

VERSIA 2-Axis Scan Head

Technical Manual



Read carefully before using.
Retain for future reference.

Manufacturer

Novanta Corporation
125 Middlesex Turnpike
Bedford, MA 01730, USA

Email: Photonics@Novanta.com

Customer service

Before contacting us for assistance, please review appropriate sections in this manual that may answer your questions. After consulting the manual, please contact one of our worldwide offices between 9 AM and 5 PM local time or by submitting a request through our website: <https://novantaphotonics.com/contact-us/>

Americas, Asia Pacific

Novanta Headquarters
Bedford, USA
Phone: +1-781-266-5700

Email: Photonics@Novanta.com

China

Novanta Sales & Service Office

Shenzhen, China
Phone: +86-755-8280-5395

Suzhou, China
Phone: +86-512-6283-7080

Email: Photonics.China@Novanta.com

Europe, Middle East, Africa

Novanta Europe GmbH
Wackersdorf, Germany
Phone: +49-9431-7984-0

Milan, Italy
Phone: +39-039-793-710

Email: Photonics@Novanta.com

Japan

Novanta Service & Sales Office

Tokyo, Japan
Phone: +81-3-5753-2460

Email: Photonics.Japan@Novanta.com

TABLE OF CONTENTS

1	How to use this user manual	6
1.1	Symbols and signal words	6
1.2	Notation conventions	7
1.3	Storage and replacement.....	7
1.4	Specifics and structure.....	8
1.5	Target audience and qualification	8

2	General safety instruction	9
2.1	Disambiguation of term 'laser unit'	9
2.2	Normal use	9
2.3	Reasonably foreseeable misuse	10
2.4	Hazards	10
2.4.1	Thermal hazards	10
2.4.2	Noise hazards	11
2.4.3	Radiation hazards	11
2.4.4	Material / substance hazards	12
2.4.5	Ergonomic hazards	12
2.4.6	Electric hazards	13
2.5	Modifications and spare parts	13
2.6	Fire extinguisher recommendation	13

3	Overview	15
3.1	Labels.....	16
3.2	Interfaces.....	17
3.3	Controls and indicators	17

4	Prepare for use	18
4.1	Transport and storage	18
4.2	Unpacking.....	19
4.3	Installation	20
4.3.1	Incorporating the VERSIA scan head into the laser unit	20
4.3.2	Connecting the cooling.....	23

4.3.3	Connecting the power supply, control, and feedback signals	24
4.3.4	Installing the software	27
4.4	Commissioning	28
4.4.1	Switching on for the first time	28
4.4.2	Calibrating the scan field	30
5	Operating	32
5.1	Protection and emergency measures.....	32
5.2	Operational procedures	32
5.3	Observable signals	33
5.4	Troubleshooting	33
6	Cleaning, maintaining, and repair	34
6.1	Cleaning	34
6.2	Maintaining	34
6.3	Repair.....	35
7	Decommissioning, returning, and disposal	36
7.1	Decommissioning	36
7.2	Returning.....	38
7.3	Disposal.....	38
8	Appendix	40
8.1	Spare parts	40
8.2	Further reading	40
8.3	Declaration of incorporation	40

LIST OF FIGURES

Figure 1: Position of labels (“top I/O”-variant shown; same position on “side I/O”-variant) ...	16
Figure 2: Position of the interfaces (left: “top I/O”-variant; right: “side I/O”-variant).....	17
Figure 3: Dimensions of “top I/O”- and “side I/O”-variant in millimeters	22

LIST OF TABLES

Table 1: Environmental.....	20
Table 2: Physical	20
Table 3: Dimensions you need to design the lens spacer besides the dimensions of your F-Theta lens.....	21
Table 4: Cooling	23
Table 5: Pin assignment of the power, control, and feedback signal connector	26
Table 6: XY2-100 signals.....	27
Table 7: NVL-100 signals	27
Table 8: Recommended delay settings for initial use	30
Table 9: Troubleshooting	33
Table 10: Maintenance plan.....	35

1 HOW TO USE THIS USER MANUAL

1.1 SYMBOLS AND SIGNAL WORDS

This user manual uses the following symbols and signal words for information of importance.



DANGER

indicates a hazardous situation which, if not avoided, *will* result in severe injury or death.



WARNING

indicates a hazardous situation which, if not avoided, could result in severe injury or death.



CAUTION

indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE

indicates a hazardous situation which, if not avoided, could result in damage to the equipment or something in its vicinity.

IMPORTANT

indicates information considered important but not directly hazard related (e.g., security, hygiene).

TIP

indicates a practice that facilitates work.

Procedure

indicates a call to action. After this signal word you must execute one or more steps. We made an exception for warnings where we omitted this signal word, as avoidance procedures are mandatory there.

1.2 NOTATION CONVENTIONS

This user manual uses the following notation conventions.

Notation	Meaning
<u>Underlined</u>	click-able cross reference or hyperlink
[(Number)]	cross reference to a list of further reading on page 40
Bold	element in the graphical user interface that the user shall click
<i>Italic</i>	name of element in the graphical user interface or emphasized text
Typewriter	text that the user must type in, filename, or path

1.3 STORAGE AND REPLACEMENT

- Keep this user manual with the VERSIA scan head to access it at any time during its lifetime.
- You can access a copy of this manual on our website:
https://novantaphotonics.com/wp-content/uploads/2023/05/VERZIA_2-Axis_Scan_Head_Technical_Manual.pdf.
- This user manual is part of the product. If ownership changes then this user manual must accompany the VERSIA scan head.

1.4 SPECIFICS AND STRUCTURE

Novanta reserves the right to make changes to the VERSIA scan head covered in this user manual to improve its performance, reliability, or manufacturability. Contents of this user manual are subject to change without notice.

Although every effort has been made to ensure the accuracy of the information contained in this user manual, Novanta assumes no responsibility for inadvertent errors.

- Be mindful of the environment, do not print this manual unless necessary.

1.5 TARGET AUDIENCE AND QUALIFICATION

IMPORTANT

Only target audience, who are listed in the beginning of each instructing section in the following chapters, may perform the activities described there.

The people who perform these activities need to be of age.

The qualification of the target audience is defined below.

Laypersons

without special qualification, who e.g., transport and store the boxed VERSIA scan head.

Operators

who are trained by the company that is operating the laser unit that contains the VERSIA scan head, in the use of that laser unit and who confirmed the training by signature.

Experts

in electrical engineering or mechatronics with successful training in handling highly sensitive electronic and optical equipment. Experts must be trained by the company that is operating the laser unit that contains the VERSIA scan head in the use of that laser unit.

2 GENERAL SAFETY INSTRUCTION

2.1 DISAMBIGUATION OF TERM 'LASER UNIT'

A *laser unit* is a machine that incorporates a laser device (that is the actual laser), the VERSIA scan head and other components.

2.2 NORMAL USE

VERZIA scan head is delivered as an OEM component for integration into a laser unit that uses a class 4 laser and that will be operated in a dry and clean indoor environment without electrically conductive contamination.

- Before installing and operating the VERSIA scan head, carefully read this user manual for your protection.
- Retain this user manual for future reference.

IMPORTANT

Novanta has no influence over the employed laser device or the overall laser unit.

- Customers assume full responsibility for implementing and maintaining a laser-safe working environment.
- Original equipment manufacturer (OEM) customers assume full responsibility for CDRH (Center for Devices and Radiological Health) certification and compliance with the standards and guidelines required for the CE (European Conformity) label.
- Please contact Novanta for further information about the VERSIA scan head and applicable guidelines.

2.3 REASONABLY FORESEEABLE MISUSE

It is considered a misuse if you use VERSIA scan head without incorporating it into a laser unit that complies with the standards and guidelines required for the CE (European Conformity) label.

2.4 HAZARDS

IMPORTANT

- Follow the control measures and safety guidelines provided by the laser's manufacturer, and those established by your Laser Safety Officer (LSO), Radiation Safety Officer (RSO), or safety department of your business or institution.

2.4.1 THERMAL HAZARDS



WARNING

Explosive and flammable materials under the scan head can cause burns.

- Consult the respective material safety data sheets and provide appropriate protective measures.



CAUTION

Hot laser-processed materials can cause burns.

- If you are the system integrator, then place a sign at the laser processing area that warns about hot surfaces.
- If you are the operator and must handle laser-processed materials by hand, then wear personal protective equipment (heat resistant gloves).

2.4.2 NOISE HAZARDS



CAUTION

Noise from the coolant chiller can cause stress, discomfort, and consequential failure in the manufacturing process.

- Consult the coolant chiller user manual and ...
 - If you are the system integrator, then provide appropriate sound insulation.
 - If you are the operator, then wear personal protective equipment (ear protection).

2.4.3 RADIATION HAZARDS



WARNING

Laser radiation can cause burns and damage to eyes and skin.

- Consult the laser user manual and ...
 - If you are the system integrator, then provide appropriate protective measures.
 - If you are the operator, then wear personal protective equipment (laser safety goggles according to the parameters of the laser in use).



WARNING

If you use an ultra-short-pulsed laser and if the irradiance limit is exceeded, then **X-rays** are emitted from the processing point. This can cause burns and damage to eyes and skin. It also can have effects on the reproductive capability and cause cancer.

- Consult the laser user manual and provide sufficient shielding.

**WARNING**

If you use an ultra-short-pulsed laser, then under certain circumstances **UV radiation** is emitted from the processing point. This can cause burns and damage to eyes and skin. It also can cause cancer.

- Consult the laser user manual and provide sufficient shielding.

2.4.4 MATERIAL / SUBSTANCE HAZARDS**WARNING**

Laser generated air contaminants (dust, fume, vapor) can cause cancer, poisoning, breathing difficulties, suffocation, sensitization, and can influence the reproductive capability. They also can pose a risk of explosion and a fire risk.

- Consult the respective material safety data sheet and provide an appropriate dust, fume, and vapor extraction.

**CAUTION**

Coolant and coolant additives can cause cancer, poisoning, and sensitization.

- Consult the respective material safety data sheet and ...
 - If you are the system integrator, then provide appropriate protective measures.
 - If you are the operator, then wear personal protective equipment (safety goggles, waterproof assembly gloves).

2.4.5 ERGONOMIC HAZARDS**CAUTION**

Unergonomic work environment can cause discomfort, fatigue, musculoskeletal disorder, and stress.

- If you are the system integrator, then provide an ergonomic work environment.

2.4.6 ELECTRIC HAZARDS



NOTICE

Electrostatic discharge can damage the VERSIA scan head.

- Transport the VERSIA scan head only in anti-static packaging and packaging equivalent to that received with the shipment.
- Keep the VERSIA scan head sealed in anti-static packaging until within an ESD-controlled environment.

A proper static control station should include:

- ☐ A soft grounded conductive tabletop or grounded conductive mat on the tabletop
- ☐ A grounded wrist strap with the appropriate (1 MΩ) series resistor connected to the tabletop mat and ground
- ☐ An adequate earth ground connection, such as an uncoated water pipe or AC ground
- ☐ Conductive bags, trays, totes, racks, or other storage
- ☐ Properly grounded power tools
- ☐ Personnel handling ESD items must wear ESD protective garments and ground straps

2.5 MODIFICATIONS AND SPARE PARTS

Modifications to VERSIA scan head are not permitted and no parts are available for replacement.

2.6 FIRE EXTINGUISHER RECOMMENDATION

Procedure

- Use a carbon dioxide (CO₂) fire extinguisher.
- Ensure the fire extinguisher used is compatible with the entire laser unit.

- Prior to installing the VERSIA scan head, ensure the fire extinguisher is available and observe its instructions for use including its hazard notes.

3 OVERVIEW

VERSIA, 2-axis hybrid scan head, features a compact, industrial design that is ideal for versatile applications such as micromachining and marking and coding. Designed for simple system integration due to its compact size and standard industrial interfaces, VERSIA offers both XY2-100 protocol as well as Novanta's bi-directional communication NVL-100 which allows users to monitor position feedback among other monitoring tools. This is due to the digital servo design which enables to carry multiple tunes on the scan head where each tune is optimized for specific applications.

In addition, VERSIA features a threaded input aperture allowing flexible integration options and customizability. In addition, the scan head has passed numerous extreme condition tests to ensure reliability and safety and is IP54 rated.

Optimized System Performance

- Ability to carry multiple tunes where each tune is optimized for the specific applications
- Dynamically matched mirror design improves system performance
- Bi-directional communication enables position feedback monitoring
- Sky Writing eliminates the processing time loss due to acceleration and deceleration times
- Integrated monolithic water-cooling design

Easy to Integrate and Implement

- Compact industrial design reduces system footprint, making it easy to integrate into existing systems
- It supports industry standard interface XY2-100 with a single DB25 connector as well as Novanta's NVL-100

- Integration flexibility with two orientation options for the DB25 interface on laser input side or the top side
- Threaded input aperture (1.035"-40) enables flexible integration and customized ability

3.1 LABELS

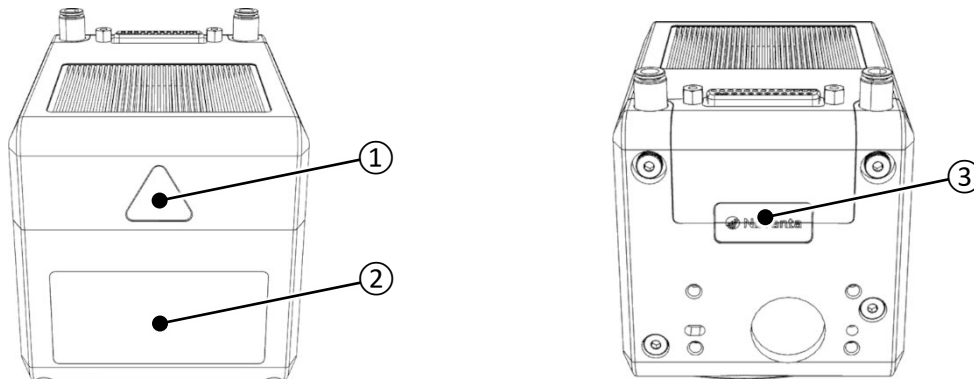


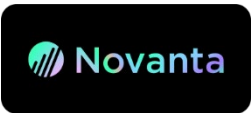


Figure 1: Position of labels ("top I/O"-variant shown; same position on "side I/O"-variant)

Legend to [Figure 1](#)

No.	Label	Description
1		Warning of laser beam label
2		Type label Product name Aperture in millimeters λ : wavelength PN: part number SN: serial number
3		Warranty label

3.2 INTERFACES

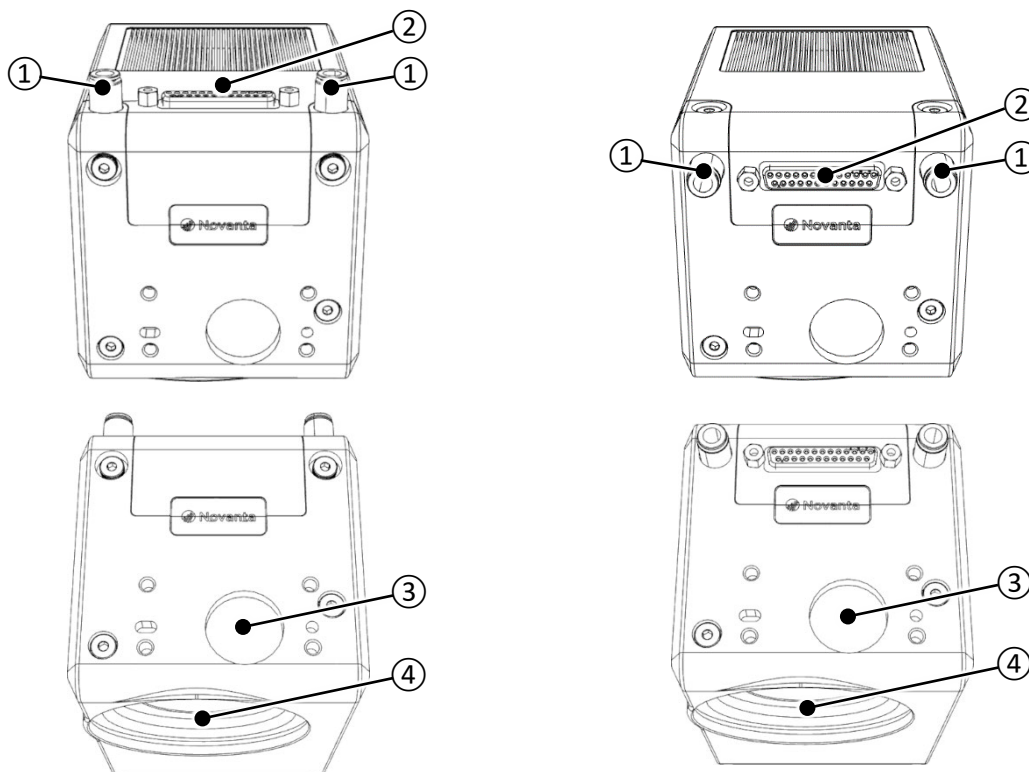


Figure 2: Position of the interfaces (left: "top I/O"-variant; right: "side I/O"-variant)

Legend to [Figure 2](#)

No.	Marking / function	See section	On page
1	– / Cooling	4.3.2	23
2	– / Power supply, control, and feedback signals	4.3.3	24
3	– / Laser beam input	4.3.1	20
4	– / Laser beam output	4.3.1	20

3.3 CONTROLS AND INDICATORS

There are no controls or indicators on VERSIA scan head.

4 PREPARE FOR USE

This chapter describes all procedures necessary to get VERSIA ready for use.

4.1 TRANSPORT AND STORAGE

Target audience and qualification

Laypersons, operators, and experts

Requirements

Characteristic	Specification
Conditions	Dry and clean indoor environment without electrically conductive contamination
Storage temperature	-35 to 60 °C (238 to 333 K)
Humidity	20 to 80 % RH, non-condensing

Safety precautions

- ☐ Wear personal protective equipment (safety shoes, waterproof assembly gloves) to prevent crushing and bruises caused by falling scan head.
- ☐ Handle VERSIA scan head with care.

Procedure

- Transport and store VERSIA scan head in its sealed original packaging or an equivalent packaging.

4.2 UNPACKING

Target audience and qualification

Experts

Have ready

- ☐ Utility knife

Safety precautions

- ☐ Wear personal protective equipment (safety shoes, waterproof assembly gloves) to prevent crushing and bruises caused by falling scan head.
- ☐ Handle VERSIA scan head with care.

Procedure

1. If any shock indicator is present and triggered, then block the delivery and inform the sender.



NOTICE

Contamination can damage optics.

- Leave any protective covers in place for as long as possible to keep the optics clean.

2. While carefully unpacking VERSIA, keep in mind that you want to retain the packaging for future use.

In case a unit return is necessary, we recommend documenting the unpacking e.g., by taking photographs.
3. Please check based on the delivery bill whether all items are present, and their serial numbers match the delivery bill. Also check by eye if the goods are free of defects. If any of these do not apply, then block the shipment and inform the sender.
4. Retain the original packaging for future use.

4.3 INSTALLATION

This section summarizes procedures necessary to mount VERSIA in the laser unit and to connect all supply lines.

4.3.1 INCORPORATING THE VERSIA SCAN HEAD INTO THE LASER UNIT

Target audience and qualification

Experts

Have ready

- ☐ Machine screws suitable for mounting VERSIA in the laser unit; see [Figure 3](#) on page [22](#). NOTE: Observe the permitted tightening torque of the screws used.
- ☐ Suitable screwdriver, hexagon socket screw key set, Torx key set

Requirements

Table 1: Environmental

Characteristic	Specification
Conditions	Dry and clean indoor environment without electrically conductive contamination
Operating temperature	15 to 35 °C (288 to 308 K)
Humidity	20 to 80 % RH, non-condensing

Table 2: Physical

Characteristic	Specification
Laser beam input	Find the aperture and wavelength on VERSIA's type label
Optical power input	
for 9.2 to 10.6 µm (CO ₂)	max. 200 W
for 1020 to 1090 nm (Fiber)	max. 200 W
for 513 to 534 nm (Green)	check with manufacturer

Characteristic	Specification
	for 341 – 357 nm (UV)
IP rating	IP54
Dry weight	2.12 kg
Dimensions (L × W × H)	132.2 mm × 99.0 mm × 99.0 mm

Table 3: Dimensions you need to design the lens spacer besides the dimensions of your F-Theta lens

Characteristic	Specification
Output aperture thread	M79×1.0 - 6H ↴4
Distance mirror center to mirror center	16.144 mm
Distance Y-mirror center to surface at beam exit	27.046 mm

Safety precautions

- Ensure fire extinguishing equipment is available and follow its instructions; see also section [2.6](#) on page [13](#).
- Switch off the laser unit that contains VERSIA. Switch off the laser device, power supply, cooling and particularly disable moving parts.
- Wear personal protective equipment (safety shoes, waterproof assembly gloves) to prevent crushing and bruises caused by falling scan head.
- Handle VERSIA scan head with care.

Procedure



NOTICE

Contamination by burned protective covers can damage optics.

- Remove protective covers at the last possible moment during the installation procedure.
- Use the M5 mounting threads as indicated in [Figure 3](#) on page [22](#) to mount the VERSIA scan head on its place in the laser unit.

Specifics of the interface

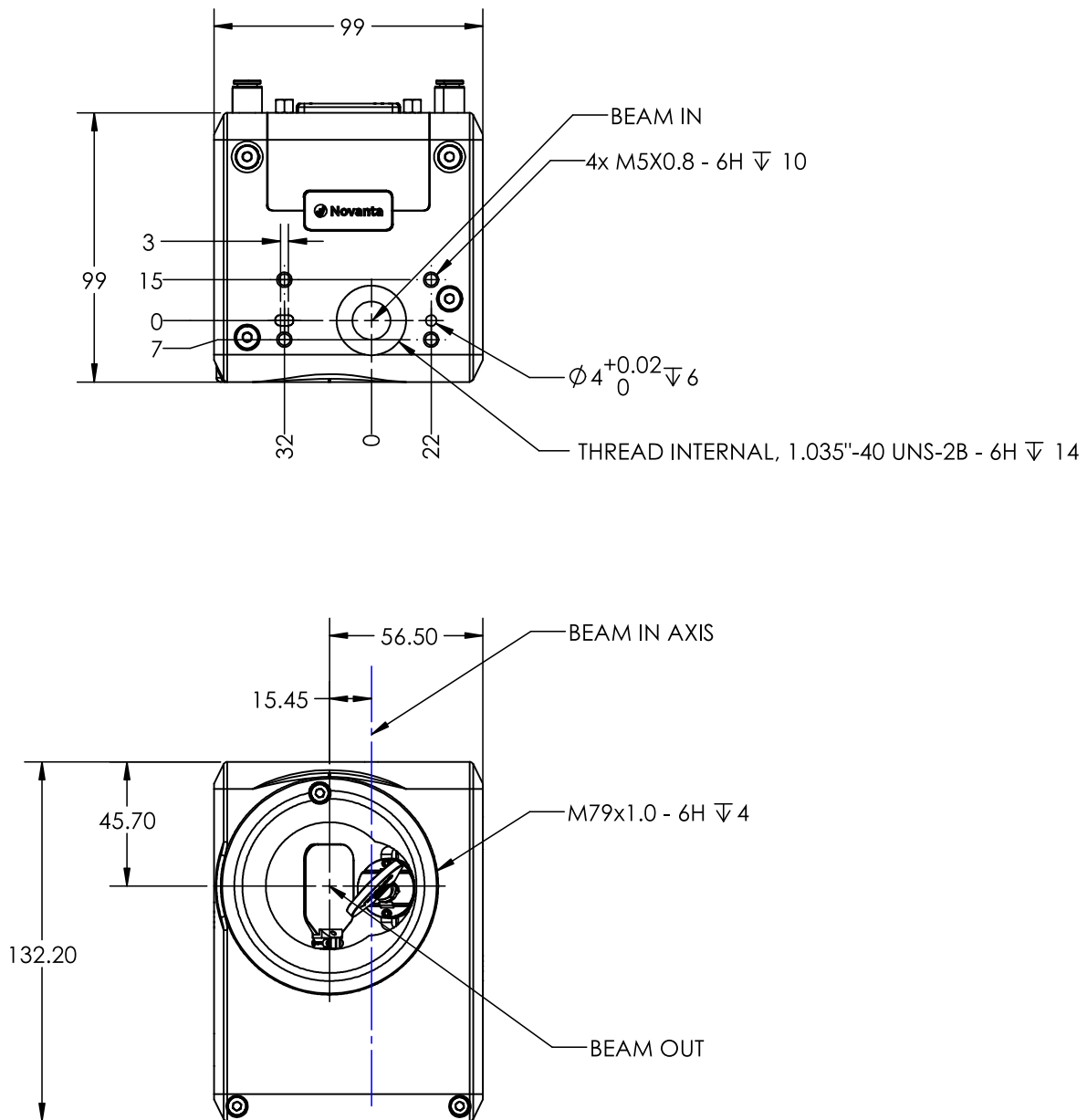


Figure 3: Dimensions of "top I/O"- and "side I/O"-variant in millimeters

4.3.2 CONNECTING THE COOLING

Target audience and qualification

Experts

Have ready

- ☐ Hose; recommended material: PU; \varnothing_o 6 mm; \varnothing_i 4 mm
- ☐ Utility knife to cut hose in length
- ☐ Tissues to wipe of small amounts of coolant

Requirements

Table 4: Cooling

Characteristic	Specification
Coolant (minimum)	Filtered (max. 100 μ m particle size) DI-water
Coolant (recommended)	Filtered (max. 100 μ m particle size) DI-water with additive Coolflow DTX
Inlet temperature (recommended)	18 to 20 °C (291 to 293 K)
Inlet pressure	3 to 4 bar (3000 to 4000 hPa)
Volume flow	1.2 to 2.2 l/min
Humidity	20 to 80 % RH, non-condensing

Safety precautions

- ☐ Wear personal protective equipment (safety goggles, waterproof assembly gloves) to prevent eye and skin irritations caused by coolant or coolant additive.

Procedure

Note that the flow direction is irrelevant.

1. Push the hose ends into the fittings as far as they will go.
2. Gently pull on the hoses to check that they are tight.

**NOTICE**

Leaking coolant can cause a short circuit and/or damage optics.

3. Check for leakage by opening the return line first and then carefully turning on the cooling water supply line and watching the connections.
4. If coolant is leaking, immediately turn off the supply line, disconnect the leaking connection, wipe away any leaked coolant, correct the fault and redo the connection.

– OR –

If coolant is not leaking, then let it flow until VERSIA's cooling loop is filled with coolant.

5. Turn off the coolant supply line first and then the return line.

Later during commissioning, you will turn on the cooling again.

Specifics of the interface

None

4.3.3 CONNECTING THE POWER SUPPLY, CONTROL, AND FEEDBACK SIGNALS**Target audience and qualification**

Experts

Have ready

- ☐ D-sub 25-pin, male connector with housing

Cable: max. 6 m recommended length (contact customer service if necessary); shielding not necessary, but recommended; note the cross-section of the cable strands regarding the current; see [Table 5](#) on page [26](#), pins 9, 10, and 22

Procedure**NOTICE**

Unequal ground potentials immediately damage the VERSIA scan head.

- Bring ground of the command signals on VERSIA scan head side and scan controller side to equal potential.

**NOTICE**

Inverted polarity of the supply voltage immediately damages the VERSIA scan head.

- Correctly connect the power supply to the connector; see [Table 5](#) on page [26](#).

1. Create a cable that connects the power supply and the scan controller to the scan head by following the information in [Table 5](#) on page [26](#) and the following.

**NOTICE**

Hot plugging can damage the VERSIA scan head.

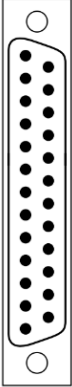
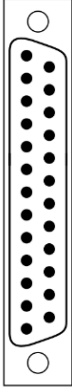
- Before connecting or disconnecting, ensure that no voltage is being applied to the VERSIA scan head. Turn off the power supply.

2. Connect the scan controller and the power supply to the VERSIA scan head.

Specifics of the interface

Marked: no
Connector: D-sub 25-pin, female

Table 5: Pin assignment of the power, control, and feedback signal connector

Pin	Function XY2-100	Function NVL-100
		
1	CLK_N	NC
14	CLK_P	
2	SYNC_N	
15	SYNC_P	
3	POS-X_N	
16	POS-X_P	
4	POS-Y_N	DATA_IN1_N
17	POS-Y_P	DATA_IN1_P
5	POS-Z_N	DATA_IN2_N
18	POS-Z_P	DATA_IN2_P
6	STAT_N	DATA_OUT1_N
19	STAT_P	DATA_OUT1_P
7	NC	NC
20		
8	STAT2_N	DATA_OUT2_N
21	STAT2_P	DATA_OUT2_P
9	Power supply (VBus); 48 V, max. 5 A	Power supply (VBus); 48 V, max. 5 A
22		
10		

Pin	Function XY2-100	Function NVL-100
23	Power ground; must be connected to protective earth	Power ground; must be connected to protective earth
11		
24		
12		
15		
13		

Table 6: XY2-100 signals

Function XY2-100	Description	Direction
CLK	Clock signal	Command signal
SYNC	Frame synchronization signal	
POS-X, -Y, -Z	X-, Y-, and Z-position data	
STAT	Scan head status	Feedback signal

Table 7: NVL-100 signals

Function NVL-100	Description		Direction
	Subframe 1 (B-/M-preamble)	Subframe 2 (W-preamble)	
DATA_IN1_P / ~N	X-position data	Y-position data	Command signal
DATA_IN2_P/N	Z-position data	4 th -position data	
DATA_OUT1_P/N	X actual position	Y actual position	Feedback signal
DATA_OUT2_P/N	Z actual position	4 th actual position	

4.3.4 INSTALLING THE SOFTWARE

The software is needed for calibration of the scan field and for later control of the scan head.

Target audience and qualification

Experts

Requirements

- If you are using a controller other than the ScanMaster Controller (SMC), follow the installation procedure described in the documentation for that controller instead of the procedure described below.

Procedure

1. Download the *Calibration Wizard (CalWizard)* and the *ScanMaster Designer* software from <https://novantaphotonics.com/manual-documents/?manual=7797>.
2. Install the *Calibration Wizard (CalWizard)* and the *ScanMaster Designer* software.

4.4 COMMISSIONING

This section describes how to commission VERSIA, i.e., what must be done when and after switching it on for the first time.

4.4.1 SWITCHING ON FOR THE FIRST TIME

Target audience and qualification

Experts

Requirements

- VERSIA is installed according to section [4.3](#) on page [20](#) ff
- Laser beam specifications

Characteristic	Specification
Laser beam input	Find the aperture and wavelength on VERSIA's type label
Optical power input	
for 9.2 to 10.6 μm (CO_2)	max. 200 W
for 1020 to 1090 nm (Fiber)	max. 200 W
for 513 to 534 nm (Green)	check with manufacturer

Characteristic	Specification
	for 341 – 357 nm (UV) check with manufacturer

- F-Theta lens
- Lens spacer (between scan head and F-Theta lens)

Dimensions you need to design the lens spacer besides the dimensions of your F-Theta lens:

Characteristic	Specification
Output aperture thread	M79×1.0 - 6H ↴4
Distance mirror center to mirror center	16.144 mm
Distance Y-mirror center to surface at beam exit	27.046 mm

Safety precautions

IMPORTANT

VERSIA must be incorporated in a laser unit and integrated into its safety concept.

Procedure

1. Switch on the cooling, the scan controller and power of VERSIA.



WARNING

Laser radiation can cause burns and damage to eyes and skin.

- Consult the laser user manual and wear personal protective equipment (laser safety goggles according to the parameters of the laser in use).

2. Adjust the optical laser power so that you can just observe it with an indicator card.
3. Align the laser beam into the scan head.

Since we do not know your system structure, we can only state conditions that must be met at this point:

- a. The laser beam must be coaxial to VERSIA's optical axis.
- b. The laser beam must enter the input aperture in the center.

- c. The laser beam must exit the output aperture in the center (0,0 position) if previously aligned correctly.
4. Switch off the laser beam.
5. Install the F-Theta lens and required lens spacer.

Positioning of the lens relative to the scan head is critical for both scanning performance and safety of the scanning mirrors. There is a matching lens spacer for each lens model.

6. Proceed to section [4.4.2](#) on page [30](#).

4.4.2 CALIBRATING THE SCAN FIELD

You must calibrate the scan field, otherwise the output will not match the desired result.

Target audience and qualification

Experts

Requirements

- ☐ VERSIA is switched on according to section [4.4.1](#) on page [28](#)
- ☐ If you are using a controller other than the ScanMaster Controller (SMC), follow the calibration procedure described in the documentation for that controller instead of the procedure described further below.

Set up for initial use

Delay parameter settings are variable because each application's requirements and the controllers that are used fluctuate.

Use the delay settings outlined in the table below as a starting point, then fine tune the settings as needed.

Table 8: Recommended delay settings for initial use

Characteristic	Specification
Mark delay	$2 \times \text{Tracking error}$
Jump delay	Tracking error
Polygon delay	$0.5 \times \text{Tracking error}$

Characteristic	Specification
Laser on	Laser-dependent
Laser off	Laser-dependent

Procedure

- Take the *Calibration Wizard User Manual* to hand and follow the procedures described there, especially in chapters 4 to 7. You can download the *Cal/Wizard Manual* (document number 1040-0008) from <https://novantaphotonics.com/manual-documents/?manual=7797>.

After that, VERSIA is ready to use.

5 OPERATING

5.1 PROTECTION AND EMERGENCY MEASURES

IMPORTANT

VERSIA must be incorporated in a laser unit and integrated into its safety concept.

5.2 OPERATIONAL PROCEDURES

VERSIA has no control elements. Use a scan controller to control the VERSIA.

Target audience and qualification

Operators and experts

Requirements

- ☐ You have successfully finished all necessary commissioning procedures.
- ☐ The laser unit, that contains VERSIA, complies with the standards and directives that are required by the declarations of incorporation of all laser unit components.
- ☐ The cooling is switched on.
- ☐ The power supply is switched on.
- ☐ All peripheral devices that are connected to the scan controller are switched on and ready.
- ☐ The scan controller is switched on.
- ☐ The scan controller software is running and connected to the scan controller.

Procedure

- Control VERSIA and the laser via the scan controller.

Please find further reading in the documentation of the installed hardware and software components.

5.3 OBSERVABLE SIGNALS

VERSIA has no visual or audible indicators that provide observable signals.

5.4 TROUBLESHOOTING

Target audience and qualification

Operators and experts

Procedure

1. Determine how a failure manifests (symptom).
2. In [Table 9](#) on page [33](#) find a matching measure and implement it then.

Please also find further reading in the documentation of the installed hardware and software components. These may be the SMC (ScanMaster Controller) and SMD (ScanMaster Designer) by Novanta or any other scan control system that is capable of the XY2-100 or NVL-100 protocol.

If troubleshooting is not possible or if you are not skilled to do so, please contact a local expert first and if more assistance is needed contact customer service.

Table 9: Troubleshooting

Symptom	Potential root cause	Measure
–	–	–

6 CLEANING, MAINTAINING, AND REPAIR

Cleaning, maintaining, and the repair of VERSIA are limited to the procedures described in this chapter. Please contact customer service for additional support.

6.1 CLEANING

Cleaning VERSIA scan head is not necessary. But cleaning the F-Theta lens may become necessary when the laser processing results become unacceptable. In this case, it is recommended to only clean the F-Theta lens, as every cleaning degrades its optical quality.

Target audience and qualification

Experts

Safety precautions

- ❑ Switch off the laser unit that contains VERSIA. Switch off the laser device, power supply, cooling and particularly disable moving parts.

Procedure

- Clean the F-Theta lens according to its manufacturer's instructions.

6.2 MAINTAINING

We recommend creating a maintenance plan. Its cadence depends on the degree of contamination in the work environment. We recommend at least the maintenance plan below.

Table 10: Maintenance plan

Interval	Measure	See section	On page
Annually	<ul style="list-style-type: none">Check the laser unit and the incorporated VERSIA according to standard EN 60204. <p>Check the electrical safety of all connecting cables and particularly the mains cable.</p>	—	—

6.3 REPAIR

There are no serviceable parts inside the scan head. Opening or disassembly of VERSIA could risk your safety and safe operation of the scan head and will void the warranty. If a repair becomes necessary, please contact customer service.

7 DECOMMISSIONING, RETURNING, AND DISPOSAL

7.1 DECOMMISSIONING

Target audience and qualification

Experts

Requirements

- ☐ Decommission the VERSIA scan head only if you want to return it, were instructed to do so, or if you want to dispose of it.

Have ready

- ☐ Suitable screwdriver for the mounting screws
- ☐ Tissues or similar, to absorb leaking coolant immediately
- ☐ Original protective covers for the laser beam entrance and exit. If the original protective covers are not available any more then alternatively use Polyamide tape

Safety precautions

- ☐ Switch off the laser unit that contains the VERSIA scan head. Switch off the laser device, power supply, cooling and particularly disable moving parts.
- ☐ Wear personal protective equipment (safety shoes, waterproof assembly gloves, safety goggles) to prevent crushing and bruises caused by falling scan head, and eye and skin irritations caused by coolant and coolant additive.
- ☐ Handle VERSIA scan head with care.

Procedure**NOTICE**

Hot plugging can damage the VERSIA scan head.

1. Before connecting or disconnecting, ensure that no voltage is being applied to the VERSIA scan head. Turn off the power supply.
2. Disconnect the power supply and electrical lines from the VERSIA scan head.
3. Turn off the coolant supply line first and then the return line.
4. Relieve the pressure from the hose.

**NOTICE**

Leaking coolant can cause a short circuit and/or damage optics.

- Immediately absorb leaking coolant with tissues.
- Deposit the open hose tips in a way that coolant cannot leak or contain the coolant in a tank.

5. Disconnect the cooling supply lines from the VERSIA scan head:
Push the black end piece into the connector and pull the hose out of the connector.
6. Dismount the VERSIA scan head from the laser unit.
7. Fix the protective covers over the laser beam entrance and exit.

**NOTICE**

Temperatures less than 0 °C (273 K) can cause frost damage to the cooling loop.

7. Blow-dry the VERSIA scan head's cooling loop.
Blowing the cooling loop dry prevents damage when accidentally transporting the VERSIA scan head at temperatures less than 0 °C (273 K).

8. Dispose of the coolant according to its material safety data sheet.
9. Clear the VERSIA scan head of contamination with any dangerous materials prior to further handling.

7.2 RETURNING

This section describes how to prepare the VERSIA scan head if you want to return it.

Target audience and qualification

Laypersons, operators, and experts

Requirements

- ☐ VERSIA scan head has been decommissioned; see section [7.1](#) on page [36](#)

Have ready

- ☐ Original packaging or an equivalent packaging
- ☐ Parcel tape

Safety precautions

- ☐ Wear personal protective equipment (safety shoes, waterproof assembly gloves) to prevent crushing and bruises caused by falling scan head.
- ☐ Handle VERSIA scan head with care.

Procedure

1. Contact customer service.
You will receive instructions about how to proceed.
2. If you are instructed to return the VERSIA scan head, then package it in its original or equivalent packaging to prevent damage during transport.
As memory aid use the documentation that you may have taken during unpacking.
3. Arrange for return consignment.

7.3 DISPOSAL

The VERSIA scan head is designed to be integrated into large-scale stationary industrial tools, therefore 2012/19/EU (WEEE) does not apply.

By ensuring the VERSIA scan head is disposed correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be

caused by inappropriate waste handling of the VERSIA scan head. The recycling of materials will help to conserve natural resources.

Target audience and qualification

Laypersons, operators, and experts

Requirements

- ☐ The VERSIA scan head has been decommissioned; see section [7.1](#) on page [36](#).

Safety precautions

- ☐ Wear personal protective equipment (safety shoes, waterproof assembly gloves) to prevent crushing and bruises caused by falling scan head.
- ☐ Handle VERSIA scan head with care.

Procedure

- Do not treat the VERSIA scan head as household waste. But hand it over to the applicable collection point or to the manufacturer as described in section [7.2](#) on page [38](#).

For more detailed information, please contact your local city office, your disposal service, or our customer service.

8 APPENDIX

8.1 SPARE PARTS

If not mentioned otherwise, the given part numbers are the manufacturer's part numbers.

Figure	Description	Part number
–	–	–

8.2 FURTHER READING

Please find more information in the documentation of the installed hardware and software components.

These may be the ScanMaster Controller (SMC) and ScanMaster Designer (SMD) by Novanta or any other scan control system that is capable of the XY2-100 or NVL-100 protocol.

If you are using the ScanMaster Controller (SMC) and want to calibrate the scan field, then read the *Calibration Wizard User Manual*. You can download the *CalWizard Manual* (document number 1040-0008) from <https://novantaphotonics.com/manual-documents/?manual=7797>. If you are using a different controller, refer to its documentation for calibration procedures.

8.3 DECLARATION OF INCORPORATION

Please turn the page.

(Translation)



Declaration of incorporation within the meaning of the Machinery Directive 2006/42/EC Annex II 1B

Product	VERSIA scan head		
Manufacturer	Novanta Inc. 125 Middlesex Turnpike Bedford, MA 01730 USA	The person authorized to compile the relevant technical documentation	Martin Hartmann (Director Engineering), manufacturer's address

The manufacturer declares that the above-named product is an incomplete machine within the meaning of the Machinery Directive. The product is exclusively intended to be incorporated into a machine or an incomplete machine and therefore does not comply with all the requirements of the Machinery Directive.

A list of the essential requirements of the Machinery Directive that apply to this product and with which it complies can be found in the Annex to this declaration.

Commissioning of the product is prohibited until it has been established that the machine into which the above-named product is incorporated complies with all essential requirements of the Machinery Directive and the safety requirements and measures of standard DIN EN ISO 12100:2010.

The special technical documentation in accordance with Machinery Directive 2006/42/EG Annex VII Part B has been created. The person authorized to compile the technical documentation undertakes to send the documentation to the national authorities in response to a reasoned request. The documentation is sent by post in paper format or by electronic media.

The above-named product fulfills the requirements of the following EC Directives:

- RoHS Directive 2011/65/EU

The following harmonized European standards have been applied:

- DIN EN ISO 60529:2014 Degrees of protection provided by enclosures (IP code)
- DIN EN 61000-4-2:2009 Electromagnetic compatibility (EMC)
- DIN EN 61000-4-4:2012 Electromagnetic compatibility (EMC)
- DIN EN 61000-4-5:2014 Electromagnetic compatibility (EMC)
- DIN EN 61000-4-6:2014 Electromagnetic compatibility (EMC)
- DIN EN ISO 12100:2010 Safety of machinery – General principles for design – Risk assessment and risk reduction

(Translation)



Other standards and regulations have been applied as follows:

- ISTA-3A packaging testing

Wackersdorf, 2023-04-17

Martin Hartmann (Director Engineering)

Annex to the declaration of incorporation

List of the essential health and safety requirements for the design and construction of machinery that apply to the product specified on page 1 and with which it complies.

Number Annex I	Heading	applicable	complied with	Comment
1	ESSENTIAL HEALTH AND SAFETY REQUIREMENTS	–	–	–
1.1.2	Principles of safety integration	Y	Y	
1.1.3	Materials and products	Y	Y	
1.1.4	Lighting	N		
1.1.5	Design of machinery to facilitate its handling	Y	Y	
1.1.6	Ergonomics	N		
1.1.7	Operating positions	N		
1.1.8	Seating	N		
1.2	CONTROL SYSTEMS	–	–	–
1.2.1	Safety and reliability of control systems	Y	Y	
1.2.2	Control devices	N		
1.2.3	Starting	N		
1.2.4	Stopping	–	–	–
1.2.4.1	Normal stop	N		
1.2.4.2	Operational stop	N		
1.2.4.3	Emergency stop	N		
1.2.4.4	Assembly of machinery	N		
1.2.5	Selection of control or operating modes	N		
1.2.6	Failure of the power supply	N		
1.3	PROTECTION AGAINST MECHANICAL HAZARDS	–	–	–
1.3.1	Risk of loss of stability	N		
1.3.2	Risk of break-up during operation	Y	Y	
1.3.3	Risks due to falling or ejected objects	N		
1.3.4	Risks due to surfaces, edges, or angles	Y	Y	
1.3.5	Risks related to combined machinery	N		
1.3.6	Risks related to variations in operating conditions	Y	Y	
1.3.7	Risks related to moving parts	Y	Y	

(Translation)



Number Annex I	Heading	applicable	complied with	Comment
1.3.8	Choice of protection against risks arising from moving parts	–	–	–
1.3.8.1	Moving transmission parts	N		
1.3.8.2	Moving parts involved in the process	N		
1.3.9	Risks of uncontrolled movements	N		
1.4	REQUIRED CHARACTERISTICS OF GUARDS AND PROTECTIVE DEVICES	–	–	–
1.4.1	General requirements	N		
1.4.2	Special requirements for guards	–	–	–
1.4.2.1	Fixed guards	N		
1.4.2.2	Interlocking movable guards	N		
1.4.2.3	Adjustable guards restricting access	N		
1.4.3	Special requirements for protective devices	N		
1.5	RISKS DUE TO OTHER HAZARDS	–	–	–
1.5.1	Electricity supply	Y	Y	
1.5.2	Static electricity	Y	Y	
1.5.3	Energy supply other than electricity	N		
1.5.4	Errors of fitting	Y	Y	
1.5.5	Extreme temperatures	Y	Y	
1.5.6	Fire	Y	Y	
1.5.7	Explosion	N		
1.5.8	Noise	Y	Y	
1.5.9	Vibrations	N		
1.5.10	Radiation	Y	N	The integrator must take appropriate protective measures to reduce risks of exposure to X-rays and UV radiation, which can occur during material processing when using ultra-short-pulsed lasers.
1.5.11	External radiation	N		
1.5.12	Laser radiation	N		
1.5.13	Emissions of hazardous materials and substances	Y	N	The integrator must take appropriate protective measures to reduce risks of exposure to dust and fumes from laser processing.
1.5.14	Risk of being trapped in a machine	N		
1.5.15	Risk of slipping, tripping, or falling	N		
1.5.16	Lightning	N		
1.6	MAINTENANCE	–	–	–
1.6.1	Machinery maintenance	N		
1.6.2	Access to operating positions and servicing points	N		
1.6.3	Isolation of energy sources	N		
1.6.4	Operator intervention	N		
1.6.5	Cleaning of internal parts	N		
1.7	INFORMATION	–	–	–
1.7.1	Information and warnings on the machinery	Y	Y	
1.7.1.1	Information and information devices	Y	Y	
1.7.1.2	Warning devices	N		

(Translation)



Number Annex I	Heading	applicable	complied with	Comment
1.7.2	Warning of residual risks	N		
1.7.3	Marking of machinery	Y	Y	
1.7.4	Instructions	Y	Y	
1.7.4.1	General principles for the drafting of instructions	Y	Y	
1.7.4.2	Contents of the instructions	Y	Y	
1.7.4.3	Sales literature	Y	Y	
2	SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR CERTAIN CATEGORIES OF MACHINERY	—	—	Section not applicable
3	SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET HAZARDS DUE TO THE MOBILITY OF MACHINERY	—	—	Section not applicable
4	SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET HAZARDS DUE TO LIFTING OPERATIONS	—	—	Section not applicable
5	SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR MACHINERY INTENDED FOR UNDERGROUND WORK	—	—	Section not applicable
6	SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR MACHINERY PRESENTING PARTICULAR HAZARDS DUE TO THE LIFTING OF PERSONS	—	—	Section not applicable



Novanta Corporation

125 Middlesex Turnpike
Bedford, MA 01730, USA

Email: Photonics@Novanta.com

Website: www.NovantaPhotonics.com

VERSIA 2-Axis Scan Head

Technical Manual

1040-0019 Rev. 02

© 2023, Novanta Corporation. All rights reserved.