



Optical Power Meter Interfaces

PM103, PM103A, PM103U Operation Manual



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We aim to develop and produce the best solutions for your applications in the field of optical measurement techniques. To help us to live up to your expectations and constantly improve our products, we need your ideas and suggestions. We and our international partners are looking forward to hearing from you.

Thorlabs GmbH

Warning

Sections marked by this symbol explain dangers that might result in personal injury or death. Always read the associated information carefully before performing the indicated procedure.

Attention

Paragraphs preceded by this symbol explain hazards that could damage the instrument and the connected equipment or may cause loss of data.

Note

This manual also contains "NOTES" and "HINTS" written in this form.

Please read this advice carefully!

1 General Information

The PM103x Optical Power and Energy Meter interfaces measure the optical power of laser light or other monochromatic or near monochromatic light detected by a connected sensor. Its high repetition rate with up to 80kHz supports even fast pyroelectric sensors. The PM103x power meter interfaces are compatible with all Thorlabs “C-Series” [Photodiodes](#), [Pyroelectric sensors](#), and respective custom sensors.

To flexibly integrate the PM103x into a setup, the PM103x models offer [different electronic interfaces](#)^[2] for instrument control and output:

- PM103: USB port and DA-15 connector
- PM103A: USB port (Input and Output) and SMA analog interface (Output only)
- PM103U: USB port only

The USB port features a fixture for secure connection of the cable to the housing.

For the PM103U and PM103A power meters, instrument control and power supply are facilitated via the USB port. The PM103 can alternatively use the DA-15 interface for instrument control and to connect a power supply. For more information on the special features of the PM103x models, please see the table [PM103x Model Comparison](#)^[2] below.

For instrument control and data analysis through a connected PC, tablet or laptop, Thorlabs offers the [Optical Power Monitor](#) (OPM) software. Instead of the OPM software, the user can write custom made software. For this, information on driver and SCPI commands are provided in the manual WriteYourOwnApplication (WYOA) for the PM103x.

In summary, the PM103x models give the customer the choice of different interfaces, as well as provide a supplied control and analysis software and the option to use custom made software. Further, the PM103 can even be controlled via an external micro-controller, supplied by the customer. These features allow for maximum flexibility to integrate the instrument in test and measurement systems and a wide range of industrial and scientific applications in manufacturing, quality control, quality assurance, and R&D for stationary and field use.

Attention

Please find all safety information and warnings concerning this product in the chapter [Safety](#)^[22] in the Appendix.

1.1 PM103x Model Comparison

	PM103 ^[9]	PM103A ^[10]	PM103U ^[10]
USB Connector and Operation ^[11]	√	√	√
SMA Connector ^[10]		√	
DA-15 Universal Connector ^[20]	√		
RS232 Operation ^[11]	√		
Analog Output Operation ^[13]	√	√	
Autonomous Operation to Analog Output ^[13]	√	√	
Real Analog Output ^[13]	√	√	
Sensitivity Configurable Analog Output ^[13]	√	√	
UART Operation ^[12]	√		
2 Digital I/O Ports ^[12]	√		
1 Digital I/O Ports ^[12]		√	
NTC Input ^[14]	√		
Power Supply +5V to +36V ^[14]	√		

1.2 Ordering Codes and Accessories

- PM103** Power and Energy Meter Interface with DA-15 Connector; USB, RS232, or UART Operation. Digital or Analog Signal Output; Two Digital I/O Ports; NTC Input; USB Interface for Control and Power Supply.
- PM103A** Power and Energy Meter Interface with SMA Connectors for two Analog Outputs and one Digital I/O Port; USB Interface for Control and Power Supply.
- PM103U** Power and Energy Meter Interface with USB Connector and USB Operation for Control, Read Out, and Power Supply.

Included Accessories:

The PM103x Power and Energy Meters include certain cables. Further cables are recommended in [Optional Accessories](#)³.

- PM103:** DA-15 Connector and Connector Housing
USB Cable, Type A to Mini B, with locking screw, 1.5m
- PM103A:** USB Cable, Type A to Mini B, with locking screw, 1.5m
- PM103U:** USB Cable, Type A to Mini B, with locking screw, 1.5m

Optional Accessories:

To run the PM103x power and energy meter, additional cables or mounting devices may be required.

Cables

- PM103: Cable to attach to the provided DA-15 connector housing.
- PM103A: SMA cable: please provide a cable with a SMA connector with your PM103A. Thorlabs offers a variety of [SMA connector cables](#).

Mounting

- Horizontal Mounting Clamp ([ECM225](#)) to mount the PM103x onto a post.
- Vertical Mounting Clamp ([ECM100](#)) to mount the narrow side of the PM103x onto a post.
- Double Sided Horizontal Mounting Clamp ([EPS225](#)) to securely mount two devices on top of each other.

Please visit our homepage <http://www.thorlabs.com> for various accessories like power and energy sensors, fiber adapters, posts and post-holders.

1.3 Requirements

Hardware Requirements

PM103: Please provide an appropriate cable to be attached to the DA-15 connector.

PM103A: Please provide [appropriate cables](#) to connect to the SMA ports.

Software Requirements

All models of the PM103x can be run with the Thorlabs' [OPM software](#). Please see the requirements for the OPM on the website.

Sensor Requirements

Thorlabs C-Series Sensors

The PM103x supports all Thorlabs C-Series photodiode and pyroelectric sensors. The C-Series can be easily identified by the red connector-housing of the DE-9 connector, compared to older versions of Thorlabs power sensors.

Please refer to the chapter [Connecting a Power Sensor](#)⁶⁷ on how to use older Thorlabs sensors or custom sensors.

2 Getting Started

Please inspect the shipping container for damage. Please do not cut through the cardboard. You might need the box for storage or for returns.

If the shipping container seems to be damaged, inspect the contents for completeness and test the PM103x mechanically and electrically. Keep the container for storage or in order to return the product in case of future problems.

Verify that you have received the following items within the package:

2.1 Parts List

1. PM103x Optical Power and Energy Meter Interface
2. USB Cable, Type A to Mini B, with Locking Screw, 1.5 m
3. PM103: DA-15 Connector and Connector Housing
4. Quick Reference
5. Certificate of Calibration

3 Operating Instructions

3.1 How To

This chapter describes how to install the PM103x for standard measurements.

3.1.1 PM103x Setup

- Download and install the [Optical Power Monitor](#) software on the device that will be used to control the power meter interface (PC, laptop or tablet).

Note

Install the software prior to connecting the power meter interface to the PC (see [Software](#)^[14]).

- Connect the PM103x to a PC (Status LED turns yellow) or other power source (status LED power supply turns green) via the USB port.
 - The PM103 accepts external power supplies with 5 V to 36 V via the DA-15 interface. When connecting the USB port while using an external power supply via the DA-15 port, connecting the USB port will automatically switch to the 5 V power supply via USB.
 - The status LED for the power supply is green when connected to an external power supply via the DA-15 connector.
- Connect the PM103x to a readout instrument (PC) using the USB cable or a matching cable for the respective output port (SMA or DA-15). For PM103A and PM103, please provide cables.
- [Connect a suitable sensor](#)^[6] to the PM103x.

The sensor status LED indicates, when a sensor has been detected (green) or when no sensor or no recognizable sensor is connected (red).

The Power Meter is now ready for operation and is recognized by the OPM software.

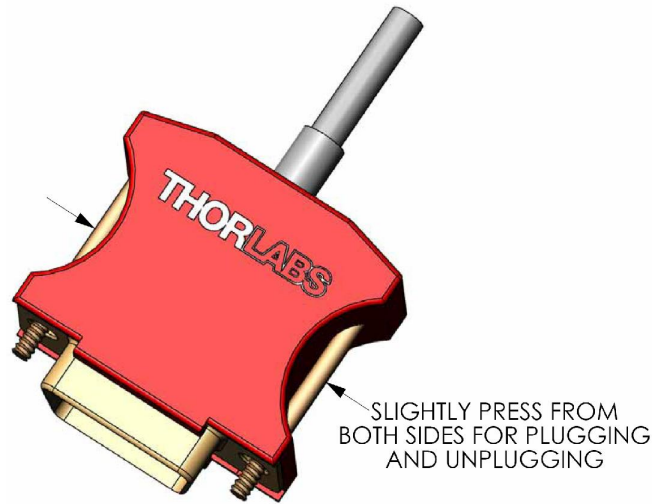
Note

For detailed instructions on controlling the PM103x through the OPM software, please download the OPM [manual](#).

3.1.2 Connecting a Power Sensor

The PM103x supports all Thorlabs C-Series photodiode and pyroelectric sensors, that can be identified by the red connector-housing of the DE-9 connector, compared to older versions of Thorlabs power sensors. Sensor type and calibration data are saved in the non-volatile memory of the DE-9 connector. Upon connection, this information is automatically sent to the PM103x and to the controlling device (PC or else) and software. The software will automatically recognize the sensor.

To plug-in or remove a sensor, slightly press on the two bolts in the connector housing, that fix it by tension.



DE-9 connector

Sensors can be hot-swapped to the power meter interface. After recognizing a new valid sensor, the type and calibration data will be downloaded to the power meter interface in approximately 2 seconds and the unit is ready to operate with the new sensor.

Note

Older Thorlabs Sensors without a DE-9 connector

The PM103x will **NOT** automatically recognize sensors lacking a DE-9 connector, as for the case of the 'A' and 'B' series. Please contact [Thorlabs](#)^[26] for an upgrade of old sensors with DE-9 connectors.

Note

Custom Sensors

To use sensors without a DE-9 connector, manufactured by Thorlabs or else, the user may provide an appropriate adapter. To build the adapter, refer to the Pin-out of the DE-9 connector shown in the [Appendix](#)^[20]. The adapter will per default automatically be recognized by the application [Optical Power Monitor](#) as "Photodiode adapter" or "Pyro adapter". The sensor type can then be adjusted in the software.

3.2 Power Meter Interface Features

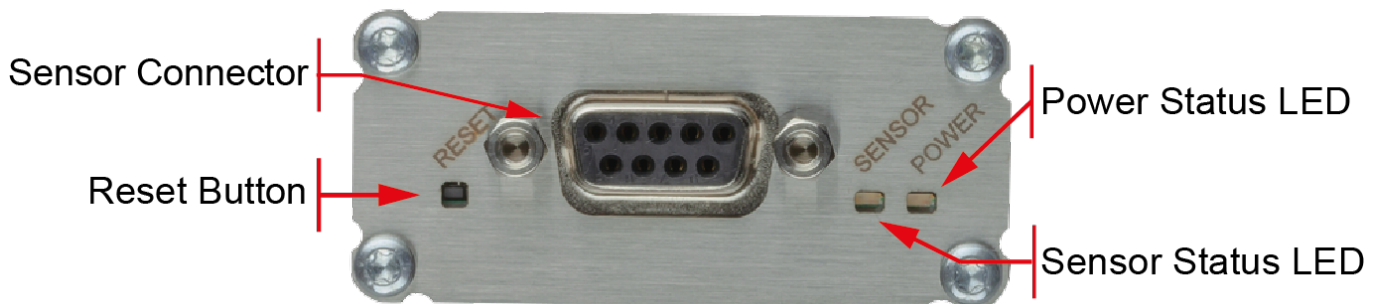
PM103x optical power meters offer full functionality to process signal from [compatible photodiode or pyroelectric sensors](#) to be displayed and analyzed on a connected PC.

PM103x general features

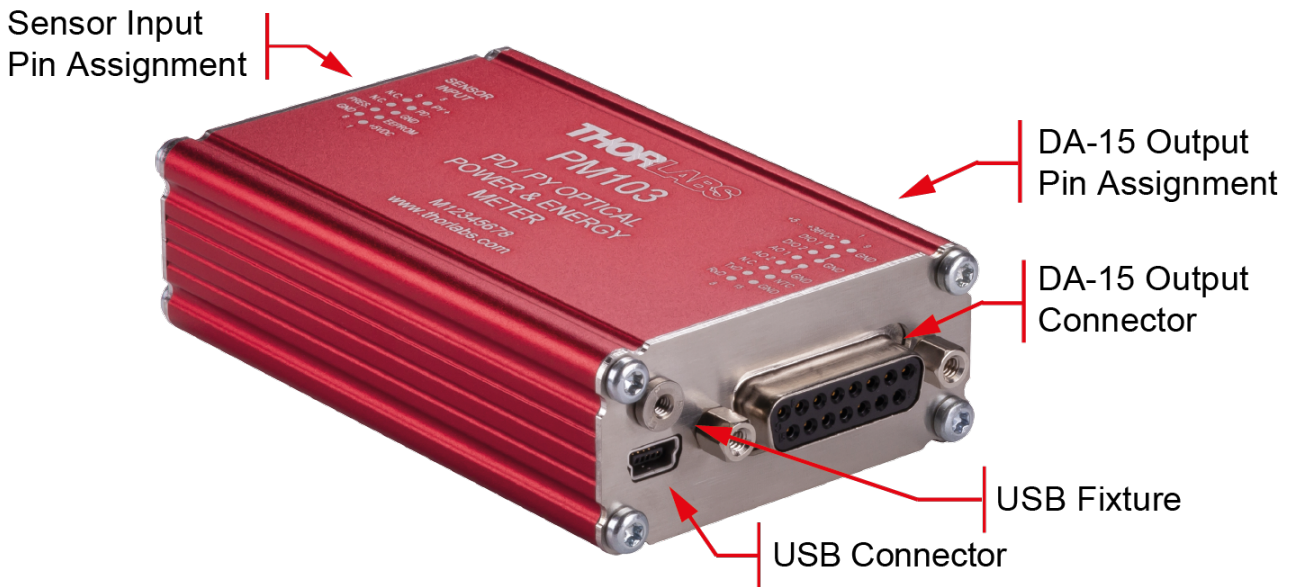
- All PM103x models have a [non-volatile memory](#) which prevents power meter settings from being lost upon shutting down or rebooting.
- A fast [readout rate](#) of 100 kS/s permits online signal monitoring.
- Finely graduated power and energy ranges permit optimal resolution for power measurements.
- A [Reset Button](#) allows quick rebooting of the micro controller.
- The PM103x is powered either via the USB interface or via the DA-15 interface. The status LED indicates appropriate connection to a power supply. It turns yellow when the PM103x is connected to the PC or green after connecting to an external power supply.
- All PM103x can calibrate up to sensors with the help of the OPM software. Please see the software manual for more information.
- Different electrical interfaces in PM103x models for integration into different systems in industrial and scientific applications. The different electrical interfaces come with further [functions](#), described in the following chapters.

3.2.1 PM103x Sensor Connector

All models of the PM103x have the same connector shown below. The [Pin assignment](#) is engraved on the front of the PM103x.



3.2.2 PM103



PM103 Special Features

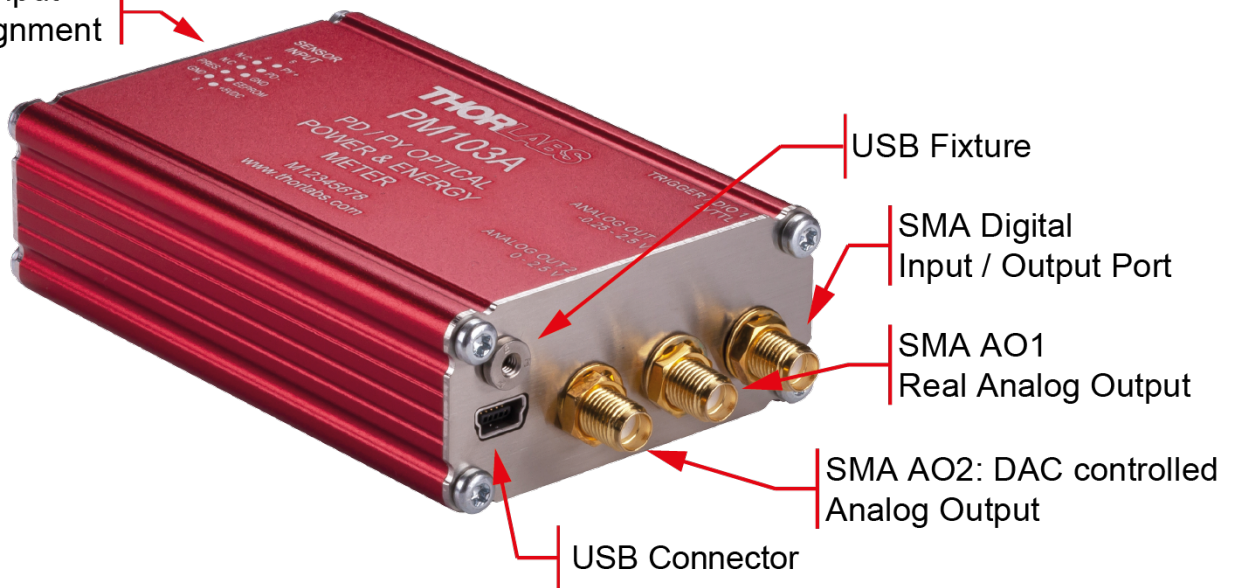
The PM103 version of PM103x features a number of additional options, due to the DA-15 output connector.

The PM103 is per default configured to RS232 configuration (+/- 5 V voltage level). This can be changed to a UART configuration (0/5 V voltage level) such that the PM103 can be accessed by external micro-controllers for instrument control and data export. The PM103 can also be adjusted to accommodate micro-controllers using 3.3 V.

1. [DA-15 Interface](#) ^[20]
2. [Two Digital I/O ports](#) ^[12]
3. [NTC input](#) ^[14]
4. [Two Analog Output Ports](#) ^[13]
5. [Real Analog Output](#) ^[13]
6. [Autonomous Operation to Analog Output](#) ^[13]
7. [Optional Use of 5 V - 36 V Power Supply](#) ^[14]
8. [RS232 Operation](#) ^[11]
9. [Adjustable Baud Rate](#) ^[12] via USB or Serial Communication (SCPI commands); The default BAUD Rate is 115200 Bit/s.
10. [UART Operation](#) ^[12] (i.e. for Control via an External Micro-Controller)
11. Instrument Control using SCPI commands (Serial Communication)
12. Power Meter Control and Output via USB

3.2.3 PM103A

Sensor Input
Pin Assignment



PM103A Special Features

1. [Autonomous Operation to analog output.](#) ^[13]
2. [Configurable Analog Output](#) ^[13]
3. [Configurable Digital In/Output](#) ^[12]
4. Power Meter Control and Output via USB

3.2.4 PM103U

Sensor Input
Pin Assignment



PM103U Special Features

- Power Meter Control and Output via USB

3.2.5 USB Operation

All PM103x models can be run via the USB port. The USB interface on all PM103x models also serves to connect a power supply and to update firmware of the PM103x.

The PM103U uses the USB interface as the only port for control and output.

Note USB vs UART operation for PM103

In case a USB communication is established in addition to the DA-15 connection, the PM103 switches to USB-Mode and the DA-15 serial interface becomes inactive. Only after actively closing the USB connection, the serial communication is reestablished.

When switching the PM103 in the opposite direction, from USB to RS232 operation or to UART operation, PM103 uses the DA-15 interface for control and output.

3.2.6 RS232 Operation

The power meter PM103 can be operated with serial communication via RS232.

Please use a RS232 standard protocol for RS232 communications. For questions, please contact our engineers at Thorlabs ²⁶.

Please set up the port as follows:

Parameter	Setting
Baud Rate	115.200 Bit/s (default) Supported range of Baud Rate: 9.600 and 230400 Bit/s
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None
Termination Character	LF (x0A; \n). The termination character needs to be enabled.

Note

PM103:

To operate the PM103 via RS232, RxD, TxD, and GND need to be wired from the DA-15 connector to a 9 Pin female connector to perform the connections.

PM103 DA-15 Pin	Male DE-9 Pin	Female DE-9 Pin (PC)
Pin7: TxD	Pin2	Pin2: RxD
Pin8: RxD	Pin3	Pin3: TxD
Pin15: GND	Pin5	Pin5: GND

3.2.7 UART Operation

The PM103 is delivered in RS232 operation but can be switched to UART operation.

UART dependent PM103 functions:

The PM103 may need to be switched from RS232 to UART operation when using an external micro controller for PM103 control. In RS232 operation the PM103 uses voltage levels of +/-5 V, while in UART mode the voltage level is shifted to 0/5 V. The PM103 can also be adjusted to accommodate micro-controllers using 3.3 V. When switched to 3.3 V, UART operation is tolerant for 5 V input signal.

For instructions on how to change the voltage level for UART operation, please refer to the document *Write-Your-Own-Applications (WYOA)* for PM103x.

For UART operation, please use standard protocols for UART communication and the SCPI commands listed in *WYOA* for PM103x.

3.2.8 Reset Button

The [reset button](#)⁸⁾ reboots the internal micro controller of the PM103x. To press the button, please use a small device that will not break inside the instrument. All settings are saved due to the internal non-volatile memory.

3.2.9 Baud Rate

For PM103, the Baud Rate can be adjusted from 9600 to 230400 Bit/s. This can be done either via the USB interface or via the serial interface using SCPI commands or driver functions. Please see the document *Write-Your-Own-Applications (WYOA)* for PM103x. The default Baud Rate is 115200.

Note

After adjusting the Baud Rate via RS232 or UART, close the RS232 or UART connection and reconnect with the desired Baud Rate in order for the Baud Rate to communicate it via RS232/UART. This is not required for operation via USB.

3.2.10 Non-Volatile Memory

All PM103x models have an internal non-volatile memory for all settings (i.e. wavelength setting, ranging, analog output configuration). The PM103x will start in the same configuration as prior to shut-down.

3.2.11 Digital I/O Ports

PM103

The PM103 has two configurable general purpose digital ports, DIO1 ([DA-15 Pin2](#)²⁰⁾) and DIO2 ([DA-15 Pin3](#)²⁰⁾). Both ports can be configured as digital input or output and queried per remote control command. These digital I/O ports use 3 V logic for output and are tolerant for 5 V input signal.

DIO1 can additionally be configured as trigger in and output, when reading the data in the 100 kS/s mode. The trigger function is supported by the Optical Power Monitor software. Alternatively, the DIO1 port can be controlled or monitored through SCPI commands in custom made software, as described in the document *WYOA* for PM103x.

DIO2 can be configured as pass/fail analysis flag and queried per remote control command.

PM103A

The PM103A has one [auxiliary digital port, DIO1](#)^[10], with an SMA connector.

The port can be configured as digital input or output and queried per remote control command.

The DIO1 port can be configured as trigger in and output, when reading the data in the 100 kS/s mode. The trigger function is supported by the Optical Power Monitor software. Alternatively, the DIO1 port can be controlled or monitored through SCPI commands in custom made software, as described in the document WYOA for PM103x.

3.2.12 Analog Output

PM103

The PM103 has two analog outputs, AO1 and AO2 (please see [Pin assignment](#)^[20]).

The Analog Output ports provide the amplified photo-diode current or the pyroelectric sensor voltage, depending on the sensor. The signal from the analog output AO1 is not wavelength- or zero- corrected.

The signal is measurement range dependent and can be calculated to:

$$U_{\text{out}} = 2.5 \text{ V} \frac{\text{Measured Scale}}{\text{Full Scale Value}}$$

AO1: The AO1 (DA-15 Pin 4) delivers the amplified direct **real analog signal** without a Digital-Analog-Converter (DAC). Therefore, the AO1 delivers a proportional output voltage for each measurement range. This analog output voltage can range from -0.25 V to +2.5 V. The real analog signal is not wavelength- or zero- corrected and offers the full bandwidth (up to 1 MHz) without quantization error.

Note

The bandwidth is in accordance with the settings of the sensor and power meter.

AO2: The AO2 (DA-15 Pin 5) delivers a range independent voltage which is **DAC controlled**. The output voltage is proportional to a configured value in V/W or V/J. This constant can be adjusted via the OPM software or, for custom made software, using the SCPI/driver commands in the WYOA for PM103x. The constant can be set in the Thorlabs software OPM under the Settings tab: AO2 Responsivity. The signal of the AO2 is generated with a 16-bit DAC with an update rate of 1 kHz. The analog output voltage can range from -0 V to +2.5 V.

The analog signal following the DAC is of advantage when large signal dynamics are expected because the DAC range changes and the output signal stays largely the same. Additionally, the output signal is wavelength corrected and corrected regarding the sensor calibration data.

PM103A

The PM103A has two analog output ports with a SMA output connectors. The functions match the function of AO1 and AO2 of the PM103 respectively.

3.2.13 Autonomous Operation to Analog Output

Power meters PM103 and PM103A can be run autonomously by simply connecting a power supply and using one of the [analog output ports](#)^[13]. In that case, no control device is required.

3.2.14 NTC Input

To monitor the temperature in a test environment, the PM103 has an NTC Input (DA-15 Pin 14) which allows connection of an NTC thermistor. The measurement range is 0.1 – 100 k Ω . The set range R0 and the bandwidth B for the NTC thermistor can be adjusted in the OPM software or through SCPI commands. The default settings are 10 k Ω and 3988 K to directly access the [TSP-TH](#)¹⁴ temperature probe. The measurement range with the PM103 is then -10 °C to 80 °C with the TSP-TH.

Note

Connection of the NTC to the DE-9 Pin 7 of the Sensor Connector requires a resistance of 0.2 k Ω to 40 k Ω .

3.2.15 Power Supply

All PM103x models use the USB port for power supply. Please provide an appropriate connection to a PC or power bank.

Note

When operating the PM103 via the RS232 interface or completely autonomously via an analog output, the unit can either be powered with 5 V via the USB connector or with any supply in the range from +5 V to +36 V via the DA-15 connector (Pin 1 and Pin 9 (GND)). As an external power supply, we recommend the [DS5](#) 5 VDC regulated power supply.

3.3 Software

The PM103x is operated remotely from a PC, laptop or tablet.

Thorlabs OPM Software

The Thorlabs [Optical Power Monitor](#) (OPM) software provides a Graphical User Interface to view, log, and analyze measurement data. Download the OPM software package Version 2.3 or higher from the Thorlabs website, via this [link](#), through the software tab on the product website, or through searching for the product name within the Thorlabs [software website](#).

All information on software installation, device control and data management software can be found in the software manual directly downloaded [here](#).

Note

Do not connect the PM103x prior to software installation!

Attention

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

Custom Made Software

The PM103x can also be run using custom made software. For this, please refer to the document Write-Your-Own-Application (WYOA) for PM103x.

3.3.1 Software Requirements

All models of the PM103x can be run with the Thorlabs' OPM software version 2.3 or higher.

Please find the requirements for the PC intended to be used for operation of the PM103x on the [OPM website](#).

3.3.2 PM103x Specific Software Functions

When using a PM103x power meter interface, the OPM software version 2.3 (or higher) shows several power meter specific functions. To see details, please also visit the [OPM manual](#).

3.3.2.1 PM103 Specific Software Functions

1. When a PM103x power meter is connected, the OPM software recognizes NTCs in the devices section. The OPM now allows users to adjust settings, view measurement results and to integrate the NTC measurement results in long-time monitoring experiments. For more information, please see the OPM manual.
2. When a PM103 is connected, it is possible to configure the analog AO2 port and display the output voltage.

3.3.2.2 PM103A Specific Software Functions

When a PM103A is connected, it is possible to configure the analog AO2 SMA port and display the output voltage.

When using the "Scope Mode" in the OPM software, the digital I/O SMA port can be used as an external trigger or as a monitor output for the internal trigger.

3.3.3 Sensor Calibration

All models of the PM103x can be used to calibrate signal detected by Thorlabs photodiodes to a known reference.

For this, the Sensor Calibration Tool within the software Optical Power Monitor is used. All the user needs to provide is a signal from a reference sensor. The signal from the sensor to be calibrated is then adjusted and the calibration along with the serial number of the calibrated sensor and the reference are saved in the power meter EEPROM and are retrieved by the software. Please see the manual of the OPM for more information.

3.3.4 Firmware Update

To update the firmware of the PM103x, please download the latest firmware through the [OPM website](#) and use the Firmware Update Tool in the software Optical Power Monitor (OPM). For more information, please see the manual of the OPM.

4 Maintenance and Service

Protect the PM103x from adverse weather conditions. The PM103x is not water resistant.

Attention

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

The unit does not need a regular maintenance by the user. It does not contain any modules and/or components that could be repaired by the user himself. If a malfunction occurs, please contact [Thorlabs](#)^[26] for return instructions.

5 Appendix

5.1 Technical Data

All technical data are valid at $23 \pm 5^\circ\text{C}$ and $45 \pm 15\%$ rel. humidity (non condensing)

	PM103	PM103A	PM103U
Interfaces			
Input/Output Interface	Mini USB, DA-15	Mini USB, Analog SMA	Mini USB
Operation Protocol	USB, RS232, UART Autonomous Operation	USB, Analog, Autonomous Operation	USB
Current Input (Photodiode Sensor)			
Connector	DE-9 (left housing side)		
Units	W, dBm, W/cm ² , A		
Measurement Range	21 Ranges: nA: 2, 4, 10, 20, 40, 100, 200, 400; μA : 1, 2, 4, 10, 20, 40, 100, 200, 400; mA: 1, 2, 4, 10 Range Selectable [W], Sensor Dependent		
Display Resolution	1 pA / Responsivity Value (A/W)		
Measurement Uncertainty	$\pm 0.2\%$ Full Scale (400 nA - 10 mA) $\pm 0.5\%$ Full Scale (2 nA - 200 nA)		
Analog Bandwidth	DC - 150 kHz, Dependent on Sensor and Settings		
Wavelength Correction	nm (A/W)		
Beam Area Setting	Diameter $1/e^2$ or Rectangular x,y		
AD Converter	16 bit		
Voltage Input (Pyroelectric Sensors)			
Connector	DE-9 (left housing side)		
Units	J, J/cm ² , W, dBm, W/cm ² , V		
Measurement Range	13 Ranges; mV: 20, 40, 100, 200, 400; V: 1, 2, 4, 10, 20, 40, 100, 200; Ranges Selectable in J, Sensor Dependent		
Display Resolution	100 μV / Responsivity Value (V/W)		
Measurement Uncertainty	$\pm 0.5\%$ Full Scale (1 V - 200 V) $\pm 1\%$ Full Scale (20 mV, 400 mV)		
Trigger Level	3 % - 90 % Full Scale		
Repetition Rate	Single Shot - 80 kHz, Dependent on Sensor		
Wavelength Correction	Sensor Dependent; nm, (V/W)		
Beam Area Setting	Diameter $1/e^2$ or Rectangular x,y		
AD Converter	16 bit		
Sensor Temperature Measurement			
Supported Temperature Sensor	Thermistor		
Temperature Measurement Range	-10°C to 120°C		
Sensor Power Supply			
Connector	DE-9 Pin 1		
Voltage	5V		
Maximum Current	50 mA		

	PM103	PM103A	PM103U
Remote Interfaces			
Remote Interface Type 1	USB 2.0 (High Speed)		
Connector	Mini-B USB, lockable		
Measurement Speed	1 kS/s + 100 kS/s bulk mode		
Remote Interface Type 2	RS232		
Connector	DA-15 Pin 7/8	NA	NA
Baud Rate	9600 - 230400 Bit/s Default: 115200 Bit/s	NA	NA
Settings	N1S	NA	NA
Measurement Speed	200 sps + 100 kS/s bulk mode	NA	NA
Analog Output AO2, Configurable			
Connector	DA-15 Pin 5	SMA	NA
Signal	Gain Signal Configur- able	Gain Signal Configur- able	NA
Voltage Range	0 to 2.5 V	0 to 2.5 V	NA
Accuracy	±1%	±1%	NA
Bandwidth	1 kHz	1 kHz	NA
Analog Output AO1, Not Corrected			
Connector	DA-15 Pin 4	SMA	NA
Signal	Amplified Input Signal - Not Corrected	Amplified Input Signal - Not Corrected	NA
Voltage Range	-0.25 V to 2.5 V	-0.25 V to 2.5 V	NA
Accuracy	±3%	±3%	NA
Bandwidth	up to 1 MHz, Depend- ent on Sensor and Set- tings	NA	NA
Auxiliary Temperature Measurement			
Connector	DA-15 Pin 14	NA	NA
Supported Temperature Sensor	Thermistor NTC 0.1 - 100 k , B-Value: 1000 - 9999 K	NA	NA
Temperature Measurement Range	-40 °C to +200 °C (NTC dependent)	NA	NA
Digital Control Pins I/O			
Connector	DA-15 Pins 2/3	SMA	NA
Function	2 x GPIO or Configurable as Trigger Input/Output, Pass/Fail Analysis	GPIO or Configurable as Trigger Input/Out- put	NA
Power Management			
DC Input 1 / Connector	+5 VDC to +36 VDC / DA-15 Pins 1, 9	NA	NA
DC Input 2 / Connector	5 V / USB		
Power Consumption	1 W		
Display			
Display Type	None; External PC - Windows Application or Driver Set		
Display Screens	Windows Application Software Provided		
GUI Refresh Rate	1000 Hz (Dependent on PC and Settings)		

	PM103	PM103A	PM103U
General			
Detectors Compatibility	Photodiode Sensors S100C Series Energy Sensors ES100C, ES200C Series Photodiodes (Max 10 mA) Pyro Detectors (Max 200 V)		
Status LED	Power, Sensor, PGM Error, USB		
Operating Temperature	0 °C to +40 °C		
Storage Temperature	-40 to 70 °C		
Dimensions (L x W x H)	3.80" x 2.25" x 1.00" (96.5 x 57.2 x 25.4 mm ³)	3.94" x 2.25" x 1.00" (100.2 x 57.2 x 25.4 mm ³)	3.68" x 2.25" x 1.00" (93.6 x 57.2 x 25.4 mm ³)
Weight	0.15 kg (0.33 lb)		

5.2 Pin Assignment Output Connector

PM103: PM103 has a universal DA-15 connector. The Pins are assigned as follows:

Pin	Function	Description
1	Power Supply	Pin for Alternative Power Supply with 5 VDC to 36 VDC, when not powered by USB
2	D I/O 1	General Digital Input / Output port; 3 V logic (Output), 5 V tolerant for Input
3	D I/O 2	General Digital Input / Output port; 3 V logic (Output), 5 V tolerant for Input
4	AO1	Analog Output; -0.25 V to +2.5 V per Measurement Range
5	AO2	Software Configurable Analog Output; 0 V to 2.5 V
6	N.C.	Not Connected
7	TxD	RS232; Connect to PC terminal RxD (PC DE-9 Pin2)
8	RxD	RS232; Connect to PC terminal TxD (PC DE-9 Pin3)
9	GND	Power Supply Ground
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	GND	Ground
14	N.C.	NTC Thermistor Input; Measurement Range 0.1 k Ω to 100 k Ω
15	GND	RS232 Signal Ground; Connect to PC Terminal Ground (PC DS-9 Pin5)

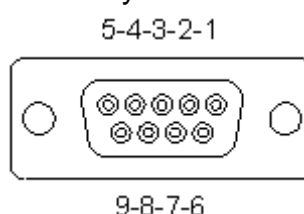
5.3 Pin Assignment of the Sensor Connector

The sensor connector allows the access of all Thorlabs "C-type" photodiode and pyroelectric sensors. The power meter interface uses the sensor calibration data, stored in the sensor connector, to calculate the corresponding actual power levels.

Additionally, the PM103x is capable to support custom made detectors. Please read the following instruction prior to connecting a self made sensor.

Warning

Pin 2 is uniquely used for the EEPROM Digital I/O (memory in Thorlabs sensor heads) and **MUST NOT** be used. Connecting this Pin may cause malfunction of the PM103x.



Pin-out of the DE-9 female connector (female)

Pin	Function	Description
1	Power Supply	+5 V; Max Current 50 mA from this Pin
2	EEPROM	Sensor Memory for the Calibration Data

Pin	Function	Description
3	AGND	Analog Ground for Photodiode, Pyroelectric Sensor, NTC
4	PD -	Photodiode Cathode Input
5	PY +	Pyroelectric Sensor Input
6	DGND	Digital Ground for EEPROM and 5V Output
7	PRESENT	Sensor Recognition, NTC Input. For Custom Sensors: Connect via a 1k Ω – 10k Ω Resistor to Pin 3 (AGND) to Enable a Custom Sensor
8	N.C.	Not Connected
9	N.C.	Not Connected

5.4 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 PM103x must not be operated in explosion endangered environments!

Only with written consent from Thorlabs may changes to single components be made or components not supplied by Thorlabs be used.

All modules including control inputs / outputs and the sensor must be connected 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 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.

Thorlabs GmbH 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 GmbH. 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.

Attention

Mobile telephones, cellular phones or other radio transmitters are not to be used within the range of three meters of this unit since the electromagnetic field intensity may then exceed the maximum allowed disturbance values according to IEC 61326-1.

This product has been tested and found to comply with the limits according to IEC 61326-1 for using connection cables shorter than 3 meters (9.8 feet).

5.5 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.

5.6 Manufacturer Address



Manufacturer Address Europe

Thorlabs GmbH
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Fax: +49-8131-5956-99
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Email: europa@thorlabs.com

EU-Importer Address

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Fax: +49-8131-5956-99
www.thorlabs.de
Email: europa@thorlabs.com

5.7 Certifications and Compliances

<i>EU Declaration of Conformity</i>		
<i>in accordance with EN ISO 17050-1:2010</i>		
We:	Thorlabs GmbH	
Of:	Münchner Weg 1, 85232 Bergkirchen, Deutschland	
<i>in accordance with the following Directive(s):</i>		
2014/30/EU	Electromagnetic Compatibility (EMC) Directive	
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)	
 <i>hereby declare that:</i>		
Model:	PM103, PM103A, PM103U	
Equipment:	Power Meter for Photodiode and Pyro Sensors	
<i>is in conformity with the applicable requirements of the following documents:</i>		
EN 61326-1	Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements	2013
 <i>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:</i>		
 <i>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.</i>		
Signed:		On: 18 February 2021
Name:	Dr. Bruno Gross	
Position:	General Manager	EDC - PM103, PM103A, PM103U -2021-0...
		

5.8 Warranty

Thorlabs warrants material and production of the PM103x for a period of 24 months starting with the date of shipment in accordance with and subject to the terms and conditions set forth in Thorlabs' General Terms and Conditions of Sale which can be found at:

General Terms and Conditions:

https://www.thorlabs.com/Images/PDF/LG-PO-001_Thorlabs_terms_and_%20agreements.pdf

and

https://www.thorlabs.com/images/PDF/Terms%20and%20Conditions%20of%20Sales_Thorlabs-GmbH_English.pdf

5.9 Copyright and Exclusion of Liability

Thorlabs has taken every possible care in preparing this document. We however assume no liability for the content, completeness or quality of the information contained therein. The content of this document is regularly updated and adapted to reflect the current status of the product.

All rights reserved. This document may not be reproduced, transmitted or translated to another language, either as a whole or in parts, without the prior written permission of Thorlabs. Copyright © Thorlabs 2021. All rights reserved.

Please refer to the general terms and conditions linked under [Warranty](#)²⁵.

5.10 Thorlabs Worldwide Contacts - WEEE Policy

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.
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China

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Thorlabs 'End of Life' Policy (WEEE)

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 disassembled 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.





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