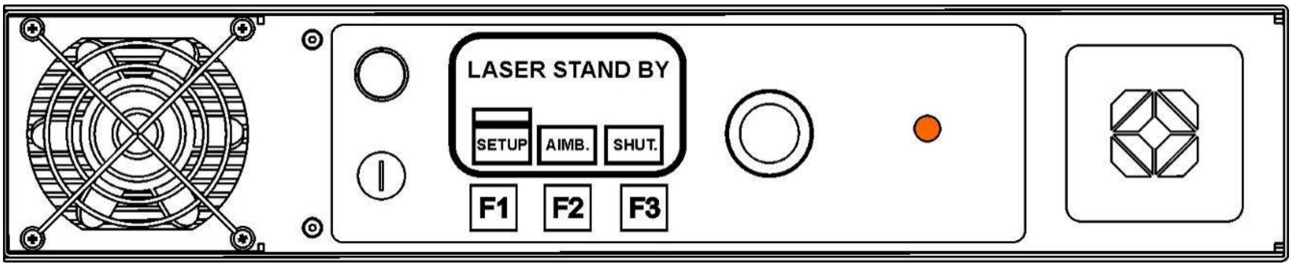


Figure 74: Stand-by screen.

5th step: **Turn on the ENABLE input (**terminal 12 of **X3**), the status LED will be steady RED.

The machine goes into the LASER READY status, in other words it is ready to emit the laser according to the Level, Q-Switch MOD and Emission signals but they are in charge of marking platform.

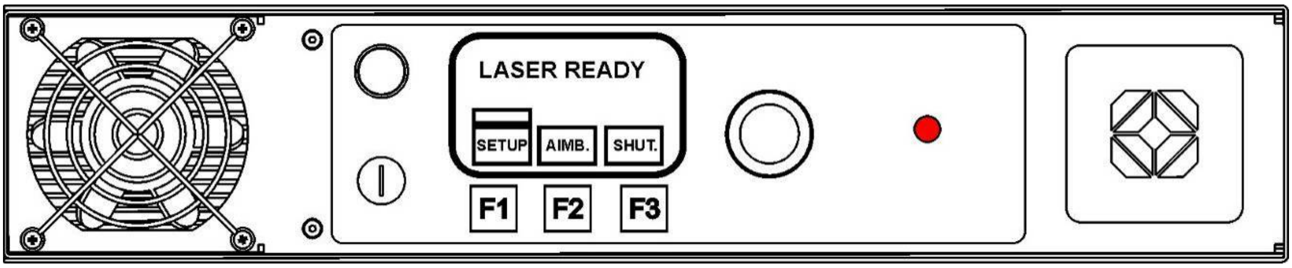


Figure 75: Laser ready screen.

WARNING:
Be CAREFUL! The LASER **is ready** to emit!

NOTE:
If the START input is turned on before steps 1 and 2, the message **STARTING NOT ALLOWED** appears on the display.

So you need to disable the START input and enable it once again.

NOTE:
If the ENABLE INPUT is turned on before steps 1, 2, 3 START INPUT, the message **ENABLING NOT ALLOWED** appears on the display.

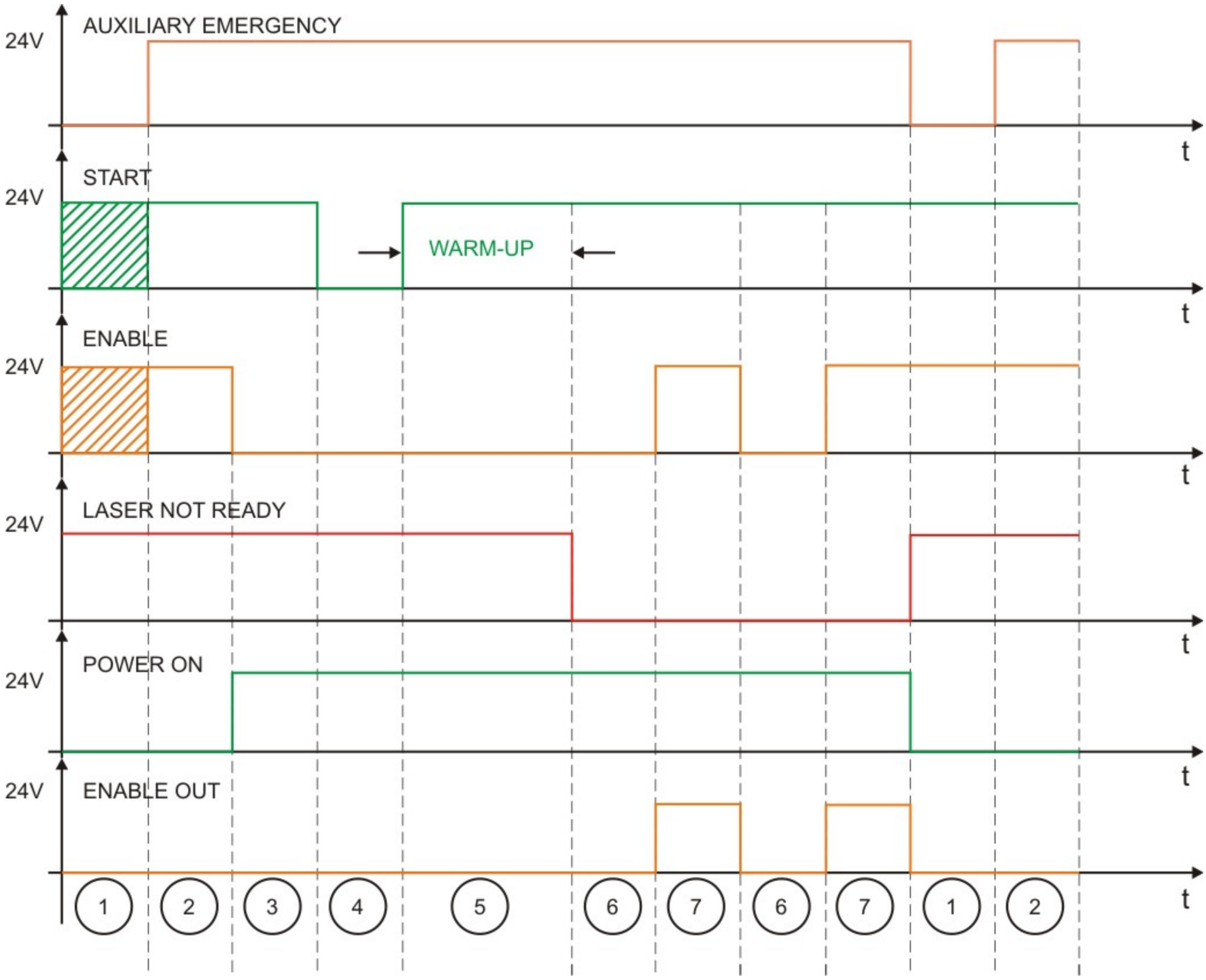
So you need to disable the ENABLE input and repeat the turning on sequence.

3.2 TURNING OFF SEQUENCE

It is recommended to perform the steps above but in reverse order before removing power supply to the device.

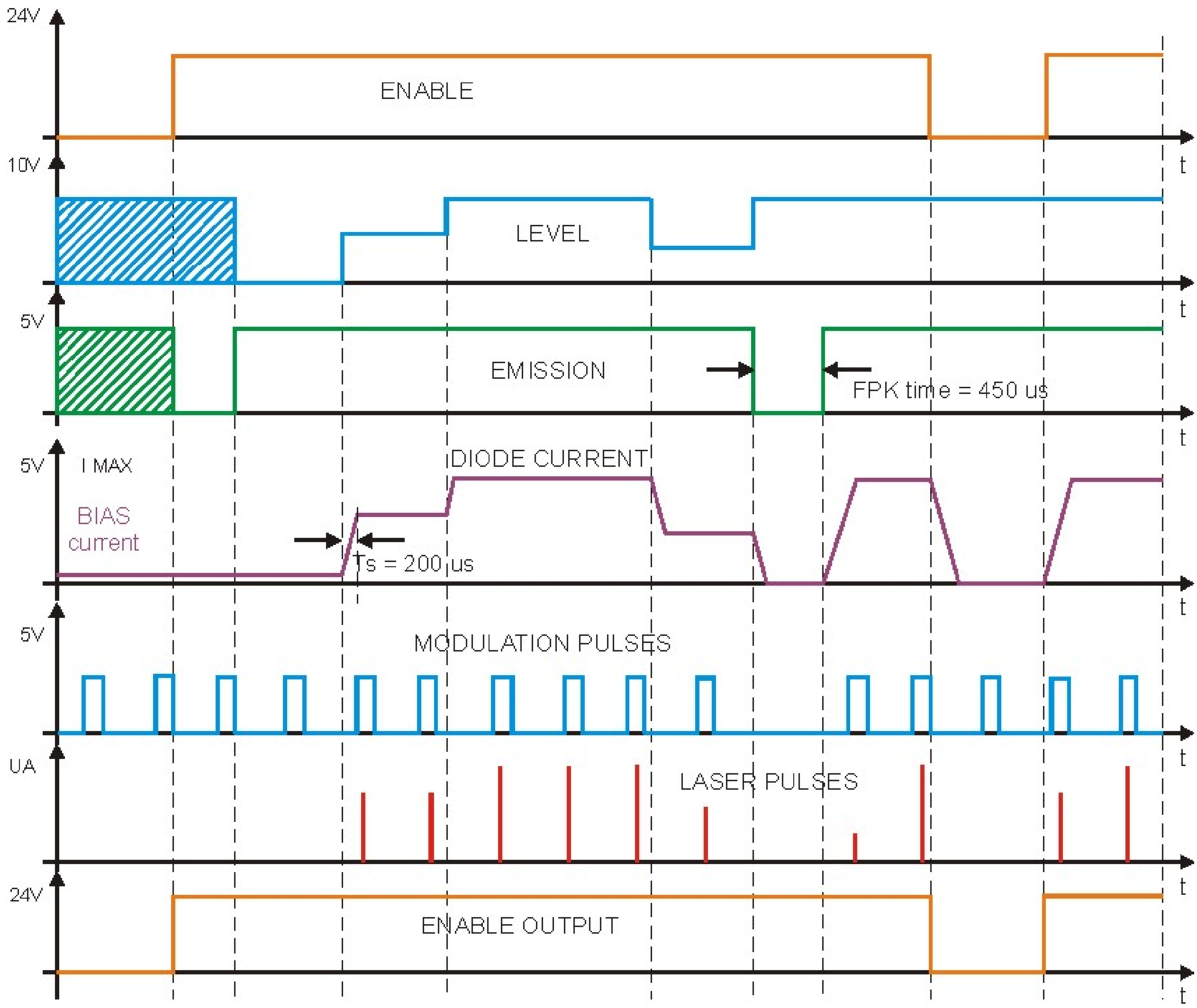
3.3 TEMPORAL DIAGRAMS

3.3.1 CORRECT AND INCORRECT TURNING ON SEQUENCES



1. AUXILIARY INTERLOCK condition
2. ENABLE NOT ALLOWED: Wrong turning on sequence
3. STARTING NOT ALLOWED: Wrong turning on sequence
4. WAIT FOR START: the machine is waiting to be started up
5. WARM UP: diode temperature stabilizing time dependant on environmental conditions (< 30 s @ 25°C)
6. STAND-BY: laser diode stabilized in terms of temperature, ready to emit
7. READY: laser diode emitting according to the LEVEL and EMISSION parameters

3.3.2 WORK SIGNALS AND LASER EMISSION ACTUAL STATUS (*)



(*) Signals valid for machine not equipped with hardware thermalization.

3.4 USING THE DISPLAY

The Display in the front panel can be used to quickly verify:

- the configurations and operating parameters of the machine;
- the firmware versions in the different electronic cards;
- the operating parameters in real time;
- whether or not there are any alarms present;
- the laser power.

This chapter describes the display screens and how it is possible to surf through them using the selection knob and keys F1, F2, F3.

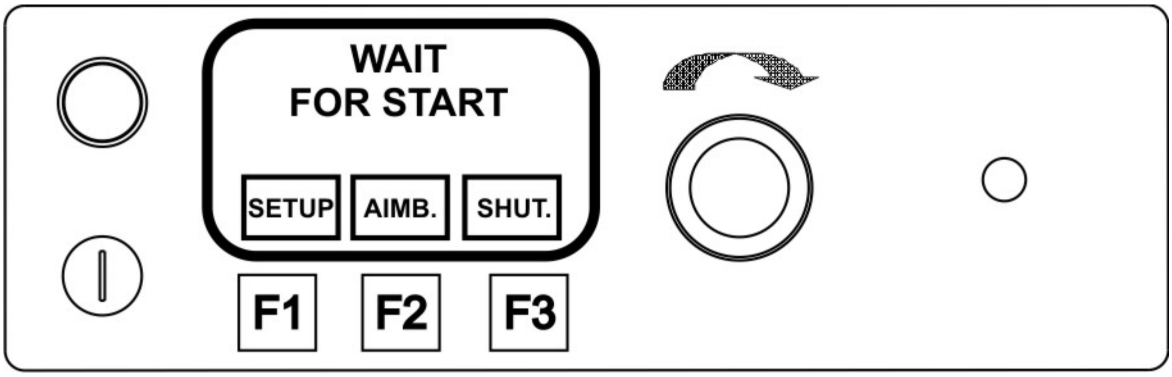


Figure 76: Start waiting screen.

The Figure above shows the first screen displayed when the machine is turned on.
There are three sub-windows:

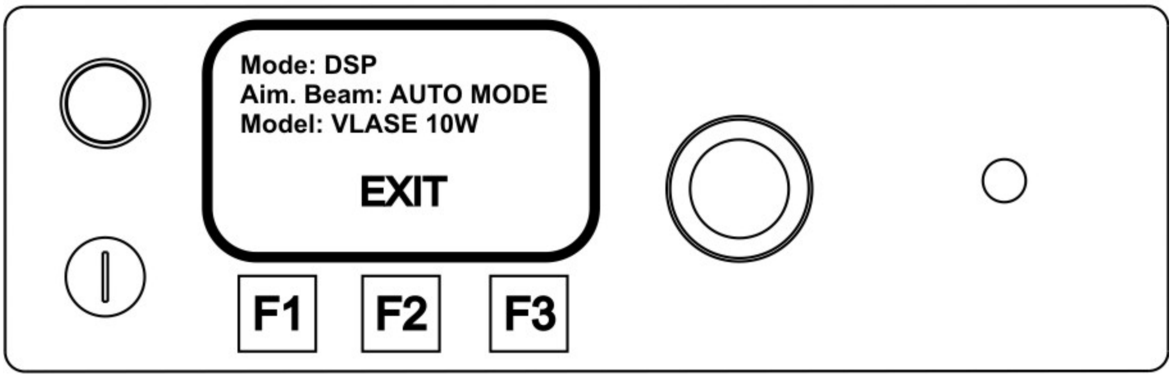


Figure 77: Machine settings description screen.

Cmd. Mode indicates the mode in which the machine is piloted: DSP, EXT I/O, EXT I/O with FPK, RS232, V_MARK
Aim. Beam indicates the piloting mode of the Aiming Diode: AUTO MODE, MAN. MODE, EXT. MODE

Model indicates type of machine: VLASE 2PWX-TLSV.

By selecting the key you can turn on or off the aiming diode in case the MAN. MODE command has been selected, otherwise the following messages may appear, indicating a different piloting mode:

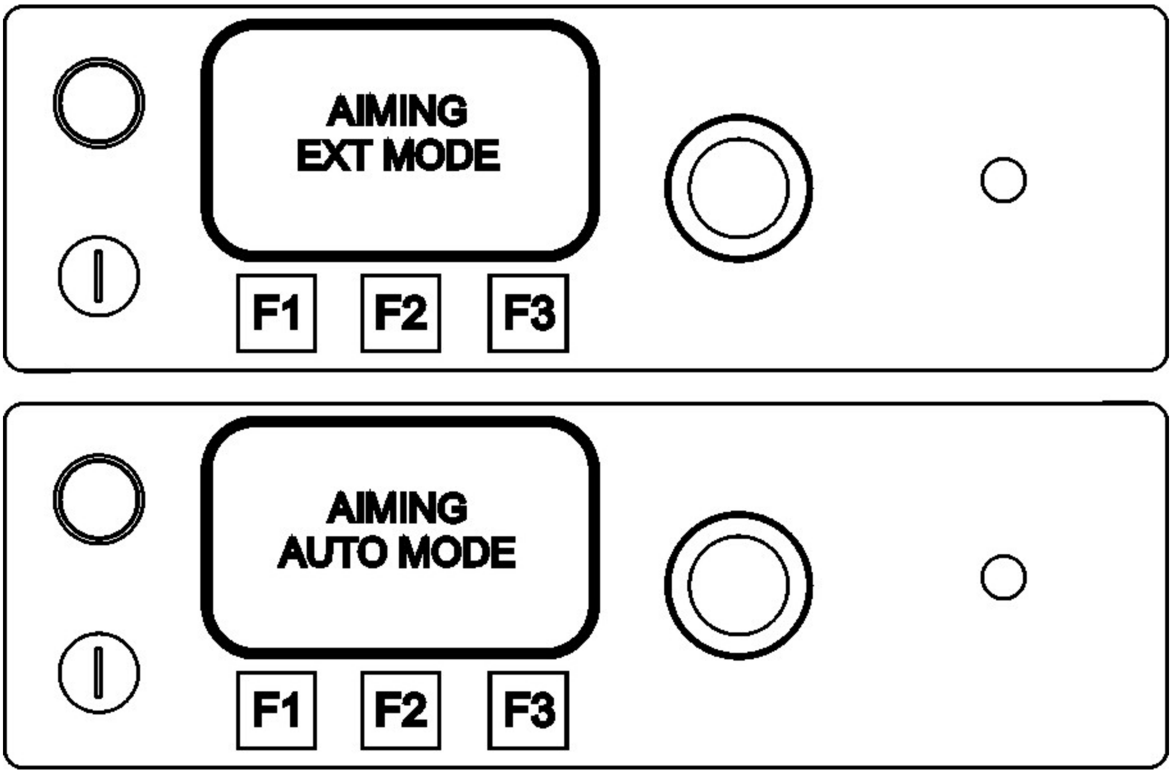


Figure 78: Aiming diode configurations screen.

If the aiming diode is activated, the key is backlit.

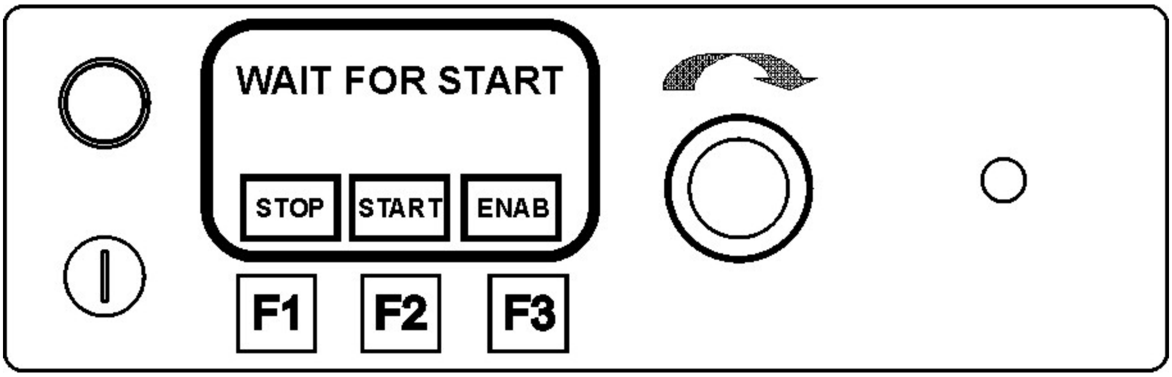


Figure 79: Input contacts status screen.

This screen is read-only.
If the keys are backlit, they indicate the active status of the corresponding inputs: AUXILIARY EMERGENCY, START, ENABLE.

Move to the right with the knob to switch to the third screen.

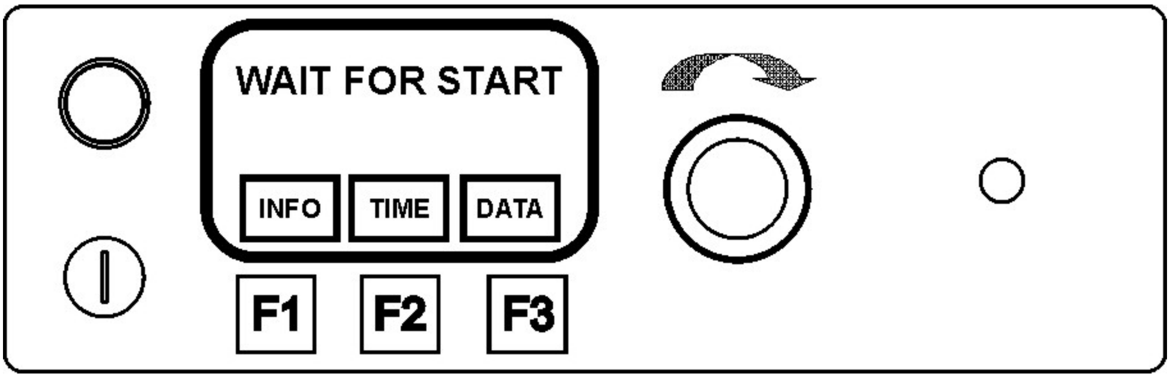


Figure 80: Work information access screen.

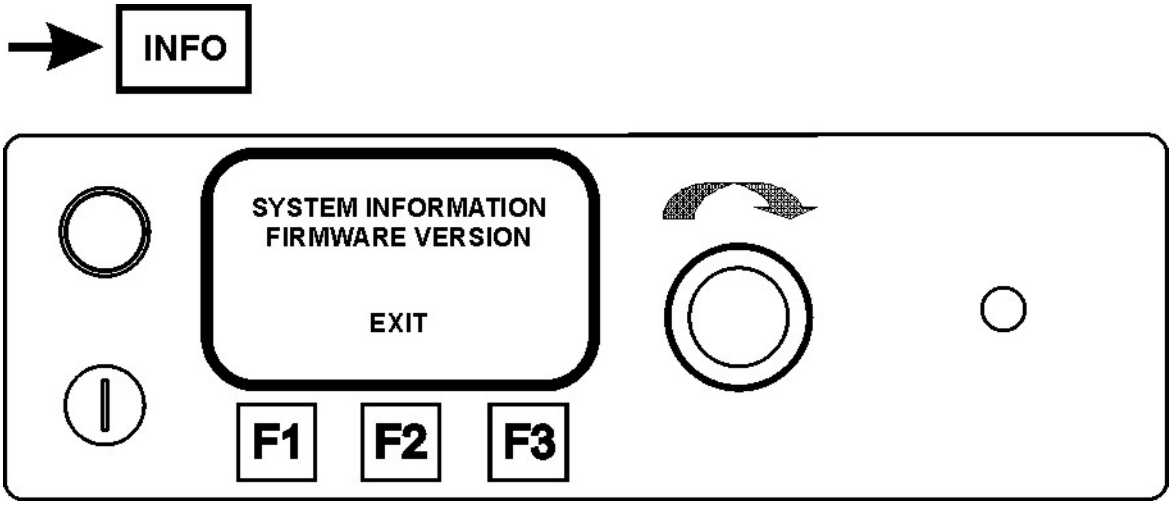


Figure 81: Machine configuration information selection screen.

By accessing the window, you can use the knob to select information about the system configuration and the firmware versions:

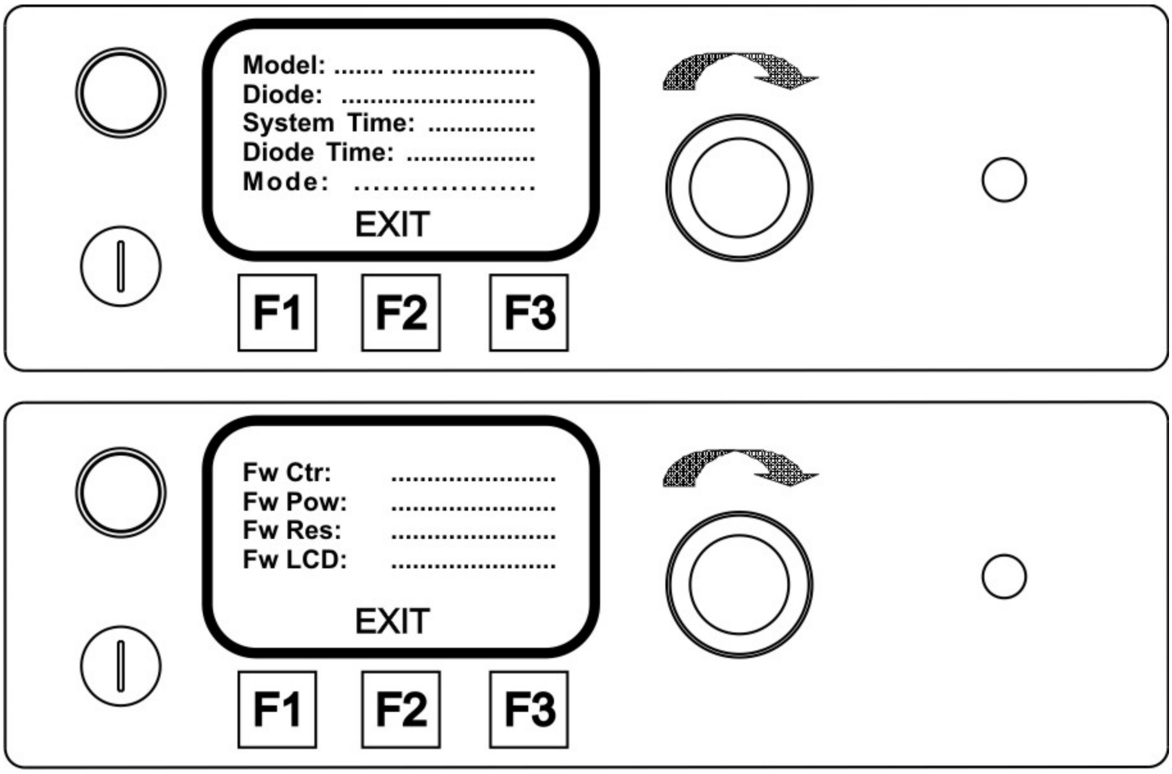


Figure 82: Machine configuration and installed firmware reading screen.

Cmd. Mode indicates the method used to pilot the machine: DSP, EXT I/O, EXT I/O with FPK, RS232, V_MARK

Aim. Beam indicates the method used to pilot the Aiming Diode: AUTO MODE, MAN. MODE, EXT. MODE

This screen shows the set time (referred to GMT + 00) and the date. This information is entered during the manufacturing phase and cannot be changed.

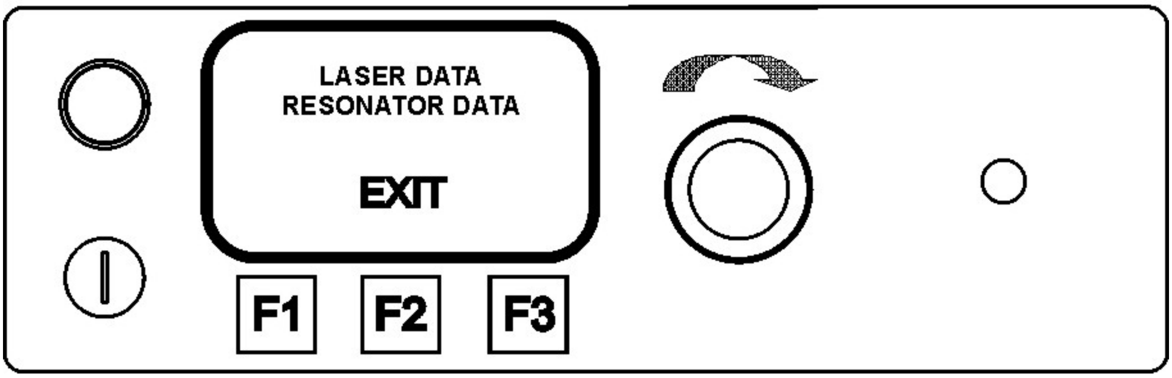


Figure 83: Screen used to select the machine working parameter reading.

Use the knob to select the type of information to be displayed; the appearing windows represent:

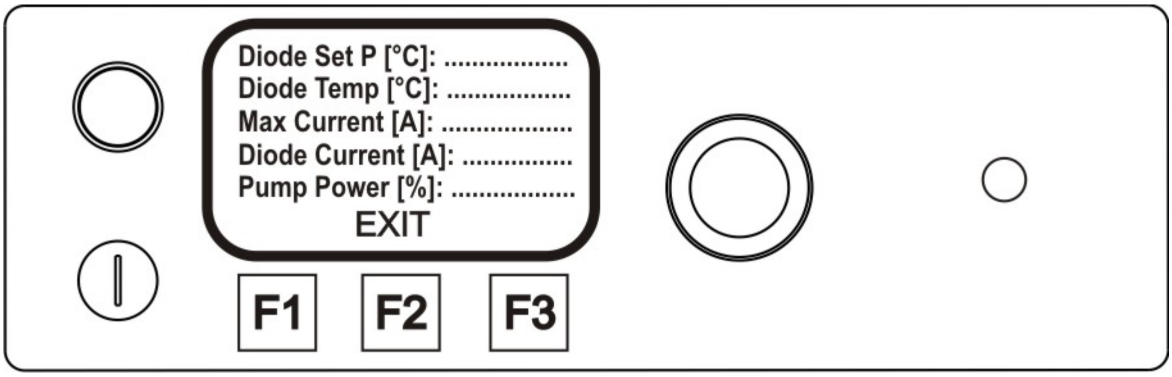


Figure 84: Resonator and diode parameters reading screen.

Move to the right with the knob to switch to the fourth screen.

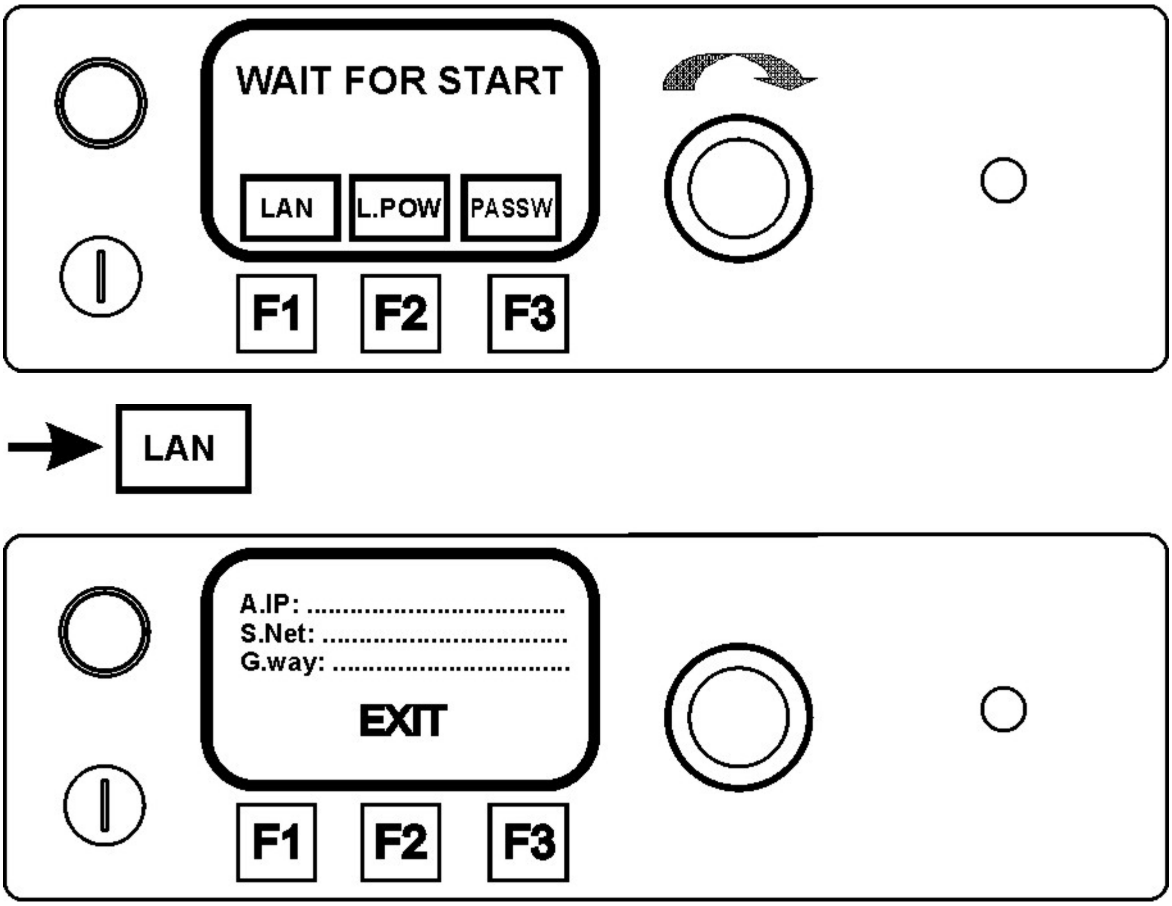


Figure 85: Network configuration screen.

In this screen you can configure the machine for network identification.

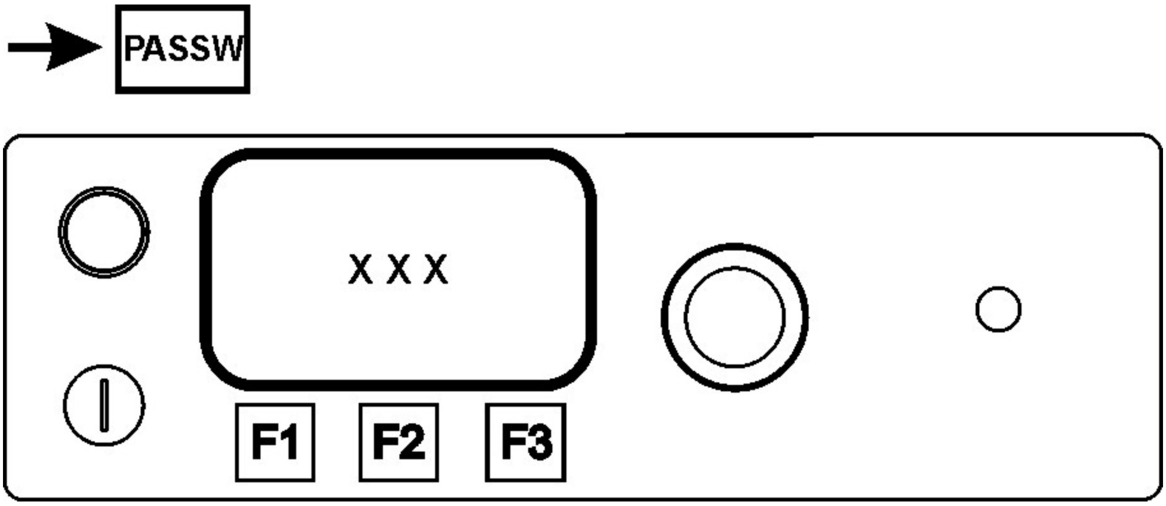


Figure 86: Screen for password protected access.

In this screen you can enter the different access passwords for changing the machine configurations.

3.5 ALARMS AND TROUBLESHOOTING

ALARM MESSAGE	DESCRIPTION	SUGGESTED ACTION (*)
EMERGENCY ACTIVE	The auxiliary emergency contact is open.	Check the connection and the wiring of the corresponding input.
STARTING NOT ALLOWED	During the system electrical turning on phase, the START contact is closed.	Comply with the proper turning on sequence described.
ENABLING NOT ALLOWED	During the system turning on sequence or at the resetting of an alarm condition, the ENABLE contact is closed.	Repeat the proper turning on sequence described in this manual.
MAX TEMP INSIDE ERROR	The system has detected an inlet air temperature (working environment temperature) above 50 °C.	Check the room temperature, cleaning of the inlet filter and the operation of the control rack fans.
MIN TEMP INSIDE ERROR	The system has detected an inlet air temperature below 5 °C.	Check the room temperature or wait for the system to warm up after shipping.
DIODE MAXTEMP ERR	The laser diode temperature has exceeded 35 °C, causing the laser to be turned off.	Check the room temperature, cleaning of the filters, operation of the fans, operation of the entire laser diode thermostatation system, then turn off and restart the system after 10 minutes.
DIODE MINTEMP ERR	The laser diode temperature has fallen below 15 °C, causing the laser to be turned off.	Check the room temperature, operation of the entire laser diode thermostatation system, turn off the restart the system after 10 minutes.
DIODE VOLTAGE ERR	The laser diode current controller detects an anomaly in the voltage applied to the laser diode.	Check for proper wiring of the laser diode and make sure it is not damaged. Change the current controller.
DIODE CURRENT ERR	The laser diode current controller detects an anomaly in the current supplied to the laser diode	Check for proper wiring of the laser diode and make sure it is not damaged. Change the current controller.
DIODE C.C. CURRENT FAULT	The laser diode current controller detects an anomalous current before having completed the turning on sequence of the laser diode.	Check for proper wiring of the laser diode and make sure it is not damaged. Disassemble the current controller, verifying the insulation between the same controller and the rack base.
TEC CURRENT ERR	The temperature controller detects an anomalous current circulating in the Peltier cells for the thermostatation of the laser diode.	Make sure the Peltier cells of the laser diode are not damaged, turn off the system and turn it back on.
TEC VOLTAGE ERR	The temperature controller detects an anomalous voltage applied to the Peltier cells for thermostatation of the laser diode.	Make sure the Peltier cells of the laser diode are not damaged, turn off the system and turn it back on.
INPUT VOLTAGE ERR	The input voltage of the control rack is not included between 24 V and 28 V.	Check the output voltage of the power supply module and the wirings.

HEAT SINK TEMP ERR	Heat Sink temperature outside the safety interval.	Check the status of the aspiration channel and operation of the Heat Sink fans.
POWER BOARD TEMP ERR	The temperature of the power board is too high.	Open the rack, checking the operation of the fan used to cool the board.
GREEN OUT OF RANGE	The second harmonic generation crystal is outside the safety interval.	If in the warm-up phase, wait for the system to reach the proper temperature; if during the work phase, check the external wirings and monitor the temperature of this crystal.
COMMUNICATION ERROR RES	The resonator control unit electronic card does not communicate with the others.	Check the connection by means of Laser Bus external cable.
CONTROL UNIT POWER FAILURE	The input-output control unit card does not communicate with the others.	Check the connection inside the rack. Make sure the cable laser bus is not shorted.
COMMUNICATION ERROR PWM	The PWM power board does not communicate with the others.	Check the connection inside the rack.
SYSTEM BOOTING	If this message appears under conditions other than the firmware upgrade operation, it indicates that the input-output control unit card does not start.	Check the connection between the power card and the control unit as well as the input voltage.

4 : TECHNICAL SPECIFICATION

4.1 DESCRIPTION OF INPUT AND OUTPUT CONNECTORS

The Vlase source must be piloted using both digital and analog signals.

This section describes in detail the contacts and signals to be used and **the turning on sequence**.

The connectors to be used are the terminal boards called X1, X2 and X3, found on the real panel of the Vlase control rack.

4.1.1 X1 TERMINAL BOARD

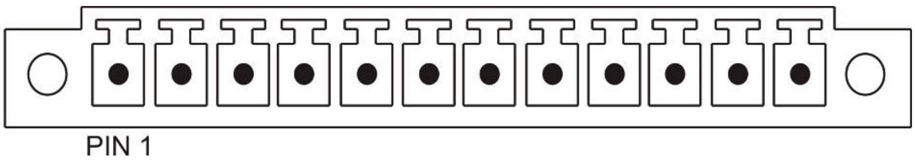


Figure 87: X1 terminal board.

PIN	SYMBOL	TYPE	DESCRIPTION
01	START	Digital Input (0 – 24 V)	Start signal
02	AUXILIARY EMERGENCY	Digital Input (0 – 24 V)	Auxiliary Emergency signal used to cut off the current in the laser diode
03	NC	-	NOT USED
04	NC	-	NOT USED
05	ENABLE OUT	Digital Output (0 – 24 V)	Laser Enabled status signal
06	LASER NOT READY OUT	Digital Output (0 – 24 V)	Laser Not Ready status signal
07	POWER ON OUT	Digital Output (0 – 24 V)	Laser On status signal
08	NC	-	NOT USED
09	AIMING BEAM	Digital Input (0 – 24 V)	Signal used to pilot the aiming laser diode
10	COMMON OUT	Ground reference	Ground reference for input signals
11	+24 V OUT	Auxiliary voltage	Auxiliary voltage 24 V–300 mA
12	GND OUT	Ground reference	Connection to ground

4.1.2 TERMINAL BOARD X3

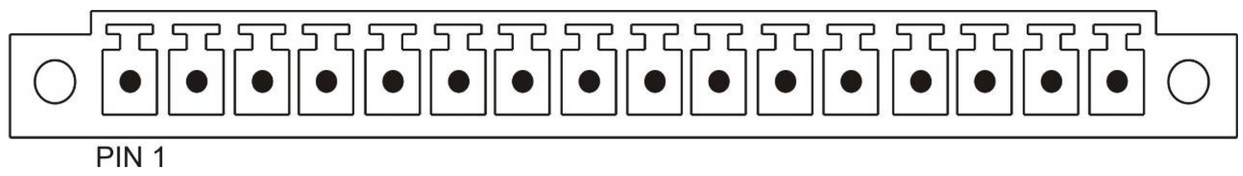


Figure 88: Terminal board X3.

PIN	SYMBOL	TYPE	DESCRIPTION
01	NC	-	NOT USED
02	NC	-	NOT USED
03	NC	-	NOT USED
04	NC	-	NOT USED
05	NC	-	NOT USED
06	NC	-	NOT USED
07	NC	-	NOT USED
08	NC	-	NOT USED
09	NC	-	NOT USED
10	NC	-	NOT USED
11	NC	-	NOT USED
12	ENABLE IN	Digital Input (0 – 24 V)	Signal used to enable the current in the pump laser diode
13	EMISSION IN	Digital Input (0 – 5 V)	Signal used to enable and disable laser emission during a marking process (pen-up and pen-down)
14	Q MOD IN	Digital Input (0 – 5 V)	Modulation signal for Q-Switch
15	LEVEL IN	Analog input (0 – 10 V)	Signal used to adjust the current in the pump diode between 0% and 100% of the maximum set current
16	GND OUT	Ground reference	Connection to ground

4.1.3 TERMINAL BOARD X2

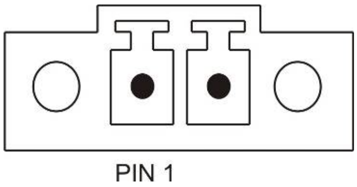


Figure 89: Terminal board X2.

PIN	SYMBOL	TYPE	DESCRIPTION
01	AUXILIARY INTERLOCK HARDWARE PLUS	Digital Output (0 – 24 V)	Delivery signal for Auxiliary Hardware Interlock contact
02	AUXILIARY INTERLOCK HARDWARE MINUS	Digital input (0 – 24 V)	Return signal for Auxiliary Hardware Interlock signal

4.1.4 VMARK

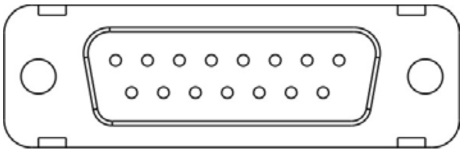


Figure 90: VMARK panel socket on rack.

PIN	SYMBOL	TYPE	DESCRIPTION
1	SPI SCK	Digital Bus	Clock SPI digital level
2	EMISSION IN	Digital Input (0-5V)	Signal used to enable and disable laser emission during a marking process (pen-up and pen-down)
3	Q MOD IN	Digital Input (0-5V)	Modulation signal for Q-Switch
4	GND	GND	GND reference
5	RESERVED	-	NOT USED
6	RESERVED	-	NOT USED
7	RESERVED	-	NOT USED
8	CAN+	Differential Digital Bus	Bus Can
9	CAN-	Differential digital Bus	Bus Can
10	SPI MOSI	Digital Bus	Data of SPI digital level
11	RESERVED	-	NOT USED
12	GND	GND	GND reference
13	RESERVED	-	NOT USED
14	RESERVED	-	NOT USED
15	SPI CS	Digital Bus	Chip Select SPI digital level

4.1.5 HEAD iMARK

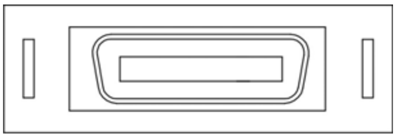


Figure 91: Head iMark panel socket on head resonator.

PIN	SYMBOL	TYPE	DESCRIPTION
1	GND	GND	GND reference
2	DO+	Differential Digital Bus	Bus Can
3	GND	GND	GND reference
4	LOCK	Digital Bus	Bus Can
5	GND	GND	GND reference
6	GND	GND	GND reference
7	+15V	Output Power Supply	+15VDC output supply
8	+15V	Output Power Supply	+15VDC output supply
9	+15V	Output Power Supply	+15VDC output supply
10	-15V	Output Power Supply	-15VDC output supply
11	-15V	Output Power Supply	-15VDC output supply
12	-15V	Output Power Supply	-15VDC output supply
13	GND	GND	GND reference
14	GND	GND	GND reference
15	DO-	Differential Digital Bus	Bus Can
16	GND	GND	GND reference
17	STATUS	Digital Bus	Bus Can
18	GND	GND	GND reference
19	GND	GND	GND reference
20	+15V	Output Power Supply	+15VDC output supply
21	+15V	Output Power Supply	+15VDC output supply
22	+15V	Output Power Supply	+15VDC output supply
23	-15V	Output Power Supply	-15VDC output supply
24	-15V	Output Power Supply	-15VDC output supply
25	-15V	Output Power Supply	-15VDC output supply
26	GND	GND	GND reference

4.1.6 GALVO SUPPLY DSP2

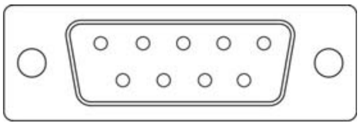


Figure 92: Galvo supply connector.

PIN	SYMBOL	TYPE	DESCRIPTION
1	-15V	Output Power Supply	-15VDC output supply
2	-15V	Output Power Supply	-15VDC output supply
3	GND	GND	GND reference
4	+15V	Output Power Supply	+15VDC output supply
5	+15V	Output Power Supply	+15VDC output supply
6	-15V	Output Power Supply	-15VDC output supply
7	GND	GND	GND reference
8	GND	GND	GND reference
9	+15V	Output Power Supply	+15VDC output supply

4.1.7 GALVO HEAD DSP2

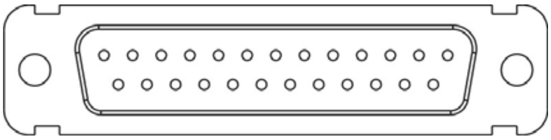


Figure 93: Head DSP2 panel socket on resonator.

PIN	SYMBOL	TYPE	DESCRIPTION
1	A0+	Differential Digital Bus	Bus Can
2	B0+	Differential Digital Bus	Bus Can
3	RESERVED	-	NOT USED
4	C0+	Differential Digital Bus	Bus Can
5	D0+	Differential Digital Bus	Bus Can
6	RESERVED	-	NOT USED
7	RESERVED	-	NOT USED
8	RESERVED	-	NOT USED
9	RESERVED	-	NOT USED
10	RESERVED	-	NOT USED
11	SP5V	Output Power Supply	5VDC output supply
12	SM12V	Output Power Supply	12VDC output supply
13	PGND	GND	GND reference
14	A0-	Differential Digital Bus	Bus Can
15	B0-	Differential Digital Bus	Bus Can
16	RESERVED	-	NOT USED
17	C0-	Differential Digital Bus	Bus Can
18	D0-	Differential Digital Bus	Bus Can
19	RESERVED	-	NOT USED
20	RESERVED	-	NOT USED
21	RESERVED	-	NOT USED
22	RESERVED	-	NOT USED
23	RESERVED	-	NOT USED
24	SP12V	Output Power Supply	12VDC output supply
25	PGND	GND	GND reference

4.2 DESCRIPTION OF INPUT AND OUTPUT SIGNALS

4.2.1 VOLTAGE REFERENCES

The control rack supplies an auxiliary voltage of 24 V – 300 mA (terminal 11 of **X1**) to be used for input contacts.

This voltage refers to the ground, in other words to GND OUT (terminal 12 of **X1** and terminal 16 of **X3**), consequently the COMMON OUT (terminal 10 of **X1**) must also be connected to the ground).

4.2.2 AUXILIARY INTERLOCK HARDWARE (NORMALLY CLOSED)

Connect a normally closed safety contact between terminals 1 and 2 of connector X2.

If the contact is opened, the entire power electronics is turned off and the machine goes into a status that cannot be reset; at this point, the voltage incoming the control rack must be cut off by means of the main switch found on the rear panel of the rack.

4.2.3 AUXILIARY EMERGENCY (NORMALLY CLOSED)

Connect a normally closed contact between the 24 V OUT auxiliary voltage (terminal 11 of **X1**) and the AUXILIARY EMERGENCY input (terminal 2 of **X1**).

If the contact is opened, the laser diode current is instantly cut off and the machine must be restarted by properly repeating the turning on sequence (please refer to paragraph 3.3).

This contact should be considered an auxiliary emergency contact, consequently it should not be used to stop the laser operation during the processing, but should be connected instead to the red “mushroom” pushbutton with mechanical block that signals precisely an emergency action.

If this contact is open, all other input signals are ignored and the machine cannot be started.

4.2.4 START (NORMALLY OPEN)

Connect a normally open contact between the 24 V OUT auxiliary voltage (terminal 11 of **X1**) and the START input (terminal 1 of **X1**).

By closing the contact and keeping it closed, the machine initiates the WARM-UP procedure in order to bring the laser diode to the proper working temperature.

At the end of this phase, the machine goes into the LASER STAND-BY status.

Under this condition, a polarization current (BIAS) flows into the laser diode.

4.2.5 POWER ON

If the START command was properly received by the system (proper turning on sequence and no alarm present), the POWER ON output goes to 24 V (terminal 7 of X1) and stays in this condition as long as the machine is powered. The available output current is 150 mA.

4.2.6 ENABLE IN (NORMALLY OPEN)

Connect a normally open contact between the 24 V OUT auxiliary voltage (terminal 11 of **X1**) and the ENABLE input (terminal 12 of **X3**).

If the contact is closed, a current greater than the polarization current may flow in the diode due to both the presence of laser command signals to the corresponding terminals (see EMISSION IN and LEVEL IN described here below) and the presence of *hardware thermalization*.

The ENABLE IN contact is useful during the processing since it can be used to stop laser emission and restore it in continuous mode without any stress to the laser diode and without putting the machine in an alarm status.

NOTE:
The machine goes into the **LASER READY** status.
Under this condition, the machine **can emit laser radiation** from both the fiber and from the resonator!

4.2.7 ENABLE OUT

This output signal (terminal 5 of **X1**) indicates the LASER ENABLED status.
It is active if the Enable In input (terminal 12 of **X3**) is also active and the machine is not in an alarm condition. The available output current is 150 mA.

NOTE:
The machine goes into the **LASER READY** status.
Under this condition, the machine **can emit laser radiation** from both the fiber and from the resonator!

4.2.8 LASER NOT READY OUT (OR INTERNAL ERROR)

This output (terminal 6 of **X1**) indicates whether or not the machine is in an alarm status or if it is ready to receive commands regardless of the machine status. The available output current is 150 mA.

Use the three outputs Power On Out, Enable Out and Laser Not Ready Out to control the machine status.

Power ON Out	Enable Out	Laser Not Ready Out	Machine status
0 V	0 V	0 V	Machine turned off
0 V	0 V	24 V	Machine waiting to Start
24 V	0 V	24 V	Machine in Warm-Up or in Alarm mode
24 V	0 V	0 V	Machine on stand-by
24 V	24 V	0 V	Machine in Ready mode

NOTE: No other conditions are possible.

4.2.9 AIMING BEAM IN

If the machine is configured for piloting the aiming diode in "External Mode" (please refer to paragraph 3.8 on how to use the display), you can turn on and off the aiming diode using terminal 8 of **X1**, regardless of the laser status.

0 V → Aiming diode off

24 V → Aiming diode on

4.2.10 LEVEL IN

If the machine is configured to receive the Level signal from this input (terminal 15 of X3), the applied voltage determines the current level in the laser diode in reference to the maximum possible current for each given system. The LEVEL IN signal is the analog type with dynamic between 0 and 10 V and bandwidth of 1 kHz at full dynamics. In other words, a response in current can be obtained with no distortion by applying a sinusoidal signal with width of 10 V, average value of 5 V and frequency of 1 kHz.

Similarly, the response to a voltage step is 350 microseconds.

NOTE:
The voltage interval between 0 and 10 V corresponds to the interval of currents in the laser diode included between 0 % and 100 % of the maximum current set for each laser system.

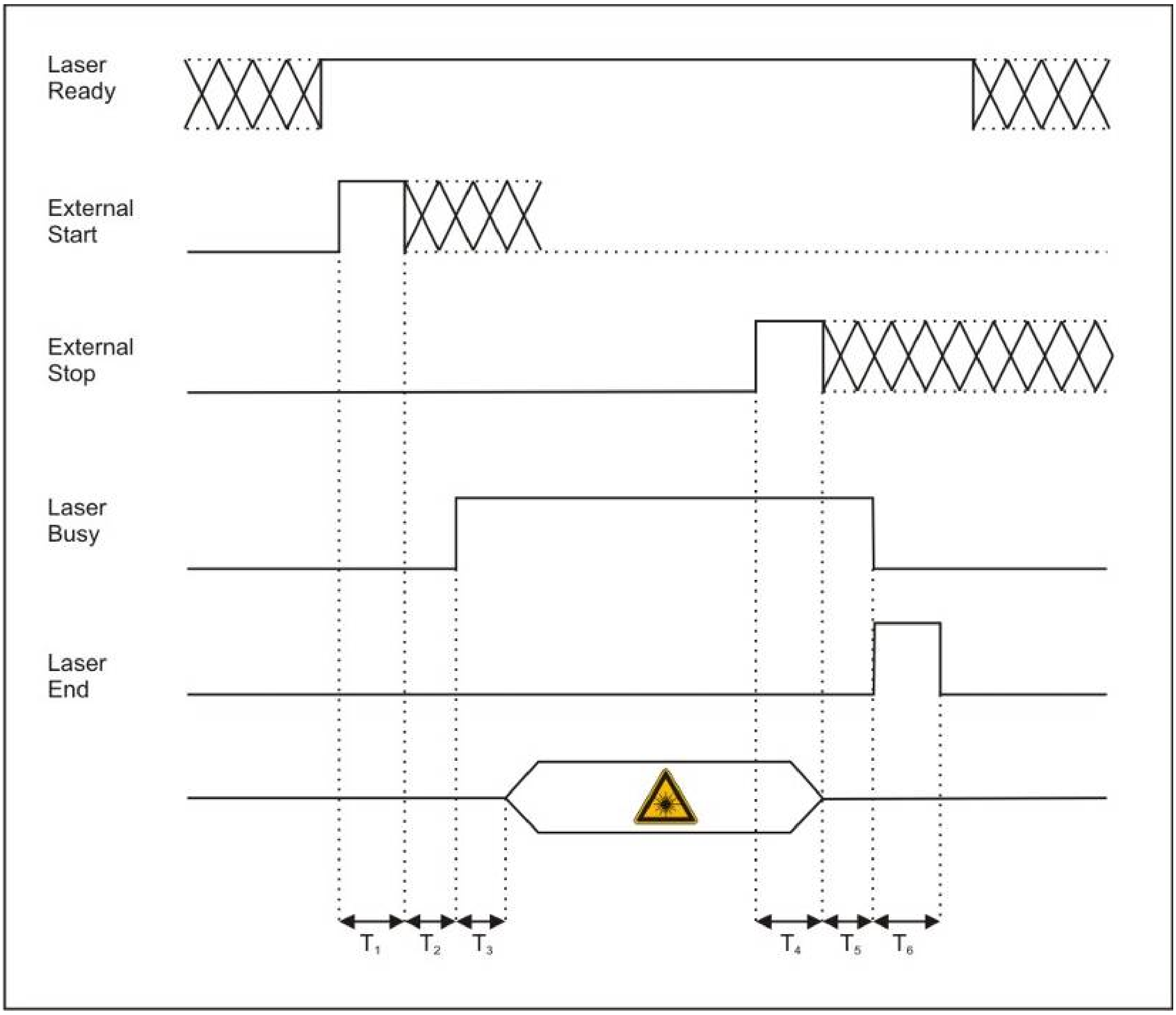
4.2.11 Q-SWITCH MOD IN

If the machine is configured to receive the Modulation signal for the Q-Switch from this input (terminal 14 of X3), a digital signal (0 – 5 V) with well-defined characteristics needs to be applied so as to generate the desired laser pulses. In OEM machines (supplied without the marking kit), level 0 V is associated with the status of Q-Switch "closed", while level 5 V is associated with the status of Q-switch "open".

The modulation signal must be a square wave with temporal characteristics that comply with the table here below.

4.2.12 I/O TIMINGS

The following diagram illustrates the possible timings and settings of these 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.

Laser source	Frequency interval	Operation in Continuous Wave (CW)	Q-switch opening time (Shot Time)
VLASE 204X-TFSV	20 kHz ÷ 200 kHz	NO	0.4 ÷ 1.0 microseconds
VLASE 210X-TFSV	20 kHz ÷ 100 kHz	NO	0.4 ÷ 1.0 microseconds

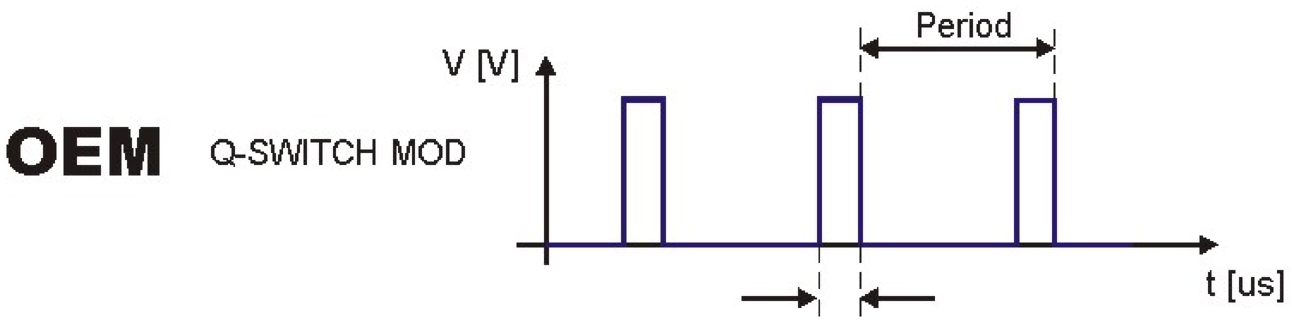
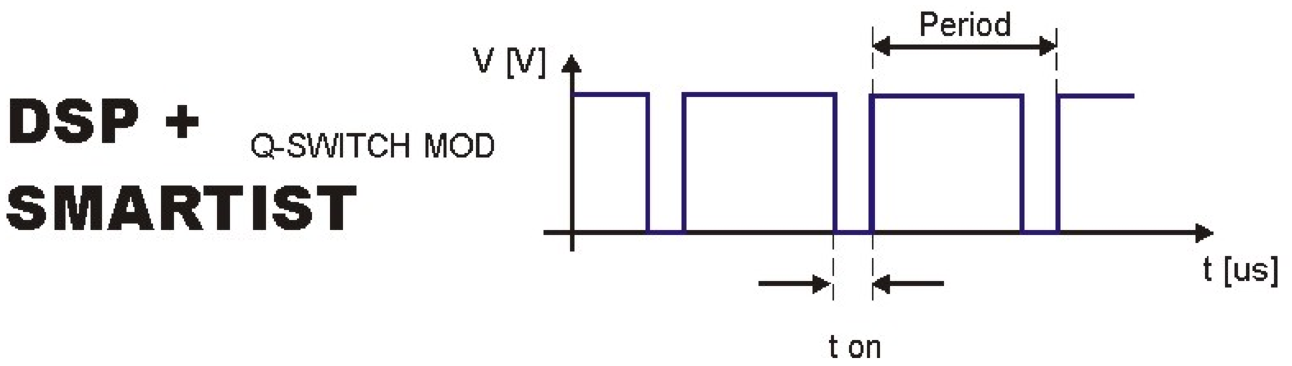


Figure 94: Opening time.

Moreover, in OEM machines the formation of giant pulses must be avoided by adopting suitable FPK (First Pulse Killing) measures.
Datalogic Automation offers a machine configuration mode called “EXT-IO with FPK” that protects the sources from improper external piloting actions.

In OEMK machines (in other words supplied with marker configuration and equipped with scanner head and DSP card), level 0 V is associated with the status of Q-Switch “open”, while level 5 V is associated with the status of Q-switch “closed”.



The signal is generated directly by the Smartist marking software and by the DSP card, consequently the accuracy of the signal and the protections against the generation of giant pulses are ensured by the software itself (parameter pertaining to FPK Delay > 450 microseconds).

4.2.13 EMISSION

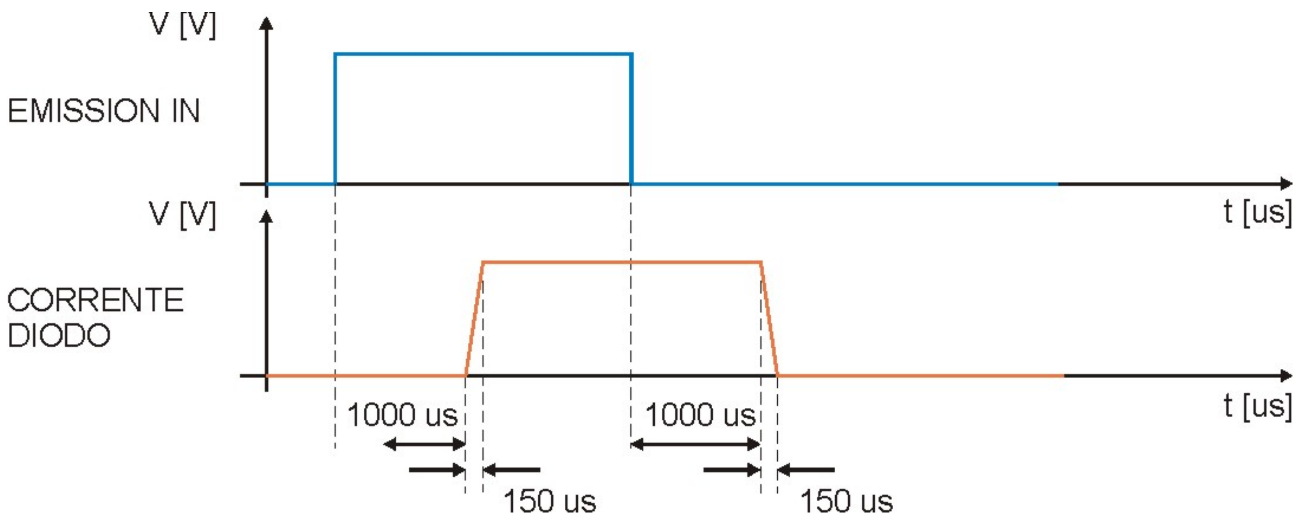
If the machine is configured to receive the Emission signal from this input (terminal 13 of X3), you can quickly turn on and off the laser radiation during the work process.

The signal is TTL.

0 V – No laser radiation, but (where available) hardware thermalization

5 V – Laser radiation dependant on the selected current level

NOTE:
This signal is used during a work process and NOT as a safety contact!



4.2.14 EMISSION OUT

This output indicates whether or not the laser radiation is present at the resonator output thanks to a photodiode installed inside the bracket located after the beam expander.

This being an output in the “Open Collector” configuration, a “pull-up” must be provided on the outside using a 2.2 kOhm resistor connected between terminal 11 of X3 and terminal 11 of X1, measuring the voltage at its extremities (24 V → No Laser Emission; 0 V → Laser Emission).

The Emission Out output may be used to check whether or not the exiting laser beam is present, although it does not provide any information with regards to the actual power of the laser.

4.3 OPERATING MODES

The Vlase system can be configured to work in different modes, depending on the type of integration and logic of the piloting signals.
The operating mode is determined at the Datalogic Automation premises when the system is being developed, but may also be changed by an authorized system integrator subject to notification to Datalogic Automation.

4.3.1 DSP MODE

In this configuration, the system is piloted using the Marking Kit DSP2 supplied by Datalogic Automation, consequently the piloting signals for the control rack and for the scanner head are generated by the DSP2 card following the design data generated by Smartist.
Proper signal generation and the procedures aimed at ensuring good marking quality, as well as the prevention of giant impulses, is completely assigned to the marking software and to the DSP2 card.

4.3.2 EXT – IO WITH FPK MODE

In this configuration, the system is supplied for customers who do not use the Marking kit offered by Datalogic Automation, consequently the system integrator has to generate the signals needed for laser operation according to the characteristics described in detail in paragraph 3.2.
This operating mode ensures intrinsic protection provided by the source against the formation of giant pulses that may damage the same source.
To learn more about the FPK procedures and the meaning of giant pulses see paragraph 3.5.

4.3.3 EXT – IO MODE

In this configuration the system is supplied for customers who do not use the Marking Kit offered by Datalogic Automation, consequently the system integrator has to generate the signals needed for laser operation according to the characteristics described in detail in paragraph 3.2.
This mode DOES NOT ensure intrinsic protection provided by the source against the formation of giant pulses that may damage the same source, so the system integrator will have to arrange for implementing giant pulse suppression procedures autonomously in order to avoid damaging the source.
This mode ensures total freedom in the management of signals by the system integrator, and will be supplied ONLY if the customer explicitly requests it, accepting the risks deriving from improper piloting of the laser source.
To learn more about the FPK procedures and the meaning of giant pulses see paragraph 3.6.

4.3.4 RS232 MODE

In this configuration the system can be used by the system integrator for special self-test and self-diagnostic functions; specifically, it is used to verify whether or not the laser source works properly without the use of external control signals and contacts.
This operating mode is temporary and does not represent a work mode of the source. Access to this mode is reserved to integrators authorized by Datalogic Automation through a special access password.

4.3.5 V_MARK_MODE

In this configuration, the system is controlled using the kit supplied by Datalogic Automation marking, so the control signals to the control rack and the scan head are generated by the card Imark (connected via DB15) as a result of design data generated by Lighter.
The generation of signals and the correct procedures to ensure a good quality of marking, as well as the prevention of giant pulses is entirely left to the software and product marking Imark.

NOTE:
Pay attention to the wiring connector **X3**. The signals EMISSION IN (pin 13), Q_MOD_IN (pin 14) and LEVEL IN (pin 15) should **NOT** be connected.

4.3.6 STAND_ALONE_OEM MODE

Configuration for IG Solar Solutions.

4.4 THERMALIZATION AND SUPPRESSION OF GIANT PULSES

When using sources configured as OEM, it is imperative to know how to use laser control signals without damaging the source and the pieces to be processed.
Indeed, thermalization is useful in order to obtain a good marking quality, but needs to be managed properly so as to avoid damages of any entity.

For the purpose of maintaining the Nd:YVO_4 crystal constantly excited (or charged) in order to obtain uniform markings or work processes, the pumping needs to be maintained even when the laser radiation is not being generated.

This thermalization operation is carried out by maintaining a suitable current level in the laser diode (and consequently a pumping radiation at 808 nm) with Q-Switch CLOSED so that the laser radiation is neither generated nor emitted.

With the Vlase source, this procedure can be implemented in two different ways: Software Thermalization and Hardware Thermalization.

Software thermalization

Software thermalization is implemented automatically by the Smartist marking software and consists in defining, within the marking project, a certain thermalization level at which the crystal is maintained during the non-emission intervals.

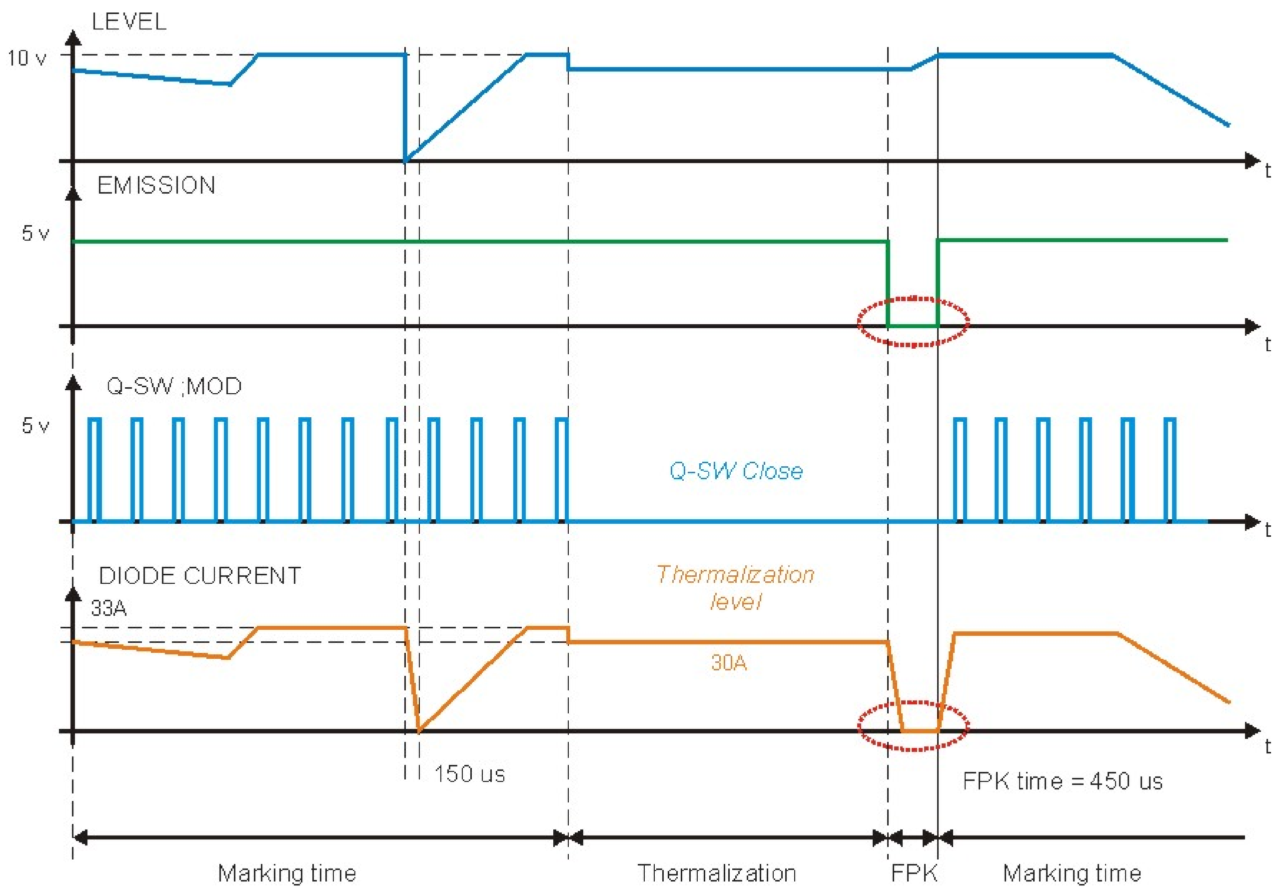


Figure 95: Temporal diagram of Software Thermalization.

As you can see in the graph shown in the Figure, during the marking phase the Q-Switch Modulation signal determines the frequency with which the laser pulses are generated, the effect of the LEVEL signal is a corresponding change in the laser diode current.

Please note that, in order for this to occur, the EMISSION signal has to be active.

NOTE:

Please also note that the current in the laser diode has an up and down time of about 150 microseconds, even if the variation front of the LEVEL signal or of the EMISSION signal were steeper. This limit in the commutation speed of the current in the diode laser is intentional since it is used to protect the laser diode from commutations that are too steep which may damage it or in any case subject it to stress, thus shortening its useful life.

During the thermalization phase, the EMISSION signal stays active, while the LEVEL signal goes into a pre-set thermalization level (i.e. 90%) and the Q SW MOD signal stays fixed at 0 V.

At the end of the thermalization phase, before starting another marking phase, the FPK (First Pulse Killing) procedure needs to be implemented in order to discharge the crystal, thus avoiding the generation of “giant” pulses which may cause marking defects as well as damages to the internal optics of the resonator.

To discharge the crystal, the Q-Switch is kept closed (Q SW MOD signal at 0 V) and the EMISSION signal is brought to a 0V level for at least 450 microseconds, so as to cut off the current in the laser diode and consequently the pumping of the crystal.

NOTE:

This procedure must be carried out every time the thermalization time exceeds 50 microseconds.

HARDWARE THERMALIZATION

Another method that can be used is the Hardware thermalization, which differs from the Software one since during the crystal thermalization phase, the thermalization level is a percentage of the LEVEL signal present at the input at that time.

The percentage (from 10% to 100%) must be configured on the machine through the Vlase Configurator configuration application software and stays the same. This method is recommended for expert users and for specific applications that justify its adoption.

The graph below shows the trend of signals in this mode.

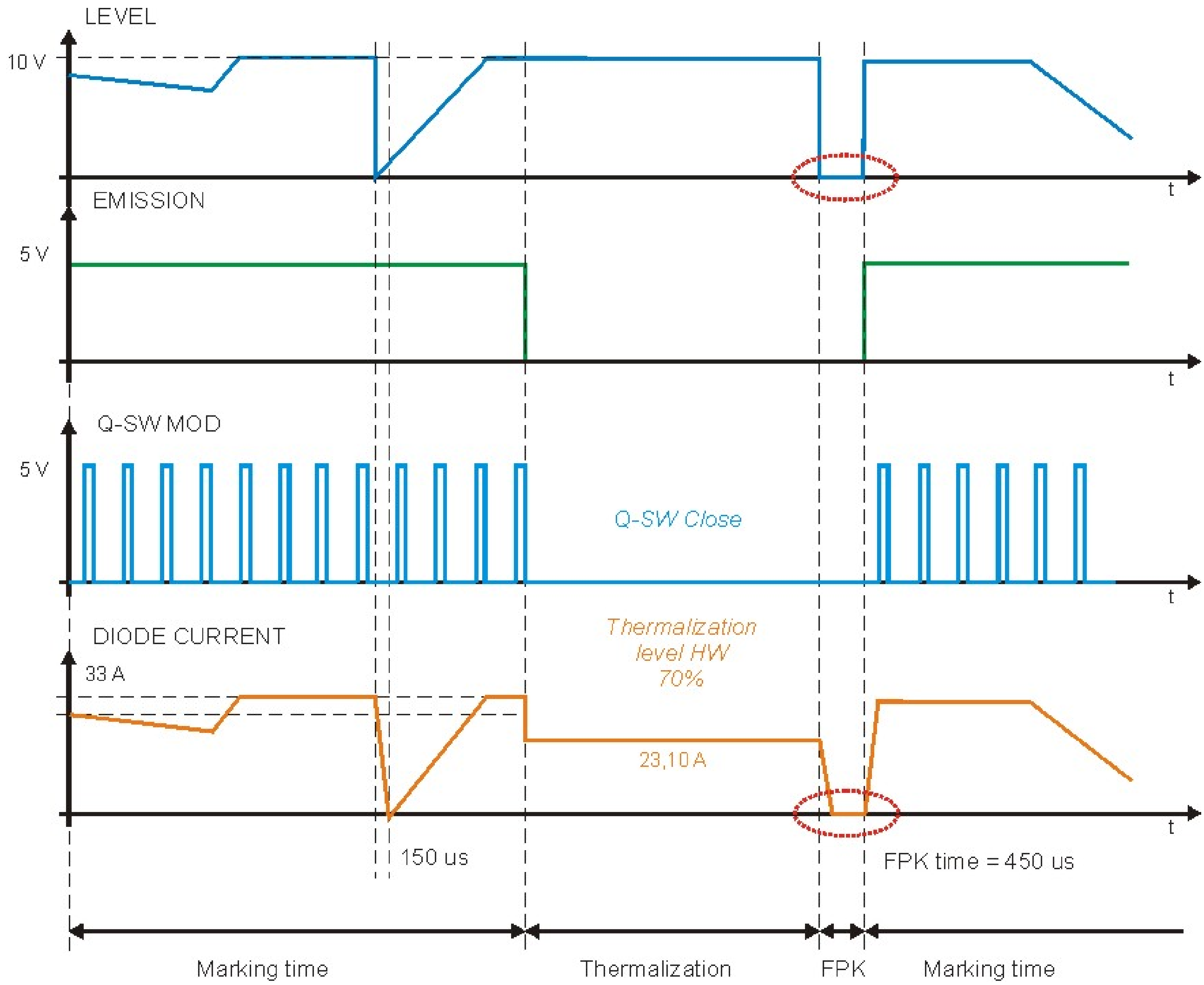


Figure 96: Temporal diagram of Hardware Thermalization.

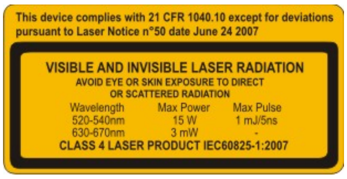
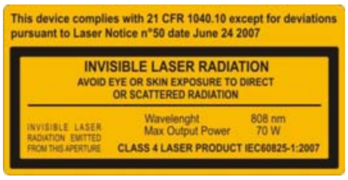
Please note that, during the marking phase, everything stays exactly the same as in the SW thermalization, while in the hardware thermalization the following occurs:

- the EMISSION signal is brought to level 0;
- the LEVEL signal stays fixed at the previous level;
- the CURRENT IN THE DIODE is given by the current corresponding to the LEVEL present at that time at the input multiplied by the hardware thermalization percentage.

During the FPK phase, the LEVEL signal is used to zero out the current in the diode for 450 µs instead of the EMISSION signal.

There is no difference in terms of efficiency in using one method instead of the other; it depends on the way the system is piloted during the marking job and the pause phases (jumps within a project, pauses between the different pieces to be marked, etc.)

APPENDIX A : LABELS IDENTIFICATION

LABEL	DESCRIPTION
	**Identification label**
	**Warning logotype**
	**Laser Label (resonator) ***
	**Laser Label (control rack) ***
	**Aperture Label**
	**Label for non-interlock protective housing**
24V DC	**Power supply slot**
X1	**X1 connector (for Input/Output signal lines)**
X2	**X2 connector (for Input/Output signal lines)**
X3	**X3 connector (for Input/Output signal lines)**
CAN	**CanBus Communication**
RS232	**Serial communication**
Galvo Supply	**Scanner head power supply connection**
VMARK	**Galvo signals connection**

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

EXTERNAL LABELS LOCATION

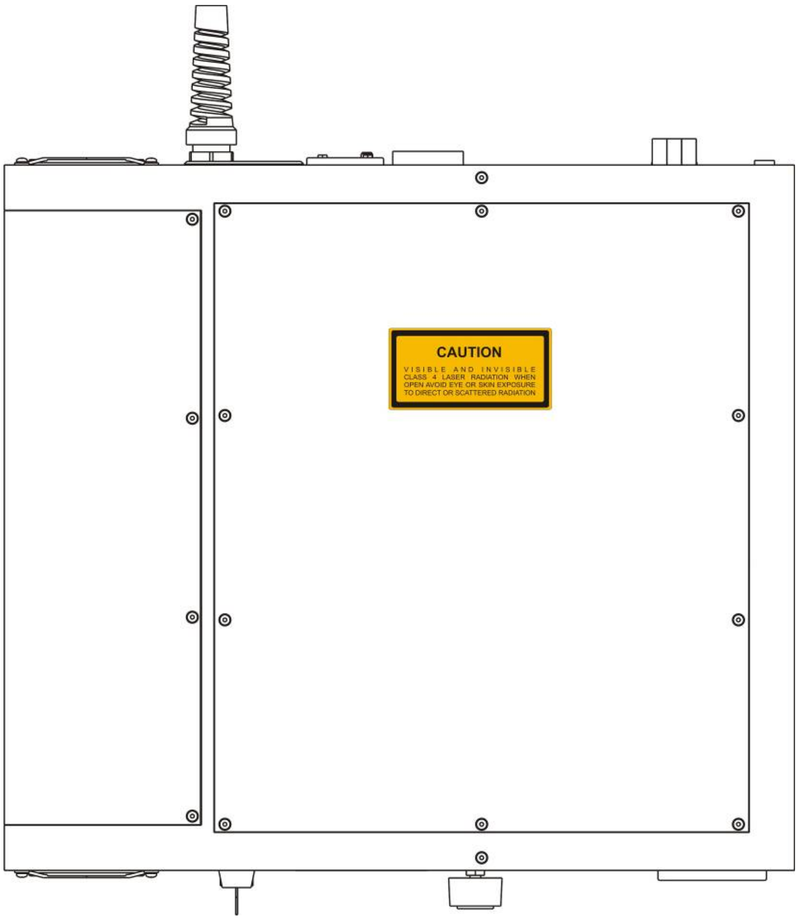


Figure 97: External labels location.

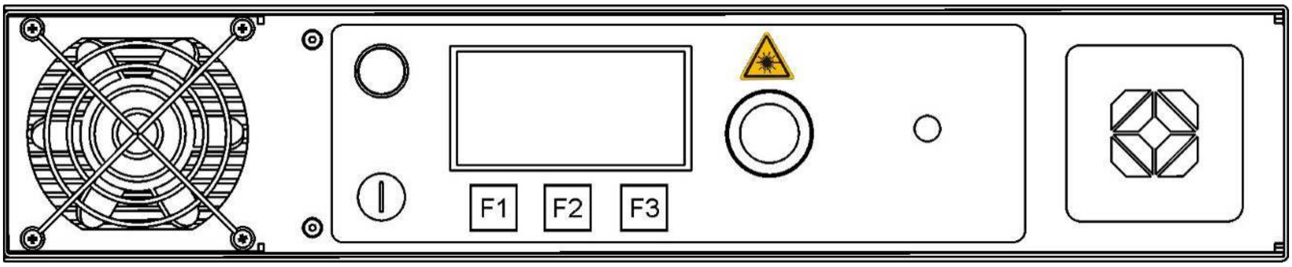


Figure 98: Positioning of external labels (front panel).

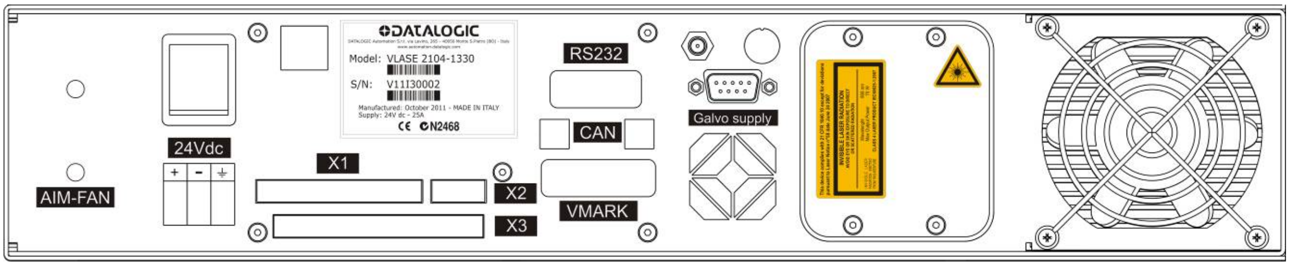


Figure 99: Positioning of external labels (rear panel).

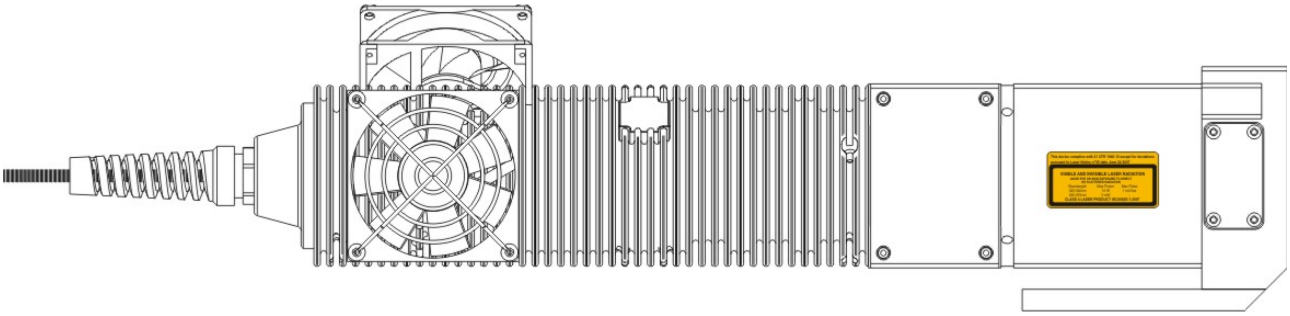


Figure 100: Positioning of external labels (resonator).

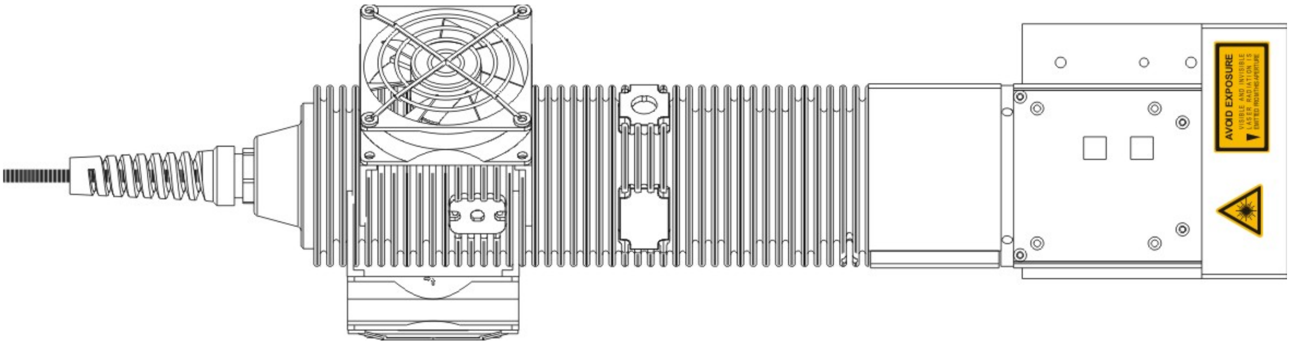


Figure 101: Positioning of external labels (resonator without scan-head).

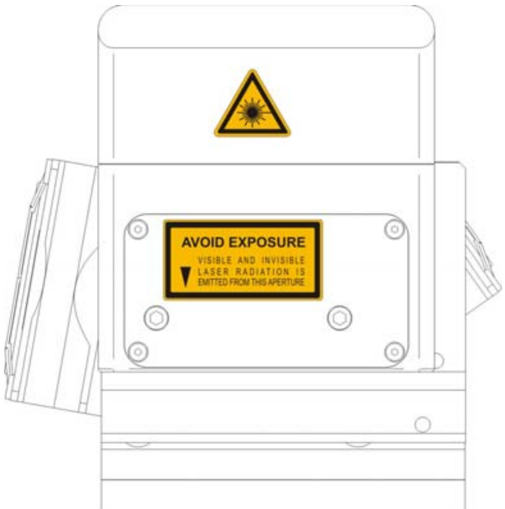


Figure 102: Positioning of labels on scanner head.

APPENDIX B: STANDARDS

LASER STANDARDS

The Vlase is designed to complies with the applicable sections of these laser standards:

EU : EN60825-1
USA : 21 CFR 1040.10

Vlase is classified as Class 4 Laser Product.

Datalogic Automation S.r.l., as manufacturer of Vlase 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

VLASE 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 responsability 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 (532nm)

- 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 (635nm)

VLASE products are designed to easily fulfill all the requirement as per EU/USA standards.

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

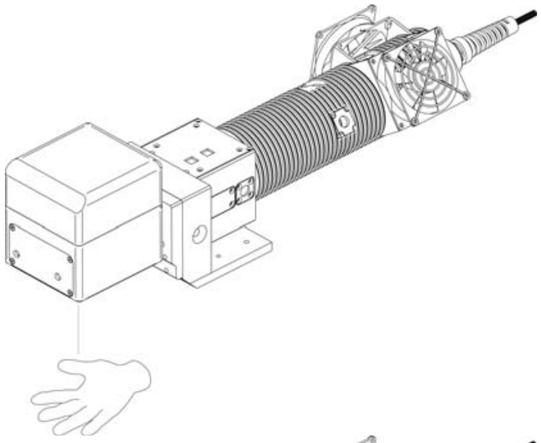
FEATURE	LOCATION/DESCRIPTION	required by USA STANDARDS	required by EU STANDARS	VLASE
KEYSWITCH	RACK On/Off key switch controls power to laser electronics. Key can not be removed from switch in "On" position	YES	YES	YES
SHUTTER FUNCTION	OUTPUT WINDOW Beam stop or attenuator	YES	YES	NO
LASER ON INDICATOR	Panel Indicator (RED) Indicates that laser is actively lasing or ready to emit according to the state	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	NO
Warning Label	External / Internal	YES	YES	YES*

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

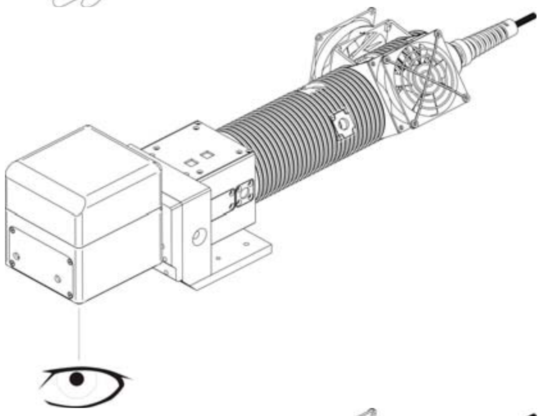
APPENDIX D: NOTE ABOUT LASER

LASER SAFETY

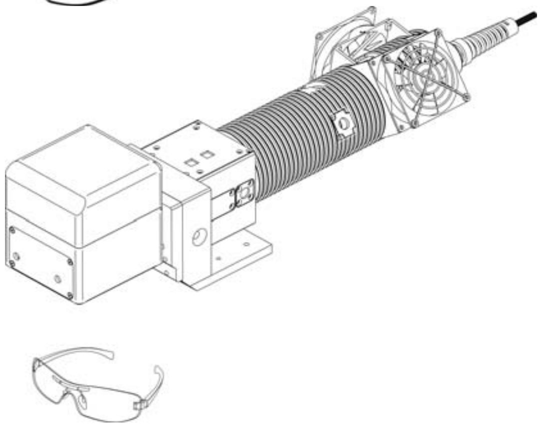
The following information is provided in compliance with regulations set by International Authorities, and it refers to the correct use of Vlase.



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 irriversible damage to your eyes.



NOTE:
Wear safety goggles while using the unit!

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 (CO_2 Laser), close infrared (Nd Laser: Yag, Nd: YVO_4), visible (He Laser: Ne or Argon) and ultraviolet (excimer laser).
It should be considered non-Ionizing Radiation. In Vlase 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 radiations of Vlase laser 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.

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.

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 Nd:YVO_4 laser radiation (532 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.

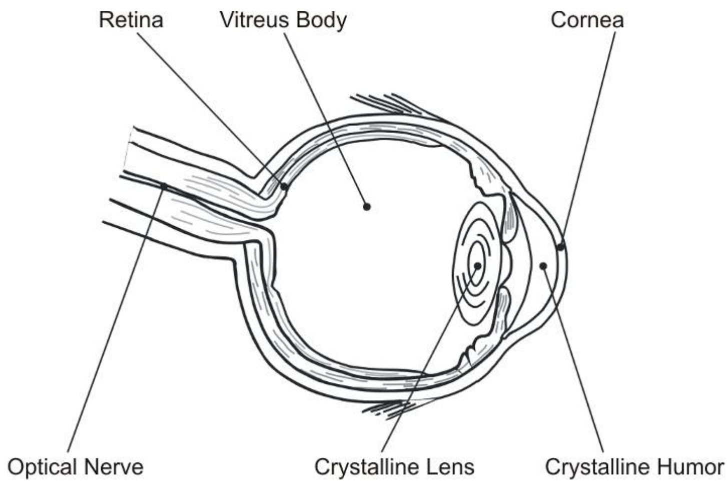


Figure 103: Eyeball section.

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 Vlase marker laser device contains a **class 4 visible** 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 “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 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.

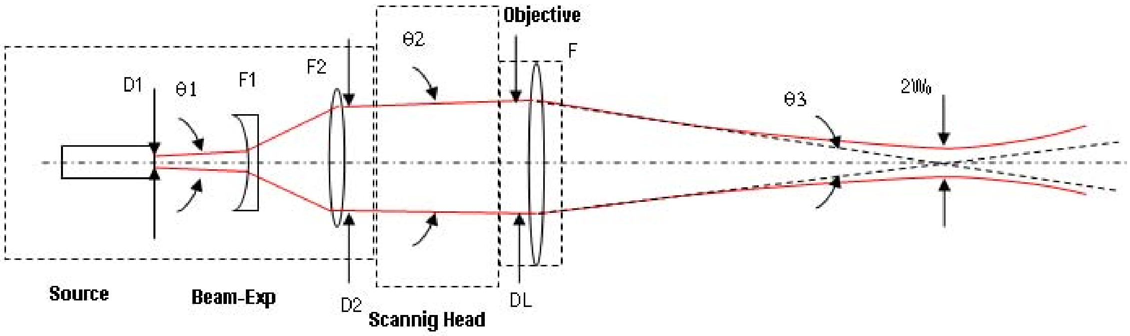
SCATTERED VIEWING OF THE BEAM AFTER FOCUSING

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 Vlase are 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.



In particular, it is very important to know the real divergence of the beam in output from the focalization lens (FTheta).
With all these optical datas it is possible to do the calculations of the nominal distance of optical risk (DNRO) and of 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.

VLASE

Wavelength	532 nm
Application type	Marking
Emission type	Q-Switched
Observation type	Direct radiation
Subtended angle of the source	$\alpha < \alpha_{min}$
Pulse energy	VLASE 2044-TFSV: 200 μJ @ 20 kHz VLASE 2104-TFSV: 350 μJ @ 20 kHz
Pulse duration	VLASE 2044-TFSV: 15 ns VLASE 2104-TFSV: 12 ns
Beam Diameter at 9X Beam Expander Output (1/e2)	VLASE 2044-TFSV: 3.2 mm VLASE 2104-TFSV: 3.5 mm
Beam divergence on the lens	VLASE 2044-TFSV: 0.65 mrad VLASE 2104-TFSV: 0.7 mrad
Focal of the FTheta lens	160 mm
Real divergence after the lens	VLASE 2044-TFSV: 20.3 mrad VLASE 2104-TFSV: 22.5 mrad
Exposition time	10 s
Diameter of the focal spot (CCD)	VLASE 2044-TFSV: 30 μm VLASE 2104-TFSV: 40 μm

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) is possible to calculate the suitable optical density for safety goggles.

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

D.O.= 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)
Greenlase 4 W Marker with Ftheta 160mm	68 m	> 3.1
Greenlase 10 W Marker with Ftheta 160mm	93 m	> 3.4

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 exposition period.

In case of exposition at 0,5 m for 10 sec the suggested optical density for safety googles is CLASS L4.

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 RISKS

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 is 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.

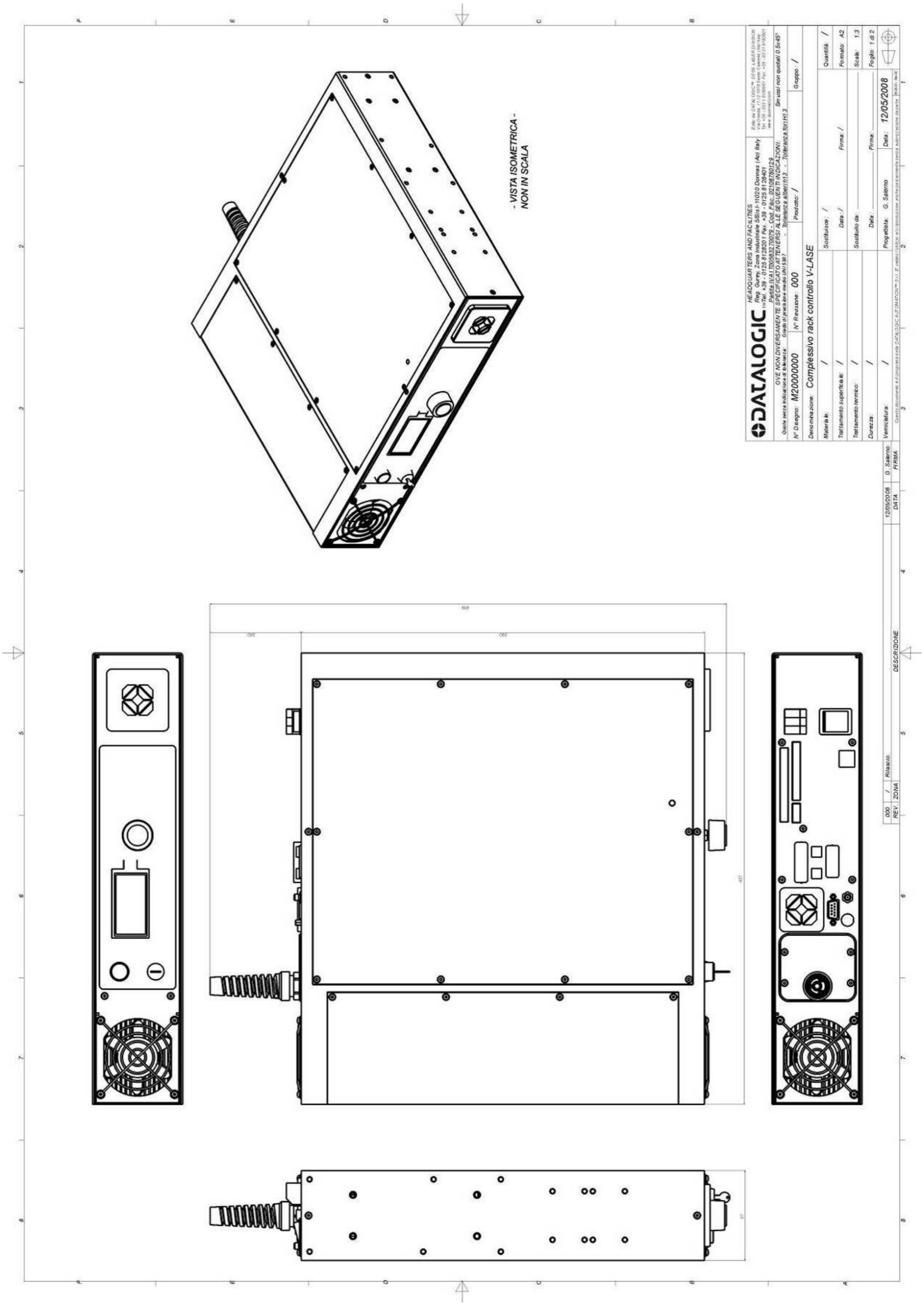
For example, during the intended use of the Laser source, if a material being processed undergoes alterations and produces irritating and/or toxic fumes, it may be necessary to remove the fumes from processing before releasing them into the air.

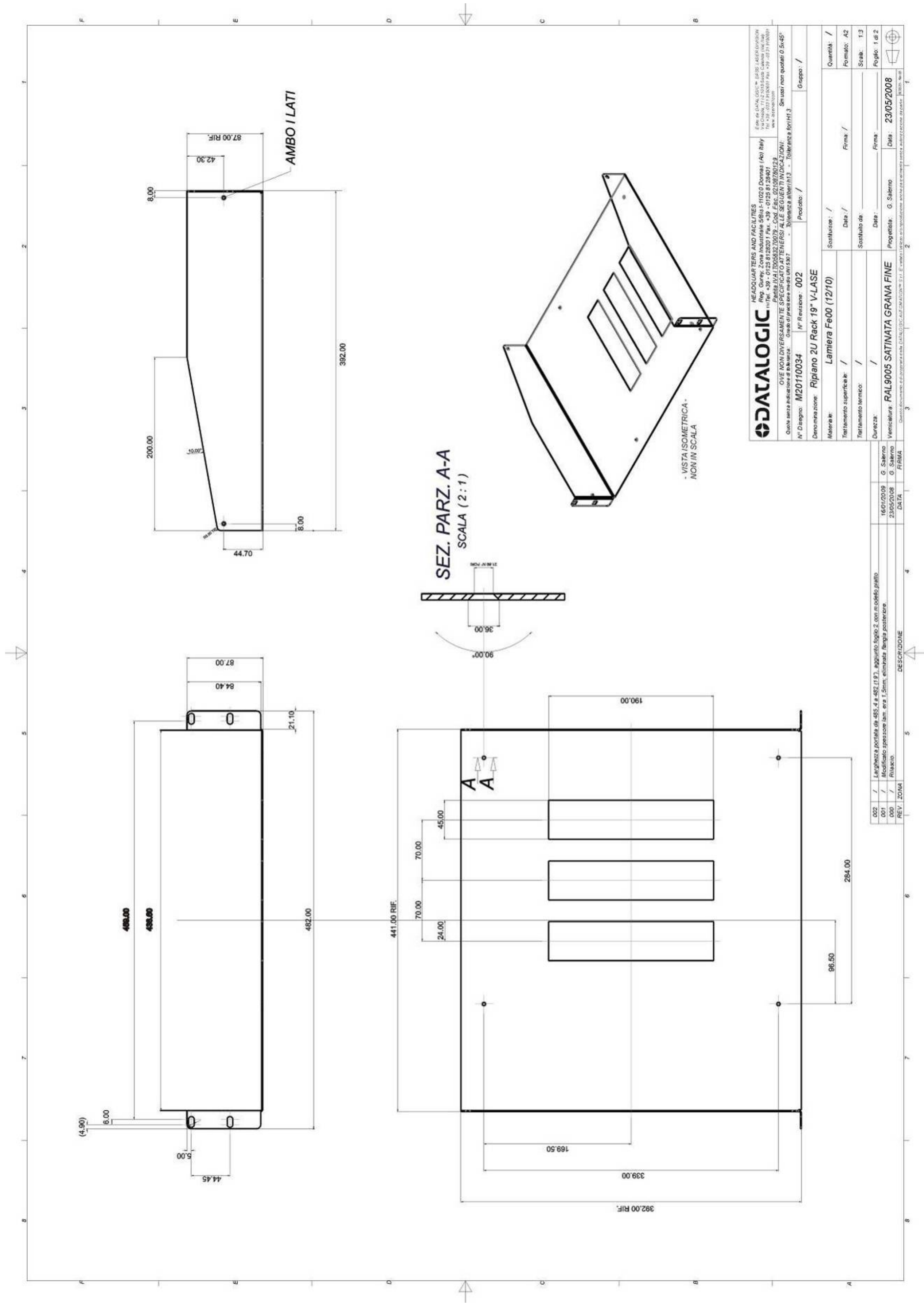
An additional risk may be represented by fire caused by processing materials other than those the equipment was designed for.

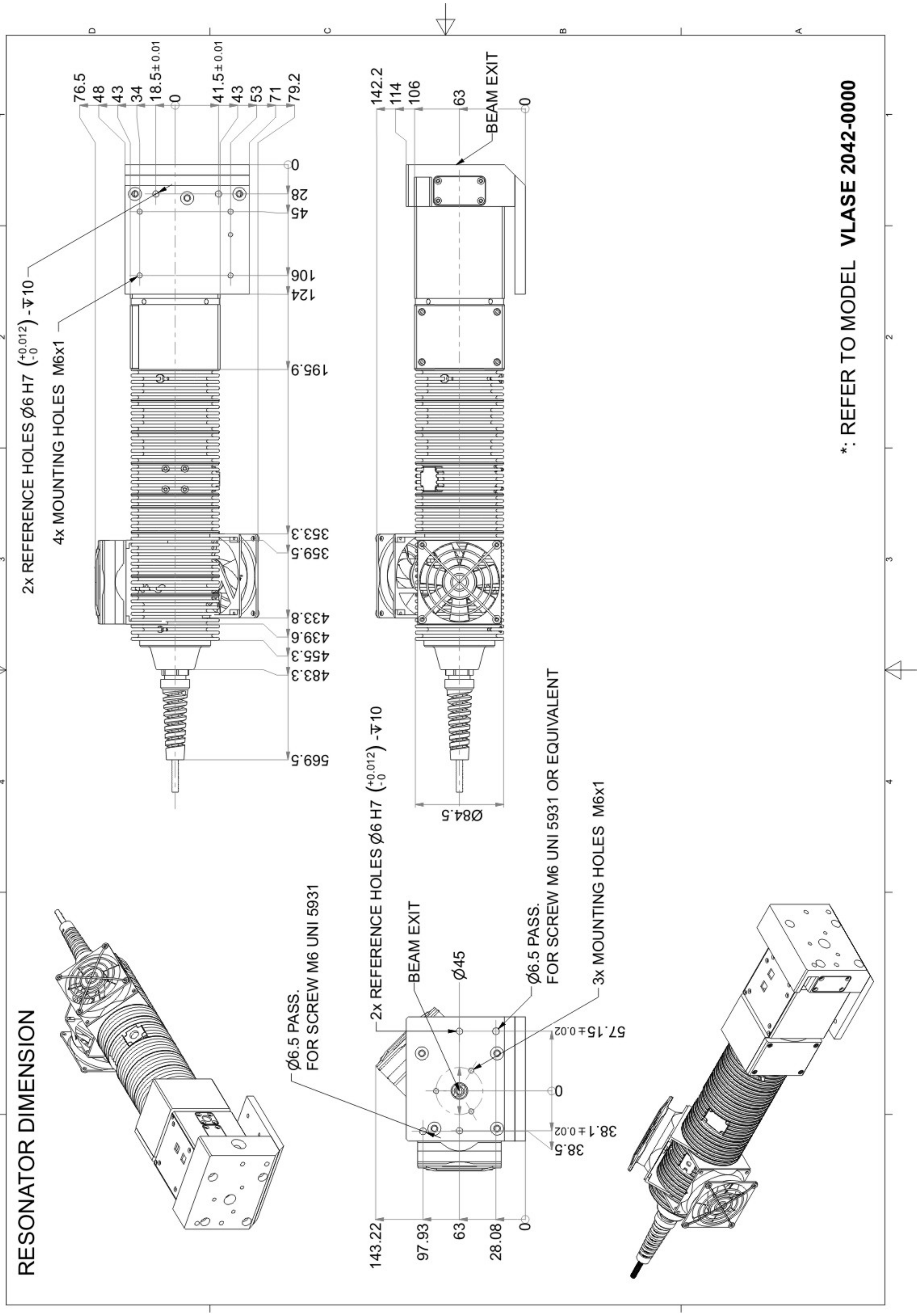
NOTE:
Do not subject **materials other** than those the equipment was designed for to radiation.

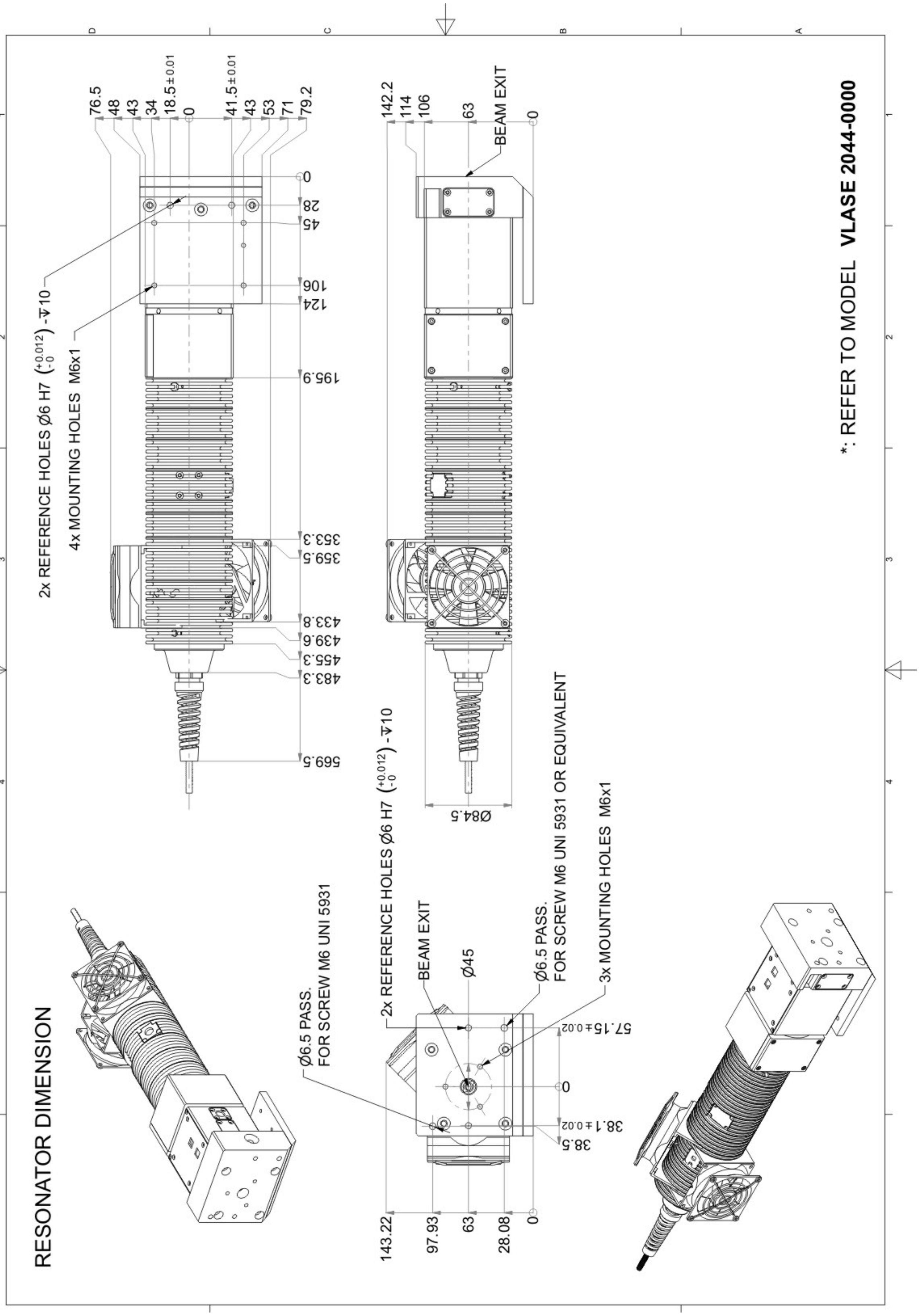
NOTE:
When processing **flammable material**, such as plastic, since there is a **fire danger**, it is indispensable to follow the instructions provided by the manufacturer when the machine is commissioned and follow the instructions in the **SAFETY** Chapter, in the **Collateral Risks** section.

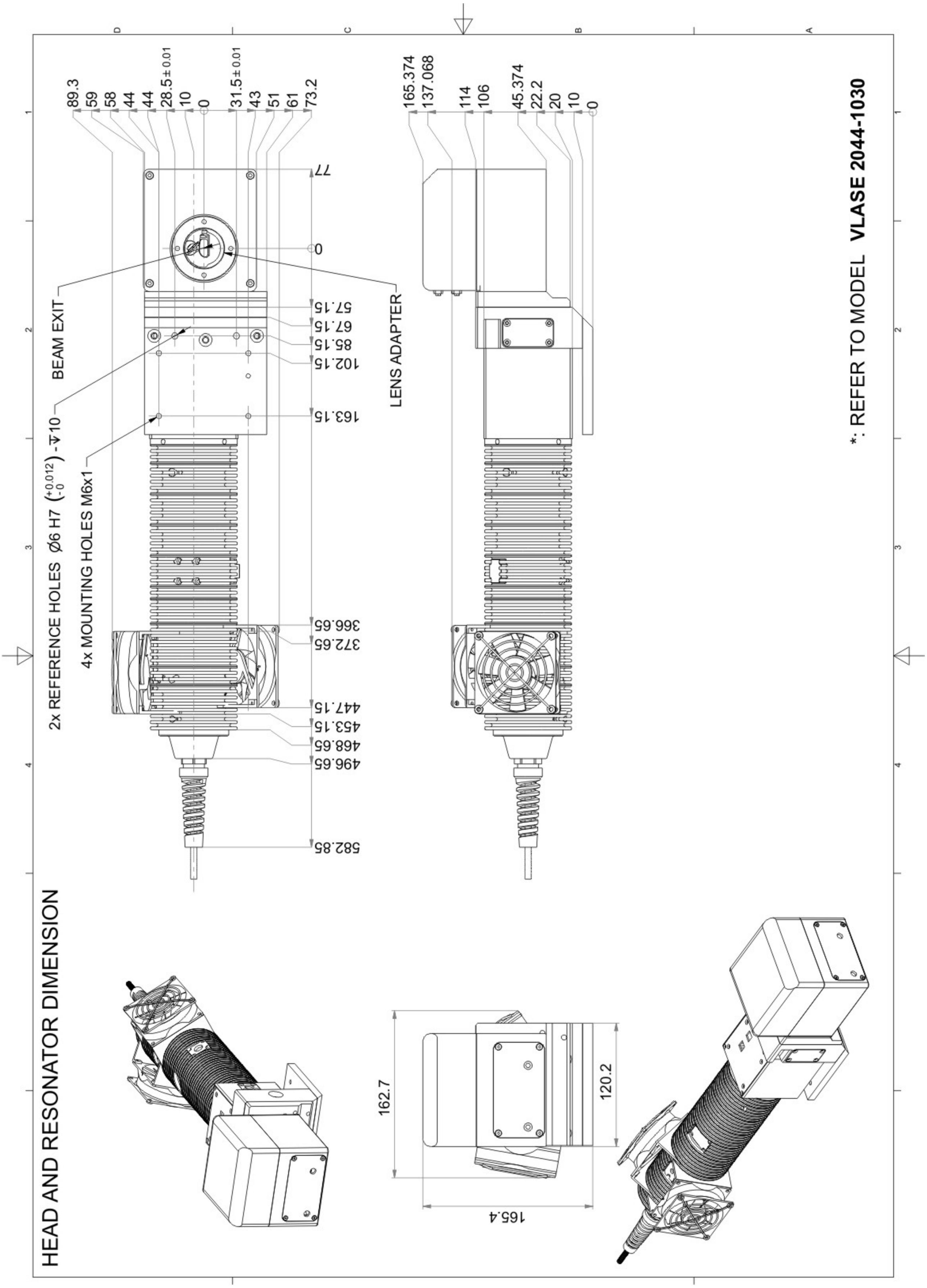
APPENDIX E : MECHANICAL DRAWS

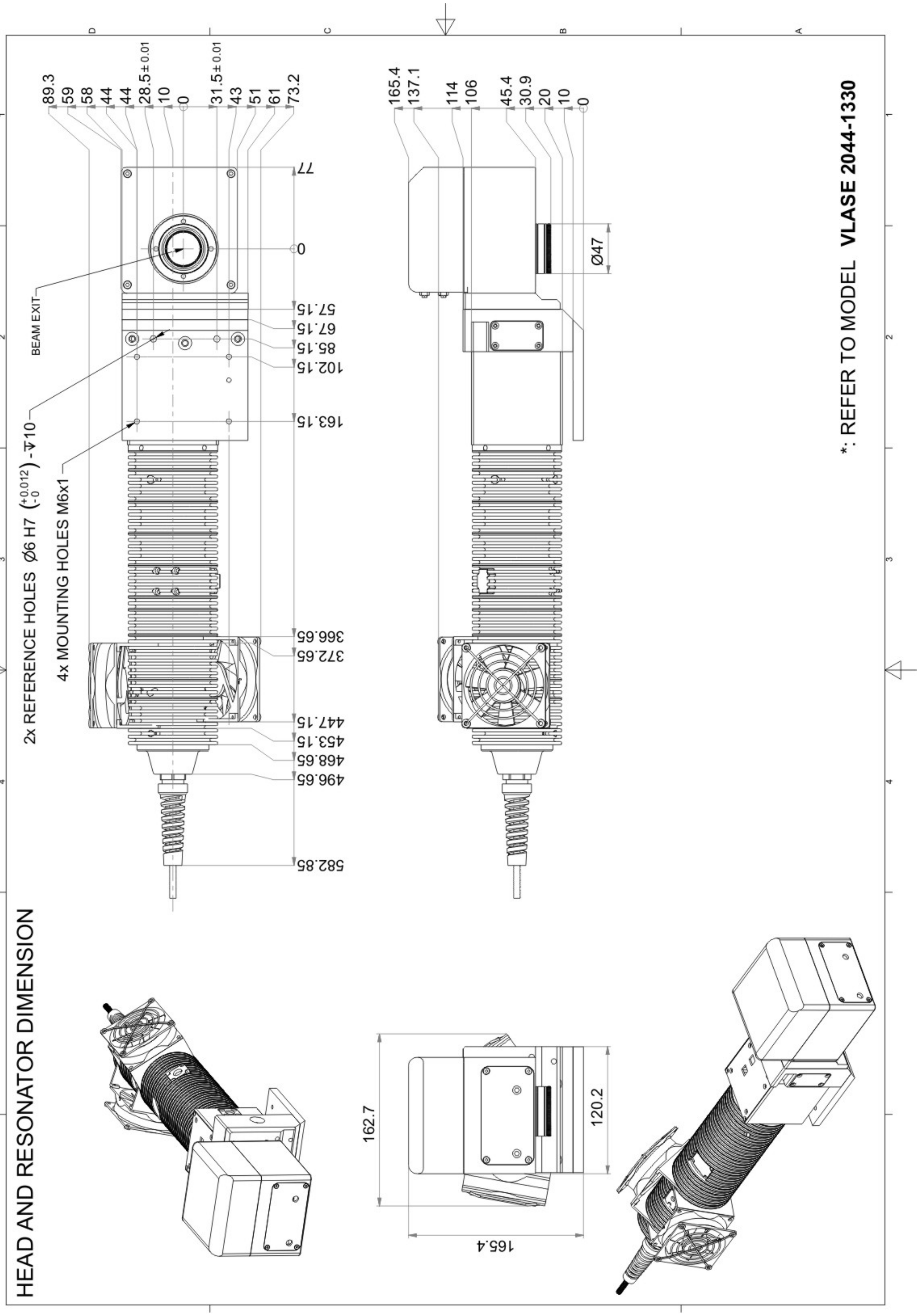


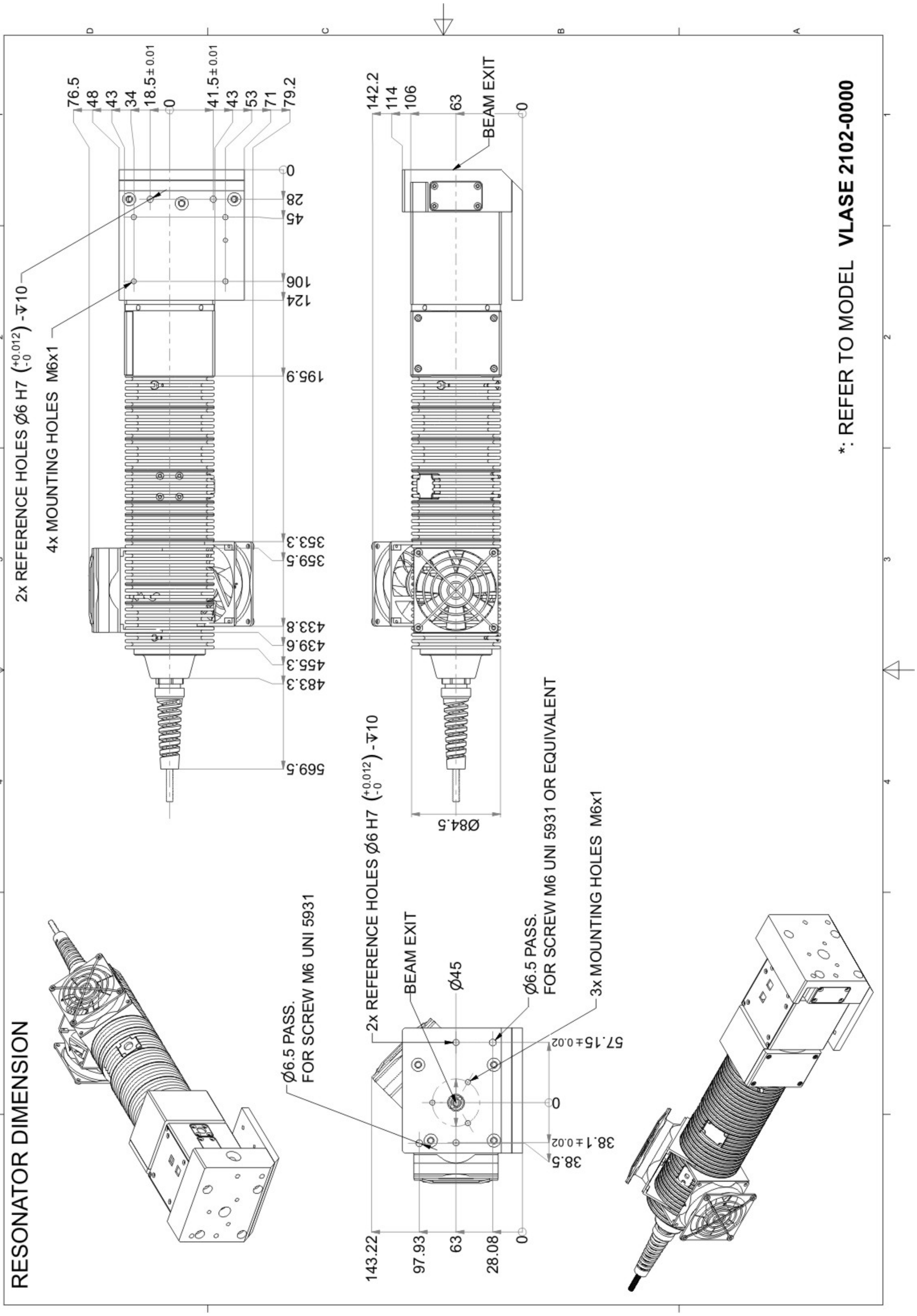

AMBO I LATI
SEZ. PARZ. A-A
SCALA (2 : 1)
- VISTA ISOMETRICA -
NON IN SCALA
M20110034
Ripiano 2U Rack 19" V-LASE
Lamiera Fe00 (12/10)
RAL9005 SATINATA GRANA FINE
23/05/2008

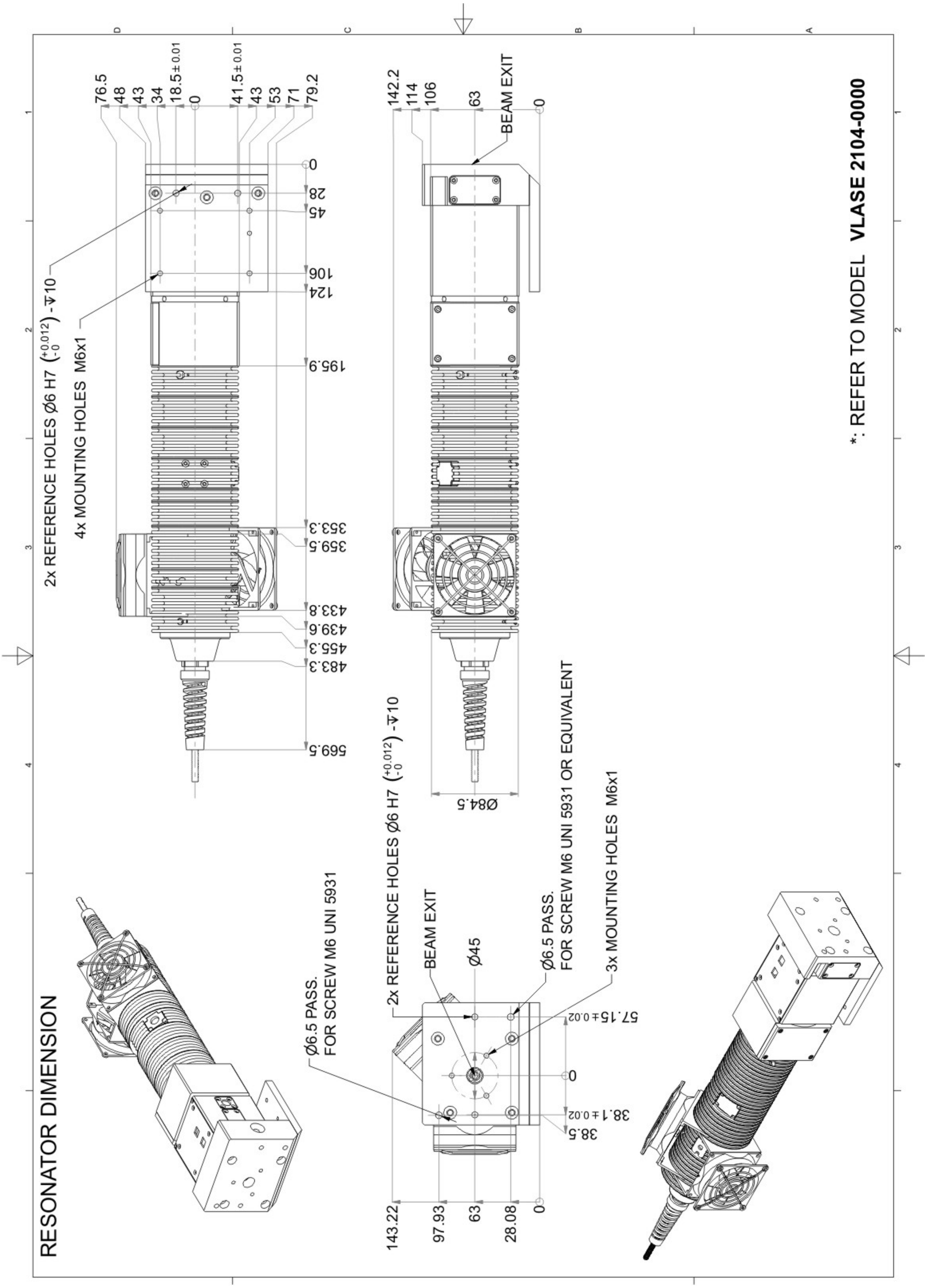

RESONATOR DIMENSION
*: REFER TO MODEL VLASE 2042-0000
2x REFERENCE HOLES Ø6 H7 (+0.012 -0) - ⊽10
4x MOUNTING HOLES M6x1
BEAM EXIT
76.5
48
43
34
18.5±0.01
0
41.5±0.01
43
53
71
79.2
142.2
114
106
63
0
28
45
106
124
195.9
353.3
359.5
433.8
439.6
455.3
483.3
569.5
Ø84.5
Ø6.5 PASS.
FOR SCREW M6 UNI 5931
2x REFERENCE HOLES Ø6 H7 (+0.012 -0) - ⊽10
BEAM EXIT
Ø45
Ø6.5 PASS.
FOR SCREW M6 UNI 5931 OR EQUIVALENT
3x MOUNTING HOLES M6x1
57.15±0.02
0
38.1±0.02
38.5
143.22
97.93
63
28.08
0

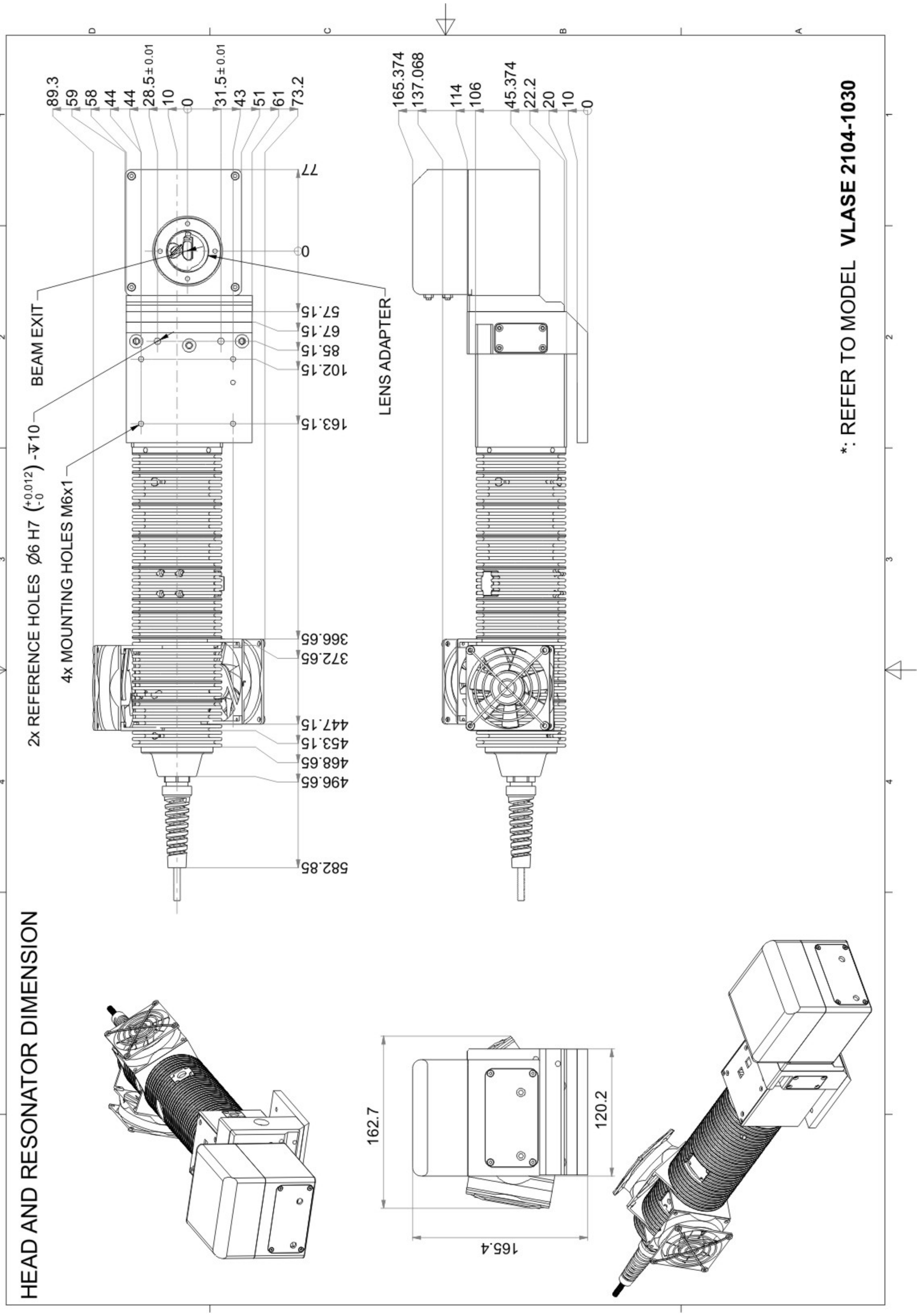

RESONATOR DIMENSION
2x REFERENCE HOLES Ø6 H7 (+0.012 / -0) -↧10
4x MOUNTING HOLES M6x1
BEAM EXIT
Ø84.5
Ø6.5 PASS.
FOR SCREW M6 UNI 5931
2x REFERENCE HOLES Ø6 H7 (+0.012 / -0) -↧10
BEAM EXIT
Ø45
Ø6.5 PASS.
FOR SCREW M6 UNI 5931 OR EQUIVALENT
3x MOUNTING HOLES M6x1
*: REFER TO MODEL VLASE 2044-0000

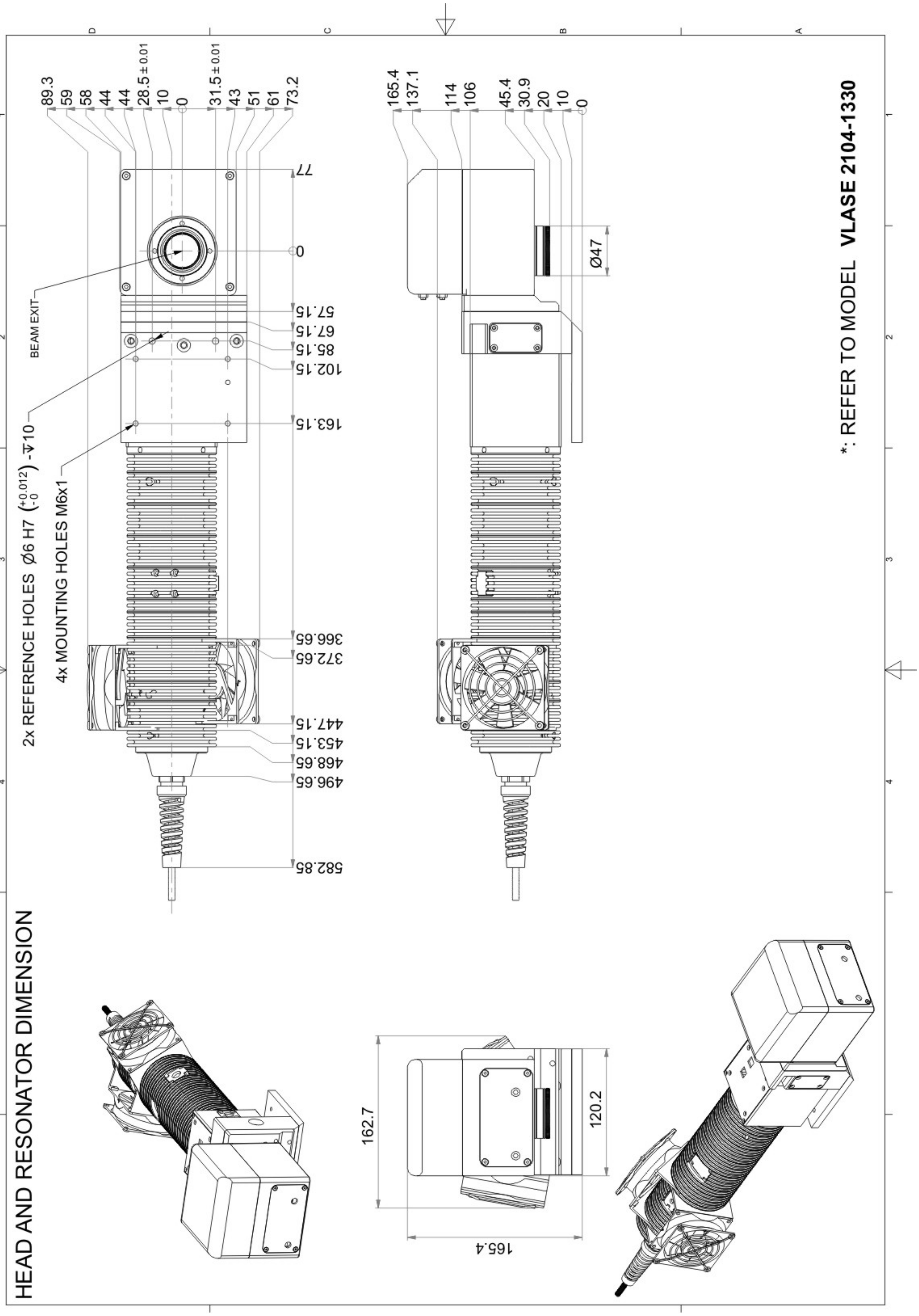

HEAD AND RESONATOR DIMENSION
*: REFER TO MODEL VLASE 2044-1030
BEAM EXIT
LENS ADAPTER
2x REFERENCE HOLES Ø6 H7 (+0.012 / -0) - ⊽10
4x MOUNTING HOLES M6x1
89.3
59
58
44
44
28.5 ± 0.01
10
0
31.5 ± 0.01
43
51
61
73.2
165.374
137.068
114
106
45.374
22.2
20
10
0
77
0
57.15
67.15
85.15
102.15
163.15
366.65
372.65
447.15
453.15
468.65
496.65
582.85
162.7
120.2
165.4


HEAD AND RESONATOR DIMENSION
*: REFER TO MODEL VLASE 2044-1330
BEAM EXIT
2x REFERENCE HOLES Ø6 H7 (+0.012 -0) - ⊽10
4x MOUNTING HOLES M6x1
89.3
59
58
44
44
28.5±0.01
10
0
31.5±0.01
43
51
61
73.2
165.4
137.1
114
106
45.4
30.9
20
10
0
Ø47
77
0
57.15
67.15
85.15
102.15
163.15
366.65
372.65
447.15
453.15
468.65
496.65
582.85
162.7
120.2
165.4


RESONATOR DIMENSION
2x REFERENCE HOLES Ø6 H7 (+0.012 / -0) - ⊽10
4x MOUNTING HOLES M6x1
BEAM EXIT
Ø84.5
Ø6.5 PASS.
FOR SCREW M6 UNI 5931
Ø45
FOR SCREW M6 UNI 5931 OR EQUIVALENT
3x MOUNTING HOLES M6x1
57.15±0.02
38.1±0.02
38.5
143.22
97.93
63
28.08
0
142.2
114
106
76.5
48
43
34
18.5±0.01
41.5±0.01
53
71
79.2
28
45
124
195.9
353.3
359.5
433.8
439.6
455.3
483.3
569.5
*: REFER TO MODEL VLASE 2102-0000


RESONATOR DIMENSION
2x REFERENCE HOLES Ø6 H7
4x MOUNTING HOLES M6x1
BEAM EXIT
Ø84.5
Ø6.5 PASS.
FOR SCREW M6 UNI 5931
2x REFERENCE HOLES Ø6 H7
BEAM EXIT
Ø45
Ø6.5 PASS.
FOR SCREW M6 UNI 5931 OR EQUIVALENT
3x MOUNTING HOLES M6x1
*: REFER TO MODEL VLASE 2104-0000


HEAD AND RESONATOR DIMENSION
*: REFER TO MODEL VLASE 2104-1030
BEAM EXIT
LENS ADAPTER
2x REFERENCE HOLES Ø6 H7 (+0.012 -0) -↧10
4x MOUNTING HOLES M6x1
89.3
59
58
44
44
28.5±0.01
10
0
31.5±0.01
43
51
61
73.2
165.374
137.068
114
106
45.374
22.2
20
10
0
77
0
57.15
67.15
85.15
102.15
163.15
366.65
372.65
447.15
453.15
468.65
496.65
582.85
162.7
120.2
165.4


HEAD AND RESONATOR DIMENSION
*: REFER TO MODEL VLASE 2104-1330
BEAM EXIT
2x REFERENCE HOLES Ø6 H7 (+0.012 / -0) -↧10
4x MOUNTING HOLES M6x1
89.3
59
58
44
44
28.5 ± 0.01
10
0
31.5 ± 0.01
43
51
61
73.2
77
0
57.15
67.15
85.15
102.15
163.15
366.65
372.65
447.15
453.15
468.95
496.65
582.85
165.4
137.1
114
106
45.4
30.9
20
10
0
Ø47
162.7
120.2
165.4

APPENDIX F: DECLARATION OF CONFORMITY

CE

Datalogic Automation S.r.l.
Via Lavino 265
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

VLASE ; CLASS 4 LASER PRODUCT

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 55011 (CLASS A), NOVEMBER 2009:	*ELECTROMAGNETIC COMPATIBILITY (EMC) INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT – RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT*
EN 60950-1, JUNE 2006:	*INFORMATION TECHNOLOGY EQUIPMENT - SAFETY 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, October 27th, 2011

Lorenzo Girotti
Product & Process Quality Manager

UNI EN ISO 9001
UNI EN ISO 14001

FIGURES

DATALOGIC AUTOMATION

DATALOGIC AUTOMATION

Headquarters
Via Lavino, 265
40050 Monte San Pietro
Bologna - Italy
Tel. +39 051 6765611
Fax +39 051 6759324
Purchasing Dept. Fax +39 051 6765499
info.automation.it@datalogic.com

Laser Marking operation officies

Donnas
Reg. Gurey, via Le Gorrey, 10
11020 Donnas (AO) - ITALY
Tel. +39 0125 8128201
Fax +39 0125 8128401

Sesto Calende
Via dell'Industria, 20
21018 Sesto Calende (VA) - ITALY
Tel. +39 0331 9180601
Fax +39 0331 9180801