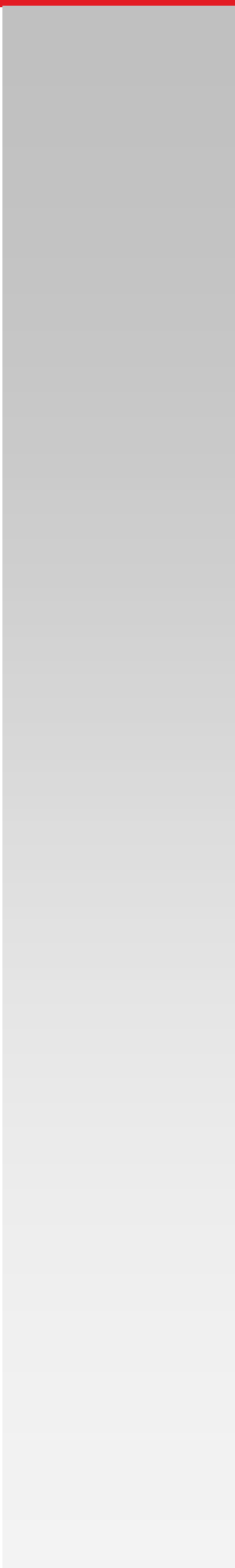




OCTH SERIES

**OCT Handheld Scanner,
Lens Kit, and
Sample Z-Spacer**

User Manual



Original User Manual – not translated

















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Chapter 1 Warning Symbol Definitions

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Description
	Direct Current
	Alternating Current
	Both Direct and Alternating Current
	Earth Ground Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	On (Supply)
	Off (Supply)
	In Position of a Bi-Stable Push Control
	Out Position of a Bi-Stable Push Control
	Caution: Risk of Electric Shock
	Caution: Hot Surface
	Caution: Risk of Danger
	Warning: Laser Radiation
	Caution: Spinning Blades May Cause Harm

Chapter 2 Introduction

2.1. Safety

Please read this manual carefully before operating the OCTH handheld scanner. Please also read any manuals for the systems being connected to the OCTH handheld scanner.

All statements regarding safety and technical specifications will only apply when the unit is operated correctly.



ATTENTION



This equipment is intended for laboratory use only and is not certified for medical applications, including, but not limited to, life support situations.



WARRANTY WARNING



There are sensitive electronic and optical parts in the OCTH.

Any modification or servicing of this system by unqualified personnel renders Thorlabs free of any liability.

Any modification of the MEMS scanner, the internal electronics or the camera may cause loss of the factory optical alignment.

The connector cable of the device contains an optical fiber – stress on this cable should be as low as possible. The radius of the cable may not be below 75 mm (2.95 inch) at any time.

This device can only be returned for service when it is packed into the complete original packaging, including all foam packing inserts. Please contact Thorlabs' tech support (techsupport@thorlabs.com) for replacement packaging if the original packaging has been lost.



LASER RADIATION WARNING



When a light source (e.g. SLD, laser) is being coupled into the OCTH, please observe the appropriate laser safety precautions for your own protection. During normal operations, laser light will be present within the scanner and will also be emitted from the scanner.

When the OCTH is equipped with a Thorlabs Scan Lens Objective and connected to a Thorlabs OCT Base Unit, this OCT Base Unit gives the limit for the laser radiation – please check the manual of the Base Unit for your own safety.

The OCT System may not be switched on, if there is no objective mounted on the OCTH.

In addition, laser light may be emitted from unexpected locations, e.g. if the fiber broke in the connector cable.

2.2. Care and Maintenance

The scanner should be treated with care, particularly during transportation and unpacking. Hitting or dropping the scanner can damage the unit and lower system performance. If mishandling occurs, misalignment of the optical components may occur, leading to a decrease in image quality. In this situation, the system should be realigned by qualified personnel. Please contact Thorlabs' technical support (techsupport@thorlabs.com) for more information.

- Do not store or operate in a damp, closed environment.
- Do not store or operate on surfaces that are susceptible to vibrations.
- Do not expose to direct sunlight.
- Do not use solvents on or near the equipment.
- Keep the unit away from dust, dirt, and airborne contaminants, such as cigarette smoke. The system is not designed for outdoor use. Protect the equipment from rain, snow, and humidity.
- Do not subject the equipment to mechanical and thermal extremes. Protect the equipment from rapid variations in temperature.
- Handle all electrical and fiber connectors with care. Use of excessive force to form electrical or fiber connections may damage the connectors.
- The connector cable of the device contains an optical fiber – stress on this cable should be as low as possible. The radius of the cable may not be below 75 mm (2.95 inch) at any time.

2.2.1. Optical Cleaning

The most common cause of low signal intensity is a contamination of the fiber due to airborne particles. To minimize the fiber's exposure to air, avoid unnecessary disconnections of the optical fiber patch cable. Ensure that the connection is tight, and keep the fiber as straight as possible without placing it under tension. It is also advisable to check the fiber when making other adjustments to the optical system, such as changing the objective.

Thorlabs' Fiber Inspection Scope (Item # FS200) can help determine when the fiber needs cleaning. We recommend our Fiber Connector Cleaner (Item # FCC-7020) to quickly clean the fiber tips.

2.2.2. Service

Only trained and approved Thorlabs personnel are allowed to service the system. Please contact Thorlabs' technical support (oct-support@thorlabs.com) for more information.

2.2.3. Accessories and Customization

The OCTH series OCT scanners are Thorlabs-qualified accessories for Thorlabs' OCT Systems (i.e., our CALLISTO, GANYMEDE-II, and TELESTO-II). We strongly suggest using Thorlabs' OCTH-LK Lens Kits with the OCTH, as they were specifically designed to work together.

In order to achieve the intended performance, this scanner should only be used with qualified parts. Please hold a conversation with Thorlabs' technical support to determine if other parts you wish to use are compatible. Any modification or servicing of this system by unqualified personnel renders the warranty null and void, leaving Thorlabs free of any liability.

Chapter 3 Scanner Compatibility

The OCTH is a standalone, preassembled, integrated accessory to a Thorlabs OCT Base Unit. It is intended for light-weight handheld operation providing ergonomic handling for imaging applications where mobility is required.

This scanner is available in versions for different wavelength ranges.

- The OCTH-900 handheld scanner for OCT systems working in the 900 nm regime.
- The OCTH-1300 handheld scanner for OCT systems working in the 1300 nm regime.

In this manual we will use abbreviation for the OCTH scanner as follows:

- OCTH OCTH-900 or OCTH-1300

For common statements the abbreviation "OCTH" is used for both setups.

The OCTH scanners are fully compatible with all Thorlabs OCT Base Units of the CALLISTO, GANYMEDE, and TELESTO series.

The table below gives a short overview of the different handheld scanners, their usable wavelength range and lists preferred OCT Base Units.

Handheld Scanner	Wavelength Range	OCT Base Unit
OCTH-900	850 nm – 1000 nm	CALxxx GANxxx
OCTH-1300	1200 nm – 1400 nm	TEL13xx

Table 1 Usable Wavelength Range of OCT Scanner

There are selective optical components in the scanner. Depending on the type of the OCTH, their specifications are different.

Chapter 4 Installation

4.1. OCTH Handling

The OCTH offers various options for handling during OCT image acquisition to match the individual needs of the imaging. The housing ergonomics are specially designed to allow for both right- and left-handed operation and using either your thumb or index finger for pushing the buttons on top. The OCTH enables pointing it at a sample while holding it at the rear end grip but you can also hold it at the front part and still be able to reach the push buttons. The long cable connecting the OCTH to the OCT Base Unit gives you flexibility to move and reach for samples over a large span. If connected properly a green light in the middle of the push buttons indicates that the OCTH is running.



ATTENTION



When pulling at the OCTH too hard it may cause the connected OCT Base Unit to move and fall off. This could severely damage the OCT Base Unit. Make sure to stay within reach of the cable length! Secure the OCT Base Unit against falling off!

Extreme pulling may cause the strain-relief to give way! This could severely damage the electrical and optical connections. Do not inadequately pull the connection cable!



Figure 1 Right-Handed Operation of OCTH Holding the Rear End Grip

4.2. OCTH Connections

4.2.1. Connecting the Electrical Control Interface

Make sure that the OCT Base Unit is switched off.

The electrical probe control cable and optical fiber are permanently connected to the OCTH. The electrical probe control cable connects to a Thorlabs OCT Base Unit via a standard Thorlabs OCT probe control AUX interface with one alignment key. For backwards compatibility to Thorlabs OCT Base Units fabricated prior to 2015 adapter cables are available to connect to AUX interfaces with two alignment keys. Please contact Thorlabs' tech support for information regarding the pin configuration.



Figure 2 AUX interface with one and two alignment keys

Attach the control probe cable of the OCTH to the Aux connector on the Thorlabs OCT Base Unit. This interface is located at the back of the OCT Base Unit. Align the red dot of the plug to the alignment mark of the port. Push the connector into the plug until a “click” sound is heard. This click indicates that the connector is locked.

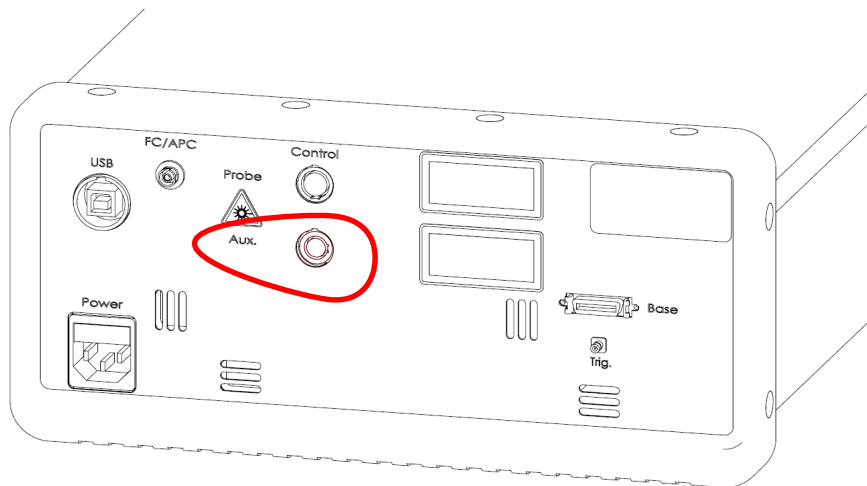


Figure 3 Installation of the Electric Connector at the Thorlabs OCT Base Unit

4.2.2. Connecting the Optical Fiber to the OCT Base Unit

ATTENTION

When installing the fiber, make sure that the fiber tip does not get contaminated by dust. Thorlabs' FS200 Fiber Inspection Scope and MCC-7020 Fiber Connector Cleaner are useful for keeping the optical path clean. Do not touch the fiber tip!

The fiber connector of the OCTH needs to be plugged in the FC/APC fiber connector on the back of the Thorlabs OCT Base Unit.

Attention

The fiber connector needs to be oriented such that alignment key slides into the key slot of the OCT Base Unit connector. If the key is NOT properly aligned with respect to the key slot, you will still be able to screw in the fiber connector, but significant light intensity losses will result from this incorrect connection.

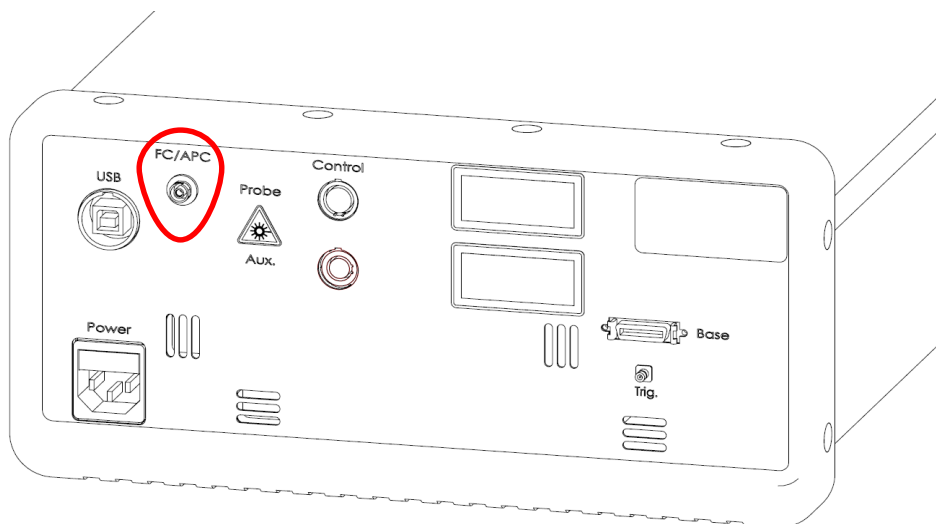


Figure 4 Installation of the Fiber Connector at the Thorlabs OCT Base Unit

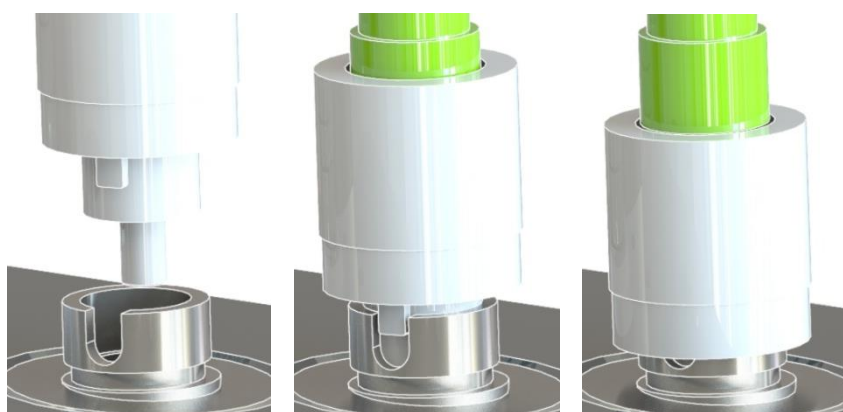


Figure 5 Fiber Installation Detail

4.2.3. Fiber Cleaning Techniques Using the FBC1

This section details how to clean fiber bulkheads and fiber connectors using the FBC1 one-step cleaner.

Using Extended Mode



Figure 6 FBC1 Extended Mode

To use extended mode, pull the tip outward while simultaneously pushing down on the lock button. Extended mode is useful for panels with multiple bulkhead connectors or other tight spaces.

Cleaning Fiber Bulkheads



Figure 7 FBC1 Extended Mode

Remove the guide cap completely from the device, and insert the tip of the cleaner into the bulkhead connector. Push the case to start the cleaning process; a click indicates that the cleaning is complete.

Cleaning Fiber Connectors

Figure 8 Cleaning Fiber Connectors

Open the cover on the guide cap, and insert the fiber connector over the guide cap. Push the case to start the cleaning process; a click indicates that the cleaning is complete.

4.3. Integration

The OCTH only works properly when used together with an OCT system that is running this scanner.

We suggest to make use of this scanner together with Thorlabs OCT Base Units like the CALLISTO, GANYMEDE II, or TELESTO II.

Make sure that the wavelength range of the base unit corresponds to the wavelength range of the OCTH.

For the full integration into such a system, please refer to the user manual of the system.

Chapter 5 Description

5.1. Theory

5.1.1. Signal Generation

Spectral Domain Optical Coherence Tomography (OCT) generates cross-sectional images up to several millimeters deep into tissue. The images are assembled by performing a series of scans at adjacent, increasing depths, allowing 2D and 3D reconstruction of the specimen.

The Thorlabs SD-OCT Base Unit (i.e., the CALLISTO, GANYMEDE-II, or TELESTO-II), to which the OCTH might be attached, consists of a broadband light source with a high-speed spectrometer. In the scanner, the light is split into two arms. In one arm the light is sent to the specimen, where it is back-reflected and back-scattered back into the scanner and to the spectrometer in the base unit; in the other arm the light is sent to a stationary optical reference arm.

In custom setup, the light is sent directly into the specimen without splitting and guided back into the scanner; the other arm is a dedicated external optical reference arm.

The phase delay of the back-reflected and back-scattered light (with respect to the stationary reference) is recorded as a function of wavenumber, and a Fast Fourier Transform (FFT) yields the cross-sectional images as a function of sample depth.

5.1.2. Limitations

The spatial resolution and sensitivity of the OCT system using the OCTH depends on several parameters, including the following:

- **Imaging speed:** The internal MEMS scanner limits the system speed. It is recommended to stay below 28 frames or B-Scans per second in the 2D Mode which corresponds e.g. to 1024 A-Scans per B-Scan at 28 kHz system speed. Greater imaging speeds will distort the scan and degrade the duty cycle of the acquisition. This is also valid for the 3D mode, where only the fast axis has this speed restriction and should stay below the 28 B-Scans per second. The slow axis settings are independent of that restriction. The ThorImage software indicates this limit with a warning sign.
- **Correct Wavelength Range:** The optical components within the OCTH are optimized for a wavelength range centered at 0.9 μm or 1.3 μm , depending upon the model you ordered.
- **Optical Power:** The sensitivity of the OCT system is directly related to the intensity of the light returning from the sample. Dirty fibers, blocked or cropped beams, condensing, and humid environments tend to reduce the light intensity collected from the sample, directly reducing the image quality.
- **Physical Movements:** OCT systems use a camera to detect the phase relation of the light returning from the sample. Even small movements of the specimen in relation to the optical reference arm will “wash out” the wavenumber-resolved phase contrast, affecting the image.
- **Imaging:** In a fiber-based OCT setup, the light returning from the sample is focused into the core of an optical fiber (through which the light propagates further). Hence, the fiber can be thought of as a spatial filter for the light. This filter has an effective diameter, referred to as the “Mode Field Diameter”, of only a few microns. (The mode field diameter for single mode use is bigger than the core diameter.) Poor focusing, caused by optical aberration or misalignment, therefore leads to loss of contrast and sensitivity.

5.2. Optical Design

5.2.1. Common Path Setup

As shown below, the OCTH is factory-configured such that the sample beam and reference beam are generated after the beam leaves the fiber. This allows us to use single-mode optical fiber to transport the beam into the scanner while minimizing the use of free-space propagation.

This approach avoids problems that can degrade image quality, related to optical phenomena like polarization mode dispersion (PMD) and birefringence, and makes the performance of the system independent from the length of the single-mode fiber.

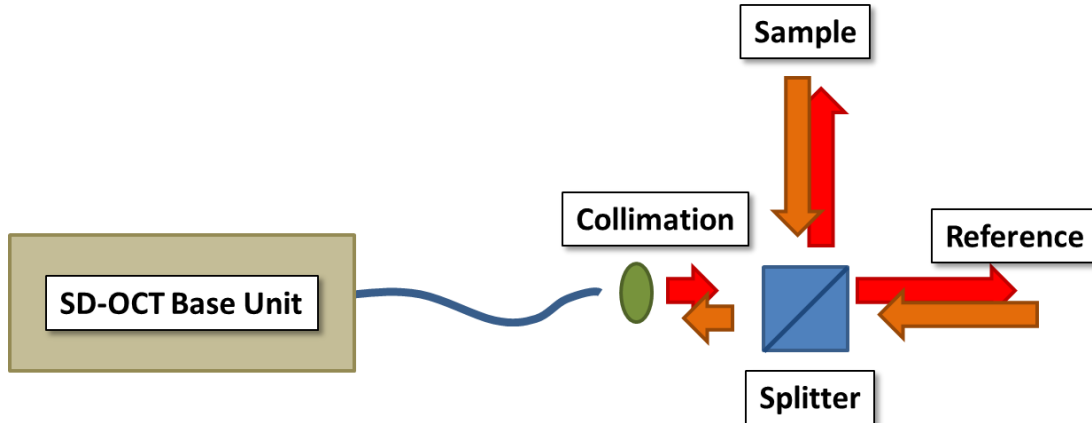


Figure 9 Diagram of the Common Path Setup

5.2.2. Dual Path Setup (Special)

Shown below is an alternative beam geometry to the Common Path Setup when the scanner is ordered in a configuration without reference. The sample beam and reference beam are generated within different fibers, before the beam exits into free space. In this configuration, the scanner becomes the sample arm of the interferometer. By using two different fibers, the beam splitter used in the Common Path Setup is no longer needed.

This configuration allows single mode optical fiber to be used to a greater extent within the setup, and the OCTH is fully capable of this geometry. While this approach is able to provide greater sensitivity due to the absence of the beam splitter (which reduces the intensity of the light that returns to the fiber), it is significantly more sensitive to the optical phenomena mentioned before. Please contact Thorlabs' tech support for details.

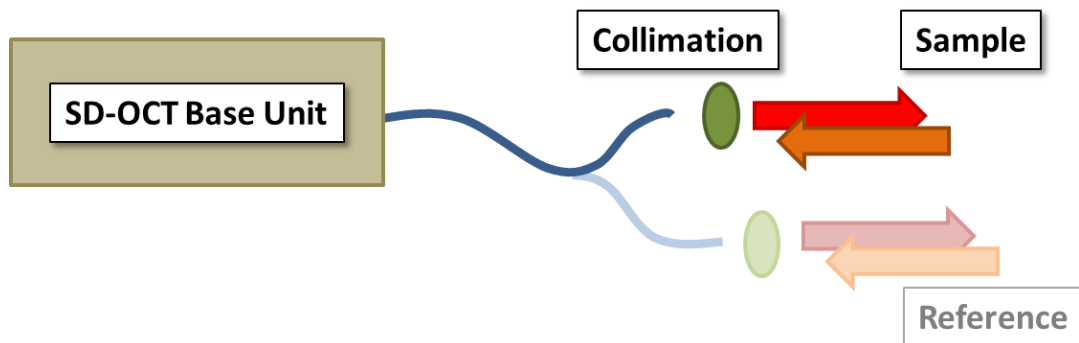


Figure 10 Diagram of the Dual Path Setup

5.2.3. Realization

The basic optical layout of the OCTH in Common Path layout is illustrated below.

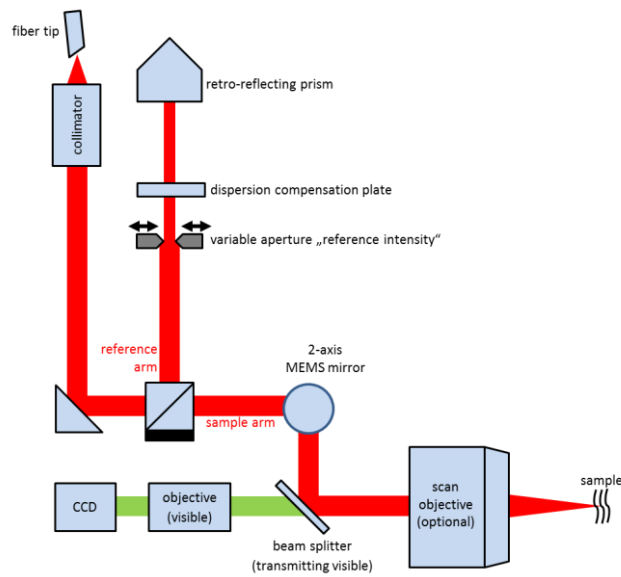


Figure 11 Optical Layout of the Common Path Setup

The output of an FC/APC fiber is collimated and routed to a beam splitter. Here, the beam is divided into a sample beam and a reference beam, similar to a Michelson interferometer. The sample beam is routed over a 2-axis MEMS mirror to allow for scanning in two axes with a common pivot point. The scan objective then focuses the beam in the sample. Back-scattered and back-reflected light is collected by the scan objective again and travels back to the fiber. The light reflected into the reference arm is retro-reflected back into the fiber. There is an optimum intensity for the reference light that can be adjusted using the reference intensity adjustment screw which will open or close the variable aperture inside the imaging scanner.

For the Dual Path layout the reference components are not inserted.

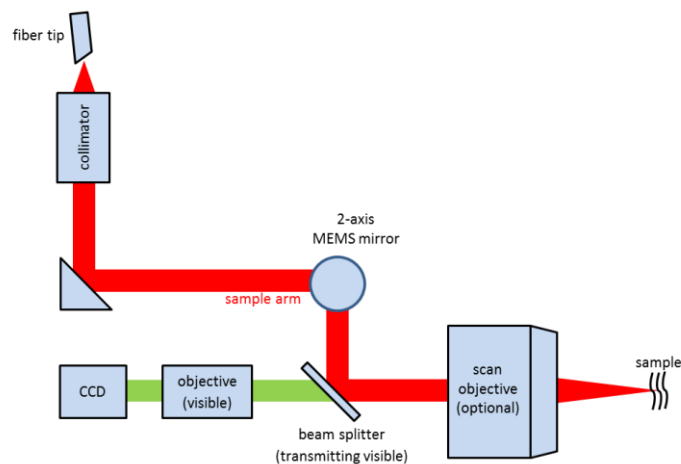


Figure 12 Optical Layout of the Dual Path Setup

5.3. Components

The OCTH is intended as an accessory for use with Thorlabs OCT Base Units.



Figure 13 OCTH Scanner

An OCTH contains a scanning system with adjustment options for intensity and integrated reference components. For full usage of the OCTH, additional kits like the Lens Kit are strongly recommended. The OCTH is specially designed with regard to optical path length. Changing the Lens Kit will hardly change optical path length in the sample arm, therefore no adjustment of reference arm optical path length is required.

The following sections describe the module and possible accessories in detail.

Please contact a member of the Thorlabs' technical support team to determine if other parts you wish to use are compatible. Any modification or servicing of this system by unqualified personnel renders the warranty null and void, leaving Thorlabs free of any liability.

5.3.1. OCTH Base Module

The OCTH base module provides high-speed, two-dimensional (X and Y) raster scans of the specimen. The clear aperture of the scan mirror used within is \varnothing 3 mm. Due to the use of a 2-axis MEMS mirror both raster scans in X and Y share a common pivot point. The module also contains a high-resolution video camera for recording the sample during the measurement.



Figure 14 OCTH Base Module

**ATTENTION**

The optical fiber is inside the probe control cable and has to be handled with care.

Avoid any unnecessary force that may cause the fiber to bend sharply and break.

Cap end face when connector is not in use.

The electrical probe control cable and optical fiber are permanently connected to the OCTH. The electrical probe control cable connects to a Thorlabs OCT Base Unit via a standard Thorlabs OCT probe control AUX interface with one alignment key. For backwards compatibility to Thorlabs OCT Base Units fabricated prior to 2015 adapter cables are available to connect to AUX interfaces with two alignment keys. For identification of your probe control interface and connection requirements please refer to chapter 4.2.1 or contact Thorlabs' tech support. Please contact Thorlabs' tech support for information regarding the pin configuration.

The optical fiber connects to a standard FC/APC receptacle at a Thorlabs OCT Base Unit, see chapter 4.2.2.

The optical output heading in direction of the reference is equipped with an aperture which is manipulated using the reference adjustment screw. In order to adjust the reference intensity, it is necessary to rotate the reference intensity adjustment screw. The reference adjustment screw is located inside the OCTH housing, see chapter 0 below.

**ATTENTION**

The functionality of the reference light or length adjustment does not require inadequate torque.

Modifications and adjustments have to be done in a clean, dust-free environment.

5.3.2. Reference Adjustment

In order to access the screw for the reference adjustment the scanner housing needs to be opened. Please use a Phillips 1 head screw driver to remove the screw on the lower rear end of the scanner as indicated in Figure 16.



Figure 15 Remove Housing Fixation Screw

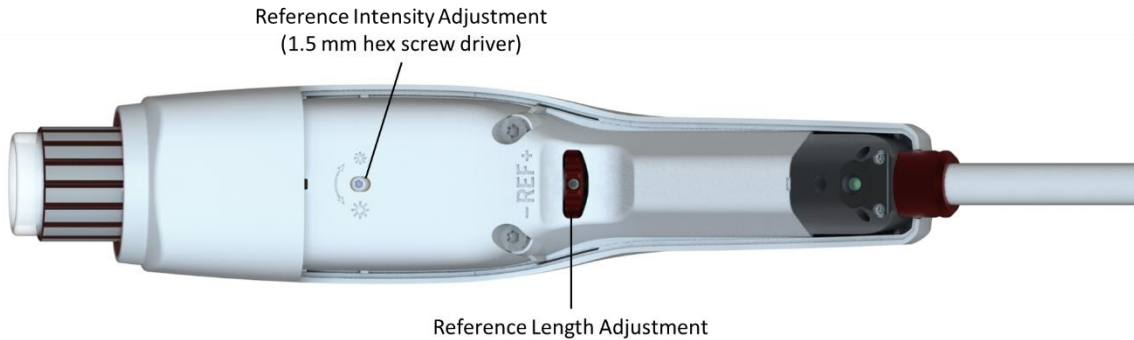
Carefully lift off the lower part of the housing.



Figure 16 Opening the OCTH

Reference Intensity Adjustment

The reference adjustment screw is now accessible inside the scanner. Please use the provided 1.5 mm hex screw driver to rotate the screw for reference intensity adjustment. Rotating clock-wise will reduce the reference intensity, rotating counter-clock-wise will increase it. As a qualitative indication, observe the reference intensity bar in the OCT software. Please refer to the Software Manual for additional guidance.



Reference Length Adjustment

After opening the lower part of the housing the red reference length adjustment wheel is accessible inside the scanner.

Plus and minus indicate the direction of the length adjustment. Plus increases the reference length, minus decreases it. As a qualitative indication, observe the image in the OCT software. Please refer to the Software Manual for additional guidance.

After finish the reference intensity or length adjustment, please close the housing again by placing the lower part of the housing back in its place and tightening the Phillips screw.

5.3.3. Push Buttons

The OCTH offers three ergonomically placed push buttons to control the Thorlabs ThorImage OCT software. In the software the handheld probe button settings can be configured to meet your application needs best. For further details please refer to the ThorImage user manual.



Figure 17 Push buttons on top of the OCTH

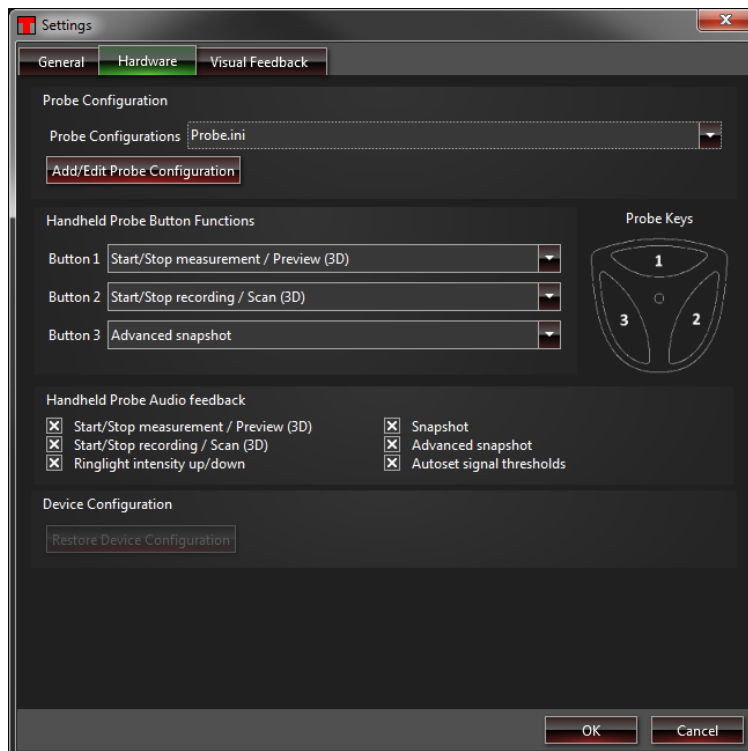


Figure 18 Probe Configuration Settings in ThorImage OCT

5.3.4. OCTH Scan Lens Kits (Accessory)

ATTENTION

Power of the whole OCT system must be switched off while changing the OCTH Lens Kit.

Optics are sensitive components!

When handling the OCTH-LK Lens Kits take care to avoid touching or harming the optical surfaces.

While changing the objectives keep the OCTH away from dust, dirt, and airborne pollutants (including cigarette smoke). The system is not designed for outdoor use. Protect the equipment from rain, snow, and humidity.

The OCT Lens Kits from Thorlabs are specially designed lenses to support telecentric scanning over a wide field of view. The OCTH-LK Lens Kits consist of a dedicated scan lens and an attached illumination tube. For the OCT-LK Lens Kit, the illumination tube is not removable. The OCTH-LK Lens Kits are fully compatible with the OCTHs and enable easy mounting and exchange of scan lenses for flexibility in resolution, depth-of-focus, and working distance.



Figure 19 OCTH Scan Lens Kit (OCTH-LK30)

If you ordered a Lens Kit with your OCTH, this item will be pre-installed.

If not already installed, the Lens Kits are mounted by screwing them in the dedicated front thread of the OCTH.



Figure 20 Installation of a Scan Lens Kit

Changing the objective of the OCTH requires changing the probe configuration data as well. For details and instructions on the calibration procedure please take a look in the ThorImage Software manual or contact the Thorlabs' tech support.

The required tool is part of the lens kit assembly.

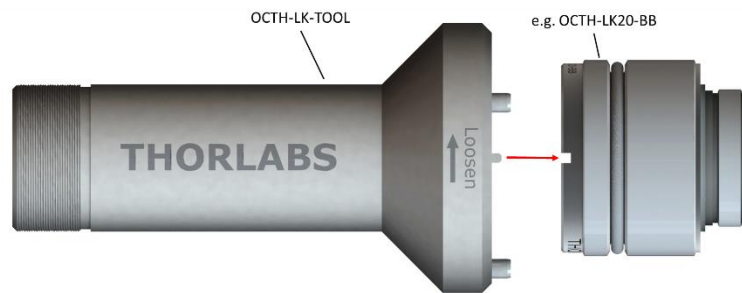


Figure 21 OCTH-LK-TOOL

5.3.5. Sample Z-Spacers (Accessory)

To ease the challenge of positioning and maintaining the OCTH at the optimal distance from the sample, ring Z-Spacers specially designed to match a scan Lens Kit can be installed.



Figure 22 Sample Z-Spacer (OCTH-AIR20)

The Sample Z-Spacer is installed on the matching Lens Kit (e.g. the OCTH-AIR20 Z-Spacer on a 20 mm Lens Kit OCTH-LK20(-BB)) by screwing them on the dedicated external thread of the Lens Kit.

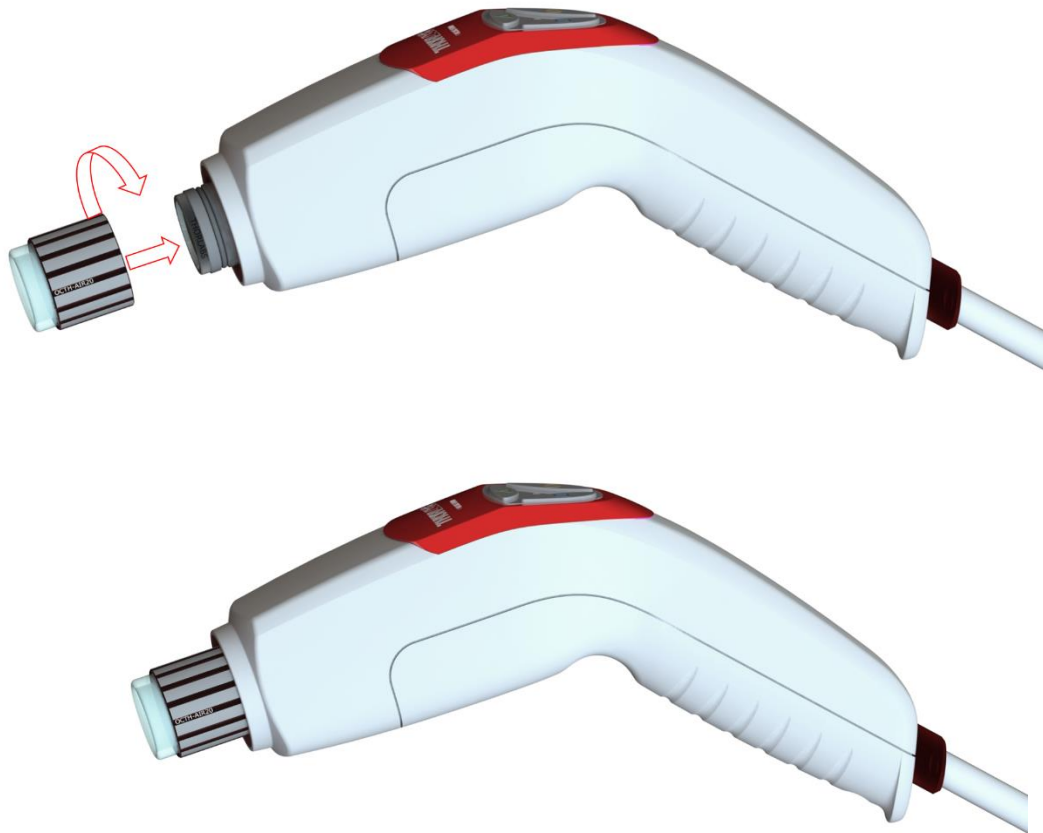



Figure 23 Installation of a Sample Z-Spacer

To adjust the distance between the scanner and the sample, the Z-Spacers have knurled edges which, when rotated, will set the working distance of the scanner.

Chapter 6 Troubleshooting

Problem	Possible Cause	Recommended Solution
Poor Reference Light Intensity	Fiber Not Connected	Remove and Reconnect Fiber, Ensuring that Alignment Key is Inserted into Key Slot
	Aperture is Too Small	Open Aperture (see section 5.3.1 OCTH Base Module)
	Fiber Tip is Dirty	Clean Fiber Tip (Thorlabs' MCC-7020 Fiber Connector Cleaner Recommended)
	Other Reason	Contact Thorlabs' Technical Support
No Image is Obtained	Optical Path Length of Reference and Sample Arms is Not Matched	Adjust Reference Arm Length (see section 5.3.2 Reference Adjustment)
	Beam is Blocked	Check for Obstructions in Optical Path
	USB Cable is Loose	Reconnect USB Cable
	PC Crashed	Restart PC
	Other Reason	Contact Thorlabs' Technical Support
Low Scan Resolution	Dispersion in Reference and Sample Arms is Not Matched	Check if Software Dispersion compensation is needed
Bad Image Quality	Image Obtained is Being Mirrored	Adjust the Distance Between the Objective and the Sample. The Image Should Move Towards the Top of the Computer Window
	Optical Path Length of Sample Arm is Too Short	Move Sample Away From Objective
	Reference Intensity is Too High or Too Low	Adjust reference Intensity (see section 5.3.2 Reference Adjustment)
	Other Reason	Contact Thorlabs' Technical Support
Flipped Image	Optical Path Length of Reference Arm is Incorrect	Adjust Reference Arm Length (see section 5.3.2 Reference Adjustment)

Chapter 7 Certifications and Compliance



THORLABS

www.thorlabs.com

EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs GmbH
Of: Hans-Boeckler-Str. 6, 85221 Dachau/München, Deutschland

in accordance with the following Directive(s):

2006/42/EC	Machinery Directive (MD)
2004/108/EC	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)

hereby declare that:

Model: OCTH-xxxx(NR)
Equipment: OCT Handheld Scanning Probe

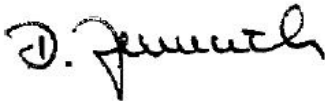
is in conformity with the applicable requirements of the following documents:

EN ISO 12100	Safety of Machinery. General Principles for Design. Risk Assessment and Risk Reduction	2010
EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements	2013
EN 61010-1	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use.	2010

and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:

does not contain substances in excess of the maximum concentration values tolerated by weight in homogenous materials as listed in Annex II of the Directive

I hereby declare that the equipment named has been designed to comply with the relevant sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed:  **On:** 21 August 2015

Name: Dorothee Jennrich
Position: General Manager

EDC - OCTH-xxxx(NR) -2015-08-21

CE

Chapter 8 Specifications

OCTH	
Optical Specifications	
Center Wavelength	900 nm or 1300 nm
Reference Length Fine Adjustment	+3/-1.5 mm
General Specifications	
Video Camera	Color CMOS
Weight of Scanner	0.5 kg (1.1 lbs)
Storage / Operating Temperature	10°C to 35°C
Dimensions of OCTH (L x W x H)	158 mm x 39 mm x 107 mm

Compatible Lens Kits				
Objective Item #	OCTH-LK20-BB	OCTH-LK30-BB	OCTH-LK20	OCTH-LK30
Field of View (diam.)	8 mm	10 mm	8 mm	10 mm
Working Distance	12 mm	22 mm	12 mm	22 mm
Design Wavelength	900 nm / 930 nm		1300 nm / 1325 nm	
Lateral Resolution	9 µm	14 µm	16 µm	24 µm
Focal length	20 mm	30 mm	20 mm	30 mm

Compatible Working Distance Holder		
Objective Item #	OCTH-AIR20	OCTH-AIR30
Field of View (diam.)	8 mm	10 mm
Working Distance	12 mm	22 mm

Chapter 9 Warranty

9.1. Lasers and Imaging Systems

Thorlabs offers a one year warranty on all lasers and imaging systems, with the exceptions of laser diodes.

9.2. Non-Warranty Repairs

Products returned for repair that are not covered under warranty will incur a standard repair charge in addition to all shipping expenses. This repair charge will be quoted to the customer before the work is performed.

9.3. Warranty Exclusions

The stated warranty does not apply to products which are (a) specials, modifications, or customized items (including custom patch cables) meeting the specifications you provide; (b) ESD sensitive items whose static protection packaging has been opened; (c) items repaired, modified, or altered by any party other than Thorlabs; (d) items used in conjunction with equipment not provided by or acknowledged as compatible by Thorlabs; (e) subjected to unusual physical, thermal, or electrical stress; (f) damaged due to improper installation, misuse, abuse, or storage; (g) damaged due to accident or negligence in use, storage, transportation, or handling.

Chapter 10 Mechanical Drawings

The outline dimensions of the OCTH series scanner is given in the following drawings.

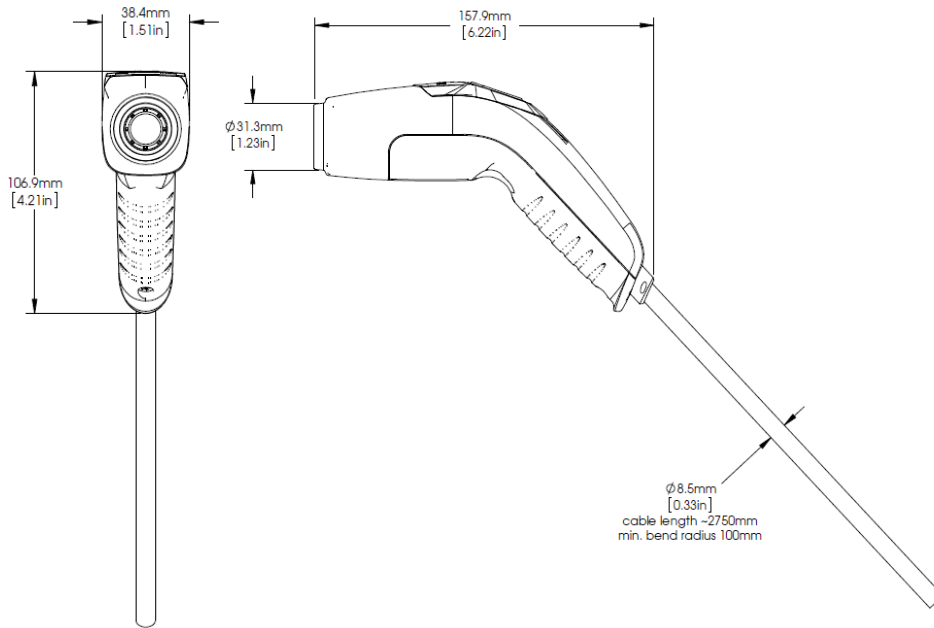


Figure 24 Dimensions of the OCTH

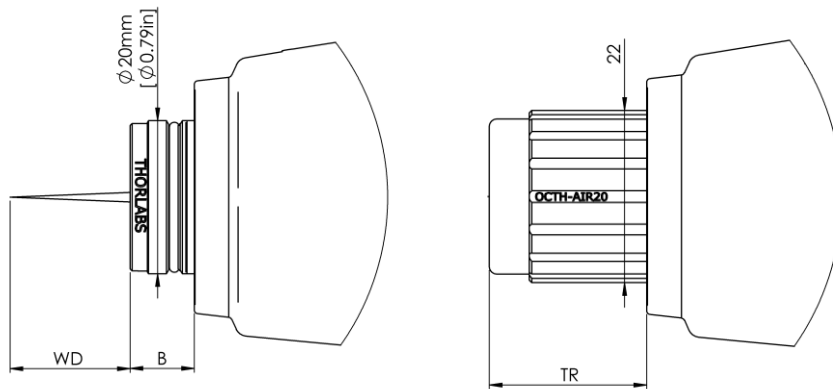


Figure 25 Dimensions of the Accessories OCTH-LKx and OCTH-AIRx

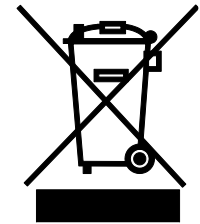
The optomechanical specifications are listed in the table below.

Item #	OCTH-LK20 (-BB)	OCTH-LK30 (-BB)	OCTH-AIR20	OCTH-AIR30
Working Distance (WD)	12 mm 0.47 in	22 mm 0.87 in	-	-
Barrel Height (B)	8.35 mm [0.33 in]	2 mm [0.08 in]	-	-
TR	-	-	17.5 – 25.5 mm [0.68 – 1.00 in]	22– 26 mm [0.86 – 1.04 in]]

Chapter 11 Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

- This offer is valid for Thorlabs electrical and electronic equipment:
- Sold after August 13, 2005
- Marked correspondingly with the crossed out “wheelie bin” logo (see right)
- Sold to a company or institute within the EC
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and not contaminated



Wheelie Bin Logo

As the WEEE directive applies to self-contained operational electrical and electronic products, this end of life take back service does not refer to other Thorlabs products, such as:

- Pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- Components
- Mechanics and optics
- Left over parts of units disassembled by the user (PCB's, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

11.1. Waste Treatment is Your Own Responsibility

If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

11.2. Ecological Background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of life products will thereby avoid negative impacts on the environment.

Chapter 12 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



USA, Canada, and South America

Thorlabs, Inc.
sales@thorlabs.com
techsupport@thorlabs.com

Europe

Thorlabs GmbH
europe@thorlabs.com

France

Thorlabs SAS
sales.fr@thorlabs.com

Japan

Thorlabs Japan, Inc.
sales@thorlabs.jp

UK and Ireland

Thorlabs Ltd.
sales.uk@thorlabs.com
techsupport.uk@thorlabs.com

Scandinavia

Thorlabs Sweden AB
scandinavia@thorlabs.com

Brazil

Thorlabs Vendas de Fotônicos Ltda.
brasil@thorlabs.com

China

Thorlabs China
chinasales@thorlabs.com



THORLABS
www.thorlabs.com