PM125D - September 25, 2025

Item # PM125D was discontinued on September 25, 2025. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

- Kits Include Console, Sensor, and Post Assembly
- Digital or Analog Console
- Wavelengths from 190 nm to 20 µm
- Powers from 500 pW to 10 W

PM400K5
Digital Console with Thermal Sensor

PM400K3
Digital Console with Slim Photodiode Sensor

OVERVIEW

Features

- Includes Console, Sensor, and Mounting Components
- Consoles Compatible with C-Series Sensors
- Large, Easy-to-Read Digital or Analog Display
- USB 2.0 Port for Control via PC with Optical Power Monitor Software (See *Software* Tab)
- Rechargeable Battery
- 3.5 mm Jack or SMA Output (0 to 2 V) on Consoles for Monitoring Signal
- Recalibration Services Available

Table 1.1 Power Meter Kit Specifications

Item #	Power Range	Wavelength Range	Sensor Type	Console Type
PM120VA	50 nW - 50 mW (200 - 450 nm) 50 nW - 20 mW (450 - 1100 nm)	200 - 1100 nm	Si (S120VC)	Analog (PM100A)
PM120D	50 nW - 50 mW	400 - 1100 nm	Si (S120C)	Digital (PM100D)
PM400K1	50 nW - 50 mW	400 - 1100 nm	Si (S120C)	Touchscreen Digital (PM400)
PM400K2	500 nW - 500 mW	400 - 1100 nm	Si (S121C)	Touchscreen Digital (PM400)
PM400K3	500 pW - 500 mW[a]	400 - 1100 nm	Slim Si (S130C)	Touchscreen Digital (PM400)
PM400K4	50 nW - 40 mW	700 - 1800 nm	Ge (S122C)	Touchscreen Digital (PM400)
PM125D	2 mW - 10 W	0.19 - 20 µm	Thermal (S425C)	Digital (PM100D)
PM400K5	2 mW - 10 W	0.19 - 20 µm	Thermal (S425C)	Touchscreen Digital (PM400)

a. The S130C sensor features a sliding neutral density filter. Without the filter, the power measurement range is 500 pW to 5 mW, while with the filter, the range is 5 mW to 500 mW. The position of the ND filter is automatically detected by the power meter console.

Our optical power meter kits consist of a console, a C-series photodiode or thermal power sensor, and a post mounting assembly. Except for the PM120VA, which includes the PM100A analog power meter console, the sensor in each kit is paired with either a PM100D digital or PM400 touchscreen digital power meter console. For a full list of available kits, see Table 1.1.

All three consoles have a USB 2.0 connection that allows them to be controlled remotely using a PC with the Optical Power Meter software package installed (see the *Software* tab for details).

PM100A Analog Console
Suitable for both absolute and relative power measurements, the PM100A analog power meter console features an analog needle display and a supplemental LCD screen. The analog needle is ideal for relative power measurements and for watching small power fluctuations. The PM100A is compatible with all C-Series photodiode sensors and thermal sensors; it is not compatible with our pyroelectric energy sensors. The PM120VA power meter kit includes the PM100A console and power cables, an S120VC sensor, and a USB flash drive with the software package preloaded. For more

Power Meter Selection Guide
Sensors
Photodiode Power Sensors
Thermal Power Sensors
Thermal Position & Power Sensors
Pyroelectric Energy Sensors
Power Meter Consoles and Interfaces
Digital Handheld Console
Analog Handheld Console
Touchscreen Handheld Console
Dual-Channel Benchtop Console

information on the PM100A analog console features, see the *Specs* tab, *Console Displays* tab, or visit the full web presentation.

USB Interfaces with External Readout
Complete Power Meters
Power Meter Bundles
Wireless Power Meters with Sensors
Compact USB Power Meters
Field Power Meters for Terminated Fibers

PM100D Digital Console

The PM100D digital power and energy meter console features a menu-driven control panel, 4" backlit display, and SD card slot for storing data. Measurements screens include a numeric readout useful for standard power and energy readings, a simulated analog needle, graphs of power measurements over time, and a statistics view. Additionally, the PM100D console has a tuning mode that provides audio feedback for use when the detector is not within visual range. See the *Console Displays* tab for more information. The console is compatible with all our C-Series sensors for power or energy measurements, including our pyroelectric energy sensors, and includes a USB flash drive with the software package preloaded. For more information on the PM100D digital console features, see the *Specs* tab, *Console Displays* tab, or visit the full web presentation.

PM400 Touchscreen Digital Console

The PM400 touchscreen digital power and energy meter console features a 4.3" display with multi-touch technology. Capacitive buttons on the front of the unit enable fast access to set the source wavelength or spectrum, a delta mode that shows the change in power from a user-selected set point, the zeroing function, and device main menu. In addition to pre-programming source wavelengths or spectra for calibrating measurements, users can enter and save up to twelve attenuation values or data files to correct for effects that external devices (such as filters or beamsplitters) may have on the power measurement.

A 14-pin auxiliary input allows users to connect their own humidity and temperature sensors as well as access four programmable I/O ports for controlling shutters, interlock devices, laser warning lights, and other common lab devices (see the *Pin Diagrams* tab for pin descriptions). Alternatively, a 2.5 mm stereo (3P) jack accepts the TSP-TH thermistor temperature probe. Like the PM100D, this console is compatible with all our C-Series sensors. For more information on the PM400 touchscreen digital console features, see the *Specs* tab, *Console Displays* tab, or visit the full web presentation.

Additional Power Meter and Sensor Options

The power meter consoles and sensors in these kits can also be purchased individually. Additionally, Thorlabs offers self-contained wireless power meters, designed for both handheld operation and remote control via Bluetooth or USB, and compact USB power meters, designed to be operated via software control on a PC.

Recalibration Services

Recalibration services are available for our photodiode and thermal power meter sensors and consoles. We recommend recalibrating your Thorlabs sensor and console as a pair; however, each may be recalibrated individually. All of the sensors on this page come with a manufacturer calibration by default, but we also offer an ISO 17025 accredited calibration for some items. For more information on calibration options, please see the *Recalibration* tab or the calibration sections at the bottom of this page.

SPECS

Click here for the complete PM100A product presentation.

PM100A Specifications	
Photodiode Sensor Input (Current)	
Measurement Ranges	6 Decades; 50 nA - 5 mA
Units	W
Accuracy	±0.2% of Full Scale (5 µA - 5 mA) ±0.5% of Full Scale (50 nA) ±3% Full Scale Analog Meter
Bandwidth	DC to 100 kHz, Dependent on Sensor and Settings
Analog Output	
Connector	SMA
Voltage Range	0 - 2 V
Bandwidth	Up to 100 kHz, Dependent on Sensor and Settings
Accuracy	±3%
General	
Sensor Input	Female DB9 for C-Series Connectors
Display	Analog Needle with 132 x 32 pixel LCD Readout
Display Update Rate	20 Hz
Display Screens	Numerical, Relative Measurements, Tuning, Statistics, Mechanical Analog Needle
Memory Card	N/A
A/D Converter	16 bit
Computer Connectivity	USB 2.0, Mini USB
Battery	Li-Polymer 3.7 V, 1300 mAh; up to 8 hrs of Operation
Dimensions	7.2" x 4.3" x 1.6" (183 mm x 109 mm x 40 mm)

Operating / Storage Temp	0 to 40 °C / -40 to 70 °C
Mounting	Kickstand, 1/4"-20 Mounting Hole

Click here for the complete PM100D product presentation.

PM100D Specifications	
Photodiode Sensor Input (Current)	
Measurement Ranges	6 Decades; 50 nA - 5 mA
Units	W, dBm, W/cm^2, A
Accuracy	±0.2% of Full Scale (5 µA - 5 mA) ±0.5% of Full Scale (50 - 500 nA)
Bandwidth	DC to 100 kHz, Dependent on Sensor and Settings
Thermopile Sensor Input (Voltage)	
Measurement Ranges	4 Decades; 1 mV - 1 V
Units	W, dBm, W/cm^2, V
Accuracy	±0.5% of Full Scale (10 mV - 1 V) ±1% of Full Scale (1 mV)
Bandwidth	DC to 10 Hz, Dependent on Sensor and Settings
Time Constant Correction	1 - 30 s
Analog Output	
Connector	SMA
Voltage Range	0 - 2 V
Bandwidth	Up to 100 kHz, Dependent on Sensor and Settings
Accuracy	±3%
General	
Sensor Input	Female DB9 for C-Series Connectors
Display	3.2" x 2.4" (81.4 mm x 61 mm), 320 x 240 pixels
Display Update Rate	20 Hz
Display Screens	Numerical, Bar Graph, Trend Graph, Statistics, Simulated Analog Needle
Memory Card	SD, 1 GB
A/D Converter	16 bit
Computer Connectivity	USB 2.0, Mini USB
Battery	Li-Polymer 3.7 V, 1300 mAh; up to 8 hrs of Operation
Dimensions	7.2" x 4.3" x 1.6" (183 mm x 109 mm x 40 mm)
Operating / Storage Temp	0 to 40 °C / -40 to 70 °C
Mounting	Kickstand, 1/4"-20 Mounting Hole

Click here for the complete PM400 product presentation.

Specifications	
Compatible Detectors	Thorlabs' C-Series Photodiode, Thermal, and Pyroelectric Sensors Photodiodes up to 5 mA, Thermopiles up to 1 V, and Pyroelectric Detectors up to 100 V
Display	
Type	4.3" TFT, WQVGA, 400 x 272 Pixels, 16 Bit Color
Viewing Area	95 mm x 54 mm
Update Rate (Max)	10 Hz Numerical, 25 Hz Analog Simulation
Format	Numerical, Bar Graph, Trend Graph, Statistics, and Simulated Analog Needle
Backlight	LED, Adjustable
Features	Projected Capacitive Touchscreen and Buttons, Support Stand, Rubberized Outside, 2 x M3 Threaded Inserts for Mounting on Back Side
Analog Output	
Connector	3.5 mm Mono Audio (2P) Jack, Adapter to BNC Included
Signal	Amplified Input Signal - Not Corrected
Voltage Range	0 to 2 V
Accuracy	±3%
Bandwidth	Up to 100 kHz, Dependent on Sensor and Settings
Auxiliary Input/Output	

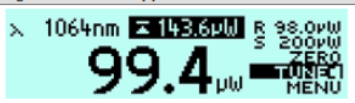
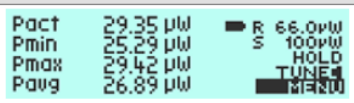
Connector	2 x 7 Pins, 0.1" Socket, Top Side
Function	4 x GPIO 2 x 10 bit ADC for External Temperature, Relative Humidity Sensor +3.3 V, +/- 2.5 V (100 mA Max)
Temperature Sensor Internal to C-Series Optical Sensor[a]	
Temperature Sensor Type	Thermistor
Temperature Measurement Range	-10 °C to 80 °C
External Temperature Sensor	
Supported Temperature Sensor	Thermistor NTC 0.1 - 100 kΩ, B-Value 1000 - 9999 K
Temperature Measurement Range	-10 °C to 80 °C (with TSP-TH)
Connector	2.5 mm Stereo Audio (3P) Jack
Sound	
Type	Internal Speaker
Function	Laser Tuning Support, Console Function Support
Memory	
Type	NAND Flash
Size	4 GB
Interfaces	
Type	USB 2.0
Connector	Mini-B USB
Power Management	
Battery	LiPo 3.7 V 2600 mAh
Charger	Built In; Charging Current: 0.5 / 1 A
Power Connector	Mini USB
General	
Operating Temperature Range[b]	0 to 40 °C
Storage Temperature Range	-40 to 70 °C
Dimensions	136 mm x 96 mm x 29 mm
Weight	0.35 kg

a. Many of Thorlabs' compatible C-Series optical power and energy sensors have a built-in temperature sensor.
b. Non-Condensing

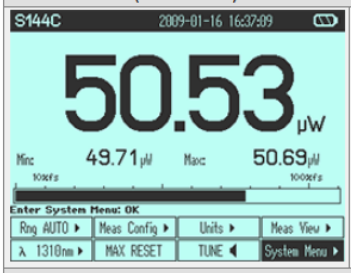
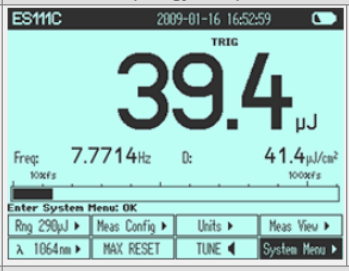
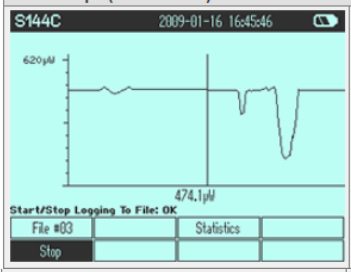
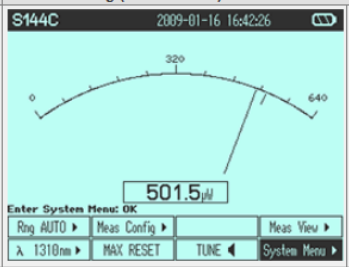
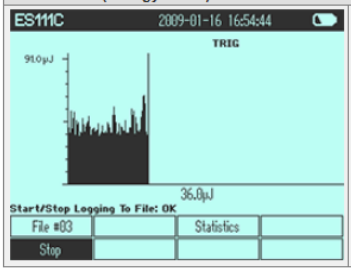
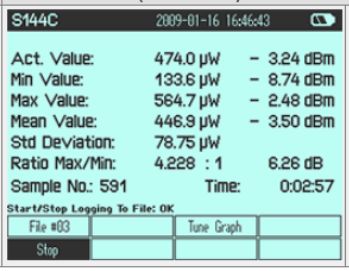
Power Meter Console Displays

Click on a the console item #s to expand the corresponding section that provides details on the display for each.

PM100A

PM100A Display	
Standard Absolute Measurements	**Relative Measurements**
	
This display shows the current absolute power values on both the mechanical needle and the LCD display.	Shows positive or negative power deviation from an initially zeroed position (needle in middle position). The offset and the absolute power value will be displayed in two sub displays in negative presentation.
Power Tuning with Sound Support	**Statistics Screen**
	
This display shows the maximum reached power level. The level can be reset to the actual power level.	A display showing the current, min, max, and average power. All items can be reset to restart data sampling.
Wavelength Setting	
	
Configuration screen to set the wavelength of the incident beam. Easy switching between 9 user preconfigurable wavelengths.	

PM100D

PM100D Display			
Numeric Screen (Power Mode)		This display combines a clear, numerical 4-digit read out of the optical power, a bar graph function with zooming capabilities, and configurable sub displays.	
Numeric Screen (Energy Mode)		A display with the same option as on the left for optical energy read outs.	
Trend Graph (Power Mode)		For laser tuning and beam alignment to visualize changes and trends together with an additional 4-digit numerical value of the absolute power.	
Needle Tuning (Power Mode)		A display imitating an analog needle together with an additional 4-digit numerical value for laser tuning tasks. A special feature is a resettable max hold indicator and a shiftable tuning sound.	
Pulse Chart (Energy Mode)		Like the Trend Graph (Power Mode), this shows changes and trends together with an additional 4-digit numerical value of the absolute energy of incident beam pulses.	
Statistics Screen (Power Mode)		The statistics display shows the actual, minimum, maximum and mean value in linear and logarithmic representation; further the standard deviation, the max/min ratio, the number of samples and the elapsed time.	

Common Display Elements

- Header line with sensor information, date/time, and battery state
- Status line with warning annunciators
- Bar graph and configurable left and right sub display areas to display a minimum and a maximum value or a ratio of both values (numerical screen only)
- Tool tip text above the menu
- Easily accessible menu via buttons

Touchscreen Power Meter Console Front Panel

Thorlabs' PM400 Power Meter Console features a front panel with several key elements, as shown in the photo to the right. The projected capacitive touchscreen and buttons are sensitive enough to allow smooth operation even when the user wears cotton, latex, or nitrile gloves, but durable enough to be cleaned with standard screen cleaning solvents.

- **Capacitive Touchscreen:** The capacitive touchscreen allows the user to control the console functions with finger taps and swipes. Features include numerical displays of power and energy measurements, logging of long-term measurements, settings for a calibration wavelength or a preset attenuation value, and temperature monitoring. The user can switch measurement views by swiping one finger over the screen to the left or right, or by tapping the window icon in the lower right corner of the screen. More details on the measurement options are provided below.
- **Spectral Correction Button:** This button opens a screen where the user can quickly select or save up to 12 measurement wavelengths. The PM400 will use this wavelength setting in conjunction with the calibration data recorded in the connector of Thorlabs' power and energy sensors in order to provide a calibrated optical power or energy reading. The selected wavelength is displayed above the button.
- **Delta Mode:** In delta mode, the console will display the power or energy relative to a user selected setpoint. Pressing this button saves the current power or energy reading as the reference value, and subsequent measurements will be displayed as the difference between the actual value and the reference. The reference value is displayed above this button when Delta Mode is active.
- **Zeroing:** Quickly set the current power or energy value as the zero point for subsequent measurements. The measured power or energy when the console is zeroed will be displayed above the Zero button.
- **Main Menu:** This button provides quick access to the main menu. From here, the user can access a submenu to set the parameters for long-term power measurements, device settings, the file manager, sensor info, and the laser calculator. Details are provided below.

Click to Enlarge
The Front Panel of the Touchscreen Power Meter Console

Additional Features

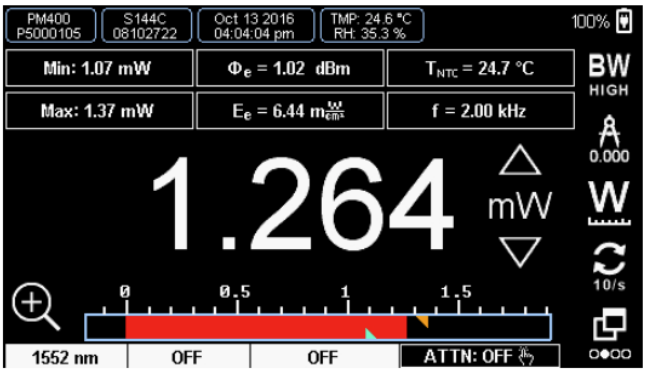
In addition to allowing users to select different measurement modes and settings, the PM400 incorporates other features to allow users to customize the interface.

- **Language Settings:** English, French, German, and Chinese can be selected.
- **Display Brightness and Contrast:** In addition to adjusting these settings, the user can choose whether to have the display show white text on a black background, or black text on a white background.
- **Laser Tuning Sound:** The console plays an audible tone to aid in identifying when peak power is achieved while tuning a laser. The console will beep repeatedly, with the frequency of the beep increasing as the measured power increases.
- **Programmable I/O Ports:** The PM400 features four programmable I/O ports for controlling shutters, interlocks, laser warning lights, etc.

The Touchscreen Display

The screenshots below provide an overview of some of the measurement views, measurement settings, functions, and calculators accessible through the touchscreen display.

Numerical Display

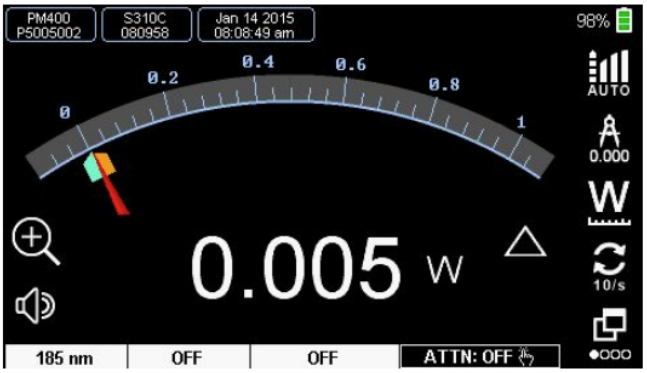


Subpanel Display Options		
Photodiode Sensors	**Thermal Sensors**	**Pyroelectric Sensors**
Current (I_{DET})	Voltage (V_{DET})	Voltage (V_{DET})
Power (Φ_e)	Power (Φ_e)	Energy (W_{DET})
Power in dBm (Φ_e)	Power in dBm (Φ_e)	N/A
Max	Max	Max
Min	Min	Min
Ratio (Max/Min)	Ratio (Max/Min)	Ratio (Max/Min)
Sensor Temperature[a]	Sensor Temperature[a]	N/A
Frequency	Frequency	Frequency
External NTC Temperature	External NTC Temperature	External NTC Temperature
Irradiance (E_e)	Irradiance (E_e)	Fluence (H_e)

a. Many, but not all, of Thorlabs' compatible optical power sensors have an internal temperature sensor. This subpanel display option is only available if this internal temperature sensor is detected by the PM400.

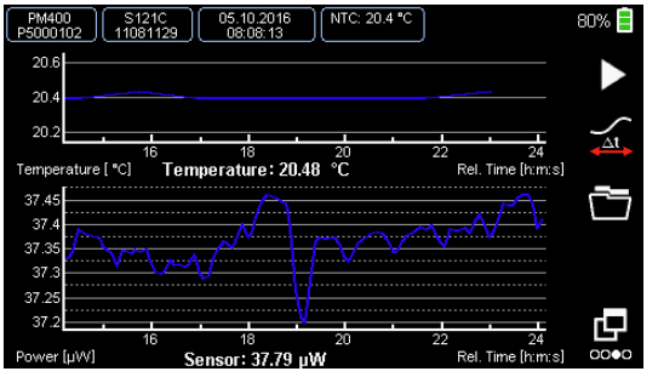
The numerical display shows a digital measurement of the power or energy with a bar graph along the bottom. The orange and blue triangles on the bar graph show the min and max values detected during the measurement. To reset the min and max values, press the reset button on the front panel. The six rectangular subpanels immediately above the power or energy measurement are configurable displays, allowing the user to select which parameters to view. The Subpanel Display Options table provides a summary of available settings for each style of detector.

Simulated Analog Needle



Measurements can be viewed with a simulated analog needle. The orange and blue marks are indicators for the max and min measured power, and the scale can be zoomed by a factor of 10. Icons down the side of the screen allow the user to set the bandwidth, adjust the resolution of the digital value at the bottom of the display, change units, adjust the display update rate or change screens.

Graph View



In the graph view, the user can monitor the optical power or energy of a source as it changes over time. A second, optional display can be added that shows the readout from a connected temperature sensor (the upper graph in the screenshot above). Icons on the side of the window allow the user to start and stop the measurement, scroll through the data, and open the folder where the measurement is saved.

Touchscreen Power Meter Console Front Panel

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- **Capacitive Touchscreen:** The capacitive touchscreen allows the user to control the console functions with finger taps and swipes. Features include numerical displays of power and energy measurements, logging of long-term measurements, settings for a calibration wavelength or a preset attenuation value, and temperature monitoring. The user can switch measurement views by swiping one finger over the screen to the left or right, or by tapping the window icon in the lower right corner of the screen. More details on the measurement options are provided below.
- **Spectral Correction Button:** This button opens a screen where the user can quickly select or save up to 12 measurement wavelengths. The PM400 will use this wavelength setting in conjunction with the calibration data recorded in the connector of Thorlabs' power and energy sensors in order to provide a calibrated optical power or energy reading. The selected wavelength is displayed above the button.
- **Delta Mode:** In delta mode, the console will display the power or energy relative to a user selected setpoint. Pressing this button saves the current power or energy reading as the reference value, and subsequent measurements will be displayed as the difference between the actual value and the reference. The reference value is displayed above this button when Delta Mode is active.
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- **Main Menu:** This button provides quick access to the main menu. From here, the user can access a submenu to set the parameters for long-term power measurements, device settings, the file manager, sensor info, and the laser calculator. Details are provided below.

Click to Enlarge
The Front Panel of the Touchscreen Power Meter Console

Additional Features

In addition to allowing users to select different measurement modes and settings, the PM400 incorporates other features to allow users to customize the interface.

- **Language Settings:** English, French, German, and Chinese can be selected.
- **Display Brightness and Contrast:** In addition to adjusting these settings, the user can choose whether to have the display show white text on a black background, or black text on a white background.
- **Laser Tuning Sound:** The console plays an audible tone to aid in identifying when peak power is achieved while tuning a laser. The console will beep repeatedly, with the frequency of the beep increasing as the measured power increases.
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The Touchscreen Display

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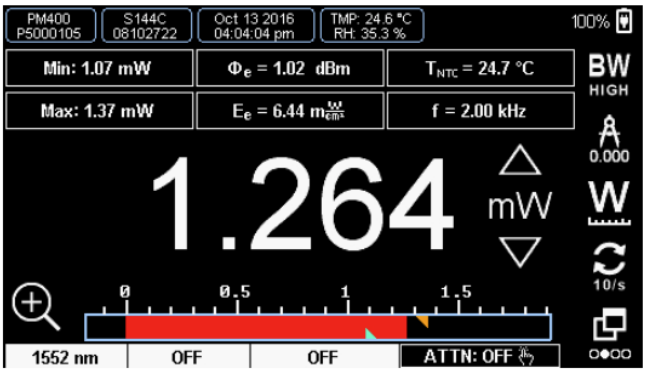

Subpanel Display Options		
Photodiode Sensors	**Thermal Sensors**	**Pyroelectric Sensors**
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Power (Φ_e)	Power (Φ_e)	Energy (W_{DET})
Power in dBm (Φ_e)	Power in dBm (Φ_e)	N/A
Max	Max	Max
Min	Min	Min
Ratio (Max/Min)	Ratio (Max/Min)	Ratio (Max/Min)
Sensor Temperature[a]	Sensor Temperature[a]	N/A
Frequency	Frequency	Frequency
External NTC Temperature	External NTC Temperature	External NTC Temperature
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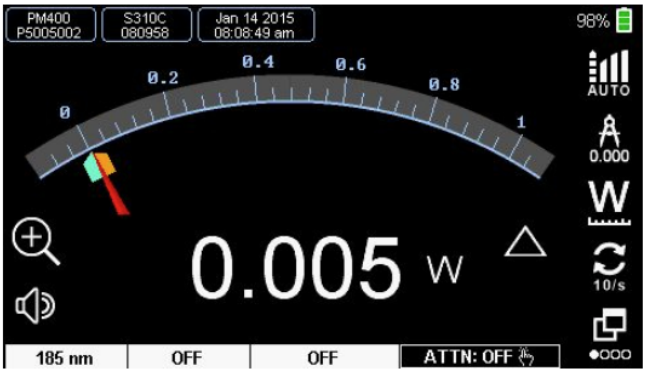
a. Many, but not all, of Thorlabs' compatible optical power sensors have an internal temperature sensor. This subpanel display option is only available if this internal temperature sensor is detected by the PM400.

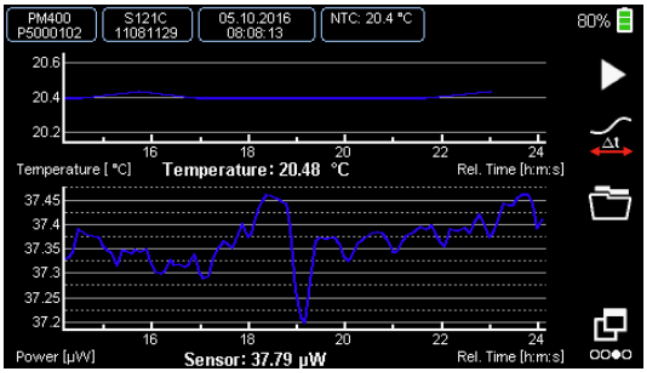
The numerical display shows a digital measurement of the power or energy with a bar graph along the bottom. The orange and blue triangles on the bar graph show the min and max values detected during the measurement. To reset the min and max values, press the reset button on the front panel. The six rectangular subpanels immediately above the power or energy measurement are configurable displays, allowing the user to select which parameters to view. The Subpanel Display Options table provides a summary of available settings for each style of detector.

Simulated Analog Needle



Measurements can be viewed with a simulated analog needle. The orange and blue marks are indicators for the max and min measured power, and the scale can be zoomed by a factor of 10. Icons down the side of the screen allow the user to set the bandwidth, adjust the resolution of the digital value at the bottom of the display, change units, adjust the display update rate or change screens.

Graph View



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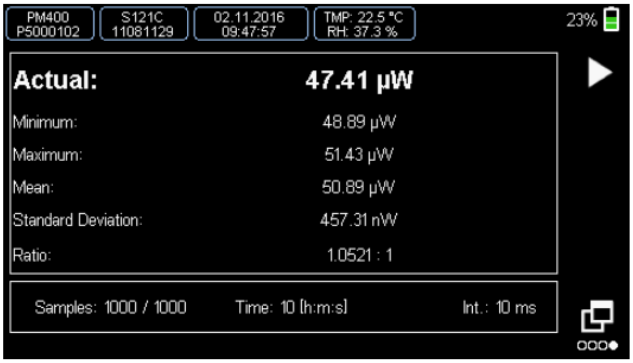
Statistics Display

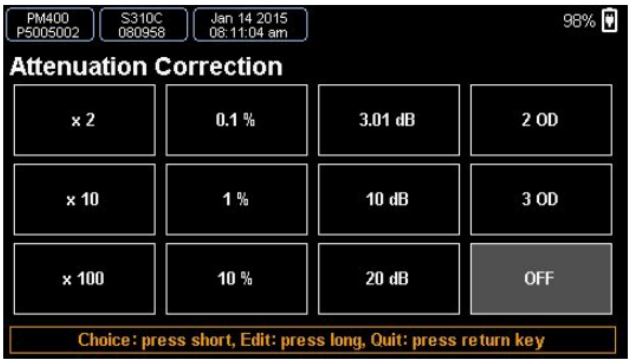


In the statistics display, the user can start a sequential measurement. The sample rate and duration can be adjusted from the Capture Settings screen, accessible from the main menu. The bottom bar of the display shows the number of measurements taken, total elapsed time since the measurements were started, and the measurement interval. The main part of the display shows statistics for the accumulated measurements, including the minimum, maximum, mean, and standard deviation.

Spectral Correction

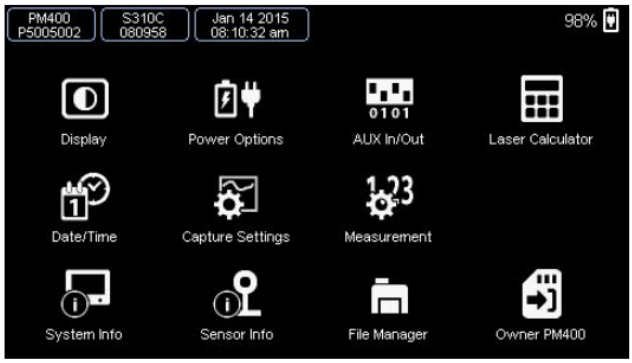
This mode can be entered by pressing the λ symbol on the front panel. The unit can store up to 12 preset spectral correction entries, editable by the user. In their simplest form, these entries can consist of a single user-entered wavelength that will be used in conjunction with the NIST-traceable calibration data from a Thorlabs' sensor to produce a calibrated power measurement. Alternatively, each entry can be a .csv file with the source spectrum that has been uploaded and saved. When a spectral correction entry is selected, the entry name will be displayed in the field above the spectral correction button.

Attenuation Correction



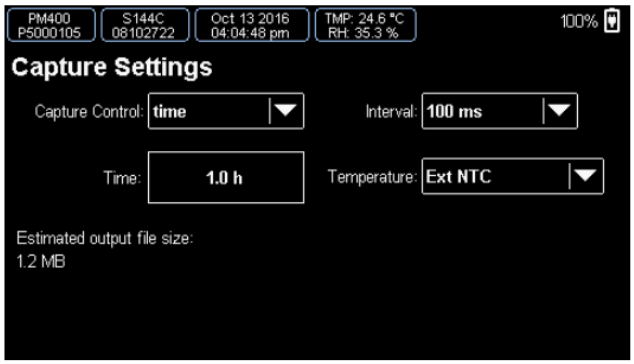
External devices within a setup, such as a filter or beamsplitter, may be needed to attenuate the signal being measured. The attenuation correction function allows the PM400 to display a power reading that accounts for these sources of attenuation. Attenuation values can be assigned as a multiplier (e.g. x2), in percent, in dB, or in OD (optical density). Alternatively, complete filter transmission curves can be uploaded and saved. Up to 12 different attenuation settings can be programmed and stored.

Main Menu



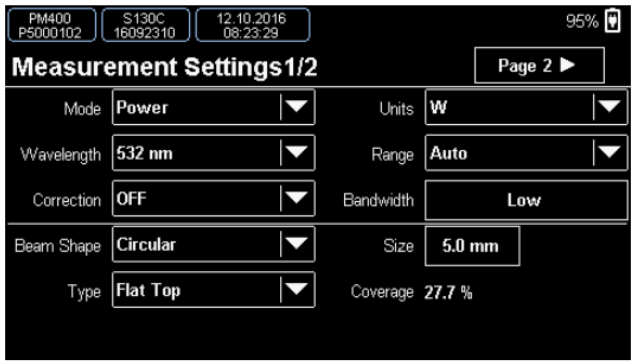
The PM400 main menu allows access to device features including the screen brightness, the menus to set the parameters for power, energy, and temperature measurements, a screen for calculating laser pulse characteristics, and a unit converter.

Capture Settings



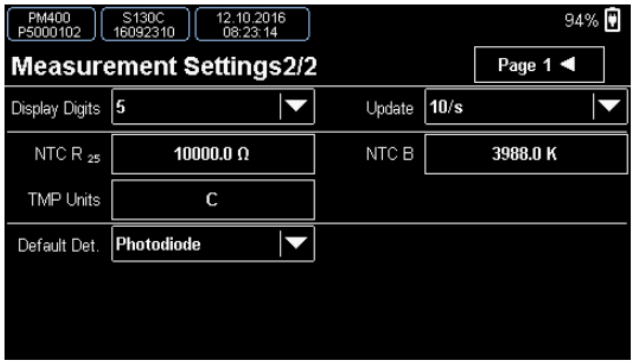
This screen allows the user to set the parameters for taking data. User-selectable settings include manual or automatic data acquisition, the exposure time, the number of samples, and the capture interval. It also allows the temperature logging parameters to be set. Once all of the settings are selected, this screen will return an estimated file size so that the user can ensure there is enough free memory on the device. In the case of manual operation (the user manually starts and stops the measurement), the estimated output file size will be the rate at which memory is used up as the data is collected.

Sensor Measurement Settings



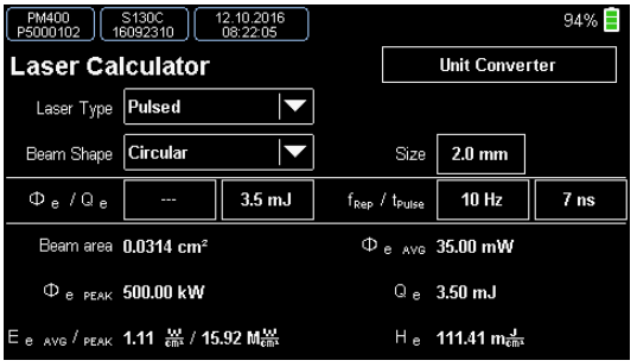
This screen allows the user to view sensor-dependent content, adjust common settings such as wavelength, attenuation, mode, etc., and enter beam parameters.

Temperature Sensor Settings



If an external temperature sensor is hooked up to the PM400, the user can adjust the parameters here.

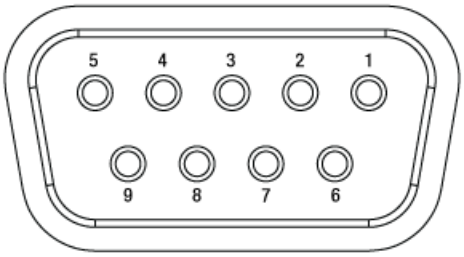
Laser Calculator and Unit Converter



The PM400 has several calculators. The laser calculator screen allows the user to calculate laser beam parameters based on available inputs. A unit converter provides quick conversions between Watts and dBm or between wavelength, frequency, wavenumbers, and photon energy.

PM100A and PM100D Power Meter Consoles

Optical Sensor Head Input

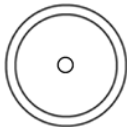


9-Pin Female D-Sub

Connection		
Pin	**PM100A**	**PM100D**
1	+5 V (100 mA Max Current from This Pin)	
2	DO NOT USE[a]	
3	AGND (Analog Ground): Photodiode Ground (Anode), Thermal and Pyroelectric Sensor Ground	
4	Photodiode Cathode	
5	Not Connected	Pyro-Electric Sensor +
6	DGND (Digital Ground)	
7	Present: Connect this Pin via a 1 kΩ to 10 kΩ Resistor to Pin 3 (AGND) to Enable a Custom Sensor	
8	Thermal Sensor +	
9	Not Connected	

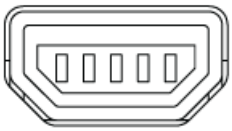
a. Pin 2 is reserved for the EEPROM Digital I/O (memory in Thorlabs' sensor heads) and **MUST NOT** be used to connect anything other than a C-Series sensor. Connecting this pin may cause the console to malfunction.

Analog Output



0 ... 2 V,
SMA Female

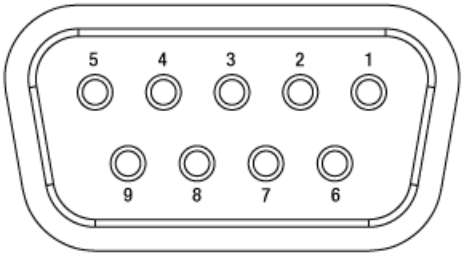
Computer Connection
USB Type Mini-B



USB Type Mini-B for Remote Control and Charging, Cable Included

PM400 Power Meter Console

Optical Sensor Head Input



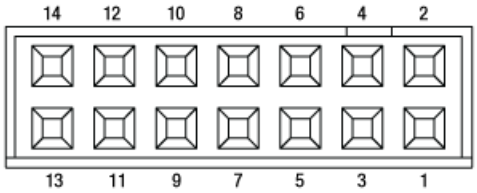
9-Pin Female D-Sub

Pin	Connection
1	+5 V (100 mA Max Current from This Pin)
2	DO NOT USE[a]

3	AGND (Analog Ground): Photodiode Ground (Anode), Thermal and Pyroelectric Sensor Ground
4	Photodiode Cathode
5	Pyroelectric Sensor +
6	DGND (Digital Ground)
7	Present: Connect this Pin via a 1 kΩ to 10 kΩ Resistor to Pin 3 (AGND) to Enable a Custom Sensor
8	Thermal Sensor +
9	Not Connected

a. Pin 2 is reserved for the EEPROM Digital I/O (memory in Thorlabs' sensor heads) and **MUST NOT** be used to connect anything other than a C-Series sensor. Connecting this pin may cause the console to malfunction.

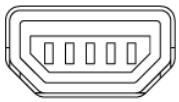
Auxiliary Connector



14-Pin Dual-In-Line Socket, 0.1" (2.54 mm) Pitch

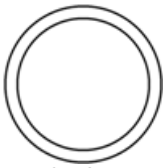
Pin	Connection
1	Ground
2	+3.3 VDC, 0.1 A
3	Do Not Use (No Function)
4	ADC Current In (Humidity Sensor)
5	Temp / Humidity Detection Module
6	ADC Current In (Temperature Sensor)
7	GPIO 02
8	GPIO 01
9	GPIO 03
10	GPIO 04
11	Ground
12	+ 2.5 VDC, 0.05 A
13	Ground
14	-2.5 VDC, 0.05 A

Computer Connection USB Type Mini-B



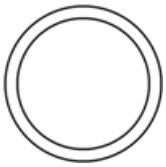
USB Type Mini-B for Remote Control and Charging, Cable Included

Analog Output



0 to 2 V,
3.5 mm Mono Audio (2P) Jack

Temperature Sensor Input



2.5 mm Stereo Audio (2P) Jack for NTC

SOFTWARE

Compatible Power Meters

- Consoles:
  - PM100A Analog Power and Energy Meter Console
  - PM200 Legacy Touch Screen Power and Energy Meter Console
  - PM100D Digital Power and Energy Meter Console
  - PM400 Capacitive Touchscreen Power and Energy Meter Console
  - PM5020 Dual-Channel Benchtop Optical Power and Energy Meter Console (Version 4.0 or Later)
- Complete Power Meters:
  - PM160, PM160T, and PM160T-HP Wireless Handheld Power Meters with Bluetooth® Technology
  - PM16 Series Compact USB Power Meters
  - PM60 and PM61 Fiber Optic Power Meter Series (Version 6.0 or Later)
- Interfaces:
  - PM101 Series Power Meter Interfaces with External Readout (Version 2.0 or Later)
  - PM102 Series Power Meter Interfaces with External Readout (Version 2.1 or Later)
  - PM103 Series Power Meter Interfaces with External Readout (Version 3.0 or Later)

- PM100USB USB Interface Digital Power and Energy Meter

Other Compatible Devices

- ERM2xx Series Extinction Ratio Meters
- SPCNT Single Photon Counting Device
- TSP01 USB Temperature and Humidity Data Logger
- TSP-TH Additional Temperature Probe
- WM202 Wavelength Meter

Optical Power Monitor

The Optical Power Monitor GUI software features readout from up to eight power meters or other compatible devices, or remote wireless operation.

For details on specific software features, please see the user manual.

Users interested in the legacy Power Meter Software can find it by visiting the software page.

The PM101 Series Power Meters are only compatible with version 2.0 or later. The PM102 Series Power Meters are only compatible with version 2.1 or later. The PM103 Series Power and Energy Meters are only compatible with version 3.0 or later. The PM5020 Console is only compatible with version 4.0 or later. The PM60 and PM61 Power Meter Series are only compatible with version 6.0 or later.

Software

Optical Power Monitor GUI Software for Touchscreen, Handheld, and USB-Interface Power Meters

Features

- Operate up to Eight Devices Simultaneously
- Record and Analyze Measurements in Real Time
- Intuitive Analog Display and Graphing Modes
- Configurable Long-Term Data Logging
- Also Supports Position Measurements with Thermal Position & Power Sensors
- Compatible with USB and Bluetooth® Connections

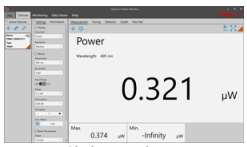
The Optical Power Monitor (OPM) software GUI enables seamless control of up to eight compatible devices that are connected via USB, RS232, or Bluetooth® wireless technology[a]. The latest software, firmware, drivers, and utilities for these power meters can be downloaded here.

Multiple data measurement and analysis functions are integrated into the GUI package. The interface offers a user-friendly design with minimal use of color and low brightness that is ideal for use in dark lab environments while wearing laser safety glasses. Measured data can be displayed in real time as a simulated analog needle, digital values, line graph, or bar graph. Continuously logged and short-term measurements can be recorded for data viewing and analysis at a later point. A built-in statistics mode analyzes measured data and updates continuously to reflect new measurements within the pre-determined measurement period. Beam position measurements are also supported when used with our thermal position & power sensors.

The OPM software package installs the GUI, which then can be used to control the touchscreen, handheld, or USB-interface power meters and other compatible devices. Firmware updates for supported power meters are also available. Programming examples and drivers for interfacing with our power and energy meter consoles using LabVIEW, C/C++, Visual C#, and Python are installed with the software; refer to the manual for details.

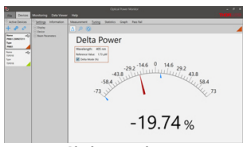
Please note that the OPM Software uses different drivers than the Power Meter Utilities Software and Thorlabs recommends using the new driver TLPM.dll. For users who wish to use the legacy Power Meter Software or use custom software designed using the older PM100D.dll driver, a Power Meter Driver Switcher program is included for easy swapping of the installed driver between the two versions.

a. The PM61 Series, PM160, PM160T, and PM160T-HP power meters are equipped with Bluetooth® connections.



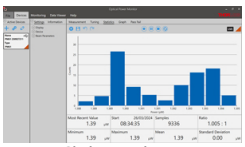
Click to Enlarge

Figure 149A Power Measurement Mode
Set up and configure up to eight power meters.



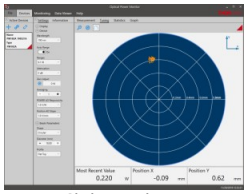
Click to Enlarge

Figure 149B Power Tuning Mode
Simulated analog needle and digital measurement value provided. Delta Mode, enabled here, shows the fluctuation range during the measurement period.



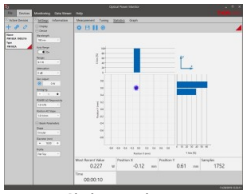
Click to Enlarge

Figure 149C Power Statistics Mode
Calculate numerical statistics for a pre-determined measurement period. The panel displays the analyzed values in a bar graph and the results as numerical values.



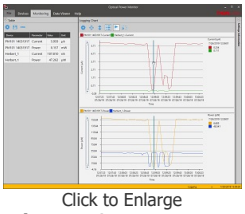
Click to Enlarge

Figure 149D Position Tuning Mode
Tuning mode can be used with a thermal position & power sensor to aid in beam alignment.



Click to Enlarge

Figure 149E Position Statistics Mode
Statistics mode also provides aggregate information for thermal position & power sensors.



Click to Enlarge

Figure 149F Data Logging
Enable long-term measurement and simultaneous recording from up to eight power meters. Save data as .csv files for later processing while measurement results are displayed in a graph in real time.

PULSE CALCULATIONS

Pulsed Laser Emission: Power and Energy Calculations

Determining whether emission from a pulsed laser is compatible with a device or application can require referencing parameters that are not supplied by the laser's manufacturer. When this is the case, the necessary parameters can typically be calculated from the available information. Calculating peak pulse power, average power, pulse energy, and related parameters can be necessary to achieve desired outcomes including:

- Protecting biological samples from harm.
- Measuring the pulsed laser emission without damaging photodetectors and other sensors.
- Exciting fluorescence and non-linear effects in materials.

Pulsed Lasers
Introduction to Power and Energy Calculations

Click above to download the full report.

Pulsed laser radiation parameters are illustrated in Figure 170A and described in Table 170B. For quick reference, a list of equations is provided below. The document available for download provides this information, as well as an introduction to pulsed laser emission, an overview of relationships among the different parameters, and guidance for applying the calculations.

Equations:

***Period* and *repetition rate* are reciprocal:** $\Delta t = \frac{1}{f_{rep}}$ and $f_{rep} = \frac{1}{\Delta t}$

***Pulse energy* calculated from *average power*:** $$E = \frac{P_{avg}}{f_{rep}} = P_{avg} \cdot \Delta t$$

***Average power* calculated from *pulse energy*:** $$P_{avg} = \frac{E}{\Delta t} = E \cdot f_{rep}$$

***Peak pulse power* estimated from *pulse energy*:** $$P_{peak} \approx \frac{E}{\tau}$$

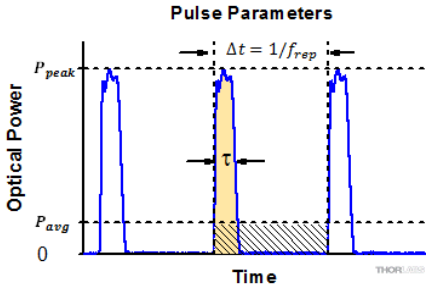
***Peak power* and *average power* calculated from each other:**

$$P_{peak} = \frac{P_{avg}}{f_{rep} \cdot \tau} = \frac{P_{avg} \cdot \Delta t}{\tau}$$ and $P_{avg} = P_{peak} \cdot f_{rep} \cdot \tau = \frac{P_{peak} \cdot \tau}{\Delta t}$

***Peak power* calculated from *average power* and *duty cycle**:**

$$P_{peak} = \frac{P_{avg}}{\tau/\Delta t} = \frac{P_{avg}}{duty\ cycle}$$

*Duty cycle ($\tau/\Delta t$) is the fraction of time during which there is laser pulse emission.



Click to Enlarge

Figure 170A Parameters used to describe pulsed laser emission are indicated in this plot and described in Table 170B. **Pulse energy** (**E**) is the shaded area under the pulse curve. Pulse energy is, equivalently, the area of the diagonally hashed region.

Table 170B Pulse Parameters

Parameter	Symbol	Units	Description
Pulse Energy	**E**	Joules [J]	A measure of one pulse's total emission, which is the only light emitted by the laser over the entire period. The pulse energy equals the shaded area, which is equivalent to the area covered by diagonal hash marks.
Period	**Δt**	Seconds [s]	The amount of time between the start of one pulse and the start of the next.

Average Power	P_{avg}	Watts [W]	The height on the optical power axis, if the energy emitted by the pulse were uniformly spread over the entire period.
Instantaneous Power	**P**	Watts [W]	The optical power at a single, specific point in time.
Peak Power	P_{peak}	Watts [W]	The maximum instantaneous optical power output by the laser.
Pulse Width	τ	Seconds [s]	A measure of the time between the beginning and end of the pulse, typically based on the full width half maximum (FWHM) of the pulse shape. Also called **pulse duration**.
Repetition Rate	f_{rep}	Hertz [Hz]	The frequency with which pulses are emitted. Equal to the reciprocal of the period.

Example Calculation:

Is it safe to use a detector with a specified maximum peak optical input power of **75 mW** to measure the following pulsed laser emission?

- Average Power: 1 mW
- Repetition Rate: 85 MHz
- Pulse Width: 10 fs

The energy per pulse:

$$E = \frac{P_{avg}}{f_{rep}} = \frac{1\ mW}{85\ MHz} = \frac{1\ x\ 10^{-3} W}{85\ x\ 10^{6} Hz} = 1.18\ x\ 10^{-11} J = 11.8\ pJ$$

seems low, but the peak pulse power is:

$$P_{peak} = \frac{P_{avg}}{f_{rep} \cdot \tau} = \frac{1\ mW}{85\ MHz\ \cdot 10\ fs} = 1.18\ x\ 10^{3}\ W = \mathbf{1.18\ kW}$$

It is ***not safe*** to use the detector to measure this pulsed laser emission, since the peak power of the pulses is >5 orders of magnitude higher than the detector's maximum peak optical input power.

CONSOLE SELECTION

Thorlabs offers a wide selection of power and energy meter consoles and interfaces for operating our power and energy sensors. Key specifications of all of our power meter consoles and interfaces are presented in this tab to help you decide which device is best for your application. We also offer self-contained wireless power meters and compact USB power meters.

When used with our C-series sensors, Thorlabs' power meter consoles and interfaces recognize the type of connected sensor and measure the current or voltage as appropriate. Our C-series sensors have responsivity calibration data stored in their connectors. The console will read out the responsivity value for the user-entered wavelength and calculate a power or energy reading.

- Photodiode sensors deliver a current that depends on the input optical power and the wavelength. The current is fed into a transimpedance amplifier, which outputs a voltage proportional to the input current. The photodiode's responsivity is wavelength dependent, so the correct wavelength must be entered into the console for an accurate power reading. The console reads out the responsivity for this wavelength from the connected sensor and calculates the optical power from the measured photocurrent.
- Thermal sensors deliver a voltage proportional to the input optical power. Based on the measured sensor output voltage and the sensor's responsivity, the console will calculate the incident optical power.
- Energy sensors are based on the pyroelectric effect. They deliver a voltage peak proportional to the pulse energy. If an energy sensor is recognized, the console will use a peak voltage detector and the pulse energy will be calculated from the sensor's responsivity.

The consoles and interfaces are also capable of providing a readout of the current or voltage delivered by the sensor. Select models also feature an analog output.

Consoles

Item #	PM100A	PM100D	PM400	PM5020

(Click Photo to Enlarge)				
Key Features	Analog Power Measurements	Digital Power and Energy Measurements	Digital Power and Energy Measurements, Touchscreen Control	Dual Channel
Compatible Sensors	Photodiode and Thermal Power	Photodiode Power, Thermal Power, and Pyroelectric Energy[a]	Photodiode Power, Thermal Power, Thermal Power and Position, and Pyroelectric Energy[a]	Photodiode Power, Thermal Power, Thermal Power and Position, and Pyroelectric Energy
Housing Dimensions (H x W x D)	7.24" x 4.29" x 1.61" (184 mm x 109 mm x 41 mm)	7.09" x 4.13" x 1.50" (180 mm x 105 mm x 38 mm)	5.35" x 3.78" x 1.16" (136.0 mm x 96.0 mm x 29.5 mm)	9.97" x 4.35" x 11.56" (253.2 mm x 110.6 mm x 293.6 mm)
Channels	1			2
External Temperature Sensor Input (Sensor not Included)	-	-	Readout and Record Temperature Over Time	Readout and Record Temperature Over Time
External Humidity Sensor Input (Sensor not Included)	-	-	Readout and Record Humidity Over Time	Readout and Record Humidity Over Time
Input/Output Ports	-		4 GPIO, Programmable	4 Configurable Digital I/O Channels
Shutter Control	-	-	-	Support for SH05R(/M) or SH1(/M) Optical Shutter with Interlock Input
Fan Control	-	-	-	✓
Source Spectral Correction	-	-	✓	✓
Attenuation Correction	-	-	✓	✓
External Trigger Input	-	-	-	✓
Display				
Type	Mechanical Needle and LCD Display with Digital Readout	320 x 240 Pixel Backlit Graphical LCD Display	Protected Capacitive Touchscreen with Color Display	
Dimensions	Digital: 1.9" x 0.5" (48.2 mm x 13.2 mm) Analog: 3.54" x 1.65" (90.0 mm x 42.0 mm)	3.17" x 2.36" (81.4 mm x 61.0 mm)	3.7" x 2.1" (95 mm x 54 mm)	4.32" x 2.43" (109.7 mm x 61.6 mm)
Refresh Rate	20 Hz		10 Hz (Numerical) 25 Hz (Analog Simulation)	25 Hz
Measurement Views[b]				
Numerical	✓	✓	✓	✓
Mechanical Analog Needle	✓	-	-	-
Simulated Analog Needle	-	✓	✓	✓
Bar Graph	-	✓	✓	✓
Trend Graph	-	✓	✓	✓
Histogram	-	✓	-	-
Statistics	✓	✓	✓	✓
Memory				
Type	-	SD Card	NAND Flash	SD Card
Size	-	2 GB	4 GB	8 GB
Power				
Battery	LiPo 3.7 V 1300 mAh		LiPo 3.7 V 2600 mAh	-
External	5 VDC via USB or Included AC Adapter		5 VDC via USB	Line Voltage: 100 - 240 V

a. As the PM100D and PM400 consoles can only support repetition rates of up to 3 kHz, they should not be used with the ES408C sensor, which detects repetition rates up to 10 kHz.
b. These are the measurement views built into the unit.

Interfaces

Item #	PM101	PM102	PM103	PM101A	PM102A	PM103A

(Click Photo to Enlarge)						
Operation Protocol	USB, RS232, UART, and Analog			USB and Analog SMA		
Sensor Compatibility						
Photodiode	✓	-	✓	✓	-	✓
Thermal Power	✓	✓	-	✓	✓	-
Thermal Position & Power	-	✓	-	-	✓	-
Pyroelectric	-	-	✓	-	-	✓
More [+]						

Item #	PM103E	PM101R	PM101U	PM102U	PM103U	PM100USB
(Click Photo to Enlarge)						
Operation Protocol	Ethernet, RS232, and Analog	USB and RS232	USB Operation			USB
Sensor Compatibility						
Photodiode	✓	✓	✓	-	✓	✓
Thermal Power		✓	✓	✓	-	✓
Thermal Position & Power		-	-	✓	-	-
Pyroelectric	✓	-	-	-	✓	✓[a]
More [+]						

a. As the PM100USB interface can only support repetition rates of up to 3 kHz, it should not be used with the ES408C sensor, which detects repetition rates up to 10 kHz.
b. Dependent on PC Settings
c. These power meter interfaces do not have a built-in monitor, so all data must be displayed through a PC running the Optical Power Monitor Software
d. 48 V is the nominal voltage over the network, but can range from 36 V - 57 V.

RECALIBRATION

Recalibration Services

Thorlabs offers two types of recalibration services in-house for our power and energy meter electronics and photodiode power sensors: ISO 17025 accredited calibrations and manufacturer calibrations. Only the manufacturer calibration is available for the NS170C microscope slide peak power sensor, our thermal power sensors, and our pyroelectric energy sensors. All new products are delivered with a manufacturer calibration by default; if an ISO 17025 accredited calibration is desired for a new device, please contact Tech Sales.

Figure 796A DAkkS-accredited calibrations are performed in accordance with DIN EN ISO/IEC 17025:2018.

ISO 17025 accredited calibrations are performed in-house in accordance with DIN EN ISO/IEC 17025:2018. Thorlabs GmbH's calibration laboratory is accredited by the German Accreditation Body (DAkkS), the national accreditation authority of the Federal Republic of Germany. The scope of services is described here in English or German. Accredited calibrated power and/or energy meter electronics come with a dedicated certificate of calibration proving the specified accuracy and traceability of calibration data. This certification may be required in certain applications or industries, such as the medical market.

In contrast, our manufacturer calibrations are subject to the quality management requirements of ISO 9001. The certificate of calibration lists the equipment used for the calibration procedure as well as the calibration data acquired. The manufacturer calibration of a power sensor includes recalibration of a single-channel console or interface at no additional cost. If you wish to calibrate one or more sensors with a dual-channel console, each sensor and console calibration service will need to be purchased individually.

Both types of calibration can be offered for third-party equipment or adjusted for special requirements upon request. Please reach out to Tech Sales for further details.

We recommend recalibrating your Thorlabs sensor and console as a pair; however, each may be recalibrated individually. To ensure accurate measurements, we recommend recalibrating annually. To order one or more sensor recalibrations with a dual-channel console, we offer two options: either 1) fill out the Returns Material Authorization (RMA) form with each console and sensor Item # to be recalibrated and specify either manufacturer calibration or ISO 17025 accredited calibration in the "Further Details" field, or 2) separately add each recalibration service Item # offered below to your cart.

SENSOR SELECTION

This tab outlines the full selection of Thorlabs' power and energy sensors. Refer to Table 113B for power meter console and interface compatibility information.

In addition to the power and energy sensors listed below, Thorlabs also offers all-in-one, wireless, handheld power meters and compact USB power meter interfaces that contain either a photodiode or a thermal sensor, as well as power meter bundles that include a console, sensor head, and post mounting accessories.

Click to Enlarge
Figure 113A The PM160 wireless power meter, shown here with an iPad mini (not included), can be remotely operated using Apple mobile devices.

Thorlabs offers four types of sensors:

- **Photodiode Sensors:** These sensors are designed for power measurements of monochromatic or near-monochromatic sources, as they have a wavelength dependent responsivity. These sensors deliver a current that depends on the input optical power and the wavelength. The current is fed into a transimpedance amplifier, which outputs a voltage proportional to the input current.
- **Thermal Sensors:** Constructed from material with a relatively flat response function across a wide range of wavelengths, these thermopile sensors are suitable for power measurements of broadband sources such as LEDs and SLDs. Thermal sensors deliver a voltage proportional to the input optical power.
- **Thermal Position & Power Sensors:** These sensors incorporate four thermopiles arranged as quadrants of a square. By comparing the voltage output from each quadrant, the unit calculates the beam's position.
- **Pyroelectric Energy Sensors:** Our pyroelectric sensors produce an output voltage through the pyroelectric effect and are suitable for measuring pulsed sources, with a repetition rate limited by the time constant of the detector. These sensors will output a peak voltage proportional to the incident pulse energy.

Power and Energy Sensor Selection Guide

There are two options for comparing the specifications of our Power and Energy Sensors. Tables 113C, 113D, 113E, and 113F sort our sensors by type (e.g., photodiode, thermal, or pyroelectric) and provide key specifications.

Alternatively, the selection guide Figures 113G and 113H arrange our entire selection of photodiode and thermal power sensors by wavelength (Figure 113G) or optical power range (Figure 113H). Each box contains the item # and specified range of the sensor. These graphs allow for easy identification of the sensor heads available for a specific wavelength or power range.

Table 113B Console Compatibility

Console Item #	PM100A	PM100D	PM400	PM5020	PM101 Series	PM102 Series	PM103 Series	PM100USB
Photodiode Power	✓	✓	✓	✓	✓	-	✓	✓
Thermal Power	✓	✓	✓	✓	✓	✓	-	✓
Thermal Position	-	-	✓	✓	-	✓	-	-
Pyroelectric Energy	-	✓[a]	✓[a]	✓	-	-	✓	✓[a]

a. As the PM100D and PM400 consoles and the PM100USB interface can only support repetition rates of up to 3 kHz, they should not be used with the ES408C sensor, which detects repetition rates up to 10 kHz.

Table 113C Photodiode Power Sensors	More [+]
Table 113D Thermal Power Sensors	More [+]
Table 113E Thermal Position & Power Sensors	More [+]
Table 113F Pyroelectric Energy Sensors	More [+]

a. The response time of the photodiode sensor. The actual response time of a power meter using these sensors will be limited by the update rate of your power meter console.
b. The power range provided is for lasers with a repetition rate of 80 MHz. Because the peak power and peak power density are dependent on the average power and repetition rate of the laser, the upper limit to the working average power range will be lower for lower repetition rates. Please see the *Specs* tab here for more details.
c. Typical natural response time (0 - 95%). Our power consoles can provide estimated measurements of optical power on an accelerated time scale (typically <1 s) when the natual response time is approximately 1 s or greater. As the natural response times of the S415C, S425C, and S425C-L are fast, these do not benefit from accelerated measurements and this function cannot be enabled. For more information, see the *Operation* tab here.
d. With intermittent use: maximum exposure time of 20 minutes for the S401C, otherwise maximum exposure time is 2 minutes.
e. All pyroelectric sensors have a thermal time constant, τ. This value indicates how long it takes the sensor to recover from a single pulse. To detect the correct energy levels, pulses must be shorter than 0.1τ and the repetition rate of your source must be well below 1/τ. Please see the Specs tab here for the τ value of each sensor.

Photodiode Sensors	Thermal Sensors
Standard	High Resolution
Slim	Max Power: 5 W to 10 W
Compact Slim	Max Power: 40 W to 200 W
Integrating Sphere	High Max Power Density
Fiber Coupled	Microscope Slide
Microscope Slide	Position Sensing

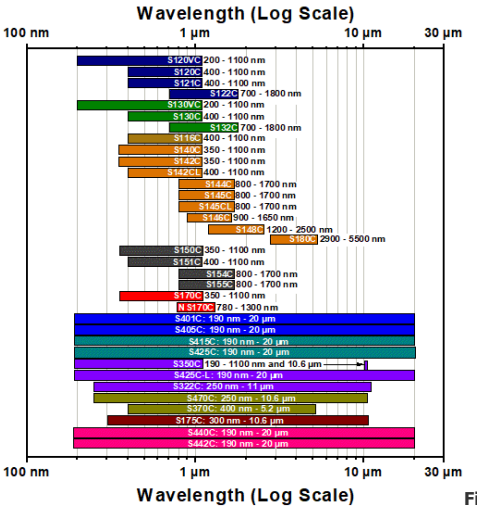


Figure 113G Sensor Options Arranged by Wavelength Range

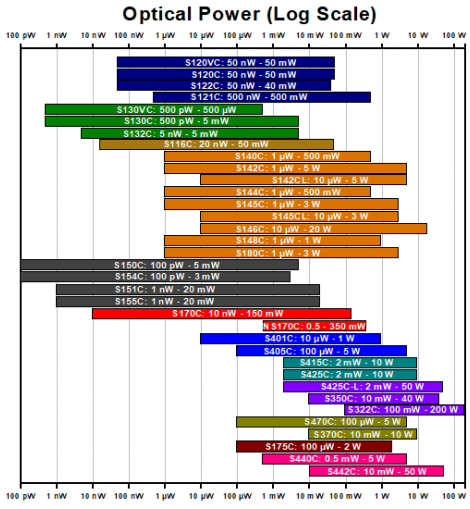


Figure 113H Sensor Options Arranged by Power Range

Analog Console with Photodiode Sensor (50 nW - 50 mW, 200 nm - 1100 nm)

Kit Item #	PM120VA
Click Image to Enlarge	
Included Console Item #	PM100A
Display	Analog Needle with 132 x 32 Pixel LCD
Connectivity	USB 2.0 Connectivity
Console Sensor Compatibility	All C-Series Photodiode and Thermal Power Sensors
Post Assembly Threading	Imperial
Mounting Base Compatibility	Imperial

Included Sensor	S120VC
Wavelength Range	200 - 1100 nm
Power Range	50 nW - 50 mW (200 - 450 nm) 50 nW - 20 mW (450 - 1100 nm)
Resolution	1 nW
Detector Type	Si Photodiode
Aperture	Ø9.5 mm
Spec Sheet	

This kit includes our PM100A console, an S120VC photodiode power sensor, and a post assembly, consisting of a BA2 base, PH2 post holder, and TR2 Ø1/2" post. This is a general-purpose kit for low-power lasers (50 nW - 50 mW) within the visible and NIR regions. Surrounding the sensor's active area is a fluorescing alignment disk, which absorbs light from 200 - 525 nm. Many of our laser diodes and HeNe lasers are suitable for use with this power meter kit.

Thorlabs offers an in-house NIST traceable recalibration service for this power and energy meter kit, which can be ordered using Item # CAL-UVPD below. Enter only the Part # and Serial # of the sensor that requires recalibration and include the corresponding console for recalibration during shipment.

We recommend recalibrating your sensor and console as a pair; however, if you would like to recalibrate only your console, use Item #s CAL-PM1 or CAL-PM1D below.

We also offer an ISO 17025 accredited calibration for the sensor and console separately. For more information or to order the accredited calibration, see Item #s CAL-UVPDD or CAL-PM1D below.

Part Number	Description	Price	Availability
PM120VA	Analog Power Console, Si Sensor, 200 nm - 1100 nm, 50 nW - 50 mW	$1,721.70	Lead Time

Digital Console with Photodiode Sensor (50 nW - 50 mW, 400 nm - 1100 nm)

Kit Item #	PM120D	PM400K1
Click Image to Enlarge		
Included Console Item #	PM100D	PM400
Display	4" Backlit Digital Display, 320 x 240 Pixel Resolution	4.3" Capacitive Color Touchscreen, WQVGA Resolution
Connectivity	USB 2.0 Connectivity	
Console Sensor Compatibility	All C-Series Photodiode and Thermal Power Sensors as Well as All Pyroelectric Energy Sensors	
Post Assembly Threading	Imperial	
Mounting Base Compatibility	Imperial	

Included Sensor	S120C
Wavelength Range	400 - 1100 nm
Power Range	50 nW - 50 mW
Resolution	1 nW
Detector Type	Si Photodiode
Aperture	Ø9.5 mm
Spec Sheet	

Each kit includes our PM100D or PM400 power meter console, a S120C photodiode sensor, and a post assembly, consisting of a BA2 base, PH2 post holder, and TR2 Ø1/2" post. This is a general purpose kit for low power lasers (50 nW - 50 mW) within the visible and NIR. Surrounding the sensor's active area is a fluorescing alignment disk, which absorbs light from 400 - 640 nm and 800 - 1700 nm. Many of our laser diodes and HeNe lasers are suitable for use with this power meter kit.

Thorlabs offers an in-house NIST traceable recalibration service for these power and energy meter kits, which can be ordered using Item # CAL-PD below. Enter only the Part # and Serial # of the sensor that requires recalibration and include the corresponding console for recalibration during shipment.

We recommend recalibrating your sensor and console as a pair; however, if you would like to recalibrate only your console, use Item #s CAL-PM1 or CAL-PM1D below.

We also offer an ISO 17025 accredited calibration for the sensor and console separately. For more information or to order the accredited calibration, use Item #s CAL-PDD or CAL-PM1D below.

Part Number	Description	Price	Availability
PM120D	Digital Power & Energy Console, Si Sensor, 400 nm - 1100 nm, 50 nW - 50 mW	$1,740.44	Lead Time
PM400K1	Touchscreen Digital Power & Energy Console, Si Sensor, 400 - 1100 nm, 50 nW - 50 mW	$2,075.35	Lead Time

Digital Console with Photodiode Sensor (500 nW - 500 mW, 400 nm - 1100 nm)

Kit Item #	PM400K2
Click Image to Enlarge	
Included Console Item #	PM400
Display	4.3" Capacitive Color Touchscreen, WQVGA Resolution
Connectivity	USB 2.0 Connectivity
Console Sensor Compatibility	All C-Series Photodiode and Thermal Power Sensors as Well as All Pyroelectric Energy Sensors
Post Assembly Threading	Imperial
Mounting Base Compatibility	Imperial

Included Sensor	S121C
Wavelength Range	400 - 1100 nm
Power Range	500 nW - 500 mW
Resolution	10 nW
Detector Type	Si Photodiode
Aperture	Ø9.5 mm
Spec Sheet	

The PM400K2 kit includes our PM400 console, a S121C photodiode sensor, and a post assembly, consisting of a BA2 base, PH2 post holder, and TR2 Ø1/2" post. This is a general purpose kit for low to medium power lasers (500 nW - 500 mW) within the visible and NIR spectrums (<1100 nm). It is similar to the S120C, which is included in the kit above, but an ND filter attenuates the light before the sensor. Surrounding the sensor's active area is a fluorescing alignment disk, which absorbs light from 400 - 640 nm and 800 - 1700 nm.

Thorlabs offers an in-house NIST traceable recalibration service for these power and energy meter kits, which can be ordered using Item # CAL-PD below. Enter only the Part # and Serial # of the sensor that requires recalibration and include the corresponding console for recalibration during shipment.

We recommend recalibrating your sensor and console as a pair; however, if you would like to recalibrate only your console, use Item #s CAL-PM1 or CAL-PM1D below.

We also offer an ISO 17025 accredited calibration for the sensor and console separately. For more information or to order the accredited calibration, use Item #s CAL-PDD or CAL-PM1D below.

Part Number	Description	Price	Availability
PM400K2	**Touchscreen Digital Power & Energy Console, Si Sensor, 400 nm - 1100 nm, 500 nW - 500 mW**	**$2,108.02**	**Lead Time**

Digital Console with Photodiode Sensor (500 pW - 500 mW, 400 nm - 1100 nm)

Kit Item #	PM400K3

Click Image to Enlarge	
Included Console Item #	PM400
Display	4.3" Capacitive Color Touchscreen, WQVGA Resolution
Connectivity	USB 2.0 Connectivity
Console Sensor Compatibility	All C-Series Photodiode and Thermal Power Sensors as Well as All Pyroelectric Energy Sensors
Post Assembly Threading	Imperial
Mounting Base Compatibility	Imperial

Included Sensor	**S130C**
Wavelength Range	400 - 1100 nm
Power Range	500 pW - 5 mW (Up to 500 mW with Filter)[a]
Resolution	100 pW
Detector Type	Si Photodiode
Aperture	Ø9.5 mm
Spec Sheet	

a. The S130C sensor features a sliding neutral density filter.

The PM400K3 kit includes our PM400 console, an S130C photodiode power sensor, and a post assembly, consisting of a BA2 base, PH2 post holder, and TR2 Ø1/2" post. The kit's slim sensor head is ideal for use in tight spaces as it is only 0.2" (5 mm) thick at its sensor. A sliding neutral density filter extends the power range that the sensor can be used to measure. With the filter out of the beam path, the power detection range is 500 pW to 5 mW. With the filter in the beam path, power detection from 50 nW to 500 mW is possible; however, power levels below 5 mW should be detected without the filter in the beam path for optimal results. The filter's position is automatically detected and accounted for by the power meter console.

Thorlabs offers an in-house NIST traceable recalibration service for these power and energy meter kits, which can be ordered using Item # CAL-PD2 below. Enter only the Part # and Serial # of the sensor that requires recalibration and include the corresponding console for recalibration during shipment.

We recommend recalibrating your sensor and console as a pair; however, if you would like to recalibrate only your console, use Item #s CAL-PM1 or CAL-PM1D below.

We also offer an ISO 17025 accredited calibration for the sensor and console separately. For more information or to order the accredited calibration, use Item #s CAL-PD2D or CAL-PM1D below.

Part Number	Description	Price	Availability
PM400K3	**Touchscreen Digital Power & Energy Console, Slim Si Sensor, 400 nm - 1100 nm, 500 pW - 500 mW**	**$2,328.33**	**Lead Time**

Digital Console with Photodiode Sensor (50 nW - 40 mW, 700 nm - 1800 nm)

Kit Item #	**PM400K4**

Click Image to Enlarge	
Included Console Item #	PM400
Display	4.3" Capacitive Color Touchscreen, WQVGA Resolution
Connectivity	USB 2.0 Connectivity
Console Sensor Compatibility	All C-Series Photodiode and Thermal Power Sensors as Well as All Pyroelectric Energy Sensors
Post Assembly Threading	Imperial
Mounting Base Compatibility	Imperial

Included Sensor	**S122C**
Wavelength Range	700 - 1800 nm
Power Range	50 nW - 40 mW
Resolution	2 nW
Detector Type	Ge Photodiode
Aperture	Ø9.5 mm
Spec Sheet	

The PM400K4 kit includes our PM400 console, a S122C photodiode sensor, and a post assembly, consisting of a BA2 base, PH2 post holder, and TR2 Ø1/2" post. This combination is ideal for customers working with wavelengths in the far red to NIR (700 - 1800 nm). Surrounding the sensor's active area is a fluorescing alignment disk, which absorbs light from 400 - 640 nm and 800 - 1700 nm.

Thorlabs offers an in-house NIST traceable recalibration service for these power and energy meter kits, which can be ordered using Item # CAL-IRPD below. Enter only the Part # and Serial # of the sensor that requires recalibration and include the corresponding console for recalibration during shipment.

We recommend recalibrating your sensor and console as a pair; however, if you would like to recalibrate only your console, use Item #s CAL-PM1 or CAL-PM1D below.

We also offer an ISO 17025 accredited calibration for the sensor and console separately. For more information or to order the accredited calibration, use Item #s CAL-IRPDD or CAL-PM1D below.

Part Number	Description	Price	Availability
PM400K4	**Touchscreen Digital Power & Energy Console, Ge Sensor, 700 nm - 1800 nm, 50 nW - 40 mW**	**$2,455.48**	**Lead Time**

Digital Console with Thermal Sensor (2 mW - 10 W, 0.19 µm - 20 µm)

Kit Item #	**PM125D**	**PM400K5**
Click Image to Enlarge		
Included Console Item #	PM100D	PM400
Display	4" Backlit Digital Display, 320 x 240 Pixel Resolution	4.3" Capacitive Color Touchscreen, WQVGA Resolution

Connectivity	USB 2.0 Connectivity
Console Sensor Compatibility	All C-Series Photodiode and Thermal Power Sensors as Well as All Pyroelectric Energy Sensors
Post Assembly Threading	Imperial
Mounting Base Compatibility	Imperial

Included Sensor	**S425C**
Wavelength Range	0.19 - 20 µm
Power Range	2 mW - 10 W
Resolution	100 µW
Detector Type	Thermal
Aperture	Ø25.4 mm
Spec Sheet	

Each kit includes our PM100D or PM400 power meter console, an S425C photodiode sensor, and a post assembly, consisting of a BA2 base, PH2 post holder, and TR2 Ø1/2" post. This is a general-purpose kit for customers working with higher powered lasers (up to 10 W) or longer wavelengths (up to 20 µm). The S425C thermal sensor has an exceptionally fast response time of 0.6 s.

Thorlabs offers an in-house NIST traceable recalibration service for these power and energy meter kits, which can be ordered using Item # CAL-THPY below. Enter only the Part # and Serial # of the sensor that requires recalibration and include the corresponding console for recalibration during shipment.

We recommend recalibrating your sensor and console as a pair; however, if you would like to recalibrate only your console, use Item #s CAL-PM1 or CAL-PM1D below.

We also offer an ISO 17025 accredited calibration for the PM100D and PM400 consoles separately. For more information or to order the accredited calibration, use Item # CAL-PM1D below.

Part Number	Description	Price	Availability
PM125D	**Digital Power & Energy Console, Thermal Sensor, 0.19 µm - 20 µm, 2 mW - 10 W**	**$2,346.26**	**Today**
PM400K5	**Touchscreen Digital Power & Energy Console, Thermal Sensor, 0.19 µm - 20 µm, 2 mW - 10 W**	**$2,681.00**	**Lead Time**

Manufacturer Recalibration Service for Photodiode Power Sensors

Thorlabs offers traceable recalibration services for our photodiode optical power sensors. To ensure accurate measurements, we recommend recalibrating the sensors annually. The manufacturer calibration of a power sensor includes recalibration of a single-channel console or interface at no additional cost; this is unavailable for the accredited calibration option. If you wish to calibrate one or more sensors with a dual-channel console, each sensor and console calibration service will need to be purchased individually. For more details on these recalibration services, please click the Documents ( ) icons below.

Refer to Table 236A for the appropriate calibration service Item # that corresponds to your power sensor.

Table 236A Compatibility	
Calibration Service Item #	**Compatible Sensors**
CAL-UVPD	S120VC
CAL-PD	S116C, S120C, S121C, S170C, S140C, S142C, S142CL, S150C, S151C, PM16-120, PM16-121, PM16-140
CAL-UVPD2	S130VC
CAL-PD2	S130C, PM16-130, PM160
CAL-NS	NS170C
CAL-IRPD	S122C, S144C, S145C, S145CL, S146C, S154C, S155C, PM16-122, PM16-144
CAL-IRPD2	S132C
CAL-MIRPD	S148C, S180C

Requesting a Calibration
Thorlabs provides two options for requesting a calibration:

1. Complete the Returns Material Authorization (RMA) form. When completing the RMA form, please enter your name, contact information, the Part #, and the Serial # of each item being returned for calibration; in the *Reason for Return* field, select "I would like an item to be calibrated." In the *Further Details* field, please indicate "Manufacturer Calibration" or the desired calibration part number below in order to differentiate from the ISO 17025 accredited calibration option. Once the form has been submitted, a member of our RMA team will reach out to provide an RMA Number, return instructions, and to verify billing and payment information.

Submit Calibration Request

2. Select the appropriate sensor calibration Item # below, enter the Part # and Serial # of the sensor that requires recalibration, and then Add to Cart. If you would like a console calibrated with your sensor, repeat this process for Item # CAL-PM1 or CAL-PM2 below, entering the console Item # and Serial #. A member of our RMA team will reach out to coordinate the return of the item(s) for calibration. Note that each console calibration Item # represents the cost of calibrating a console alone; if requesting a single-channel console calibration with a sensor calibration, the appropriate discount will be applied when your request is processed. Should you have other items in your cart, note that the calibration request will be split off from your order for RMA processing.

Please Note: To ensure your item being returned for calibration is routed appropriately once it arrives at our facility, please do not ship it prior to being provided an RMA Number and return instructions by a member of our team.

Part Number	Description	Price	Availability
CAL-UVPD	Manufacturer Recalibration Service for S120VC UV-Extended Silicon Photodiode Power Sensor	$206.73	Lead Time
CAL-PD	Manufacturer Recalibration Service for Single-Power-Range Silicon Photodiode Power Sensors	$179.20	Lead Time
CAL-UVPD2	Manufacturer Recalibration Service for S130VC Extended-UV Silicon Photodiode Power Sensor	$245.50	Lead Time
CAL-PD2	Manufacturer Recalibration Service for Dual-Power-Range Silicon Photodiode Power Sensors	$208.47	Lead Time
CAL-NS	Manufacturer Recalibration Service for Second-Order Nonlinear Crystal with Silicon Photodiode Sensor	$358.45	Lead Time
CAL-IRPD	Manufacturer Recalibration Service for Single-Power-Range Germanium or InGaAs Photodiode Power Sensors	$202.10	Lead Time
CAL-IRPD2	Manufacturer Recalibration Service for Dual-Power-Range Germanium or InGaAs Photodiode Power Sensors	$221.16	Lead Time
CAL-MIRPD	Manufacturer Recalibration Service for Extended InGaAs or MCT Photodiode Power Sensors	$360.99	Lead Time

In-House ISO 17025 Accredited Recalibration Service for Photodiode Power Sensors

Thorlabs offers ISO 17025 accredited recalibration services for our photodiode optical power sensors. If you wish to calibrate one or more sensors with a console, each sensor and console calibration service will need to be purchased individually. ISO 17025 accredited calibrations are performed in accordance with DIN EN ISO/IEC 17025:2018. Thorlabs GmbH's calibration laboratory is accredited by the German Accreditation Body (DAkkS), the national accreditation authority of the Federal Republic of Germany. The scope of services is described here in English or German. For more details on these recalibration services, please see the *Recalibration* tab or click the Documents ( ) icons below.

Refer to Table 791A for the appropriate calibration service Item # that corresponds to your power sensor.

Table 791A Compatibility	
Calibration Service Item #	**Compatible Sensors**
CAL-UVPDD	S120VC
CAL-PDD	S116C, S120C, S121C, S170C, S140C, S142C, S142CL, S150C, S151C, PM16-120, PM16-121, PM16-140
CAL-UVPD2D	S130VC
CAL-PD2D	S130C, PM16-130, PM160
CAL-IRPDD	S122C, S144C, S145C, S145CL, S146C, S154C, S155C, PM16-122, PM16-144
CAL-IRPD2D	S132C
CAL-MIRPDD	S148C

Requesting a Calibration
Thorlabs provides two options for requesting a calibration:

1. Complete the Returns Material Authorization (RMA) form. When completing the RMA form, please enter your name, contact information, the Part #, and the Serial # of each item being returned for calibration; in the *Reason for Return* field, select "I would like an item to be calibrated." In the *Further Details* field, please indicate "ISO 17025 Accredited Calibration" or the desired calibration part number below in order to differentiate from the manufacturer calibration option. Once the form has been submitted, a member of our RMA team will reach out to provide an RMA Number, return instructions, and to verify billing and payment information.

Submit Calibration Request

2. Select the appropriate sensor calibration Item # below, enter the Part # and Serial # of the sensor that requires recalibration, and then Add to Cart. If you would like a console calibrated with your sensor, repeat this process for Item # CAL-PM1, CAL-PM1D, CAL-PM2, or CAL-PM2D below, entering the console Item # and Serial #. A member of our RMA team will reach out to coordinate the return of the item(s) for calibration. Note that each console calibration Item # represents the cost of calibrating a console alone; if requesting a single-channel console calibration with a sensor calibration, the appropriate discount will be applied when your request is processed. Should you have other items in your cart, note that the calibration request will be split off from your order for RMA processing.

Please Note: To ensure your item being returned for calibration is routed appropriately once it arrives at our facility, please do not ship it prior to being provided an RMA Number and return instructions by a member of our team.

Part Number	Description	Price	Availability
CAL-UVPDD	ISO 17025 Accredited Calibration Service for S120VC UV-Extended Silicon Photodiode Power Sensor	$597.98	Lead Time
CAL-PDD	ISO 17025 Accredited Calibration Service for Single-Power-Range Silicon Photodiode Power Sensors	$518.35	Lead Time
CAL-UVPD2D	ISO 17025 Accredited Calibration Service for S130VC Extended-UV Silicon Photodiode Power Sensor	$710.10	Lead Time
CAL-PD2D	ISO 17025 Accredited Calibration Service for Dual-Power-Range Silicon Photodiode Power Sensors	$531.30	Lead Time

CAL-IRPDD	ISO 17025 Accredited Calibration Service for Single-Power-Range Germanium or InGaAs Photodiode Power Sensors	$584.57	Lead Time
CAL-IRPD2D	ISO 17025 Accredited Calibration Service for Dual-Power-Range Germanium or InGaAs Photodiode Power Sensors	$639.69	Lead Time
CAL-MIRPDD	ISO 17025 Accredited Calibration Service for Extended InGaAs Photodiode Power Sensors	$921.23	Lead Time

Manufacturer Recalibration Service for Thermal Power and Pyroelectric Energy Sensors

Thorlabs offers recalibration services for our Thermal Power and Pyroelectric Energy Sensors. To ensure accurate measurements, we recommend recalibrating the sensors annually. Recalibration of a single-channel power and/or energy meter console or interface is included with the recalibration of a sensor at no additional cost. If you wish to calibrate one or more sensors with a dual-channel console, each sensor and console calibration service will need to be purchased individually.

Please note that the CAL-THPY recalibration service cannot be used for our Thermal Position & Power Sensors; recalibration for these sensors can be requested by contacting Tech Support. Table 317A lists the sensors for which the CAL-THPY recalibration service is available.

Table 317A Compatibility	
Sensor Type	**Sensor Item #s**
Thermal Power	S175C, S302C[a], S305C[a], S310C[a], S314C[a],S322C, S350C, S370C, S401C, S405C, S415C, S425C, S425C-L, S470C, PM160T, PM160T-HP, PM16-401, PM16-405
Pyroelectric Energy	ES111C, ES120C, ES145C, ES220C, ES245C, ES308C, ES312C, ES408C, ES412C

a. This former catalog item is now offered as a special.

Requesting a Calibration
Thorlabs provides two options for requesting a calibration:

1. Complete the Returns Material Authorization (RMA) form. When completing the RMA form, please enter your name, contact information, the Part #s, and the Serial #s of all sensors or consoles being returned for calibration; in the *Reason for Return* field, select "I would like an item to be calibrated." All other fields are optional. Once the form has been submitted, a member of our RMA team will reach out to provide an RMA Number, return instructions, and to verify billing and payment information.

   Submit Calibration Request

2. Enter the Part # and Serial # of the item that requires recalibration below and then Add to Cart. If you would like a console calibrated with your sensor, repeat this process for Item # CAL-PM1 or CAL-PM2 below, entering the console Item # and Serial #. A member of our RMA team will reach out to coordinate the return of the item(s) for calibration. Note that each console calibration Item # represents the cost of calibrating a console alone; if requesting a single-channel console calibration with a sensor calibration, the appropriate discount will be applied when your request is processed. Should you have other items in your cart, note that the calibration request will be split off from your order for RMA processing.

Please Note: To ensure your item being returned for calibration is routed appropriately once it arrives at our facility, please do not ship it prior to being provided an RMA Number and return instructions by a member of our team. Pyroelectric energy sensors returned for recalibration or servicing must include the separate BNC to DB9 adapter, which contains the sensor EEPROM.

Part Number	Description	Price	Availability
CAL-THPY	Recalibration Service for Thermal Power and Pyroelectric Energy Sensors at 1064 nm	$227.50	Lead Time

Manufacturer Recalibration of Power & Energy Meter Electronics

These traceable recalibration services are for the power and/or energy meter electronics of our consoles and interfaces. To ensure accurate measurements, we recommend recalibrating annually. The manufacturer calibration of a power sensor includes recalibration of a single-channel console or interface at no additional cost; this is unavailable for the accredited calibration option. If you wish to calibrate one or more sensors with a dual-channel console, each sensor and console calibration service will need to be purchased individually. For more details on these recalibration services, please click the Documents ( ) icons below.

Table 719A Compatibility	
Calibration Service Item #	**Compatible Consoles & Interfaces**
Single-Channel	
CAL-PM1	PM100D, PM100A, PM400, PM100USB, PM101 Series, PM102 Series, PM103 Series
Dual-Channel	
CAL-PM2	PM5020, Previous-Generation PM320E

Table 719A lists the power and/or energy meter consoles and interfaces that can be calibrated using the CAL-PM1 and CAL-PM2 recalibration services.

Requesting a Calibration
Thorlabs provides two options for requesting a calibration:

1. Complete the Returns Material Authorization (RMA) form. When completing the RMA form, please enter your name, contact information, the Part #, and the Serial # of each item being returned for calibration; in the *Reason for Return* field, select "I would like an item to be calibrated." In the *Further Details* field, please indicate "Manufacturer Calibration" or the desired calibration part number below in order to differentiate from the ISO 17025 accredited calibration option. Once the form has been submitted, a member of our RMA team will reach out to provide an RMA Number, return instructions, and to verify billing and payment information.

Submit Calibration Request

2. Select the appropriate Item # below, enter the Part # and Serial # of the item that requires recalibration, and then Add to Cart. If you would like to calibrate one or more sensors with your console, repeat this process for the appropriate sensor recalibration service above, entering the console Item # and Serial #. A member of our RMA team will reach out to coordinate return of the item(s) for calibration. Note that each console calibration Item # represents the cost of calibrating a console alone; if requesting a single-channel console calibration with a sensor calibration, the appropriate discount will be applied when your request is processed. Should you have other items in your cart, note that the calibration request will be split off from your order for RMA processing.

Please Note: To ensure your item being returned for calibration is routed appropriately once it arrives at our facility, please do not ship it prior to being provided an RMA Number and return instructions by a member of our team.

Part Number	Description	Price	Availability
CAL-PM1	Manufacturer Recalibration of Single-Channel Power and/or Energy Meter Electronics	$84.32	Lead Time
CAL-PM2	Manufacturer Recalibration of Dual-Channel Power and Energy Meter Electronics	$224.83	Lead Time

In-House ISO 17025 Accredited Recalibration of Power & Energy Meter Electronics

These ISO 17025 accredited recalibration services are for the power and/or energy meter electronics of our consoles and interfaces. If you wish to calibrate one or more sensors with a console, each sensor and console calibration service will need to be purchased individually. ISO 17025 accredited calibrations are performed in accordance with DIN EN ISO/IEC 17025:2018. Thorlabs GmbH's calibration laboratory is accredited by the German Accreditation Body (DAkkS), the national accreditation authority of the Federal Republic of Germany. The scope of services is described here in English or German. For more details on these recalibration services, please see the *Recalibration* tab or click the Documents ( ) icons below.

Table 792A Compatibility	
Calibration Service Item #	**Compatible Consoles & Interfaces**
Single-Channel	
CAL-PM1D	PM100D, PM100A, PM400, PM100USB, PM101 Series, PM102 Series, PM103 Series
Dual-Channel	
CAL-PM2D	PM5020

Table 792A lists the power and/or energy meter consoles and interfaces that can be calibrated using the CAL-PM1D and CAL-PM2D recalibration services.

Requesting a Calibration
Thorlabs provides two options for requesting a calibration:

1. Complete the Returns Material Authorization (RMA) form. When completing the RMA form, please enter your name, contact information, the Part #, and the Serial # of each item being returned for calibration; in the *Reason for Return* field, select "I would like an item to be calibrated." In the *Further Details* field, please indicate "ISO 17025 Accredited Calibration" or the desired calibration part number below in order to differentiate from the manufacturer calibration option. Once the form has been submitted, a member of our RMA team will reach out to provide an RMA Number, return instructions, and to verify billing and payment information.

Submit Calibration Request

2. Select the appropriate Item # below, enter the Part # and Serial # of the item that requires recalibration, and then Add to Cart. If you would like to calibrate one or more sensors with your console, repeat this process for the appropriate sensor recalibration service above, entering the console Item # and Serial #. A member of our RMA team will reach out to coordinate return of the item(s) for calibration. Note that each console calibration Item # represents the cost of calibrating a console alone; if requesting a single-channel console calibration with a sensor calibration, the appropriate discount will be applied when your request is processed. Should you have other items in your cart, note that the calibration request will be split off from your order for RMA processing.

Please Note: To ensure your item being returned for calibration is routed appropriately once it arrives at our facility, please do not ship it prior to being provided an RMA Number and return instructions by a member of our team.

Part Number	Description	Price	Availability
CAL-PM1D	ISO 17025 Accredited Calibration for Single-Channel Power and/or Energy Meter Electronics	$244.22	Lead Time
CAL-PM2D	ISO 17025 Accredited Calibration for Dual-Channel Power and/or Energy Meter Electronics	$545.51	Lead Time