



CAL4 - February 12, 2021

Item # CAL4 was discontinued on February 12, 2021. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

PHOTODIODE POWER SENSORS (C-SERIES)



Hide Overview

OVERVIEW

Features

- Fast Response Time and High Resolution
- C-Series Connector Design for Quick Sensor Connection
- · Over-Temperature Alert Sensor (Except S130 Series and S170C Microscope Slide Sensor)
- Individually Calibrated with NIST- or PTB-Traceable Certificate of Calibration Plus Embedded Calibration
 Curve and Sensor Settings

Thorlabs' C-Series Photodiode Power Meter Sensors cover a wide power and wavelength range. These sensors are offered in standard, slim, microscope slide, integrating sphere, and compact fiber versions to meet your specific application requirements. They are the best sensor choice when a fast response time or high resolution is required and there is not a need for a flat spectral response.

These photodiode power meter sensors feature enhanced shielding to avoid electromagnetic interference as well as an over-temperature alert sensor to warn against damage and measurement errors due to overheating of the sensor (except the S130C Series Slim Sensors and the S170C Microscope Slide Sensor). For all sensors (except the S130C Slim Sensors and the S170C Microscope Slide Sensor), a set of fiber adapters is available to connect them to standard optical fiber patch cables (see below). Other fiber adapter types are available upon request.

The sensors below (except the S150C series) have universal 8-32 and M4 taps for mounting to Ø1/2" Posts. Posts and post holders are not included and sold separately.

Compatibility

The Photodiode Sensors presented here are compatible with C-Series power meter consoles including the PM400, PM100D, PM100A, PM100USB, and PM320E. The S150C Series Fiber Sensors are integrated into the connector itself and directly plugged into the console.

Calibration

Each sensor head is individually calibrated and is shipped with NIST- or PTB-traceable calibration data. The included data will match the calibration certification of the photodiode used to test the individual sensor. The calibration and identification data is stored in the connector of the sensor and is downloaded automatically to the connected power meter console.

Thorlabs offers specific recalibration services for all our photodiode power sensors. To ensure accurate measurements, we recommend recalibrating the sensors annually. To order this service, scroll toward the bottom of the page and select the appropriate Item # that corresponds to your power sensor. For questions and pricing information pertaining to this service, please contact Tech Support.

Sensor Upgrade Service

All C-Series Sensors are incompatible with old power meter consoles with non-C-Series connectors. We offer a sensor upgrade service if you want to use your existing sensors with a new power meter console with C-Series connector. Note: upgraded sensors will be incompatible with old power meter consoles with non-C-Series connectors. Please contact our Tech Support team for details.

Power Meter Selection Guide
Sensors
Photodiode Power Sensors
Thermal Power Sensors
Thermal Position & Power Sensors
Pyroelectric Energy Sensors
Power Meter Consoles
Digital Handheld Console
Analog Handheld Console
Touchscreen Handheld Console
Dual-Channel Benchtop Console
Complete Power Meters
Power Meter Bundles
Wireless Power Meters with Sensors
Compact USB Power Meters
ield Power Meters for Terminated Fibers
USB Interfaces, External Readout

Recalibration Service

Recalibration services are available for these photodiode power sensors. To order this service, scroll to the bottom of the page and select the appropriate Item # that corresponds to your sensor.

Photodiode Sensor Selection Guide							
Housing Type	Standard	Slim	Microscope Slide	Integrating Sphere	Fiber-Coupled		
Power Range	50 nW - 500 mW	500 pW - 500 mW	10 nW - 150 mW	1 µW - 20 W	100 pW - 20 mW		
Wavelength Range	200 - 1800 nm	200 - 1800 nm	350 - 1100 nm	350 - 5500 nm	350 - 1700 nm		
Typical Application	General Measurement	Tight Places	Microscope Alignment and Calibration	Divergent Beams	Fiber		
Fiber Adapters Available	Yes	Yes	No	Yes	Yes		

Hide Specs

SPECS

These specifications were obtained at an ambient room temperature of 23 °C \pm 0.5 °C and a humidity of 45% \pm 15%.

Standard Photodiode Sensors: S120C Series							
Item #	S120VC	S120VC S120C S121C					
Technical Specs							
Detector Type	Silicon Photodiode (UV Extended)	Silicon Photodiode	Silicon Photodiode	Germanium Photodide			
Wavelength Range	200 nm - 1100 nm	400 nm - 1100 nm	400 nm - 1100 nm	700 nm - 1800 nm			
Optical Power Range	50 nW - 50 mW	- 50 mW 50 nW - 50 mW 500 nW - 5		50 nW - 40 mW			
Max Average Power Density ^b	20 W/cm ² 10 W/cm ²						
Max Pulse Energy	20 µJ						
Linearity	±0.5%						
Resolution ^c	Resolution ^c 1 nW 1 nW 10 nW		10 nW	2 nW			
Measurement Uncertainty ^d	±3% (440 - 980 nm) ±5% (280 - 439 nm) ±7% (200 - 279 nm, 981 - 1100 nm)	±3% (440 - 980 nm) ±5% (400 - 439 nm) ±7% (981 - 1100 nm)	±3% (440 - 980 nm) ±5% (400 - 439 nm) ±7% (981 - 1100 nm)	±5%			
Responsivity ^e (Click for Details)	Raw Data	Raw Data	Raw Data	Raw Data			

 The minimum measurable power for Germanium photodiodes can vary due to large fluctuations in the sensor's dark current, which is dependent on wavelength and temperature. This is particularly true at the edges of the sensor's operating range where the responsivity is lower. The S122C also includes an ND filter with high attenuation from 700 nm to 900 nm in front of the sensor. This will also affect the measurable minimum power in that wavelength range.

• For continuous wave (CW) sources, this value is equivalent to the peak power density, while for pulsed laser sources this value is calculated from the

time-averaged power and beam profile. Measured with PM100D console in low bandwidth setting.

Beam diameter > 1 mm.

All sensor responsivities shown in these plots were calibrated to a NIST-traceable source with measurements taken in 5 nm intervals.

For the S120VC, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had a reflective ND diffuser (OD1).
 Additionally, they came with an 8-32 tap and M4 adpater. For additional information, please contact technical support.

For the S120C, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had an absorptive ND diffuser (Schott NG3). Additionally, they came with an 8-32 tap and M4 adpater. For additional information, please contact technical support.

For the S121C, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had an absorptive ND diffuser (Schott NG9). Additionally, they came with an 8-32 tap and M4 adpater. For additional information, please contact technical support.

Item #	S130VC	S130C	S132C ^a				
echnical Specs							
Detector Type	Silicon Photodiode (UV Extended)	Silicon Photodiode	Germanium Photodide				
Wavelength Range	200 nm - 1100 nm	400 nm - 1100 nm	700 nm - 1800 nm ^b				
Optical Power Range (with Filter)	500 pW - 0.5 mW ^c (Up to 50 mW) ^c	500 pW - 5 mW (Up to 500 mW)	5 nW - 5 mW (Up to 500 mW)				
Max Average Power Density ^d	20 W	10 W/cm ²					
Max Pulse Energy	20 µJ						
Linearity	±0.5%						
Resolution	100 pW ^e	100 pW ^e	1 nW ^f				
Measurement	±3% (440 - 980 nm)	±3% (440 - 980 nm)					

Uncertainty ^g	±5% (400 - 439 nm) ±7% (200 - 279 nm, 981 - 1100 nm)	±5% (280 - 439 nm) ±7% (981 - 1100 nm)	±5%	
Responsivity ^h (Click for Details)	sponsivity ^h (Click Image: Click Raw Data Image: Click Raw Data			
 The minimum m which is depende For the S132C, tt ND diffuser (For the S130VC, power range of 5 For continuous w All sensor response For the S130 ab 	neasurable power for Germanium pho nt on wavelength and temperature. T the nese specifications are valid for devic OD1), which would decrease the wav additional informat these specifications are valid for dev in W - 5 mW (50 nW - 50 mW with fil con ave (CW) sources, this value is equiv is calculated from the Measured with PM100D c Measured with PM100D console Be onsivities shown in these plots were o IC, these specifications are valid for or sorptive ND diffuser (Schott NG9). For	otodiodes can vary due to large fluctu his is particularly true at the edges o e responsivity is lower. es with serial numbers 1203xxx or hivelength range from 700 nm to 1800 ion, please contact technical support ices with serial numbers 1203xxx or ter) and a reflective ND diffuser (OD tact technical support. valent to the peak power density, whith in low bandwidth setting, withe in low bandwidth setting at 1550 nm am Diameter > 1 mm. talibrated to a NIST-traceable sourced intervals. levices with serial numbers 1203xxx or additional information, please contact the set of the set of the set of the set of the set of the tervals.	ations in the sensor's dark f the sensor's operating rar gher. Older versions had a nm to 1200 nm to 1800 nn higher. Older versions had 1). For additional informatic le for pulsed laser sources file. but filter. h, without filter.	current, ige where reflective n. For an optical m, please this value in 5 nm ad an
			licroscope Slide	Photodiode Sens
		It	em #	S170C
		т	echnical Specs	
		D	etector Type	Silicon Photodiode
		v	avelength Range	350 - 1100 nm
		O W	ptical Power /orking Range	10 nW - 150 mW
		M	ax Average ower Density ^a	20 W/cm ²
		M	ax Pulse Energy	N/A
Linearity ±0.5				

Sensor

•	For continuous wave (CW) sources, this value is
	equivalent to the peak power density, while for
	pulsed laser sources this value is calculated from
	the time-averaged power and beam profile

Resolution^b

Calibration

Uncertainty^c

Details)

.

Responsivity^d (Click for

1 nW

±3% (440 - 980 nm)

±5% (350 - 439 nm)

±7% (981 - 1100 nm)

 \land

Raw Data

- Measured with PM100D console in low bandwidth . setting.
 - Beam diameter > 1 mm.
- The sensor responsivity shown in this plot was . calibrated to a NIST-traceable source with measurements taken in 5 nm intervals.
- · Please note that the S170C power meter head is not compatible with older Thorlabs power meter consoles (PM100, PM30, PM300, PM300E, and S100).

Integrating Sphere Photodiode Sensors

Item #	S140C	S142C	S144C	S145C	S146C	S148C	S180C		
Technical Specs									
Detector Type	Si Photodiode		InGaAs Photodiode				HgCdTe (MCT) Photodiode		
Wavelength Range	350 nm -	- 1100 nm		350 nm - 1100 nm 800 nm - 1700 nm 900 nm - 1650		800 nm - 1700 nm 900 nm - 1650 nm 1200 -		1200 - 2500 nm	2900 - 5500 nm
Optical Power Range	1 µW - 500 mW	1 µW - 5 W	1 μW - 500 mW	1 µW - 3 W	10 µW - 20 W	1 µW - 1 W	1 µW - 3 W		
Max Average Power Density ^a	1 kW/cm ²	2 kW/cm ²	1 kW/cm²	1 2 kW/cm ²			1 kW/cm²		
Max Pulse									

Energy Density	1 J/cm ²	7 J/cm ²	1 J/cm ²	1 J/cm ² 7 J/cm ²		1 J/cm ²	
Linearity		±0.5%					
Resolution ^b	1 nW				10 nW	1 nW	10 nW
Measurement Uncertainty ^c	±3% (440 - 980 nm) ±5% (350 - 439 nm) ±7% (981 - 1100 nm)			±5%			
Responsivity ^d (Click for Plot)	Raw Data	Raw Data	Raw Data	Raw Data	Raw Data	Raw Data	Raw Data
 For continuous wave (CW) sources, this value is equivalent to the peak power density, while for pulsed laser sources this value is calculated from the time-averaged power and beam profile. Measured with PM100D console in low bandwidth setting. Beam Diameter > 1 mm. 							
 All sensor responsivities shown in these plots were calibrated to a NIST-traceable source with measurements taken in 5 nm intervals except for the 							

Sensor Connectors **D-Type Male**

10 0 0 0 05 60 0 0 09

S180C. See the S180C responsivity plot to see the NIST-traceable reference points.

Fiber-Coupled Photodiode Sensors: S150C Series

Item #	S150C	S151C	S154C S155C					
Technical Specs								
Detector Type	Si Photodiode InGaAs Photo			Photodiode				
Wavelength Range	350 nm - 1100 nm	400 nm - 1100 nm	800 nm - 1700 nm	800 nm - 1700 nm				
Optical Power Range 100 pW - 5 mW 1 nW - 20 mW 1 (-70 dBm to 7 dBm) (-60 dBm to 13 dBm) (-70 dBm)		100 pW - 3 mW (-70 dBm to 5 dBm)	1 nW - 20 mW (-60 dBm to 13 dBm)					
Max Average Power Density ^a	100 mW/cm ²	10 W/cm ²	100 mW/cm ² 10 W/cm ²					
Max Pulse Energy	20 µJ							
Linearity		±0.	5%					
Resolution ^b	10 pW (-80 dBm)	100 pW (-70 dBm)	10 pW (-80 dBm) 100 pW (-70					
Measurement Uncertainty ^c	±3% (440 - 980 nm) ±5% (350 - 439 nm) ±7% (981 - 1100 nm)	±3% (440 - 980 nm) ±5% (400 - 439 nm) ±7% (981 - 1100 nm)	±5%					
Responsivity ^d (Click for Details)	Raw Data	Raw Data	Raw Data	Raw Data				

· For continuous wave (CW) sources, this value is equivalent to the peak power density, while for pulsed laser sources this value is calculated from the time-averaged power and beam profile.

Measured with PM100D console in low bandwidth setting.

For a beam diameter > 1 mm incident on the active area of the detector (i.e. at the detector surface after the light has exited the fiber and passed

through any internal optics).

All sensor responsivities shown in these plots were calibrated to a NIST-traceable source with measurements taken in 5 nm intervals. This specification is valid for devices with serial numbers 1203xxx and higher. For older versions, please contact technical support.

Hide Pin Diagram

PIN DIAGRAM

	Conne	ection				
Pin	S120, S140, and S150 Series, S170C, and S180C Sensors	S130 Series Sensors				
1	Not Used					
2	EEPROM Data					
3	Photodiode Anode and NTC Ground Photodiode Anode					
4	Photodiode Cathode					
5	Not Used					
6	EEPROM Ground					
7	NTC	Slider Detection				
8	Not	Not Used				

Not Used

Hide Pulse Calculations

9

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:

Pulsed Lasers Introduction to Pow and Energy Calculati

Click above to download the full report.

- 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 laser radiation parameters are illustrated in Figure 1 and described in the table. For quick reference, a list of equations are 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:

Pulse energy calculated from average power:

Average power calculated from pulse energy:

peak τ

Peak power and average power calculated from each other:

$$P_{peak} = \frac{P_{avg}}{f_{rep} \cdot \tau} = \frac{P_{avg} \cdot \Delta t}{\tau} \quad \text{and} \quad \sum_{k_{a} \neq j_{min} \neq j_{mi$$

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.



Figure 1: Parameters used to describe pulsed laser emission are indicated in the plot (above) and described in the table (below). Pulse energy (E) is the shaded area under the pulse curve. Pulse energy is, equivalently, the area of the diagonally hashed region.

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			The height on the optical power axis, if the energy emitted		

$$E = \frac{1}{f_{rep}} \quad \text{and} \quad (z_{-} z_{+}^{+})$$
$$E = \frac{P_{avg}}{f_{rep}} = P_{avg} \cdot \Delta t$$
$$P_{avg} = \frac{E}{\Delta t} = E \cdot f_{rep}$$

 $\Delta t = \frac{1}{f}$

$$P_{avg} = \frac{E}{\Delta t} = E \cdot f_{rep}$$

$$F_{rep} = \frac{E}{\Delta t} = E \cdot f_{rep}$$

$$P_{neak} \approx \frac{E}{-}$$

Peak pulse power estimated from pulse energy:

Power	Pavg	Watts [W]	by the pulse were uniformly spread over the entire period.
Instantaneous Power	Ρ	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:

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

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.

Hide Console Selection

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 below 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	PM320E
(Click Photo to Enlarge)		0.387 (2)		52200 - C = 1 52200 - C = 1 5200 - C = 1 5200 - C = 1 5200 - C
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 and Thermal Power; Pyroelectric		
Housing Dimensions	7.24" x 4.29" x 1.61"	7.09" x 4.13" x 1.50"	5.35" x 3.78" x 1.16"	4.8" x 8.7" x 12.8"

(H x W x D)	(184 mm x 109 mm x 41 mm)	(180 mm x 105 mm x 38 mm)	(136.0 mm x 96.0 mm x 29.5 mm)	(122 mm x 220 mm x 325 mm)
Channels		1		2
External Temperature Sensor Input (Sensor not Included)	-	-	Instantaneous Readout and Record Temperature Over Time	-
External Humidity Sensor Input (Sensor not Included)	-	-	Instantaneous Readout and Record Humidity Over Time	-
GPIO Ports	-		4, Programmable	-
Source Spectral Correction	-	-	✓	-
Attenuation Correction	-	-	✓	-
External Trigger Input	-	-	-	✓
Display				
Туре	Mechanical Needle and LCD Display with Digital Readout	320 x 240 Pixel Backlit Graphical LCD Display	Protected Capacitive Touchscreen with Color Display	240 x 128 Pixels Graphical LCD 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)	3.7" x 2.4" (94.0 mm x 61.0 mm)
Refresh Rate	20	Hz	10 Hz (Numerical) 25 Hz (Analog Simulation)	20 Hz
Measurement Views ^a				
Numerical	√	✓	✓	✓
Mechanical Analog Needle	√	-	-	-
Simulated Analog Needle	-	✓	✓	✓
Bar Graph	-	✓	✓	√
Trend Graph	-	✓	✓	✓
Histogram	-	✓	-	✓
Statistics	✓	✓	✓	✓
Memory				
Туре	-	SD Card	NAND Flash	-
Size	-	2 GB	4 GB	-
Power				
Battery	LiPo 3.7 V	1300 mAh	LiPo 3.7 V 2600 mAh	-
External	5 VDC via USB or I	ncluded AC Adapter	5 VDC via USB	Selectable Line Voltage: 100 V, 115 V, 230 V (±10%)

These are the measurement views built into the unit. All of our power meter consoles except the PM320E can be controlled using the Optical Power Monitor software package. The PM320E has its own software package.

Interfaces

Item #	PM101	PM102	PM101A	PM102A	PM101R	PM101U	PM102U	PM100USB
(Click Photo to Enlarge)								
Key Features	USB, RS2 and Analo	232, UART, g Operation	USB and A Oper	Analog SMA ration	USB and RS232 Operation	USB O	peration	USB Operation
Compatible Sensors		PM101 Series: Photodiode and Thermal Power PM102 Series: Thermal Power and Thermal Position & Power					Photodiode and Thermal Power; Pyroelectric	
Housing Dimensions (H x W x D)	3.80" x 2.3 (96.5 x 57.2	25" x 1.00" 2 x 25.4 mm)	3.94" x 2. (100.0 x 57.	25" x 1.00" 2 x 25.4 mm)	3.78" x 2.25" x 1.00" (95.9 x 57.2 x 25.4 mm)	3.68" x 2.3 (93.6 x 57.2	25" x 1.00" 2 x 25.4 mm)	3.67" x 2.38 " x 1.13" (93.1 x 60.4 x 28.7 mm)
Channels					1			
External Temperature Sensor Input (Sensor Not Included)	NTC Tr	NTC Thermistor -						
External Humidity Sensor Input (Sensor not Included)		-						
GPIO Ports					-			
Source Spectral Correction		-						
Attenuation Correction		-						
External Trigger Input					-			
Display								
Туре				No Built-In	Display; Controlled via GU	I for PC		

Refresh Rate		Up to 1000 Hz ^a	Up to 300 Hz ^a			
Measurement Views ^b						
Numerical		Requires PC ^b				
Mechanical Analog Needle		-				
Simulated Analog Needle		Requires PC ^b				
Bar Graph	Requires PC ^b					
Trend Graph	Requires PC ^b					
Histogram	Requires PC ^b					
Statistics	Requires PC ^b					
Memory						
Туре		Internal Non-Volatile Memory for All Settings	-			
Size		-				
Power						
Battery		-				
External	5 VDC via USB or 5 to 36 VDC via DA-15	5 VDC via USB				

Dependent on PC Settings

• These power meter interfaces do not have a built-in monitor, so all data must be displayed through a PC running the Optical Power Meter Software.

Hide Sensor Selection

SENSOR SELECTION

This tab outlines the full selection of Thorlabs' power and energy sensors. Refer to the lower right table 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.

Thorlabs offers four types of sensors:



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

- 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. The expandable table below sorts our sensors by type (e.g., photodiode, thermal, or pyroelectric) and provides key specifications.

Alternatively, the selection guide graphic further below arranges our entire selection of photodiode and thermal power sensors by wavelength (left) or optical power range (right). 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.

Console Compatibility							
Console Item #	PM100A	PM100D	PM400	PM320E	PM101 Series	PM102 Series	PM100USB
Photodiode Power	~	~	~	~	~	-	~
Thermal Power	✓	✓	✓	✓	✓	✓	1
Thermal Position	-	-	~	-	-	~	-
Pyroelectric Energy	-	~	~	~	-	-	~

Photodiode Power Sensors
Thermal Power Sensors
Thermal Position & Power Sensors
Pyroelectric Energy Sensors

- 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.
- 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.
- · With intermittent use: maximum exposure time of 20 minutes for the S401C, otherwise maximum exposure time is 2 minutes.



Hide Standard Photodiode Power Sensors

Standard Photodiode Power Sensors

- For General Purpose Optical Power Measurements
- Integrated Viewing Target for Easy Sensor Alignment
- Ø9.5 mm Sensor Aperture
- Fiber Adapters Available Separately (See Table Below)
- Sensor, Protective Cap, and IR Target Included

The S12xC Standard Photodiode Power Sensors are ideal for metering low power coherent and incoherent sources from the UV to the NIR. These sensors feature an integrated viewing target for easy alignment, enhanced shielding against electromagnetic interference, over temperature alert device, and large Ø9.5 mm sensor aperture. The sensors are compatible with Ø1/2" posts and



Release Mount

SM1 (1.035"-40) lens tubes and are ideal for free-space and fiber-coupled sources. They may also be mounted in 30 mm cage systems using our selection of 30 mm Cage System Optic Mounts with internal SM1 threading.

Each sensor is shipped with NIST- or PTB-traceable calibration data. The included data will match the calibration certification of the photodiode used to test the individual sensor. Thorlabs offers a recalibration service for these photodiode power sensors, which can be ordered below (see Item # CAL1 for Si sensors and Item # CAL2 for Ge sensors).

Item # ^a	S120VC	S120C	S121C	S122C ^b			
Sensor Image (Click the Image to Enlarge)							
Aperture Size		Ø9.5	5 mm				
Wavelength Range	200 - 1100 nm	400 - 1100 nm	400 - 1100 nm	700 - 1800 nm			
Power Range	50 nW -	50 mW	500 nW - 500 mW	50 nW - 40 mW			
Detector Type	Si Photodiode (UV Extended)	Ge Photodiode					
Linearity	±0.5%						
Resolution ^c	11	2 nW					
Measurement Uncertainty ^d	±3% (440 - 980 nm) ±5% (280 - 439 nm) ±7% (200 - 279 nm, 981 - 1100 nm)	±3% (440 - 980 nm) ±3% (440 - 980 nm) ±5% (280 - 439 nm) ±5% (400 - 439 nm) ±7% (200 - 279 nm, ±5% (400 - 439 nm) 981 - 1100 nm) ±7% (981 - 1100 nm)		±5%			
Responsivity ^e (Click for Plot)	Raw Data	Raw Data	Raw Data	Raw Data			
Coating/Diffuser	Reflective ND (OD1.5) ^f	Reflective ND (OD1) ^g	Reflective ND (OD2) ^h	Absorptive ND (Schott NG9)			
Head Temperature Measurement		NTC Therm	istor 4.7 kΩ				
Housing Dimensions		Ø30.5 mm	x 12.7 mm				
Active Detector Area	9.7 mm x 9.7 mm						
Cable Length		1.5	i m				
Mounting Thread ^{f,g,h}		Universal 8-32 / M4 Tap, Post Not Included					
Aperture Thread		External SM	1 (1.035"-40)				
Fiber Adapters	S120-FC	, S120-APC, S120-SMA, S120-S	T, S120-LC, and S120-SC (Not	Included)			
Compatible Consoles		PM400, PM100D, PM100A, PM	101A, PM100USB, and PM320E				

• For complete specifications, please see the Specs tab.

The minimum measurable power for Germanium photodiodes can vary due to large fluctuations in the sensor's dark current, which is dependent on
wavelength and temperature. This is particularly true at the edges of the sensor's operating range where the responsivity is lower. The S122C also includes
an ND filter with high attenuation from 700 nm to 900 nm in front of the sensor. This will also affect the measurable minimum power in that wavelength
range.

- · Measured with PM100D console in low bandwidth setting.
- Beam diameter > 1 mm.
- · All sensor responsivities shown in these plots were calibrated to a NIST-traceable source with measurements taken in 5 nm intervals.
- For the S120VC, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had a reflective ND diffuser (OD1). Additionally, they came with an 8-32 tap and M4 adapter. For additional information, please contact technical support.
- For the S120C, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had an absorptive ND diffuser (Schott NG3). Additionally, they came with an 8-32 tap and M4 adapter. For additional information, please contact technical support.
- For the S121C, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had an absorptive ND diffuser (Schott NG9). Additionally, they came with an 8-32 tap and M4 adapter. For additional information, please contact technical support.

Part Number	Description	Price	Availability
S120VC	Standard Photodiode Power Sensor, Si, 200 - 1100 nm, 50 mW	\$450.16	Lead Time
S120C	Standard Photodiode Power Sensor, Si, 400 - 1100 nm, 50 mW	\$324.64	Today
S121C	Standard Photodiode Power Sensor, Si, 400 - 1100 nm, 500 mW	\$352.78	Today
S122C	Standard Photodiode Power Sensor, Ge, 700 - 1800 nm, 40 mW	\$648.19	Lead Time

Hide Slim Photodiode Power Sensors

Slim Photodiode Power Sensors

- For Optical Power Measurements in Confined Spaces
- Very Slim Design: 5 mm Thin on Sensor Side
- Ø9.5 mm Sensor Aperture
- Slideable ND Filter Automatically Changes Sensor Power Range
- Accessories Available Separately Below:
 - SM1A29 Adapter with VIS/IR Target and External SM1 Threading



[APPLIST]

Click for Details SM1A29 SM1 Thread Adapter Mounted on a S130C Sensor



[APPLIST]

are at a premium. The 5 mm thin

FBSM Mount with VIS/IR Target for FiberBench Systems

S130C Photodiode Sensor Mounted in FiberBench System Using FBSM Mount The S13xC Slim Photodiode Power Sensors are designed to take optical source power measurements in locations where space and accessibility

Slim Photodiode Sensors can fit between closely spaced optics, cage systems, and other arrangements where standard power meters may not fit. These sensors also feature a large Ø9.5 mm sensor aperture and slideable neutral density filter for dual power ranges in one compact device.

A separately available SM1A29 adapter can be attached by 2 setscrews to any S130 series power sensor to mount fiber adapters, light shields, filters or any other SM1-threaded (1.035"-40) mechanics or optics. The FBSM Mount allows our S130 series power sensors to be mounted vertically into FiberBench systems for stable mounting with a minimal footprint.

Each sensor is shipped with NIST- or PTB-traceable calibration data. The included data will match the calibration certification of the photodiode used to test the individual sensor. Thorlabs offers a recalibration service for these photodiode power sensors, which can be ordered below (see Item CAL-S130 for Si sensors and Item # CAL-S132 for Ge sensors).

Item # ^a	S130VC	S130C	S132C ^b				
Sensor Image (Click the Image to Enlarge)							
Aperture Size		Ø9.5 mm	1				
Wavelength Range	200 - 1100 nm	400 - 1100 nm	700 - 1800 nm ^c				
Power Range (with filter)	500 pW - 0.5 mW ^d (Up to 50 mW) ^d	500 pW - 5 mW (Up to 500 mW)	5 nW - 5 mW (Up to 500 mW)				
Detector Type	Si Photodiode (UV Extended)	Si Photodiode	Ge Photodiode				
Linearity	±0.5%						
Resolution	100 pW ^e 1 nW ^f						
Measurement Uncertainty ^g	±3% (440 - 980 nm) ±5% (280 - 439 nm) ±7% (200 - 279 nm, 981 - 1100 nm)	±3% (440 - 980 nm) ±5% (400 - 439 nm) ±7% (981 - 1100 nm)	±5%				
Responsivity ^h (Click for Plot)	Raw Data	Raw Data	Raw Data				
Coating/Diffuser	Reflective ND (OD1.5) ^d	Reflective ND (OD2) ⁱ	Absorptive ND (Schott NG9/KG3) ^C				
Housing Dimensions	150 mn	n x 19 mm x 10 mm; 5 mm Thickness on Se	nsor Side				
Active Detector Area	9.7 mm x 9.7 mm						
Cable Length	1.5 m						
Mounting Thread	s	Separate 8-32 and M4 Taps, Posts Not Inclu	ded				
Adapters (Not Included)	SM1A Fiber Adapters Compatible with SM1. F	29: Add SM1 Thread and Viewing Target to A29 Adapter: S120-FC, S120-APC, S120-S BSM: Integrate Sensor into FiberBench Setu	Aperture MA, S120-ST, S120-LC, and S120-SC .ps				
Compatible Consoles	PM400, F	PM100D, PM100USB, PM100A, PM101A, a	nd PM320E				

· For complete specifications, please see the Specs tab.

• The minimum measurable power for Germanium photodiodes can vary due to large fluctuations in the sensor's dark current, which is dependent on wavelength and temperature. This is particularly true at the edges of the sensor's operating range where the responsivity is lower.

• For the S132C, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had a reflective ND diffuser (OD1), which would decrease the wavelength range from 700 nm to 1800 nm to 1800 nm to 1800 nm. For additional information, please contact technical support.

• For the S130VC, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had an optical power range of 5 nW to 5 mW (50 nW to 50 mW with filter) and a reflective ND diffuser (OD1). For additional information, please contact technical support.

· Measured with PM100D console in low bandwidth setting, without filter.

· Measured with PM100D console in low bandwidth setting at 1550 nm, without filter.

Beam Diameter > 1 mm.

· All sensor responsivities shown in these plots were calibrated to a NIST-traceable source with measurements taken in 5 nm intervals.

• For the S130C, these specifications are valid for devices with serial numbers 1203xxx or higher. Older versions had an absorptive ND diffuser (Schott NG9). For additional information, please contact technical support.

Part Number	Description	Price	Availability
S130VC	Slim Photodiode Power Sensor, Si, 200 - 1100 nm, 50 mW	\$653.60	5-8 Days
S130C	Slim Photodiode Power Sensor, Si, 400 - 1100 nm, 500 mW	\$539.98	Today
S132C	Slim Photodiode Power Sensor, Ge, 700 - 1800 nm, 500 mW	\$767.23	Lead Time
SM1A29	Customer Inspired! SM1 Thread Adapter for Slim Photodiode Sensors	\$44.64	Today
FBSM	FiberBench Mount for Slim Photodiode Sensors	\$44.36	Lead Time

Hide Microscope Slide Photodiode Power Sensor

- Wavelength Range: 350 nm to 1100 nm
- Sensitive to Optical Powers from 10 nW to 150 mW Designed to Measure Optical Power at the Sample Plane of a Microscope
- Silicon Photodiode with Large 18 mm x 18 mm Active Area
- Sensor Housing Dimensions: 76.0 mm x 25.2 x 5.0 mm
- Index Matching Gel Utilized in Design to Prevent Internal Reflections
- Information Stored in Connector
 - Sensor Data
 - NIST- and PTB-Traceable Calibration Data

The S170C Microscope Slide Power Sensor Head is a silicon

photodiode sensor designed to measure the power at the sample in

microscopy setups. The silicon photodiode can detect wavelengths

150 mW. The sensor head's 76.0 mm x 25.2 mm footprint matches that of a standard microscope slide and is compatible with most

between 350 nm and 1100 nm at optical powers between 10 nW and

The photodiode has an 18 mm x 18 mm active area and is contained

in a sealed housing behind a neutral density (ND) filter with OD 1.5. A

20 mm x 20 mm indentation around the surface of the ND filter is

medium (water, glycerol, oil) may be placed in this well directly over the ND filter, or a cover slip may be inserted first to simplify clean up.

The gap between the photodiode and the neutral density filter has

been filled with an index matching gel in order to prevent internal

reflections from causing significant measurement errors when using

The bottom of the sensor housing features a laser-engraved grid to aid in aligning and focusing the beam. In standard microscopes, this

grid can be used for beam alignment before flipping the sensor head

microscopes, turn on the transmitted illuminator to align the grid on the detector housing with the beam, thereby centering the sensor in

front of the objective. Alternatively, the diffusive surface of the ND

to face the objective for power measurements. In inverted

sized to accept standard microscope cover slips. An immersion

Post Mountable via 8-32 (M4) Tap.

standard upright and inverted microscopes.

high NA objectives with oil or water.

filter can be used as a focusing plane.

ltem #a S170C Sensor Image (Click Image to Enlarge) 76.0 mm x 25.2 mm x 5.0 mm Overall Dimensions (2.99" x 0.99" x 0.20") Active Detector Area 18 mm x 18 mm 20 mm x 20 mm Input Aperture Wavelength Range 350 - 1100 nm Optical Power Working Range 10 nW - 150 mW Silicon Photodiode Detector Type ±0.5% Linearity 1 nW Resolution^b ±3% (440 - 980 nm) Calibration Uncertainty^c ±5% (350 - 439 nm) ±7% (981 - 1100 nm) Responsivity^d (Click for Plot) Raw Data **Neutral Density Filter** Reflective (OD 1.5) Cable Length 1.5 m Mounting Thread Universal 8-32 / M4 Tap, Post Not Included PM400, PM100D, PM100USB, Compatible Consoles PM100A, PM101A, and PM320E

- · For complete specifications, please see the Specs tab.
- · Measured with PM100D console in low bandwidth setting.
- Beam diameter > 1 mm.
- · The sensor responsivity shown in this plot was calibrated to a NIST-traceable source with measurements taken in 5 nm intervals.

Each sensor is shipped with NIST- or PTB-traceable calibration data. The included data will match the calibration certification of the

photodiode used to test the individual sensor. Sensor specifications and the included NIST- or PTB-traceable calibration data are stored in non-volatile memory in the sensor connector and can be read out by the latest generation of Thorlabs power meters. We recommend yearly recalibration to ensure accuracy and performance. Calibration may be ordered using the CAL1 recalibration service available below. Please contact technical support for more information.

The complete set of specifications are presented on the Specs tab above. Thorlabs also offers a Microscope Slide Sensor Head with a thermal sensor; the full presentation can be found here.

Part Number	Description	Price	Availability
S170C	Customer Inspired! Microscope Slide Power Sensor, 350 - 1100 nm, 150 mW	\$1,206.56	5-8 Days

Hide Integrating Sphere Photodiode Power Sensors

Integrating Sphere Photodiode Power Sensors

- For Measurements Independent of Beam Shape and Entrance Angle
- Integrating Sphere Design Acts as a Diffuser with Minimal Power Loss
- Ø5 mm, Ø7 mm, or Ø12 mm Input Sensor Aperture
- Removable S120-FC Fiber Adapter (FC/PC and FC/APC) Included
- Compatible Fiber Adapters for Terminated and Bare Fiber (See Table Below)

These Integrating Sphere Photodiode Power Sensors are the ideal choice for power measurements independent of beam uniformity, divergence angle, beam shape, or entrance angle, making them excellent for use with fiber sources and off-axis free space sources.

Our integrating spheres are designed for wavelength ranges from the visible through the NIR. Sensor heads for use between 350 and 2500 nm use a single Ø1" or Ø2" sphere made from Zenith® PTFE and feature a black housing to minimize reflected light around the entrance aperture. These sensors use either a silicon photodiode for detection in the 350 - 1100 nm range or an InGaAs photodiode for detection in the 800 - 1700 nm, 900 - 1650 nm, or 1200 - 2500 nm wavelength range.

The S180C integrating sphere for 2.9 - 5.5 µm uses two connected, gold-plated Ø20 mm spheres, with an entrance port in the first sphere and a port for the MCT (HgCdTe) detector located in the second sphere. Compared to single-sphere designs, the two-sphere configuration improves device sensitivity by minimizing the internal sphere surface area while still effectively shielding the detector from direct illumination. This design reduces the effect of input angle, divergence, and beam shape on the measurement result by effectively shielding the photodiode without the use of a baffle or other shielding mechanism.

The integrating spheres below feature large Ø5 mm, Ø7 mm, or Ø12 mm apertures, externally SM1-threaded (1.035"-40) front connections, enhanced shielding against electromagnetic interference, and an over-temperature alert sensor. Because of the large active detector areas of these sensors, the included S120-FC fiber adapter can be used with FC/PC- or FC/APC-terminated fiber. The externally SM1-threaded adapter can be removed using a size 1 screwdriver to place





(Sold Separately)



components closer to the window.

Each sensor is shipped with NIST- or PTB-traceable calibration data. The included data will match the calibration certification of the photodiode used to test the individual sensor. NIST- or PTB-traceable data is stored in the sensor connector. Thorlabs offers a recalibration service for these photodiode power sensors, which can be ordered below (see Item # CAL1 for Si sensors, Item # CAL2 for InGaAs sensors, and Item # CAL4 for InGaAs or MCT sensors).

Item # ^a	S140C	S142C	S144C	S145C	S146C	S148C	S180C
Sensor Image (Click the Image to Enlarge)							0
Aperture Size	Ø5 mm	Ø12 mm	Ø5 mm	Ø12	: mm	Ø5 mm	Ø7 mm
Wavelength Range	350 - 1	100 nm	800 - 1	700 nm	900 - 1650 nm	1200 - 2500 nm	2.9 μm - 5.5 μm
Power Range	1 µW - 500 mW	1 µW - 5 W	1 µW - 500 mW	1 µW - 3 W	10 µW - 20 W	1 µW - 1 W	1 µW - 3 W
Detector Type	Si Pho	todiode		InGaAs P	hotodiode		MCT (HgCdTe) Photodiode
Linearity				±0.5%			
Resolution ^b		1 :	nW		10 nW	1 nW	10 nW
Measurement Uncertainty ^c	±3% (440 ±5% (350 ±7% (981	- 980 nm) - 439 nm) - 1100 nm)			±5%		
Responsivity ^d (Click for Plot)	Raw Data	Raw Data	Raw Data	Raw Data	Raw Data	Raw Data	Raw Data
Integrating Sphere Material (Size)	Zenith [®] PTFE (Ø1")	Zenith [®] PTFE (Ø2")	Zenith [®] PTFE (Ø1")	Zenith [®] (Ø	[®] PTFE 2")	Zenith [®] PTFE (Ø1")	Gold Plating (Two Ø20 mm Spheres)
Head Temperature Measurement				NTC Thermistor 4.7	7 kΩ		
Housing Dimensions	Ø45 mm x 30.5 mm	70 mm x 74 mm x 70 mm	Ø45 mm x 30.5 mm	70 mm x 74	mm x 70 mm	Ø45 mm x 30.5 mm	59.0 mm x 50.0 mm x 28.5 mm
Active Detector Area		3.6 mm x 3.6 mm		Ø2 mm	Ø1 mm	Ø1 mm	1 mm x 1 mm
Cable Length				1.5 m			
Mounting Thread			Separate 8-32 and M4 T	Taps, Posts Not Included	1		Universal 8-32 / M4 Tap, Post Not Included
Aperture Thread			Included A	dapter with SM1 (1.035"	-40) External Thread		
Compatible Fiber Adapters		S	120-APC, S120-SMA, S	S120-FC (Include 120-ST, S120-SC, S120	ed))-LC, and S140-BFA (No	ot Included)	
Compatible Consoles	PM400, PM100D, PM100USB, PM100A, PM101A, and PM320E						

• For complete specifications, please see the Specs tab.

• Measured with PM100D console in low bandwidth setting.

Beam diameter > 1 mm

• All sensor responsivities shown in these plots were calibrated to a NIST-traceable source with measurements taken in 5 nm intervals except for the S180C. See the S180C responsivity plot to see the NIST-traceable reference points.

Part Number	Description	Price	Availability
S140C	Integrating Sphere Photodiode Power Sensor, Si, 350 - 1100 nm, 500 mW	\$745.58	Today
S142C	Integrating Sphere Photodiode Power Sensor, Si, 350 - 1100 nm, 5 W	\$1,034.50	5-8 Days
S144C	Integrating Sphere Photodiode Power Sensor, InGaAs, 800 - 1700 nm, 500 mW	\$875.44	5-8 Days
S145C	Integrating Sphere Photodiode Power Sensor, InGaAs, 800 - 1700 nm, 3 W	\$1,074.55	Today
S146C	Integrating Sphere Photodiode Power Sensor, InGaAs, 900 - 1650 nm, 20 W	\$1,074.55	Today
S148C	Customer Inspired! Integrating Sphere Photodiode Power Sensor, InGaAs, 1200 - 2500 nm, 1 W	\$899.24	5-8 Days
S180C	Integrating Sphere Photodiode Power Sensor, MCT (HgCdTe), 2.9 - 5.5 $\mu m,$ 3 W	\$3,909.69	Today

Hide Bare Fiber Adapter

Bare Fiber Adapter

- Compatible with S140C Series Power Sensors
- Power Measurements of Bare Fiber Outputs
- Easy Loading and Positioning of Optical Fiber in V-Groove
- Supports Fiber with Buffer Diameters from 250 to 450 µm
- Tight Holding without Fiber Damage by Magnetic Clip
- Attached by Two M2.5 x 4 mm Cap Screws



S140-BFABare Fiber Adapter for Calibrated Integrating Sphere Power Sensors\$137.43\$-8 Days

Hide Fiber Photodiode Power Sensors

Fiber Photodiode Power Sensors

- For Fiber-Based Optical Power Measurements
- Compact Sensor Integrated into the Connector
- Integrated Design for use in the Field and Lab
- Includes FC/PC Adapter
 - S150C and S151C Sensors also Include SMA Adapter
 - Compatible FC/APC, LC/PC, SC/PC, and ST Fiber Adapters Also Available (See Table Below)
- Compatible with the PM100D, PM100USB, PM100A, and PM320E Consoles



Click to Enlarge PM100D with S150C Sensor and FC Cable

The S15xC Compact Fiber Photodiode Power Sensor is designed to take power measurements from a wide variety of fiber-coupled and FC Cable sources. The compact sensor, integrated into the power meter connector, features a unique integrated design housing the photodiode sensor, fiber coupling, and NIST- or PTB-traceable data. The fiber adapter included with each sensor can be interchanged easily to accomodate a variety of fiber connectors (see table below).

Each sensor is shipped with NIST- or PTB-traceable calibration data. The included data will match the calibration certification of the photodiode used to test the individual sensor. NIST- or PTB-traceable data is stored in the sensor connector. Thorlabs offers a recalibration service for these photodiode power sensors, which can be ordered below (see Item # CAL1 for Si sensors and Item # CAL2 for InGaAs sensors).

Item # ^a	S150C	S151C	S154C	S155C	
Sensor Image (Click the Image to Enlarge)					
Wavelength Range	350 - 1100 nm	400 - 1100 nm	800 - 1	700 nm	
Power Range	100 pW to 5 mW (-70 dBm to +7 dBm)	1 nW to 20 mW (-60 dBm to +13 dBm)	100 pW to 3 mW (-70 dBm to +5 dBm)	1 nW to 20 mW (-60 dBm to +13 dBm)	
Detector Type	Si Pho	todiode	InGaAs P	hotodiode	
Linearity		±0.	5%		
Resolution ^b	10 pW (-80 dBm)	100 pW (-70 dBm)	10 pW (-80 dBm)	100 pW (-70 dBm)	
Measurement Uncertainty ^c	±3% (440 - 980 nm) ±5% (350 - 439 nm) ±7% (981 - 1100 nm)	±3% (440 - 980 nm) ±5% (400 - 439 nm) ±7% (981 - 1100 nm)	±5%		
Responsivity ^d (Click for Details)	Raw Data	Raw Data	Raw Data	Raw Data	
Coating/Diffuser	N/A	Absorptive ND (Schott NG3)) N/A		
Head Temperature Measurement ^e		NTC Therr	nistor 3 kΩ		
Aperture Thread		External SM0	05 (0.535"-40)		
Fiber Adapters ^f	Included (FC and SMA): F Optional: PM20-APC, PM20-	PM20-FC and PM20-SMA; LC, PM20-SC, and PM20-ST	Included (FC Optional: PM20-APC, PM20- PM20	;): PM20-FC; LC, PM20-SC, PM20-ST, and)-SMA	
Compatible Consoles		PM400, PM100D, PM100USB, F	PM100A, PM101A, and PM320E		

• For complete specifications, please see the Specs tab.

· Measured with PM100D console in low bandwidth setting.

• For a beam diameter > 1 mm incident on the active area of the detector (i.e. at the detector surface after the light has exited the fiber and passed through any internal optics).

• All sensor responsivities shown in these plots were calibrated to a NIST-traceable source with measurements taken in 5 nm intervals.

• This specification is valid for devices with serial numbers 1203xxx and higher. For older versions, please contact technical support.

Because of the large active detector area of these sensors, the included PM20-FC fiber adapter can be used with both FC/PC- and FC/APC-terminated fiber.

Part Number	Description	Price	Availability
S150C	Compact Fiber Photodiode Power Sensor, Si, 350 - 1100 nm, 5 mW	\$324.64	Today
S151C	Compact Fiber Photodiode Power Sensor, Si, 400 - 1100 nm, 20 mW	\$370.09	5-8 Days
S154C	Compact Fiber Photodiode Power Sensor, InGaAs, 800 - 1700 nm, 3 mW	\$466.39	Today
S155C	Compact Fiber Photodiode Power Sensor, InGaAs, 800 - 1700 nm, 20 mW	\$534.57	Today

Hide Internally SM05-Threaded Fiber Adapters

Internally SM05-Threaded Fiber Adapters

These internally SM05-threaded (0.535"-40) adapters mate terminated fiber to our free-space detectors and power sensors, including, but not limited to:

- S150C Series Fiber Power Meter Sensors (Sold Above)
- PM160 Series Wireless, Handheld Power Meter
- PM20 Series Fiber Power Meters

For details on narrow versus wide key connectors, please see our Intro to Fiber tutorial. Please contact Tech Support if you are unsure if the adapter is mechanically compatible.

Part Number	PM20-FC2	PM20-FC	PM20-APC2 ^a	PM20-APC ^a	PM20-SMA	PM20-ST	PM20-SC	PM20-LC
Adapter Image (Click the Image to Enlarge)	(Cos	6				C.		
Connector Type	FC/PC, 2.0 mm Narrow Key	FC/PC, 2.2 mm Wide Key	FC/APC, 2.0 mm Narrow Key	FC/APC, 2.2 mm Wide Key	SMA	ST/PC	SC/PC ^b	LC/PC
Thread			Internal S	M05 (0.535"-40)				

• The PM20-APC and PM20-APC2 are designed with a 4° mechanical angle to compensate for the refraction angle of the output beam.

• In certain angle-independent applications, this adapter may also be used with SC/APC connectors.

Part Number	Description	Price	Availability
PM20-FC2	NEW! FC/PC Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads, Narrow Key (2.0 mm)	\$34.36	Today
PM20-FC	FC/PC Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads, Wide Key (2.2 mm)	\$34.36	Today
PM20-APC2	FC/APC Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads, Narrow Key (2.0 mm)	\$33.95	Today
PM20-APC	Customer Inspired! FC/APC Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads, Wide Key (2.2 mm)	\$33.95	Today
PM20-SMA	SMA Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads	\$34.36	Today
PM20-ST	ST/PC Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads	\$47.62	5-8 Days
PM20-SC	SC/PC Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads	\$47.62	Today
PM20-LC	Customer Inspired! LC/PC Fiber Adapter Cap with Internal SM05 (0.535"-40) Threads	\$47.62	Today

Hide Internally SM1-Threaded Fiber Adapters

Internally SM1-Threaded Fiber Adapters

These internally SM1-threaded (1.035"-40) adapters mate terminated fiber to any of our externally SM1-threaded components, including a selection of our photodiode power sensors, our thermal power sensors, and our photodetectors.

The APC adapters have two dimples in the front surface that allow them to be tightened with the SPW909 or SPW801 spanner wrench. The dimples do not go all the way through the disk so that the adapter can be used in light-tight applications when paired with SM1 lens tubes.

For details on narrow versus wide key connectors, please see our Intro to Fiber tutorial. Please contact Tech Support if you are unsure if the adapter is mechanically compatible.

Item #	S120-FC2	S120-FC	S120-APC2 ^a	S120-APC ^a	S120-SMA	S120-ST	S120-SC	S120-LC
Adapter Image (Click the Image to Enlarge)			· · ·	- Set		B		
Fiber Connector Type	FC/PC, 2.0 mm Narrow Key	FC/PC, 2.2 mm Wide Key	FC/APC, 2.0 mm Narrow Key	FC/APC 2.2 mm Wide Key	SMA	ST/PC	SC/PC ^b	LC/PC
Thread			Internal SI	M1 (1.035"-40)				

• The S120-APC and S120-APC2 are designed with a 4° mechanical angle to compensate for the refraction angle of the output beam.

• In certain angle-independent applications, this adapter may also be used with SC/APC connectors.

Part Number	Description	Price	Availability
S120-FC2	NEW! FC/PC Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads, Narrow Key (2.0 mm)	\$42.20	Today
S120-FC	FC/PC Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads, Wide Key (2.2 mm)	\$42.20	Today
S120-APC2	FC/APC Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads, Narrow Key (2.0 mm)	\$32.96	Today
S120-APC	Customer Inspired! FC/APC Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads, Wide Key (2.2 mm)	\$32.96	Today
S120-SMA	SMA Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads	\$42.20	Today
S120-ST	ST/PC Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads	\$42.20	Today
S120-SC	SC/PC Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads	\$53.02	Today
S120-LC	LC/PC Fiber Adapter Cap with Internal SM1 (1.035"-40) Threads	\$53.02	Today

Hide Externally SM1-Threaded Slim Photodiode Adapter

Externally SM1-Threaded Slim Photodiode Adapter

Compatible with Thorlabs Slim Photodiode Power Sensors

- Enables Integration with SM1-Threaded Components
- Adds VIS/IR Target Around Sensor

The SM1A29 adapter can be attached to our slim photodiode sensors using two setscrews, which are compatible with 0.035" (0.9 mm) hex keys. This allows for mounting SM1-threaded fiber adapters, filters, or other SM1-threaded mechanics or optics to our slim photodiode sensors. The target around the aperture uses the same material as our VRC2 Laser Viewing Card and is sensitive to light between the wavelength ranges of 400 - 645 nm and 800 - 1700 nm.



SM1 Lens Tube Mounted on an S132C Photodiode Sensor Using an SM1A29 Adapter

Part Number	Description	Price	Availability
SM1A29	Customer Inspired! SM1 Thread Adapter for Slim Photodiode Sensors	\$44.64	Today

Hide FiberBench Slim Photodiode Mount

FiberBench Slim Photodiode Mount

- Compatible with Thorlabs Slim Photodiode Power Sensors
- Enables Integration with Single- and Multi-Axis FiberBench Systems
- Adds VIS/IR Target Around Sensor



The FBSM FiberBench Mount enables stable mounting of our slim photodiode sensors into our FiberBench systems. A sidelocated setscrew with a 0.050" (1.3 mm) hex can be used to lock the sensor in place. The mount has dowel pins for compatibility with FiberBenches and an optical axis height of 0.56" (14.2 mm) to match other FiberBench components. The target around the aperture uses the same material as our VRC2 Laser Viewing Card and is sensitive to light between the wavelength ranges of 400 - 645 nm and 800 - 1700 nm.

Click for Details [APPLIST] S130C Photodiode Sensor Mounted in FiberBench System Using FBSM Adapter

Fart Nulliber	Description	Price	Availability
FBSM Fiber	perBench Mount for Slim Photodiode Sensors	\$44.36	Lead Time

Hide Recalibration Service for Photodiode Power Sensors

Recalibration Service for Photodiode Power Sensors

Thorlabs offers calibration services for our photodiode optical power sensors and consoles. To ensure accurate measurements, we recommend recalibrating the sensors annually. Recalibration of the console is included with the recalibration of a sensor at no additional cost. If you wish to recalibrate only your power meter console, please contact Tech Support for details.

alibration Service Item #	Compatible Sensors
AL1	S120VC, S120C, S121C, S170C, S140C, S142C, S150C, S151C
AL2	S122C, S144C, S145C, S146C, S154C, S155C
AL-S130	S130VC, S130C
AL-S132	\$132C
AL4	S148C, S180C

Refer to the table to the right for the appropriate calibration service Item # that corresponds to your power meter sensor. Once the appropriate Item # is selected, enter the Part # and Serial # of the sensor that requires recalibration prior to selecting Add to Cart.

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
CAL1	Recalibration Service for Si Power Meter Sensors Except S130 Series	\$152.57	Lead Time
CAL2	Recalibration Service for Ge & InGaAs Power Meter Sensors Except S132 Series and S148C	\$172.06	Lead Time
CAL-S130	Recalibration Service for Si Power Meter Sensors for S130 Series and PM160	\$177.47	Lead Time
CAL-S132	Recalibration Service for Ge Power Meter Sensors for S132 Series only	\$188.28	Lead Time
CAL4	Recalibration Service for MCT and Extended InGaAs Mid-IR Power Sensors (S148C and S180C)	\$307.32	Lead Time