Koheras HARMONIK

Low Noise Single Frequency 2nd Harmonic Laser System

PRODUCT GUIDE

Item 800-604-01

PRODUCT GUIDE
This guide includes the following NKT Photonics products:

Koheras HARMONIK

Low Noise Single Frequency 2nd Harmonic Laser System

GUIDE OVERVIEW

This product guide is intended to provide functional, operational and installation information for the Koheras HARMONIK laser systems. The guide is divided into three sections:

- **Koheras HARMONIK Description** - introduces the Koheras HARMONIK system, its functionality, interfaces and variants.
- **Installation** – includes the details on how to install the system and connect optional interfaces.
- **Operations** – – provides information and procedures on how to connect, configure and manage the system.

The Koheras HARMONIK system consists of three modules. This guide provides details for the harmonic generator module. For details on operating the seed and amplifier lasers, refer to the following documents:

Koheras ADJUSTIK Product Guide

Koheras BOOSTIK HPA Product Guide

Warning: Do not operate the laser before first reading and understanding all warnings, cautions and handling information stated within the document:

Koheras HARMONIK Safety, Handling and Regulatory Information

Note: The paper copy of this document is included with your laser; however, it can also be downloaded from:

https://www.nktphotonics.com/lasers-fibers/support/product-manuals/

Target audience

This guide is for technical personnel involved in the selection, planning and deployment of lasers in laboratory and industrial settings. The guide assumes a reasonable knowledge level of lasers, photonic principles and electrical interface connectivity.

Chapters inside

This guide includes the following chapters:

- Chapter I "HARMONIK System Description" — Describes the laser system including its general operational principles, management and interfaces.
- Chapter 2 "Installation" — Contains information on installing and connecting the Koheras HARMONIK.
- Chapter 3 "Operations" — Provides information on turning on, connecting, configuring and operating the Koheras HARMONIK.

- Appendices — The appendices contain system specifications and service and support information.

Added information and safety notices

Lasers are highly dangerous devices that can cause serious injury and property damage. This guide use the following symbols to either highlight important safety information or provide further information in relation to a specific topic.

Note: Highlights additional information related to the associated topic and/or provides links or the name of the NKT guides describing the additional information.

Caution: Alerts you to a potential hazard that could cause loss of data, or damage the system or equipment.

Warning: The laser safety warning alerts you to potential serious injury that may be caused when using the laser.

Revision

The section records the document revision details.

February 2020 – First release. Note that this document has been rewritten from an earlier draft release.

September 2020 – Corrected some procedures orders and text through out.

December 2020 – Released revision 2.0 to reflect design change implementing a built-in controller within the HARMONIK.

January/February 2021 – Updated support contact details in Appendix B. Minor corrections and updated figure 10.

CONTENTS

TABLES

FIGURES

PROCEDURES

1 HARMONIK System Description

The HARMONIK system is a high-power frequency doubled laser system. The system is modular and consists of the following modules:

- HARMONIK module – the module houses the HARMONIK's optical components for frequency doubling the source laser beam. Specifically, this is a photonic crystal operating at 50-65° C (for 775 fiber) that ensures high-power delivery. The module also includes an electronic interface for control of the module from a PC.
- Koheras ADJUSTIK – laser seed source. The emission from the ADJUSTIK is delivered to the BOOSTIK HPA.
- Koheras BOOSTIK HPA – Amplifies the seed laser to provide up to 15 W of power from the optical module in a standard system. Higher custom power levels are available on request.

Note: All modules are specifically aligned at the factory and cannot be replaced without NKTP support.

This guide describes the Koheras HARMONIK module in detail. For details of the system's seed and amplifier laser modules, refer to the following NKTP guides:

Koheras ADJUSTIK Product Guide

Koheras BOOSTIK HPA Product Guide

Models

The Koheras HARMONIK system models are listed in Table 1. The two systems are defined in the table by their advantages and particular optical specifications.

Table 1 HARMONIK system models

Model	Advantage	Specification
C7	Low Relative Intensity Noise (RIN)	RIN: -140 dBc/Hz @ 10 MHz
E7	Narrow line width and low phase noise	Line width: < 0.2 kHz Phase noise:-87 dB(rad/√Hz/m) at 10 Hz.

Installation

The HARMONIK module is designed to be placed on a table or shelf installation. The Koheras ADJUSTIK and BOOSTIK HPA modules can be either racked mounted in a standard 19 inch rack or directly placed on a flat surface such as table or shelf.

Optical

Output power and wavelengths

Table 2 lists standard wavelength and power specifications. Contact NKT Photonics to discuss your requirements and options available.

Table 2 Optical interface parameters @ 20 W BOOSTIK HP output power

Parameter	C7	E7
Center wavelengths (nm)	766-780 and 1533-1560	766-780 and 1533-1560
SHG output power (W)	>4[i] or >7[ii]	>4[i] or >7[ii]
Fundamental power (W)	>4[i] or >7[ii]	>4[i] or >7[ii]

i. @ 1533-1560 nm
ii. @ 766-780 nm

Note: For all other HARMONIK specifications refer to the product datasheet.

Emission beam quality

The beam quality, M2 is less than 1.1 and is suitable for advanced quantum physics projects such as quantum sensing and laser cooling and trapping. Contact NKT Photonics to discuss the applications that are possible.

Free-space or fiber output

By default, the HARMONIK systems are equipped with free-space output apertures. If a fiber coupling is required, an efficient coupling using NKTP's unique polarization-maintaining single mode fiber can be included.

Laser classification

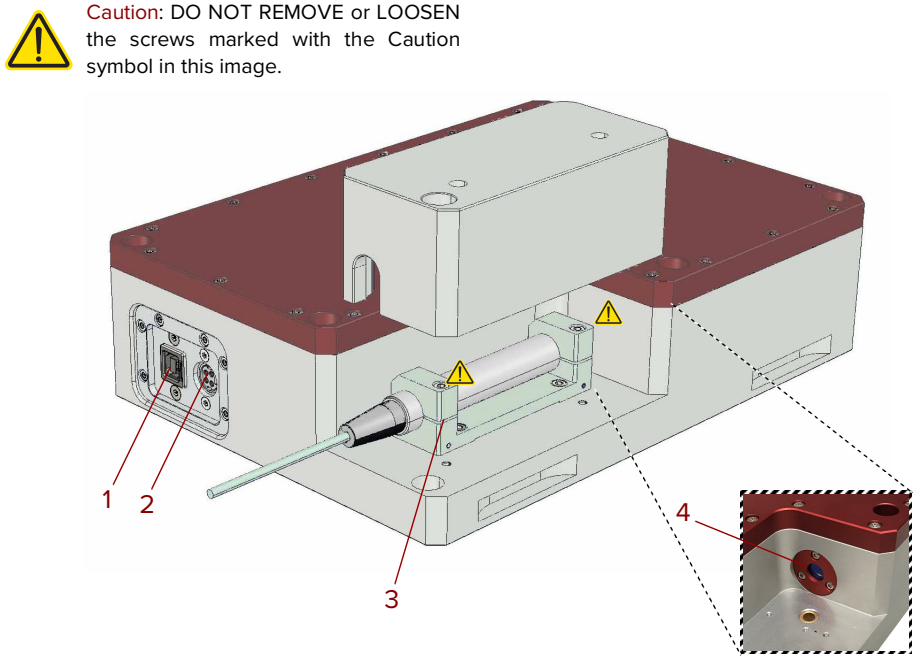
The optical output is classified as a CLASS 4 laser emission.

HARMONIK module

Front panel

The HARMONIK module front panel houses the electrical interfaces and an optical input assembly in a cut-out along the front and right side panel as shown in Figure 1.

Figure 1 Optical module front panel



1	Management USB port	3	Collimator assembly (cover off)
2	12 VDC input	4	Optical input aperture

Management port

The HARMONIK module is managed directly from a PC connected to this USB type B port, see - "Management connection" on page 17.

12 VDC input

Connect this Kycon KPP-4P port to the included AC mains to 12 VDC power adapter.

Collimator assembly and cover

The assembly consists of a collimator and a holder with alignment pins that insert into the Optical module chassis for correct alignment. The assembly is aligned at the factory so that the collimator output is aligned with the input aperture of the optical module.

Caution: Under no circumstances should the collimator assembly be disassembled by unscrewing the collimator clamp screws.

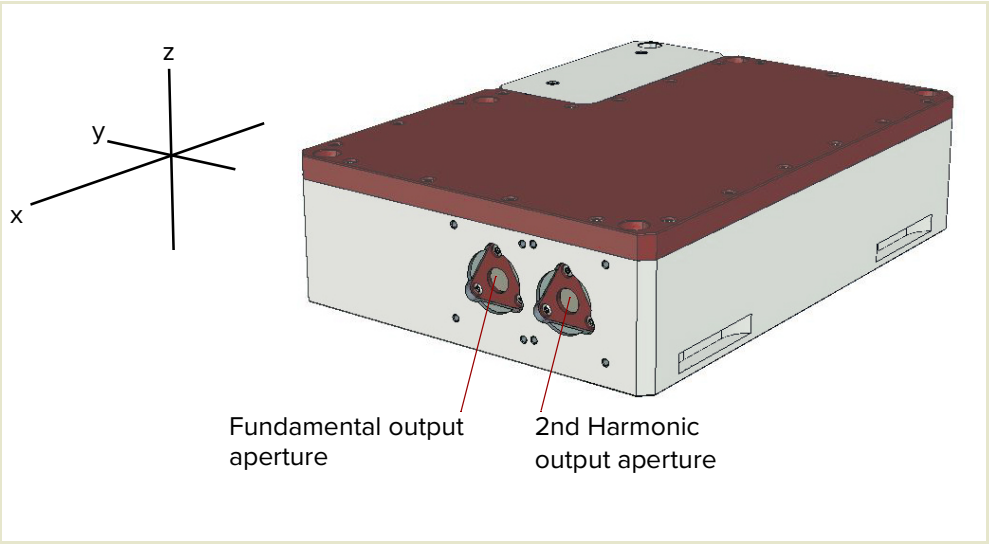
Optical input aperture

The emission from the BOOSTIK HPA is coupled through the collimator assembly to the optical input aperture from the factory aligned collimator assembly.

Rear panel

The rear panel houses two free-space output apertures.

Figure 2 Optical module rear panel



Fundamental output aperture

This free-space aperture emits the residual fundamental beam with vertical polarization (z-axis in Figure 2).

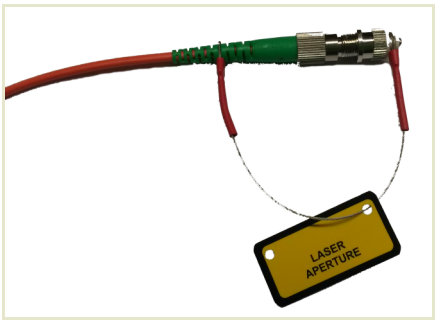
Second harmonic output aperture

This free-space aperture emits the second harmonic beam with vertical polarization (z-axis in Figure 2).

Optional fiber coupling

Pigtail fiber coupling are available as an option and can be fitted to one or both of the laser output apertures. The polarization axis for a fiber connector output is parallel to the fiber coupler alignment key.

Figure 3 Optical module rear panel



Miscellaneous

Safety

Warning: The Koheras HARMONIK system emission is rated as Class 4 laser and is therefore hazardous. Before turning on the laser, ensure to read and understand all safety statements of the document:

Koheras HARMONIK Safety, Handling and Regulatory Information

A paper copy of this document is included with your laser. If you do not have access it, you can download a copy from:

https://www.nktphotonics.com/lasers-fibers/support/product-manuals/

CONTROL and CONFIGURATION

Management software

The HARMONIK module is managed using client software executable from a PC connected over USB to the HARMONIK module. The client can be used to:

- Configure the temperature setpoint of the second harmonic conversion crystal oven.
- Auto-configure the temperature setpoint where the optimum efficiency of the second harmonic conversion is obtained.
- Configure the SHG wavelengths corresponding to a second harmonic crystal oven temperature.
- Monitor the input optical power (pump) and the 2nd harmonic output power (SHG).
- Upgrade the HARMONIK firmware.

For information regarding the client software and using it see "Operations" on page 27.

Note: The seed and amplifier lasers are controlled using NKT Photonics CONTROL Graphical User Interface (GUI) software client installed on a PC or the front panel interface. For managing these modules of the system, refer to their respective product guides:

Koheras ADJUSTIK Product Guide

Koheras BOOSTIK HPA Product Guide

Note: DO NOT OPERATE the laser system until you are familiar with the controls and have taken all precautions necessary for your region and as described in the document: *Koheras HARMONIK Safety, Handling and Regulatory Information*.

Management connection

The HARMONIK module connects to a PC over a USB2 serial connection using a a standard Type A to B USB cable.

Note: The maximum cable length is typically limited to 2 meters maximum

Chassis labels

A Koheras HARMONIK chassis has a number of labels on it that indicate hazards, regulatory, or manufacturing information. The labels are described in Table 3 with the label placements shown in Figure 4.

Table 3 Module labels

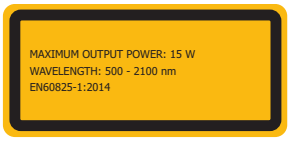
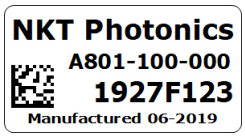
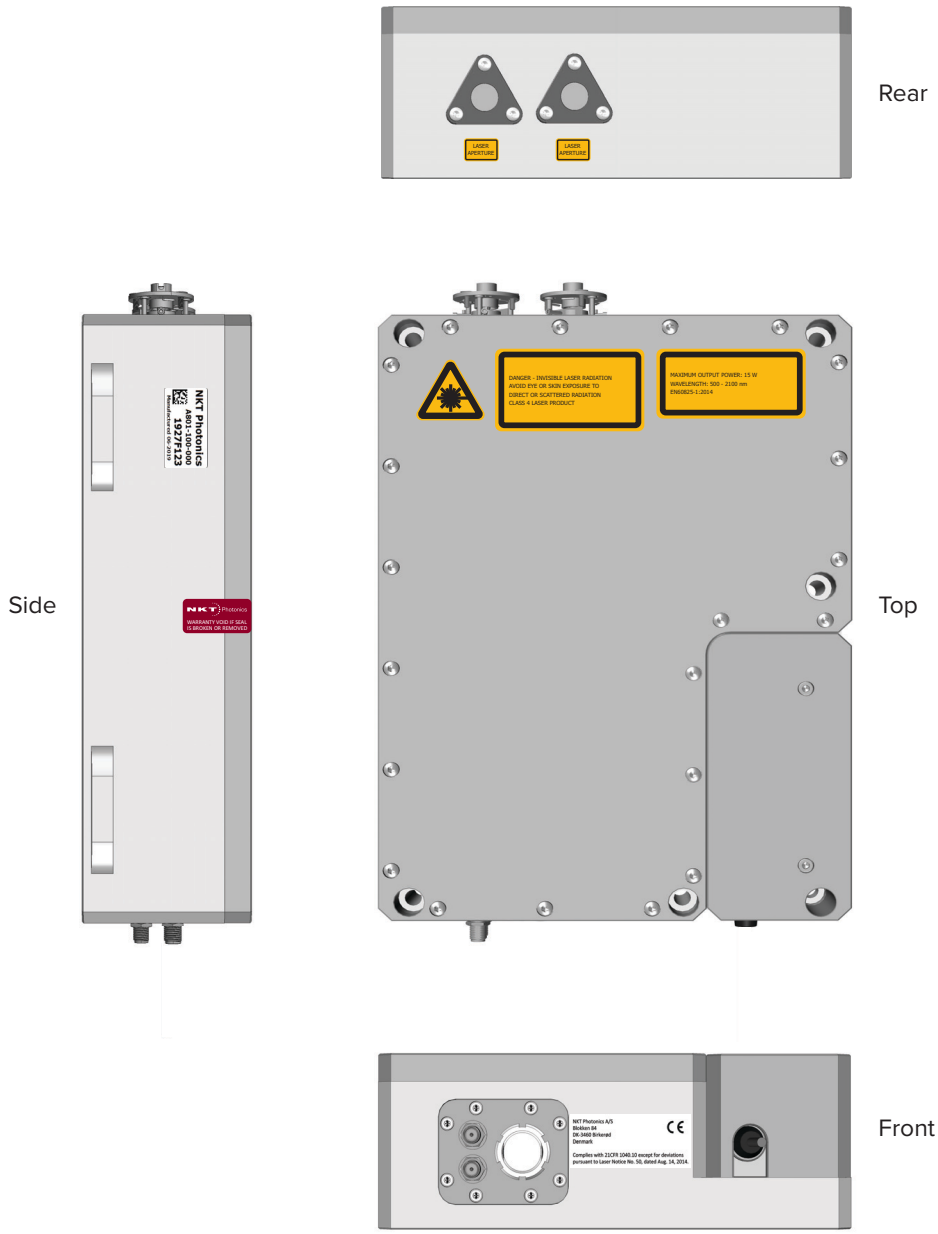
Label	Panel	Description	
Classification - Emission Hazards	Top	Safety information stating the laser emission hazards and the laser's class rating.	
Product Information	Top	Safety label showing the emission specifications of the laser.	
Manufacturing	Side	Manufacturing information including address, part and serial number, date manufactured and regulatory compliance.	
Laser Radiation Warning	Top	Safety information alert indicating this area of the laser is near a source of dangerous laser emissions.	
Warranty Seal	Side	Safety information alert indicating the location of the aperture where laser radiation is emitted from the laser. If the module includes a monitor output, this is a class 1 laser output and does not require a a label.	
Laser Aperture	Rear	Safety information alert indicating the location of the aperture where laser radiation is emitted from the laser. If the module includes a monitor output, this is a class 1 laser output and does not require a a label.	

Figure 4 Label locations



2 Installation

General

Install the system modules on a level surface that is free from vibrations. The ambient temperature surrounding any of the optical modules should be stable and free from any sources that could cause temperature fluctuations. Temperature changes and vibrations may affect the laser system's operation and result in abnormal operation.

Warning: Align the fundamental and second harmonic laser apertures with an appropriate beam dump and ensure the beam path is safely contained and known to prevent damage and accidental exposure to personnel. All nearby personnel must wear suitable clothing and be aware of the laser operations and the danger involved. Ensure that a door interlock is used for any access to the contained operating area. For further safety recommendations, READ the NKTP document:

Koheras HARMONIKs Laser Safety, Handling and Regulatory Information

Requirements

Ambient Conditions:

- Allowable operating system temperature range: +15° C to +30 °C
- Protection from dust (Pollution degree 2, Office environment)
- Allowable relative humidity: 0 to 70% (non-condensing)

Room requirements

The HARMONIK module is classified as a Class 4 laser product. As such, NKT Photonics recommends that the system is installed and operated according to the requirements in:

- CFR21 1040.10 & Laser Notice LN50
- IEC / EN 60825-1

Note: Installation and operational requirements defined by regional regulations prevail.

Warning: At all times during system operation, ensure that the beam paths are known and controlled. Wear suitable protection and make sure everybody in the laser area is aware of the fact that the system is being operated.

Electrical supply requirements

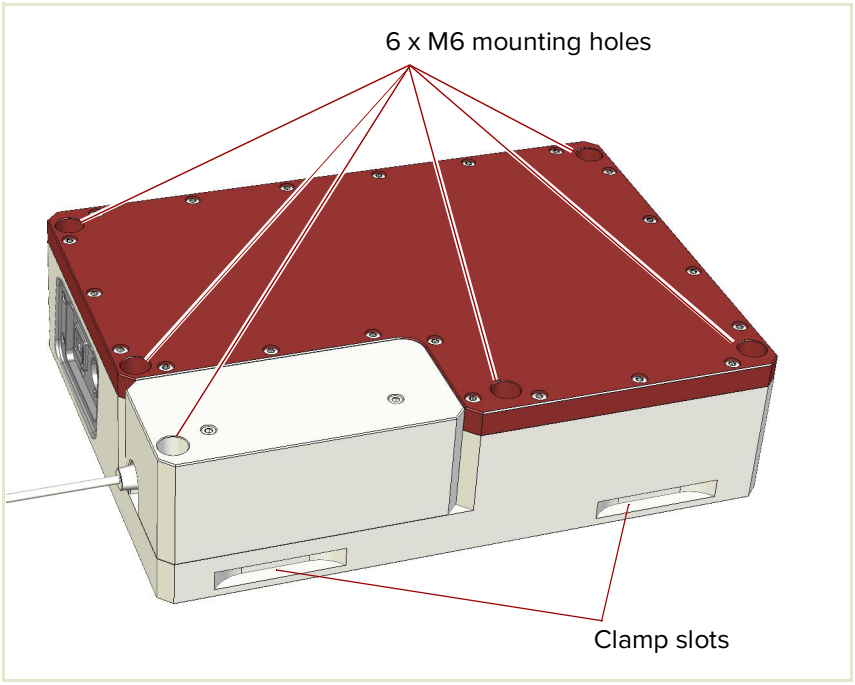
The supply voltage for the power adapter is 100-240 VAC, @ 100 W maximum.

Installing the system

The HARMONIK module is designed to be fastened on an optical table with M6 holes spaced apart by 25 mm. Alternatively, the module can be clamped to any table using the four clamp slots available on the left and right panels. Appendix 4 lists the recommended requirements for the installation.

Table 4 list all requirements for the optical module installation. NKTP recommends to adhere to these requirements. Doing otherwise may result in improper operation of the system.

Figure 6 Optical module rear panel



Caution: Before fastening the optical module to a table top, ensure the area beneath module is clean and free from debris or any corrosive chemicals.

Note: To maintain adequate heat dissipation, it is recommended to use a metallic installation surface for heat conduction.

Table 4 Optical module installation requirements

Requirement	Specification	Instruction
Surface type	Heat and electrically conductive	NKTP recommends to install the optical module on an electrically grounded surface.
Surface flatness	As flat as possible	The installation surface should be as flat as possible to avoid twisting of the module.
Surface finish	None	NKTP recommends to install the laser on a smooth surface free from irregularities. When installing the module, handle it with due care.
Mounting Screws	5 X M6 X 50 mm ISO4762 Stainless-steel 1 X M6 X 20 mm ISO4762 Stainless-steel (under the collimator cover) NOTE: This screw size gives a penetration depth of ~ 7 mm. Select a screw length according to the installation surface.	The optical module can be fastened to a supporting surface using the module's six mounting holes with the specified mounting screws. To MINIMIZE TORSION ON THE MODULE, alternate tightening the screws using a crisscross pattern while progressively increasing the torque: **NOTE**: The module can be alternatively clamped to a table using the two clamp slots on the left and right panels.

Installing the seed and amplifier modules

Refer to the NKT Photonics documents:

Koheras ADJUSTIK Product Guide

Koheras BOOSTIK HPA Product Guide

Caution: The amplifier is equipped with an output assembly consisting of a fiber and collimator. Although the fiber has a minimum bend radius of 10 cm, the best practice is to keep the fiber as straight as possible.

Connecting the system

Procedure 1: **Connecting the system**

1. Install the HARMONIK module according to the requirements of section: "Installing the system" on page 22.
2. Connect the main optical output from the ADJUSTIK to the optical input of the BOOSTIK HPA.
3. Connect the HARMONIK fiber and collimator assembly to the optical output of the BOOSTIK HPA.

4. Align the collimator assembly output with a power meter and adjust the output from the ADJUSTIK laser and BOOSTIK HPA amplifier as necessary.

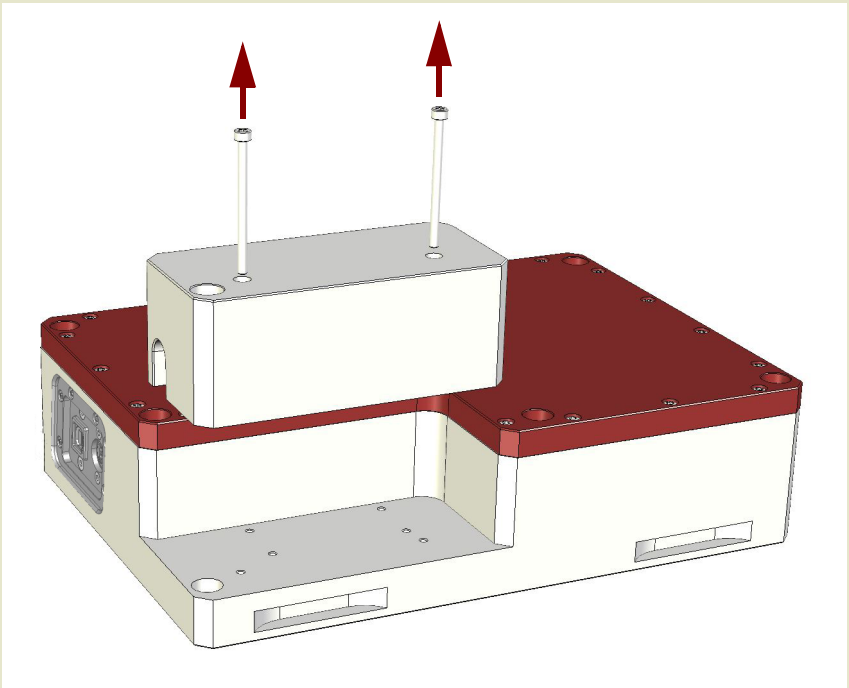
Note: For information on Koheras ADJUSTIK and BOOSTIK HPA operations, refer to the NKT Photonics documents:

Koheras ADJUSTIK Product Guide

Koheras BOOSTIK HPA Product Guide

5. Remove the cover as illustrated in Figure 7 to allow access for installing the collimator assembly.

Figure 7 Removing the optical input cover

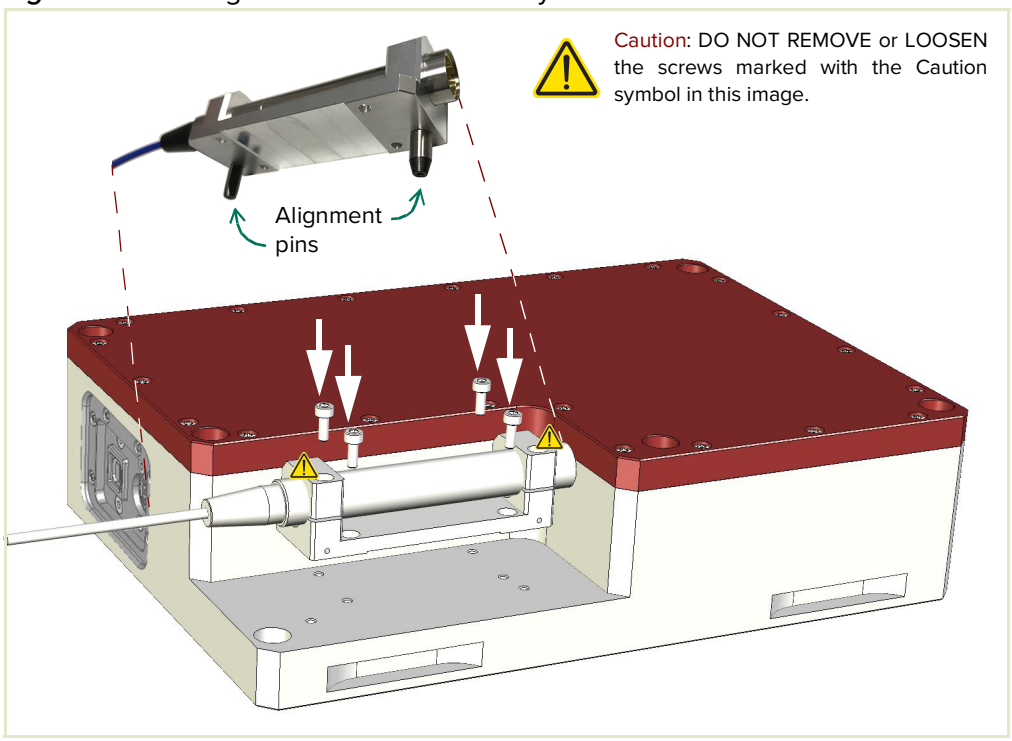


6. Mount the collimator assembly to the optics head by inserting its alignment pins into the baseplate holes, see Figure 8. The lateral positioning of the collimator is defined by the two alignment pins.

Caution: Before tightening the screws, ensure that the collimator socket sits firmly onto the baseplate without any gap.

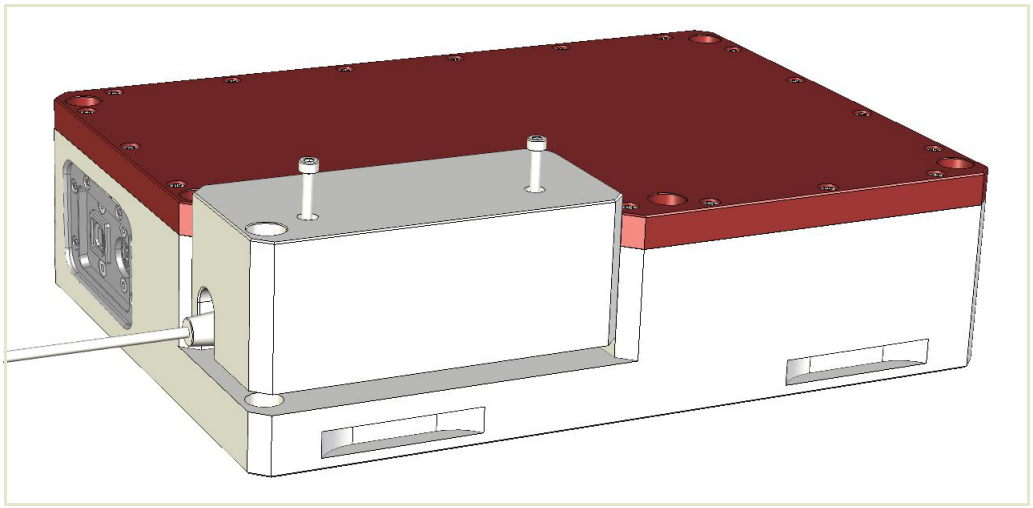
7. When the collimator assembly is positioned correctly, fasten it to the baseplate of the module using the included 4 screws as shown in Figure 8.

Figure 8 Installing the collimator assembly



8. Replace and fasten the cover over the collimator assembly.

Figure 9 Replacing the optical input cover



9. Connect the included power supply to the “Supply” connector on the rear of the HARMONIK module and then plug it into AC mains.

10. Using a USB cable, connect the HARMONIK module to a local PC.

11. See “Operations” on page 27 for information on how to manage and operate the HARMONIK module.

3 Operations

Safety

Before you connect power to the Koheras HARMONIK system, ensure that you are completely familiar with and follow all safety information and recommendations stated within this document and the document:

Koheras HARMONIK Safety, Handling and Regulatory Information

You must follow all safety regulations required at the location where the system will be operated.

Warning: Enabling emission of the system lasers will emit hazardous laser Class 4 radiation. Before using the system, ensure to observe and implement all safety regulations, warnings and cautions found in the *Safety, Handling and Regulatory Information* documents available and included with each component of the system.

Warning: The Koheras HARMONIK does not have a power ON switch. Optical output is emitted from the HARMONIK module when the fundamental laser input is active.

Damage prevention

Warning: Ensure any fiber connector faces (tip) are clean. Optical power transmitted through a dirty connector face may burn particles and damage the connector. See "Patch cable connector cleaning" on page 34.

Note: When connecting the output fiber patch cord, ensure to match it with an appropriate fiber type.

Caution: Do not enable emission from the laser system components if they have been exposed to temperature and humidity beyond the operating specifications. The lasers are designed to operate in a non-condensing environment from +15° C to +30° C. Before turning on the system components, allow them at least 30 minutes to stabilized at the operating room temperature. A laser system component that is too cold or hot may lead to damage.

General

Stability The Koheras HARMONIK should remain electrically powered ON to obtain best stability (i.e. crystal operating temperature), even if the fundamental laser is switched off.

Warning: The Optical module does not have a separate optical switch or shutter and provides a laser output as soon as the fundamental laser input is active.

Temperature Optimization

If the wavelength or power of the fundamental input is altered, using the client software controls, it may be necessary to optimize the temperature setpoint to achieve the maximum second harmonic output – see "Optimizing the SHG output - using temperature control" on page 31.

Client software

The client software is included on a USB stick included with the HARMONIK system. To install and execute the client, do the following:

1. Insert the included USB stick in your PC.
2. Copy the folder: ***Control Software*** from the USB stick to your PC.
3. Ensure the 12 VDC power adapter is connected to the HARMONIK and AC mains.
4. Open the ***Control Software*** folder on your PC and double click the executable file: **Koheras Harmonik 1.3.exe**

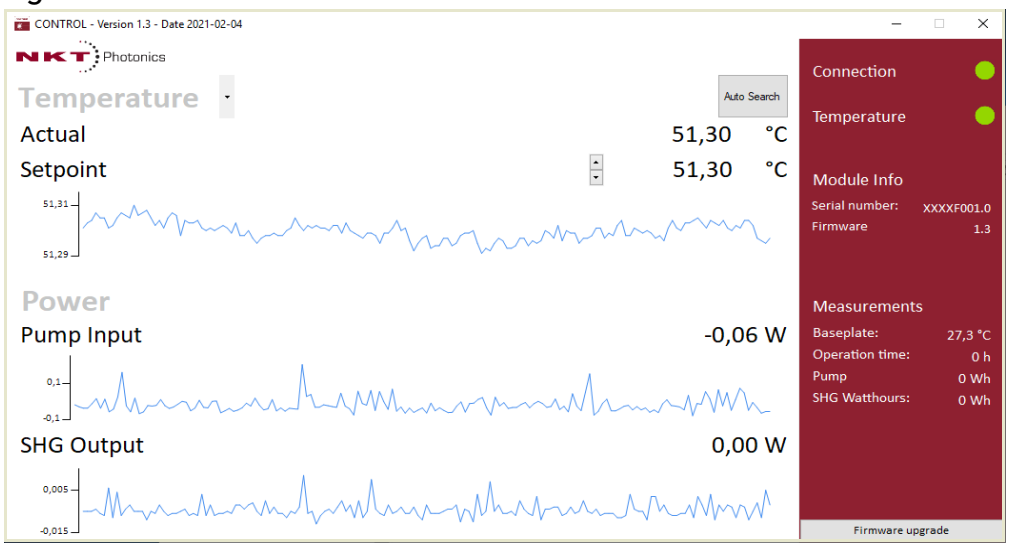
Note: You can also download the Koheras HARMONIK Control Software from the NKT Photonics website, click or copy the link below into a browser:

https://www.nktphotonics.com/lasers-fibers/support/software-drivers/

Management window

When the client starts, a management window appears as shown in Figure 10.

Figure 10 Client – main window



The window includes the following:

Temperature/ Wavelength operating mode

Click the down arrow at the upper left of the window and from the drop down list select either *Temperature* or *Wavelength* operating mode:

- *Temperature*: The crystal actual and setpoint temperatures are shown along with a graph of the crystal temperature.
- *Wavelength*: The crystal set output wavelength and actual output wavelength are displayed along with a graph of the actual crystal output wavelength.

Autosearch

Click the *Autosearch* button to automatically set the oven temperature that achieves the optimum crystal conversion efficiency of second harmonic power.

Actual

Displays either the actual crystal temperature or output wavelength depending on the display mode selected by the "Temperature/Wavelength operating mode" drop down.

Setpoint

Text input or up/down arrow controls for the target crystal temperature or output wavelength. When the temperature or wavelength target is set with this control, the HARMONIK automatically adjusts the oven temperature to achieve the setting.

Note: When a new setpoint is set or *Autosearch* is click, the system automatically adjusts the oven to achieve the setting. Before reaching the setting, the system temperature oscillates up and down around the setpoint before it settles on the requested configuration.

Power

Under *Power* are two graphs that indicate emission power levels at the HARMONIK module.

Pump power

This graph shows the power level in Watts of the fundamental input emission.

SHG power

This graph shows the power level in Watts of the second harmonic output emission.

Status panel

The status panel is located on the right side of the client window with a red background. It displays indicators, readings and system information for the HARMONIK module. It also includes a firmware upgrade button at the bottom of the panel.

Connection

Indicates an established connection with the management client software.

- Green - management client software is connected to the HARMONIK.

- Red - management client software is disconnected from the HARMONIK.

Note: If the management software is disconnected, check either the USB cable to the PC or the DC power adapter connection to the HARMONIK.

Temperature

This indicator shows when the SHG crystal has reached and stabilized at a set operating temperature.

- Green - SHG crystal set temperature has been reached and has stabilized.
- Red - SHG crystal set temperature has not been reached.

Module Info

This section shows the following:

- Serial number of the HARMONIK module
- Installed firmware version

Measurements

This section shows the following

- Baseplate – Measured baseplate temperature, degrees C
- Operation time – The accumulated operation time in hours. Operation means that input pump power is detected, h - hours.
- Pump Watthours – The accumulated amount of pump Watt hours are displayed, for example, 100 hours of operation at 2 W is equivalent to 200 Wh, Wh - Watt hours.
- SHG Watthours – The accumulated amount of SHG Watt hours are displayed, for example, 100 hours of operation at 2 W is equivalent to 200 Wh, Wh - Watt hours.

Upgrade button

To upgrade the HARMONIK firmware, click the *Firmware Upgrade* button and then click on the browse button to select a new firmware file. Click *Open* and wait for the upgrade to complete and the system to reboot.

Using the system

Initial use Follow Procedure 2 when starting up the Koheras HARMONIK system for the first time:

Procedure 2: **Initial use**

1. Set the fundamental input power from the BOOSTIK HPA amplifier to a low value i.e. P < 1 W – see document:

   Koheras BOOSTIK HPA Product Guide

2. Check if the beam profile as well as beam position of the generated second harmonic output are as expected.

3. ONLY increase the fundamental input power from the BOOSTIK HPA, if the beam profile and position are both satisfactory and safe.

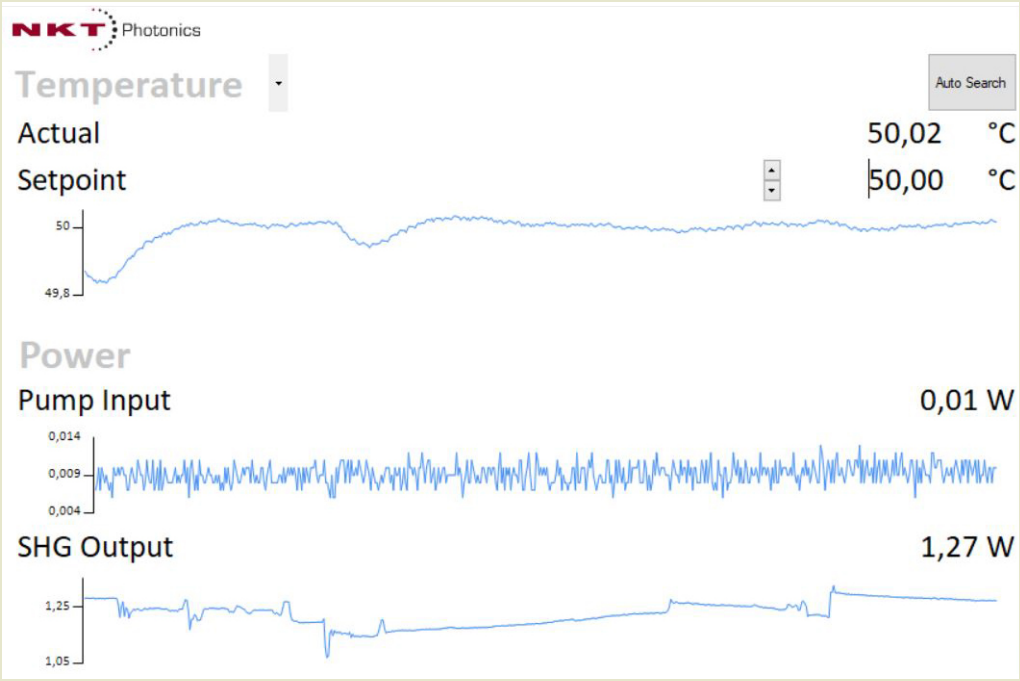
Optimizing the SHG output - using temperature control

The optical components of the Koheras HARMONIK includes an oven-controlled crystal which generates the second harmonic emission. After the system is warmed up, the temperature setpoint of the oven can be adjusted to optimize the HARMONIK conversion output.

The configuration is performed using the client temperature setpoint as shown in Figure 11. Typical temperature settings range from either:

- 90 to 105 °C for 767 nm
- 50-65° C for 775 nm
- 125-135° C for 780 nm

Figure 11 Management client – *Temperature* control



Autosearch button – automatically adjusts the oven temperature to the optimum.

Actual – Crystal oven measured temperature

Setpoint – Crystal oven set point temperature - adjustable (numeric input or arrow keys)

Pump Input – Fundamental input emission measured power level

SHG Output – Second harmonic emission output level

Warning: Depending on temperature setpoint optimization, nearly the entire fundamental input power is transferred to the fundamental laser output.

Procedure 3: **Optimize second harmonic emission level using temperature**

1. Turn ON the system, enable emission and wait for the HARMONIK crystal to warm-up until the temperature in the *Actual* field stabilizes – approximately 5 minutes.
2. Ensure the power level in the *Pump Input* field is at the desired value. If not, make the necessary changes on either the seed or amplifier lasers of the system or the connecting emission path.
3. Note the *SHG Output* value.
4. Adjust the *Setpoint* field either up or down and wait for the *Actual* field to reach the new temperature setting.

Note: To adjust the *Setpoint* temperature, you can either input the temperature directly in the text field or use the up and down arrow keys ( ) to the left of the text field.

5. Observe the *SHG Output* value.
   a. If the *SHG Output* decreases- adjust the *Setpoint* field in the opposite direction.
   b. If the *SHG Output* increases – adjust the *Setpoint* field in the same direction.
6. To reach the optimum setting, continue adjusting the *Setpoint* field incrementally increasing power up to the point just before the power decreases again.

Note: Typically increase and decrease the *Setpoint* temperature in set sizes of either 0.01 - 0.1 ° C; particularly when you are near the optimum conversion setting.

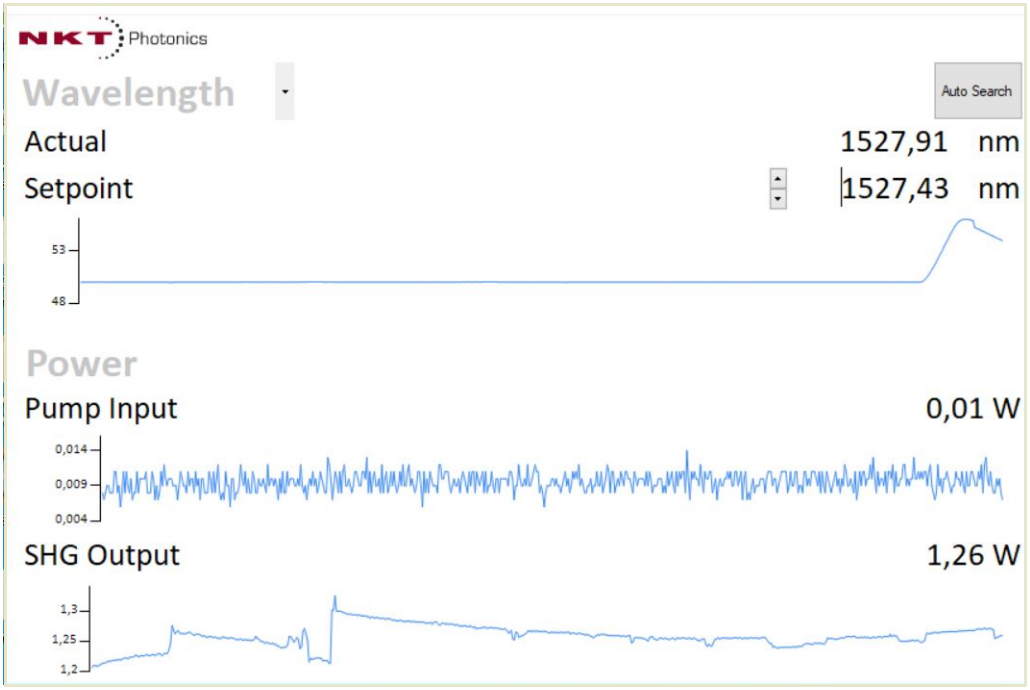
Optimizing the SHG output - using wavelength control

Instead of optimizing using a temperature setpoint, you can set a wavelength setpoint. After the system is warmed up, a wavelength setpoint can be set which corresponds to a calibrated oven temperature when adjusting for the optimum HARMONIK conversion output.

Figure 12 shows the management window when optimizing the wavelength setpoint. Upon initial startup, set the wavelength to match the fundamental input wavelength. To optimize the output click the manual step buttons ( ) or *Auto search* button. Stepping up or down the wavelength slightly corresponds to a change in the crystal oven temperature. Typically step sizes are approximately:

- 0.01°C ~ 0.0015nm step
- 0.1°C ~ 0.015nm step

Figure 12 Management client – *Wavelength* control



Autosearch button – automatically adjusts the oven temperature to the optimum.

Actual – actual measured wavelength

Setpoint – configured wavelength

Pump Input – Fundamental input emission measured power level

SHG Output – Second harmonic emission output level

Warning: Depending on wavelength setpoint optimization, nearly the entire fundamental input power is transferred to the fundamental laser output.

Procedure 4: **Optimize second harmonic emission level using wavelength**

1. Turn ON the system, enable emission and wait for the HARMONIK crystal to warm-up until the wavelength in the *Actual* field stabilizes – approximately 5 minutes.

2. Ensure the wavelength setpoint corresponds to the fundamental input wavelength.

3. Ensure the power level in the *Pump Input* field is at the desired value. If not, make the necessary changes on either the seed or amplifier lasers of the system or the connecting emission path.

4. Note the *SHG Output* value.

5. Adjust the *Setpoint* field either up or down and wait for the *Actual* field to reach the new wavelength setting.

Note: To adjust the *Setpoint* wavelength, you can either input the wavelength directly in the text field or use the up and down arrow keys ( ) to the left of the text field.

6. Observe the *SHG Output* value.

a. If the *SHG Output* decreases- adjust the *Setpoint* field in the opposite direction.

b. If the *SHG Output* increases – adjust the *Setpoint* field in the same direction.

7. To reach the optimum setting, continue adjusting the *Setpoint* field incrementally increasing power up to the point just before the power decreases again.

Note: Typically increase and decrease the *Setpoint* wavelength in set sizes from 0.002 to 0.02 nm; particularly when you are near the optimum conversion setting. degrees Celsius to wavelength equivalents are approximately 0.01°C ~ 0.0015nm or 0.1°C ~ 0.015nm.

Auto temperature button

Clicking this button, automatically optimizes the oven temperature to obtain the best frequency conversion output. The function automatically adjusts the temperature in +/- 5° C increments until the optimum second harmonic power is achieved.

Fiber procedures

Fiber coupling option

If one or both of the laser outputs are fiber coupled, make sure that the coupling efficiency is optimum before increasing the fundamental input power. Use a “beam walking” procedure to obtain the maximum coupling efficiency with the fiber couplers that can be ordered with the HARMONIK.

Note: For high-power fiber coupling solutions, contact NKTP Photonics for further information.

Patch cable connector cleaning

Due to the high power transmitted through the single mode fiber surface of the optical connector(s), it is important to keep all connector faces extremely clean. This is particularly important for amplified systems, where the power level is high.

A Specifications

Table 5 Mechanical dimensions

All chassis models	
Size (H x W x D)	48.5 x 483 x 386 mm (1.91 x 19.02 x 15.20 in)
Weight	< 7 kg (< 15.4 lb)

Table 6 Operating and storage environment

All Chassis Models	
Operating Temperature	15° C to +30° C (59° F to 86° F)
Storage Temperature	-20° C to +50° C (-4° F to 122° F)
Operating Humidity (non-condensing)	0 to 70%

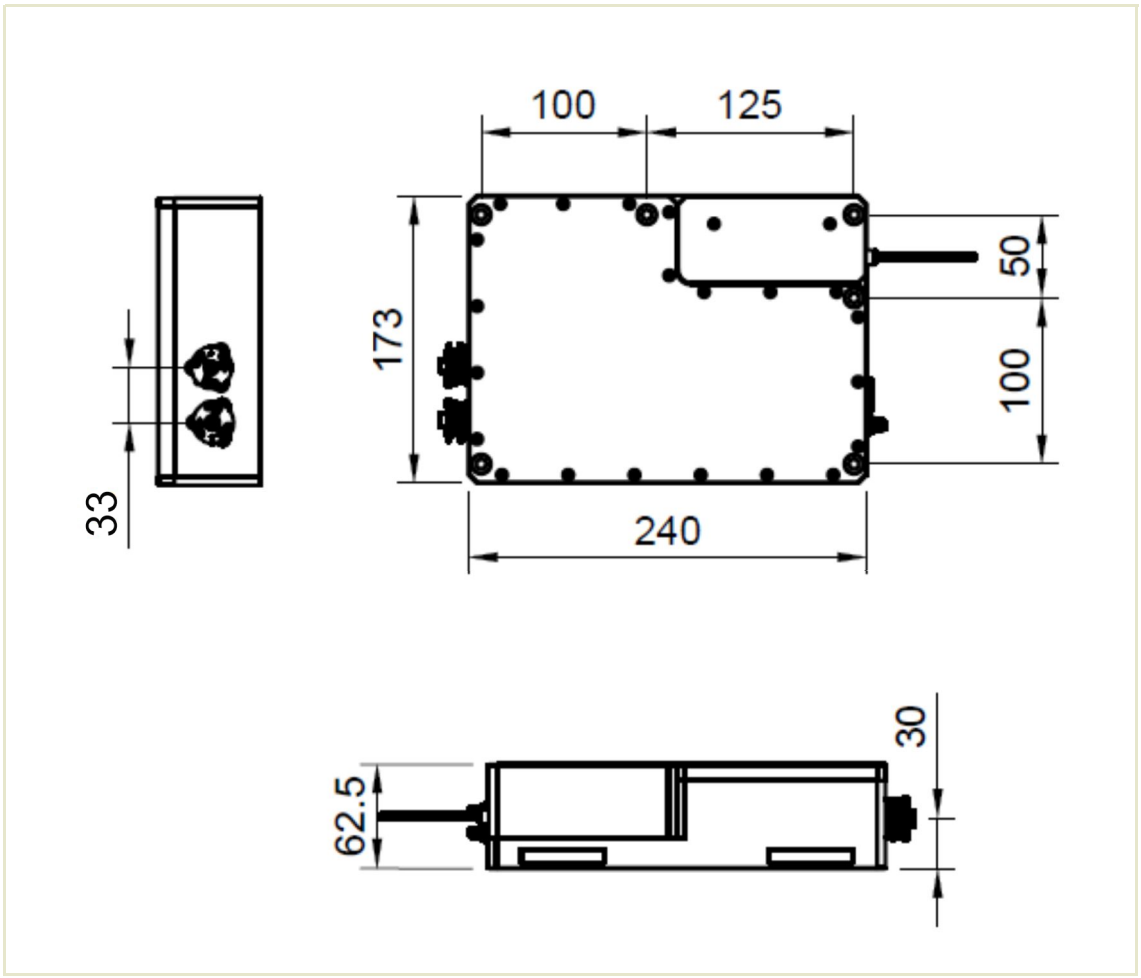
Table 7 Electrical

All Chassis Models	
Supply Voltage	100 – 240 VAC@ 50-60 Hz

Table 8 Safety and regulatory compliances

Safety	**Regulatory**
EN 60825-1:2014: Safety of laser products Part 1: Equipment classification and requirements **[Laser Class 4]** EN 61010-1:2010:Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements	EN 61326-1:2013: Electrical equipment for measurement, control and laboratory use EMC requirements – Part 1: General requirements 2004/108/EC Electromagnetic Compatibility 2011/65/EC Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS)

Table 9 Mechanical dimensions



B Service and support Information

Servicing the laser

The laser have no user serviceable components. In case of malfunction, contact NKT Photonics using the support channels in section "Support contact details".

"WARRANTY..." Label

Caution: The unit is sealed with a label "WARRANTY VOID IF SEAL IS BROKEN OR REMOVED". It is strictly prohibited to remove the chassis cover. Opening the Harmonic module chassis or any component of the system will void the warranty. Therefore should any component of the system malfunction, contact NKT Photonics A/S.

Figure 13 Warranty seal

Caution: The HARMONIK chassis' contain electro-static discharge (ESD) sensitive components. To avoid permanent ESD damage, use ESD protection when handling the laser. Always connect component earth points to a ground earth within your facility.

Opening the modules

There are no user serviceable components inside the modules. Should your laser malfunction, and it cannot be serviced on site, it must be shipped to the NKT Photonics office in Birkerød, Denmark.

Support contact details

If you need help or have questions regarding your Koheras HARMONIK laser or its accessories, contact NKT Photonics through our support website below:

Support website

1. Go to:

   https://www.nktphotonics.com/lasers-fibers/support/technical-support-and-customer-service/

2. Scroll down and click or press:

3. Select the type of help required, fill in the form, and click or press *Submit*.

Shipping address

NKT Photonics A/S
Blokken 84
DK-3460 Birkerød
Denmark