ERM200, ERM210, and ERM220 Extinction Ratio Meters

User Guide



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Chapter 1 Safety

Attention

The safety of any system incorporating the equipment is the responsibility of the assembler of the system.

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was designed for.

The ERM2xx must not be operated in explosion endangered environments!

Do not obstruct the air ventilation slots in the housing!

Do not remove covers!

Do not open the cabinet. There are no user-serviceable parts inside!

This precision device is only serviceable if returned and properly packed into the complete original packaging including the cardboard inserts. If necessary, ask for replacement packaging.

Refer servicing to qualified personnel!

Changes to this device cannot be made nor may components not supplied by Thorlabs be used without written consent from Thorlabs.

Attention

Prior to applying power to the ERM2xx, make sure that the protective conductor of the 3 conductor mains power cord is correctly connected to the protective earth ground contact of the socket outlet! Improper grounding can cause electric shock resulting in damage to your health or even death!

Ensure that the corresponding fuse is inserted. If not, please change the mains fuse (see section Replacing the Mains Fuse).

To avoid risk of fire, only the appropriate fuse for the corresponding line voltage must be used.

All modules must only be operated with duly shielded connection cables.

Attention

The following statement applies to the products covered in this manual, unless otherwise specified herein. The statement for other products will appear in the respective accompanying documentation.

Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing Equipment Standard ICES-003 for digital apparatus. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/T.V. technician for help.

Users that change or modify the product described in this manual in a way not expressly approved by Thorlabs (party responsible for compliance) could void the user's authority to operate the equipment.

Thorlabs is not responsible for any radio television interference caused by modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Thorlabs. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user.

The use of shielded I/O cables is required when connecting this equipment to any and all optional peripheral or host devices. Failure to do so may violate FCC and ICES rules**.**

Chapter 2 Intended Use

The ERM200, ERM210, and ERM220 Extinction Ratio Meters measure the polarization extinction ratio of polarization-maintaining fibers. The ERM200, ERM210, and ERM220 devices are used in photonics research and development applications.

The ERM200, ERM210, and ERM220 devices are designed for laboratory use only. These devices may not be used or integrated into equipment that is applied in pharmaceutical, medical or military applications.

Thorlabs, Inc. Life Support and Military Use Application Policy is stated below:

THORLABS' PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS OR IN ANY MILITARY APPLICATION WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF THORLABS, INC. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system or to affect its safety or effectiveness.
3. The Thorlabs products described in this document are not intended nor warranted for usage in Military Applications.

Chapter 3 Introduction

The ERM2xx Extinction Ratio Meters are designed to measure the polarization extinction ratio and the polarization angle of polarization-maintaining fibers (PM fibers) for any kind of alignment application such as connectorization of PM fibers or pigtailing of laser diodes with PM fibers.

The ERM2xx Series covers different wavelength ranges from 400 nm up to 2500 nm. The ERM200 is optimized for 600 nm to 1600 nm, the ERM210 for 400 nm to 700 nm, and the ERM220 for 1200 nm to 2500 nm.

The front panel features a connection port for light input. To test PM fibers equipped with the fiber connectors FC/PC (narrow- or wide-key), FC/APC (narrow- or wide-key), LC/PC, SC/PC, E-2000®/APC, and E-2000/PC, Thorlabs offers fiber adapters as listed in the section Ordering Codes and Accessories.

The ERM2xx Extinction Ratio Meters can be operated using the front panel display and control knobs or with custom-made software or the OPM software via the USB interface. This provides access to integration into variable setups in a wide range of applications in manufacturing, quality control, quality assurance, and R&D. To write custom-made software for the remote control of an ERM2xx Extinction Ratio Meter, Thorlabs provides drivers for LabVIEW™ and C#. Please see the section Remote Operation via Custom Software.

Attention

Please find all safety information and warnings concerning this product in the chapter Safety.

Chapter 4 Getting Started

4.1 Ordering Codes and Accessories

Item #

ERM200	Benchtop Extinction Ratio Meter with Exchangeable Fiber Adapter Connection Port, Wavelength Range 600 nm to 1600 nm
ERM210	Benchtop Extinction Ratio Meter with Exchangeable Fiber Adapter Connection Port, Wavelength Range 400 nm to 700 nm
ERM220	Benchtop Extinction Ratio Meter with Exchangeable Fiber Adapter Connection Port, Wavelength Range 1200 nm to 2500 nm

Required Accessories

Item #	**ERM2x Fiber Connector Adapters**
ERM2F	Fiber Adapter to Connect Wide-Key FC/PC Connectors to the ERM2xx Benchtop Extinction Ratio Meter
ERM2F2	Fiber Adapter to Connect Narrow-Key FC/PC Connectors to the ERM2xx Benchtop Extinction Ratio Meter
ERM2A	Fiber Adapter to Connect Wide-Key FC/APC Connectors to the ERM2xx Benchtop Extinction Ratio Meter
ERM2A2	Fiber Adapter to Connect Narrow-Key FC/APC Connectors to the ERM2xx Benchtop Extinction Ratio Meter
ERM2L	Fiber Adapter to Connect LC/PC Connectors to the ERM2xx Benchtop Extinction Ratio Meter
ERM2S	Fiber Adapter to Connect SC/PC Connectors to the ERM2xx Benchtop Extinction Ratio Meter
ERM2EF	Fiber Adapter to Connect E-2000®[a]/PC Connectors to the ERM2xx Benchtop Extinction Ratio Meter
ERM2EA	Fiber Adapter to Connect E-2000/APC Connectors to the ERM2xx Benchtop Extinction Ratio Meter

4.2 Basic Setup

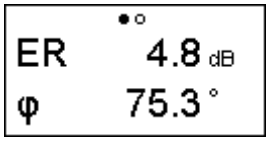
1. Remove the shipping lock from the aperture.

   Note

   The shipping lock should be retained for safe storage and shipping. If the ERM2xx is to be stored or shipped, always fit the shipping lock.
2. Place the ERM2xx such that the power cord can be easily connected and disconnected.
3. Connect the ERM2xx to the power network using the supplied power cord.
4. Identify the fiber adapter for the ERM2xx which matches the connector on the fiber under investigation.
   - ➤ The available ERM2xx fiber adapters for the ERM2xx Series are listed in the section Ordering Codes and Accessories.
   - ➤ Please note that the fiber adapters need to be ordered separately.
5. Screw this fiber adapter to the fiber adapter connection port on the front panel of the ERM2xx.
   - ➤ See the Adapter Mounting chapter for details.
6. Connect the fiber connector or the fiber cable to the fiber adapter.

a. E-2000® is a registered trademark of Diamond S.A..

7. Adapters and fibers may also be connected or exchanged at a later point.
8. Short press the *POWER* button (<3 seconds).
   ➤ The ERM2xx is switched on.
   ➤ The *POWER* button is illuminated when the device is powered up.
   ➤ The following screen will appear on the display.



9. The ERM2xx is ready for operation after a 15 minute warmup period.
   ➤ If not already done, connect the fiber adapter and optical fiber to the ERM2xx.
10. Use the *MENU* button to get to the settings for the ERM2xx.
11. Configure the ERM2xx.

Chapter 5 Operating Instructions

The ERM2xx Series utilizes a rotating polarizer followed by a photodiode for light detection to provide fast and accurate measurements of the polarization extinction ratio (PER) of PM fibers. Additionally, the polarization angle and the power of the input light beam is measured.

To set up the ERM2xx, please see the section Basic Setup.

The section Direct Operation explains how to run the ERM2xx polarization extinction ratio meter on the device via the display and control knobs.

Running an ERM2xx remotely via USB requires custom-made software. Thorlabs provides the necessary drivers for LabVIEW™ and C. Please see the section Remote Operation via Custom Software for more information.

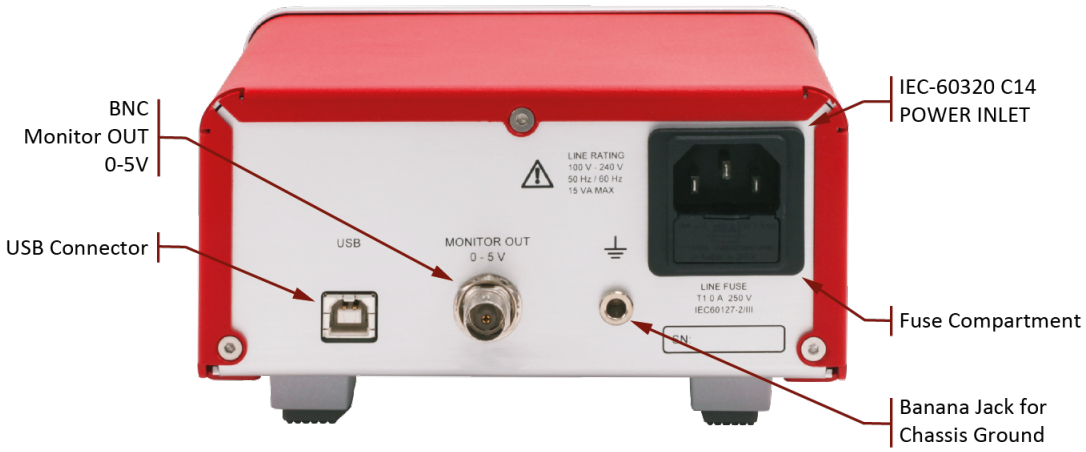
5.1 Operating Elements

ERM200, ERM210, and ERM220 outer dimensions are identical. ERM200 device is shown.

Front Panel



Rear Panel



5.2 Adapter Mounting

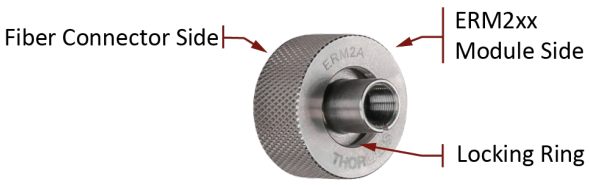
In order to measure polarization extinction ratios based of PM fibers mounted to fiber connectors, Thorlabs offers adapters for the input port on the ERM2xx modules.

Please choose the correct adapter from the table below:

Item #	Fiber Connector Type
ERM2F	Wide-Key FC/PC
ERM2F2	Narrow-Key FC/PC
ERM2A	Wide-Key FC/APC
ERM2A2	Narrow-Key FC/APC
ERM2L	LC/PC
ERM2S	SC/PC
ERM2EA	E-2000/APC
ERM2EF	E-2000/PC

Mounting Steps

1. Push the adapter with the side labeled "Thorlabs" onto the fiber adapter connection port.
2. Screw the locking ring on the adapter to the port to secure the connection.
3. Mount the fiber connector to the adapter on the ERM2xx.



5.3 Direct Operation

The ERM2xx is controlled by three buttons on the front.

The display on the front panel shows all measurement data in various display configurations. Changes to all necessary settings can be executed using the *Control* buttons and will be shown on the display.

The display features the following three display modes:

- Extinction Ration (ER) Measurement View
- Power View
- Settings View

The actual measurement data are displayed in the ER Measurement View. The Power View shows the optical input power in dBm or Watt, and the wavelength in nm. In the Settings View, measurement parameters can be modified and system information will be shown. The *MENU* button is used to get to the Settings View.

5.3.1 Extinction Ration (ER) Measurement View

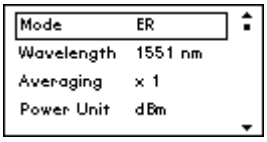
The Extinction Ratio (ER) Measurement View shows the results of the polarization extinction ratio.

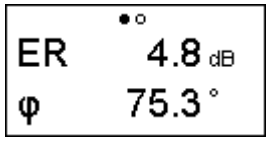
The ERM2xx will initially be in the ER Measurement View. To switch to the Measurement View from the menu, push the *MENU* button. To go to the Measurement View from the Power View, use the rotary push knob.

Three different datasets are available for display in the ER Measurement View, selected via Mode:

ER

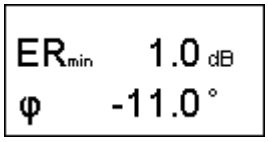
The ER displays the currently measured polarization extinction ratio in dB and the current misalignment angle in degrees. The measured ER is displayed when the ER was selected as Mode in the Settings View. Press the *MENU* button to go to the Settings View, select mode by turning the rotary push knob and press the rotary push knob until the Mode is ER (not ERmin or ERmax):



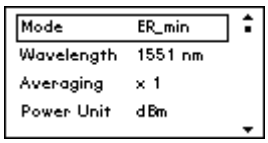


ERmin

ERmin displays the minimum extinction ratio in dB and the corresponding alignment angle in degrees since the last ERmin monitor reset.



1. Go to the Settings View and select ER_min from the mode parameter as described above.
   ➤ You are now in ERmin mode.



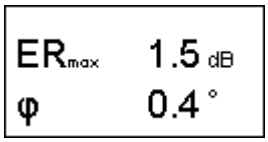
2. Press the *MENU* button.
   ➤ The minimum extinction ratio has been redetermined.



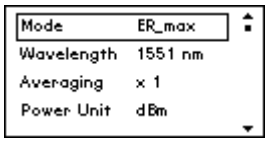
3. Press the *RETURN* button.
   ➤ The currently measured minimum ER value is shown in the ERmin display.

ERmax

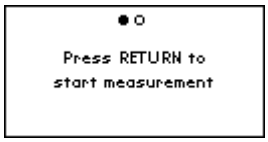
ERmax displays the maximum extinction ratio in dB and the corresponding alignment angle in degrees since the last ERmax monitor reset.



1. Go to the Settings View and select ER_max from the mode parameter as described above.
   ➤ You are now in ERmax mode.



2. Press the *MENU* button.
   ➤ The maximum extinction ratio has been redetermined.

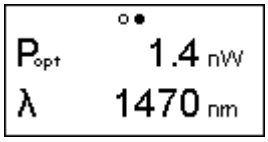


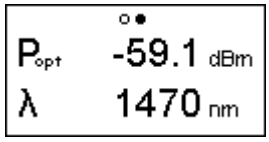
3. Press the *RETURN* button.
   ➤ The currently measured maximum ER value is shown in the ERmax display.

5.3.2 Power View

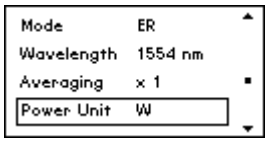
The Power View shows the optical input power in Watt or dBm for the wavelength selected in the Settings View.

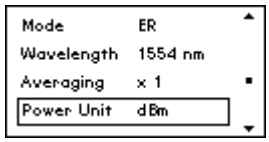
1. Turn the rotary push knob from the ER Measurement View.
   ➤ You are now in the Power View.





2. Set the unit in the settings view under Power unit.

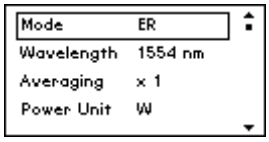


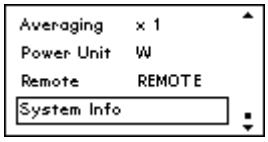


3. Press the *MENU* button.
   ➤ The Settings View is displayed.

5.3.3 Settings View

Access the ERM2xx settings via the menu in the Settings View by pressing the *MENU* button.





1. Turn the rotary push knob.
   ➤ This allows you to switch between the parameters.
2. Press the rotary push knob.
   ➤ The parameter is selected, the subpage for the selected parameter is displayed, or the selection is confirmed.
3. Use the rotary push knob to change parameter values.
4. Press the *MENU* button.
   ➤ This returns you to the displayed measurement view or performance view.
   ➤ The following settings can be changed.

Mode

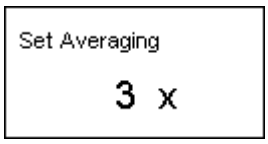
For Mode, you can choose between ER, ERmin, or ERmax.

Wavelength

The Wavelength for the wavelength of interest.

Averaging

The ERM2xx acquires 10 samples per second. With AVERAGING, up to 30 samples can be averaged for the display values. A higher AVERAGING value will result in lower display rate. The AVERAGING value has no effect on the measurement data transferred by the remote interface.



Power Unit

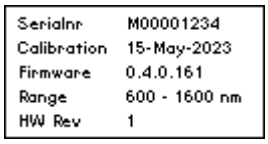
Power Unit to choose the unit for the Power View.

Remote

The ERM2xx can be controlled remotely via custom-made software or via the OPM software. Please see the section Remote Operation via Custom Software.

System Info

The System Info shows system information and parameters.



Press the *MENU* button to return to the Settings View.

5.3.4 Monitor Out Port

The Monitor Out Connector (BNC) provides the measured PER as voltage signal between 0 V to 5 V (High-Z, Conversion Factor 0.1 V/dB). This is convenient for active alignment of PM fibers.

The Monitor Out Connector (BNC) is compatible with Thorlabs Vytran® PM Fusion Splicers.

5.4 Operating Principle

The ERM2xx is based on a rotating polarizer which transmits light depending on the transmission axis of the polarizer and the polarization of the analyzed light. A photodiode positioned behind the rotating polarizer quantifies the transmitted light. Thus, whenever the analyzed light is linearly polarized and the transmission axis of the rotating polarizer is oriented parallel to the polarization axis, a peak in optical power is detected. The higher the degree of polarization (DOP) of the analyzed light, the lower the minimum polarization extinction will be.

In theory, if the input light is completely linearly polarized and the DOP is 100%, the measured photo current is sinusoidal with its minimum at zero. If the minimum is not equal to zero, it might be due to an elliptical input polarization or due to a DOP less than 100%. This occurs when the light has an unpolarized contribution. Aside from the DOP, other factors may influence the measurement data, such as dark current or noise of the detection system.

Circularly polarized light with a DOP of 100% would result in a DC photo current in the ERM2xx. A purely unpolarized input light would also generate a DC photo current.

The following table shows the measured ER value in relation to the DOP assuming an ideal linear polarization.

DOP [%]	90.0	98.0	99.0	99.8	99.9	99.94	99.98	99.99	99.998
PER [dB]	12.8	20.0	23.0	30.0	33.0	35.0	40.0	43.0	50.0

If the DOP posts a challenge in a particular PER measurement application, a more complex measurement system like Thorlabs' Polarization Measurement System PAX1000 Series is required.

PER and PM Fibers

As long as the linearly-polarized light of a broadband source travels along the slow (or fast) axis the polarization is maintained and the ERM2xx will show a high PER. If the linearly-polarized light is not coupled into one of the main axes of the PM fiber the linearly-polarized light is separated into two parts. One is traveling along the fast axis and the other along the slow axis. Both parts will travel with different speeds. Depending on the birefringence of the fiber, its length, and the induced stress (for example by bending or temperature), the output polarization is not predictable and can vary over time. Furthermore, the birefringence is wavelength dependent. The output of each wavelength of the spectrum of the broadband source will be different. This leads to a certain degree of depolarization of the light coupled into the fiber and leads to a lower extinction ratio measured by the ERM2xx.

Light with an elliptical polarization or linearly-polarized light which is not parallel to one of the main axis will not preserve its polarization state along the fiber.

5.5 Applications

Measurement setups and procedures differ depending on the task. For example, the requirements for testing the coupling of linearly-polarized light into a main axis of a PM fiber and the alignment of a laser diode to a PM fiber are different, and differ again from the requirements for testing a PM fiber patch cable.

This section suggests application procedures for widely used tasks.

For the cases described below, we assume perfect optical elements.

5.5.1 Light Source Considerations

One common application is the optimization of the PM fiber orientation to best maintain the polarization of light.

A key factor is the light source. A broadband source like a source using ASE (Amplified Apontaneous Emission) or an SLD (Super-Luminescent Diode) will simplify the alignment procedure compared to a narrowband source like a DFB laser.

Narrow Bandwidth Light Source (DFB Laser)

Light emitted from a narrow bandwidth laser light source is coherent and can result in unstable measurement results and an apparent, artificial contribution to the PER.

In many cases, it is not sufficient to simply measure a current PER value to characterize the quality of the PM fiber alignment because the output polarization, as measured by the extinction ratio meter, can be linear even when a misaligned linear polarization or an elliptical polarization was entered into the input. While misaligned linear polarization or other contributions to the transmitted apparently polarized light will be eliminated when a fiber is stressed (mechanically or by temperature), linearly-polarized light transmitted via a main axis will not change its polarization. Therefore, a conservative PER can be determined when the PM fiber is under stress.

An easy way to determine the ERmin is to stress the fiber by pulling it gently or by increasing the temperature. Stress is induced and the PER will vary while the polarization of the light in the main axis is maintained. This results in a very conservative extinction ratio, the ERmin.

SLD and ASE Source

Instead of a laser diode, an SLD or an ASE may be used as a light source.

Broadband sources emit light with an unknown state of polarization. Therefore, light emitted from the broadband source needs to be polarized with the help of a polarizer prior to fiber input. It is recommended to mount the polarizer with its transmission axis vertical to the base plate, between the light source and the PM fiber.

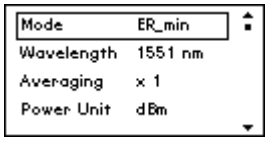
The light is fed into the slow axis of the PM fiber if the slow axis is orientated to the connectors key and the key is vertically aligned.

5.5.2 Aligning a Laser Diode to a PM Fiber

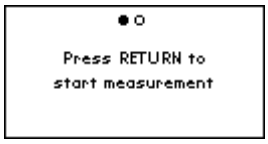
To align a laser diode to a PM fiber, the user needs to take the coherent nature of laser light into account, which adds an artificial contribution to the PER. It is therefore not sufficient to optimize the current extinction ratio (ER). Additionally, as described above, the lowest extinction ratio (ERmin) should be determined when the fiber is under stress to reduce artificial polarized light contributions. This will result in a conservative ERmin value with the optimal PM fiber orientation.

The alignment of a laser diode to a PM fiber can be done in the following way.

1. Insert the output connector of the fiber into the fiber adapter connection port of the ERM2xx.
2. Switch the ERM2xx on.
3. Switch to the ER display.
   ➤ You will receive the current ER value.
4. Press the *MENU* button.
   ➤ The Settings View appears.
5. Turn the rotary push knob and select Mode.
6. Press the rotary push knob until Mode is set to ER (not ERmin or ERmax).
7. Rotate the PM fiber relative to the laser diode until the displayed ER value has reached a peak value.
   ➤ To obtain more stable measured values, increase the averaging by slightly rotating the fiber relative to the laser diode.
8. To determine and set the ERmin value, change to the ERmin mode.
   a. Go to the Settings View and select ER_min from the Mode parameter.

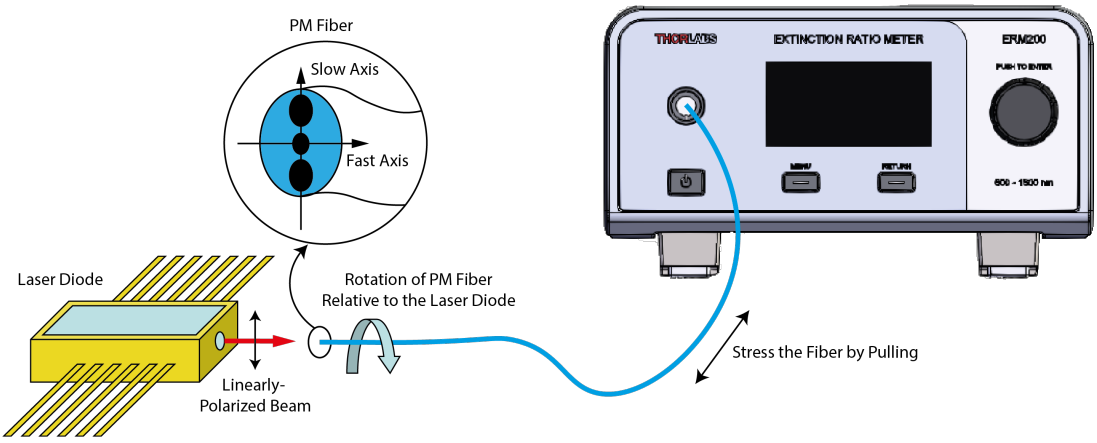


b. Press the *RETURN* button.
   ➤ ERmin is updated whenever a lower value is measured.



c. Repeat the procedure while stressing the fiber mechanically or with temperature.

9. Rotate the fiber relative to the laser diode in one direction, however only slightly and slower than in the crude first adjustment.
   ➤ The orientation of the PM fiber can be optimized by a trial and error method.
   ➤ The ERmin will be saved.
10. Repeat steps 8 b and 8 c stepwise, rotating the fiber slightly and putting it under stress until the ERmin peaks.



Note

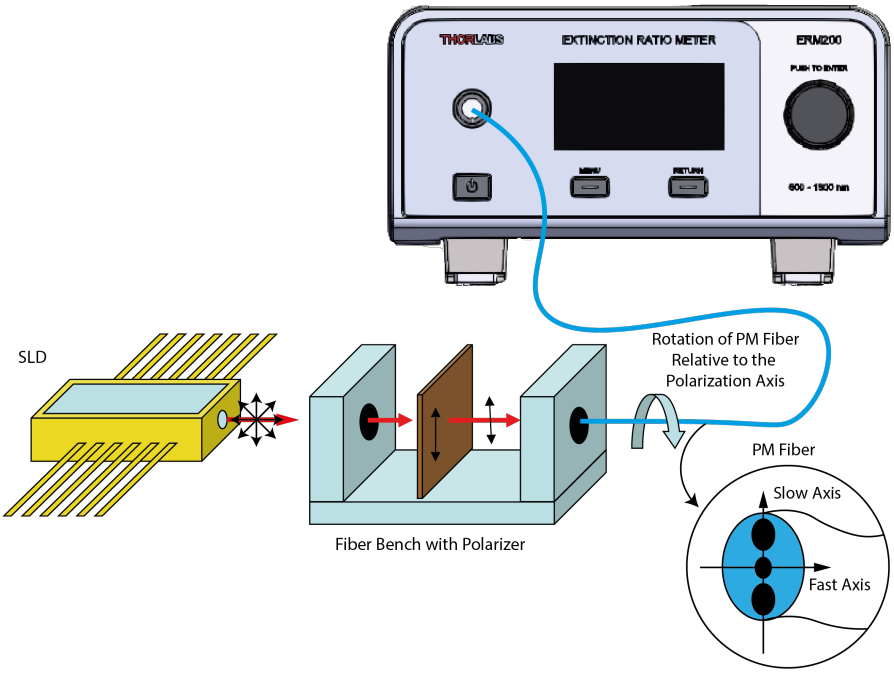
The ERM2xx cannot distinguish between the fast and slow axis of a PM fiber. A pre-adjustment to the desired main axis is required to align the DUT (Device Under Test) to the slow (or fast) axis of the PM fiber.

5.5.3 Aligning a PM Fiber Patch Cable

This section describes how to use the ERM2xx to align a PM fiber patch cable.
For this, Thorlabs recommends using an ASE or SLD as a light source rather than a laser diode.

The Extinction Ratio measurement of a PM fiber with an SLD can be done in the following way:

1. The output connector of the fiber is entered into the fiber adapter connection port of the ERM2xx.
2. Switch on the ERM2xx.
3. Connect the SLD to the input of the fiber bench with the polarizer.
4. Connect the input of the PM fiber to the output of the fiber bench.
5. Press the *MENU* button to go to the Settings View, select Mode by turning the rotary push knob and press the rotary push knob until the Mode is ER (not ERmin or ERmax).
   ➤ Toggle to the ER display to receive the actual ER value.
6. Rotate the input of the PM fiber relative to the fiber bench until a maximum ER value is displayed.



5.5.4 Aligning the Connector Key to a PM Fiber

The ERM2xx can be used to align a connector key to the polarization axis of the connected PM fiber.

There are several ways to perform this alignment depending on the type of connector and the equipment used to assemble a connector to a fiber.

Assuming the connector is already assembled to the PM fiber and the connector key can still be moved the alignment can be performed as follows:

1. Couple linearly-polarized light into the main axis of the PM fiber which has to be aligned to the connector key on the input side.
2. Press the *MENU* button to go to the Settings View, select Mode by turning the rotary push knob and press the rotary push knob until the Mode is ER (not ERmin or ERmax).
   ➤ Toggle to the ER display to receive the actual ER value.
3. Rotate the connector with the connector key under test until the displayed misalignment angle shows 0°.
4. Lock the key with respect to the connector with adhesive or another adequate method.

Chapter 6 Software

The ERM2xx can be controlled remotely from a PC with custom-made software or via the OPM software.

Connection to the PC is established by the USB 2.0 connector and the included USB cable with a male Type-A connector at the PC side and a Type-B connector on the instrument side.

In order to generate custom-made software to control the ERM2xx remotely, a specific instrument driver and some tools for use in different programming environments are required. The driver and tools are installed to your PC during the installation of the OPM software.

The OPM software can be downloaded from the Thorlabs website via the software tab.

In this section the location of drivers and files required for programming in different environments are given for installation under Windows 10 (32-bit and 64-bit) and Windows 11.

The ERM2-Series driver contains 32-bit and 64-bit versions.

In 32-bit systems, only the 32-bit components are installed to

```
C:\Program Files\...
```

In 64-bit systems the 64-bit components are being installed to

```
C:\Program Files\...
```

while 32-bit components can be found at

```
C:\Program Files (x86)\...
```

Please find a summary of what files are required for particular programming environments in the table below.

Programming Environment	Necessary Files
C, C++, CVI	*.h (Header File) *.lib (Static Library)
C#	.net wrapper dll
LabVIEW™	*.fp (Function Panel) and NI VISA Instrument Driver Beside that, LabVIEW™ driver vi's are provided with the *.llb container file. **Note** LabVIEW™ drivers and components are installed only if a LabVIEW™ installation was recognized.

Note

All above environments require also the VXIpnp Instrument Driver dll.

During installation, a system environment variable `VXIPNPPATH` for including files is created. It contains the information where the drivers are installed to, usually to `C:\Program Files\IVI Foundation\VISA\WinNT\.`

In the next sections the locations of above files are described in detail.

6.1 Requirements

Hardware Requirements

Processor (CPU) : 2.4 GHz or Higher

Memory (RAM) : 4 GB (Min)

Graphic Card Resolution : 1024 x 768 (Min)

Hard Drive : 1 GB (Min) of Available Disk Space (32-bit Operating System)
2.3 GB (Min) of Available Disk Space (64-bit Operating System)

Interface : Free USB 2.0 Port, USB Cable According the USB 2.0 Specification

Software Requirements

- Windows® 10 (32-Bit, 64-Bit)
- Windows 11

6.2 Installing Software

The installation instructions for the OPM software can be found on the Thorlabs website.

Note

Do not connect the ERM2xx to the PC prior to software installation!

Attention

Exit all running applications on your PC as the installer may require a reboot of your PC during installation!

1. Save the ZIP file to your computer and unpack the archive.
2. Double click the setup.exe to install Shield Wizard.
3. Read and accept the End-User License Agreement and the GNU Lesser general Public License.
   ➤ Note the Readme Information during the installation process: "A new and improved instrument driver is installed."
   ➤ The Software is installed.
4. Connect the ERM2xx to the PC.

6.3 32-Bit Operating System

Note

According to the VPP6 (Rev. 6.1) Standard the installation of the 32-bit VXIpnp driver includes both the WINNT and GWINNT frameworks.

VXIpnp Instrument Driver

`C:\Program Files\IVI Foundation\VISA\WinNT\Bin\TLERM200_32.dll`

Note

This instrument driver is required for all development environments!

Header File

`C:\Program Files\IVI Foundation\VISA\WinNT\include\TLERM200.h`

Static Library

`C:\Program Files\IVI Foundation\VISA\WinNT\lib\msc\TLERM200_32.lib`

Function Panel

`C:\Program Files\IVI Foundation\VISA\WinNT\TLERM200\TLERM200.fp`

Online Help for VXIpnp Instrument Driver

`C:\Program Files\IVI Foundation\VISA\WinNT\TLERM200\Manual\TLERM200.html`

NI LabVIEW™ Driver

The LabVIEW™ Driver is a 32-bit driver and compatible with 32-bit NI- LabVIEW™ versions 8.5 and higher only.

`C:\Program Files\National Instruments\LabVIEW xxxx\Instr.lib\TLERM200\TLERM200.llb`

(LabVIEW™ container file with driver vi's and an example. "LabVIEW xxxx" stands for actual LabVIEW™ installation folder.)

.net wrapper dll

`C:\Program Files\Microsoft.NET\Primary Interop Assemblies…`
`…\Thorlabs.ERM200_32.Interop.dll`

`C:\Program Files\IVI Foundation\VISA\VisaCom\…`
`…\Primary Interop Assemblies\Thorlabs.ERM200_32.Interop.dll`

Example for C

Project File:

`C:\Program Files\IVI Foundation\VISA\WinNT\TLERM200\Examples\CVI C Sample\sample.prj`

Source File:

`C:\Program Files\IVI Foundation\VISA\WinNT\TLERM200\Examples\CVI C Sample\sample.c`

Example for C#

Solution File:

`C:\Program Files\IVI Foundation\visa\WinNT\TLERM200\Examples\MS VS 2012 CSharp Demo\Thorlabs.ERM200.CSharp_Sample.sln`

Project File:

`C:\Program Files\IVI Foundation\visa\WinNT\TLERM200\Examples\MS VS 2012 CSharp Demo\Thorlabs.ERM200.CSharp_Sample.csproj`

Example for LabVIEW™

`C:\Program Files\National Instruments\LabVIEW xxxx\Instr.lib\TLERM200\TLERM200.llb`

(LabVIEW™ container file with driver vi's and an example. "LabVIEW xxxx" stands for actual LabVIEW™ installation folder.)

6.4 64-Bit Operating System

Note

According to the VPP6 (Rev. 6.1) Standard the installation of the 64-bit VXIpnp driver includes the WINNT, WIN64, GWINNT and GWIN64 frameworks. This means that the 64-bit driver includes the 32-bit driver as well.

In case of a 64-bit operating system, 64-bit drivers and applications are installed to

`C:\Program Files\...`

while the 32-bit files - to

`C:\Program Files (x86\...`

Below, both installation locations are listed.

VXIpnp Instrument Driver

`C:\Program Files (x86)\IVI Foundation\visa\WinNT\Bin\TLERM200_32.dll`

`C:\Program Files\IVI Foundation\VISA\Win64\Bin\TLERM200_32.dll`

`C:\Program Files\IVI Foundation\VISA\Win64\Bin\TLERM200_64.dll`

Note

This instrument driver is required for all development environments!

Header File

```
C:\Program Files (x86)\IVI Foundation\visa\WinNT\Include\TLERM200.h
C:\Program Files\IVI Foundation\visa\WinNT\Include\TLERM200.h
```

Static Library

```
C:\Program Files (x86)\IVIFoundation\visa\WinNT\lib\msc...
...\TLERM200_32.lib
C:\Program Files (x86)\IVIFoundation\visa\WinNT\Lib_x64\msc...
...\TLERM200_64.lib
C:\Program Files\IVI Foundation\VISA\Win64\Lib_x64\msc\TLERM200_64.lib
```

Function Panel

```
C:\Program Files (x86)\IVI Foundation\visa\WinNT\TLERM200\TLERM200.fp
```

Online Help for VXIpnp Instrument Driver

```
C:\Program Files (x86)\IVI
Foundation\VISA\WinNT\TLERM200\Manual\TLERM200.html
```

NI LabVIEW™ Driver

The LabVIEW™ Driver supports 32-bit and 64-bit NI-LabVIEW2009 and higher.

```
C:\Program Files\National Instruments\LabVIEW xxxx\Instr.lib\TLERM200…
…\TLERM200.llb
C:\Program Files (x86)\National Instruments\LabVIEW
xxxx\Instr.lib\TLERM200\TLERM200.llb
```

(LabVIEW™ container file with driver vi's and an example. "LabVIEW xxxx" stands for actual LabVIEW™ installation folder.)

.net wrapper dll

```
C:\Program Files (x86)\Microsoft.NET\Primary Interop Assemblies…
…\Thorlabs.ERM200_32.Interop.dll
C:\Program Files (x86)\Microsoft.NET\Primary Interop Assemblies…
…\Thorlabs.ERM200_64.Interop.dll
C:\Program Files (x86)\IVI Foundation\VISA\VisaCom\…
…\Primary Interop Assemblies\Thorlabs.ERM200_32.Interop.dll
```

Example for LabView™

```
C:\Program Files\National Instruments\LabVIEW xxxx\Instr.lib\XXXX…
…\TLERM200.llb
```

(LabVIEW™ container file with driver vi's and an example. "LabVIEW xxxx" stands for actual LabVIEW™ installation folder.)

Chapter 7 Technical Data

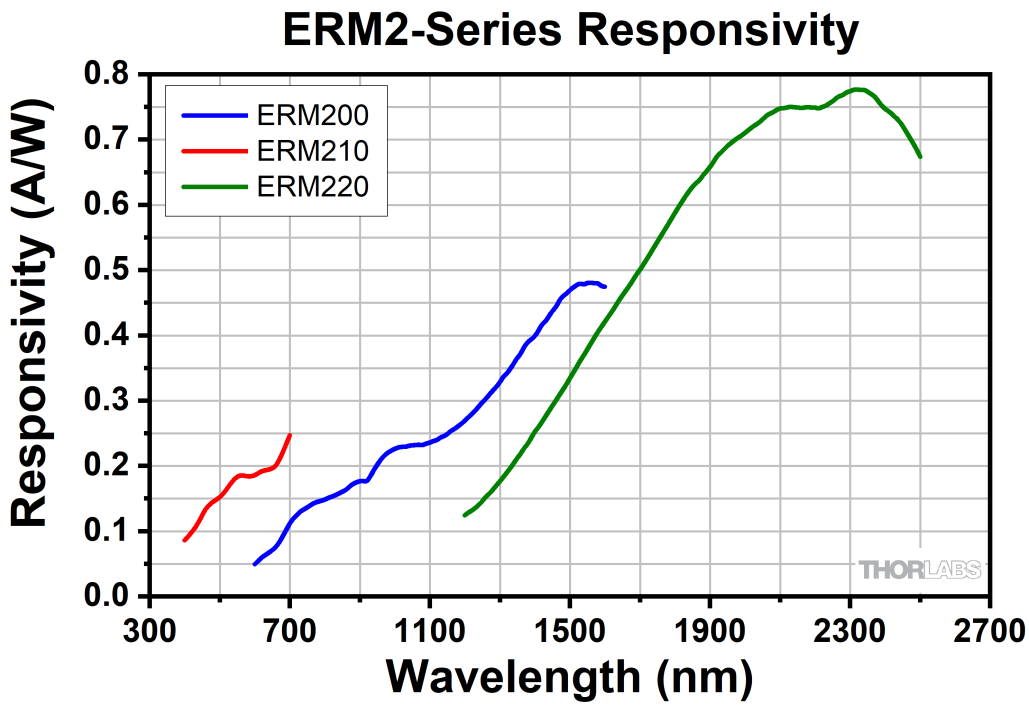
7.1 Specifications

All technical data are valid at 23 ± 5 °C and 45 ± 15% relative humidity (non-condensing).

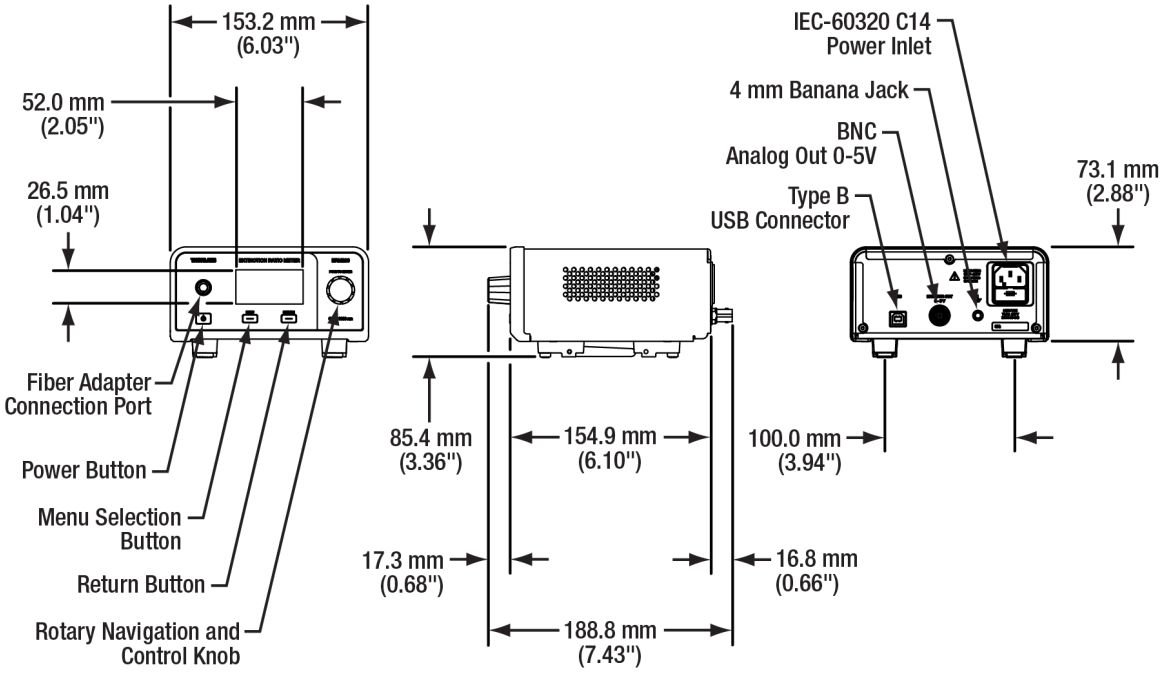
Item #	ERM210	ERM200	ERM220
Specifications			
Wavelength Range	400 nm to 700 nm	600 nm to 1600 nm	1200 nm to 2500 nm
Peak Wavelength	700 nm	1550 nm	2300 nm
Maximum Input Power @ Peak Wavelength	13 dBm		8 dBm
PER Resolution	0.1 dB (Display) 0.01 dB (USB)		
PER Range @ Peak Wavelength	0 to 40 dB (for +13 dBm to -12 dBm)		0 to 40 dB (for +8 dBm to -12 dBm)
	0 to 30 dB (for -12 dBm to -27 dBm)		
	0 to 20 dB (for -27 dBm to -37 dBm)		
PER Accuracy	<0.5 dB		
Polarization Angular Resolution	0.1° (Display) 0.01° (USB)		
Accuracy of Polarization Angle	<0.5°		
Measuring Speed	10 Hz (Approximately)		
Connector Type	M12 x 0.5 Thread for Exchangeable Adapters ERM2F (Wide-Key FC/PC), ERM2F2 (Narrow-Key FC/PC), ERM2A (Wide-Key FC/APC), ERM2A2 (Narrow-Key FC/APC), ERM2L (LC/PC), ERM2S (SC/PC), ERM2EF (E-2000/PC), ERM2EA (E-2000/APC)		
Monitor Output			
Voltage Output	0 V to 5 V (High-Z, Conversion Factor 0.1 V/dB)		
Accuracy	±10 mV (Typical) ±50 mV (Max)		
General			
Interface	USB Type B		
Display	2.42" OLED		
AC Input	Universal, 110 V to 220 V, 50/60 Hz		
Power On Warm Up Time	15 min		
Operating Temperature Range[a]	5 °C to 40 °C		
Storage Temperature Range	-20 °C to 40 °C		
Relative Humidity	80% (Max.) Up to 31 °C Decreasing to 50% at 40 °C		
Dimensions (W x H x D)	153.2 mm x 85.4 mm x 188.8 mm (6.03" x 3.36" x 7.43")		
Weight	1.05 kg (2.4 lbs)		

a. Non-condensing

7.2 Graphs



7.3 Mechanical Drawing



Chapter 8 Simplified Declaration of Conformity

The full text of the EU declaration of conformity is available at the following internet adress:
https://www.thorlabs.com/extinction-ratio-meters?tabName=Overview

Chapter 9 Return of Devices

This precision device is only serviceable if returned and properly packed into the complete original packaging including the complete shipment plus the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel.

Note

Fit the shipping lock on the aperture of the ERM2xx to ensure safe transportation. If the shipping lock is not fitted on the aperture, the ERM2xx may be damaged!

Chapter 10 Warranty

The precision devices are only serviceable if returned and properly packed into the complete original packaging including the complete shipment plus the cardboard insert that holds the enclosed devices. If necessary, ask for replacement packaging. Refer servicing to qualified personnel.

General Terms and Conditions of Sale can be found at https://www.thorlabs.com/legal.

Chapter 11 Maintenance and Cleaning

Protect ERM2xx devices from adverse weather conditions. The ERM2xx devices are not water resistant.

Attention

To avoid damage to the instrument, do not expose it to spray, liquids, or solvents!

The unit does not need regular maintenance by the user. It does not contain any modules and/or components that could be repaired by the user. If a malfunction occurs, please see the Return of Devices section and contact Thorlabs for return instructions.

Do not remove covers!

Replacing the Mains Fuse

The ERM2xx Series of extinction ratio meters have an accessible power input fuse which can be replaced if the fuse blew due to line distortions, incorrect line voltage, or other causes.

The fuse can be replaced from the rear side without opening the unit.

Attention

To avoid risk of fire only the appropriate fuses for the corresponding line voltage must be used. The fuse type is specified here and on the rear of the unit. Only use the following fuse: **T1.0A / 250 V**

Note

All fuses must meet IEC specification 60127-2/III.

To exchange the fuse, please follow the procedure below:

1. Turn off the ERM2xx.
2. Disconnect the mains cable.
3. Release the fuse holder by pressing its plastic retainer down using a small screwdriver.
   ➤ The fuse holder is located below the 3-pole power connector of the mains jack.
4. Replace the defective fuse.
5. Press the fuse in the fuse holder until locked.

Chapter 12 Disposal



Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return “end of life” Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out “wheelie bin” logo (see right), were sold to and are currently owned by a company or institute within the EC, and are not dissembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. “End of life” units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site. It is the user's responsibility to delete all private data stored on the device prior to disposal.

Chapter 13 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.



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