

Compact USB Power Meter with Stabilized Thermal Sensor



Description

PM16-401

The PM16 remotely controlled power meters have USB interfaces and are offered with a selection of photodiode and thermal power sensors. Other sensors are available upon request; please contact Tech Support with inquiries. Each sensor is connected to the USB interface by a standard 1.5 m connection cable and can be operated using any of the software and driver packages that are compatible with Thorlabs' other power meters. The PM16-401 power meter is designed for general purpose optical power measurements over a broad wavelength range from UV to Mid-IR. The sensor head is optimized for high resolution, low thermal drift, fast response, and small size, enabling power measurements from $<100 \mu\text{W}$ to 3 W in free-space and fiber-based applications.

When operating the sensor, allow it to settle to room temperature before performing a zero adjustment. Although the sensor will correct for ambient temperature changes, we recommend post mounted rather than handheld operation to avoid thermal contact with body heat. For free space measurements, using the light shield that is supplied with the sensor is recommended.

The sensor head housing includes a removable, SM1-threaded (1.035"-40) adapter aligned with the axis of the input aperture for compatibility with Thorlabs' SM1-threaded (1.035"-40) accessories, convenient for mounting external optics, fiber adapters, light shields, and apertures.

Two combined 8-32- & M4-threaded mounting holes on the sensor housing accept both metric and imperial posts.

The meter holds the sensor's individual NIST- and PTB-traceable calibration data including the spectral correction curve of the absorber material.

Software Installation

System Requirements: Windows XP and Later

The PM16 requires a National Instruments VISA installation, that can be downloaded from the National Instruments website (<https://www.ni.com/visa/>), to allow the correct USB installation as a "Test and Measurement Device (IVI)". Please install NI VISA first and then plug the PM16 into a free USB port. Wait until USB installation has finished, after which the device is ready to operate.

Software, drivers, command reference and examples can be downloaded from www.thorlabs.com

Cleaning and Maintenance

There are no serviceable parts in the PM16-401 head. The housing may be cleaned by wiping with a soft damp cloth. When cleaning the aperture filter, treat it as any other fine optic. Gently blow off any debris using compressed air and wipe gently with an optic tissue wetted with propanol. If you suspect a problem with your PM16-401 please call Thorlabs and an engineer will be happy to assist you.

As long as the sensor has not been exposed to excessive optical power (please pay attention to the maximum ratings in the technical specifications), the calibration should be very stable over long periods of time (well over a year). To keep the accuracy and performance of the *PM16-401*, Thorlabs recommends a yearly recalibration, starting one year after purchase.

Specifications

PM16-401 Specifications	
Sensor Properties	
Detector Type	Stabilized Thermal Volume Absorber
Wavelength Range	190 nm - 10.6 μ m
Optical Power Working Range	100 μ W - 1 W (3W ^a)
Max Average Power Density	500 W/cm ²
Max Pulse Energy Density	0.2 J/cm ² (1 μ s Pulse), 2 J/cm ² (1 ms Pulse)
Linearity	$\pm 0.5\%$
Active Area Uniformity ^b	$\pm 1\%$
Resolution	<1 μ W
Calibration Uncertainty ^b	$\pm 3\%$ @ 1064 nm $\pm 5\%$ @ 190 nm - 10.6 μ m
Typical Application	Low-Power Lasers
Laser Types	Diode, Diode Arrays, He-Ne, Dye, Ion Lasers (Ar+, Kr+)
Coating	Black Broadband
Response Time	<1 s
Sensor Dimensions	43 mm x 33 mm x 15 mm
Active Detector Area	10 mm x 10 mm
Input Aperture	$\varnothing 10$ mm
Post Mounting	2 x 8-32 & M4 Combined Thread
Aperture Thread	Externally SM1-Threaded (1.035"-40) Removable Adapter
Fiber Adapters (Optional)	FC, SC, LC, SMA, ST (Not Included)
Cable Length	1.5 m
Power Meter Electronics Properties	
Analog Measurement Ranges ^c	1.6 mV, 25 mV, 400 mV
Measurement Units	W, dBm, V
AD Converter	24 Bit
Analog Amplifier Bandwidth	10 Hz
Update Rate	10/s
Remote Interface	USB 2.0
Power Supply	External: 5 V DC via USB
Connector	USB
Electronics Dimensions	65 mm x 20 mm x 10 mm
Total Weight	0.07 kg

- a. Intermittent use (the maximum exposure time is 20 minutes)
- b. Beam diameter > 1 mm
- c. The appropriate range is chosen internally by the power meter to achieve the best accuracy; the auto-ranging function can be deactivated.

Precautions, Warranty and Conformity Information

These products are ESD (electro static discharge) sensitive and as a result are not covered under warranty. In order to ensure the proper functioning of a photodiode care must be given to maintain the highest standards of compliance to the maximum electrical specifications when handling such devices. The photodiodes are particularly sensitive to any value that exceeds the absolute maximum ratings of the product. Any applied voltage in excess of the maximum specification will cause damage and possible complete failure to the product. The user must use handling procedures that prevent any electro static discharges or other voltage surges when handling or using these devices.

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

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

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

Category	Standards or description	
EC Declaration of Conformity - EMC	Meets intent of Directive 2004/108/EC ¹ for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:	
	EN 61326-1:2006	EMC requirements for Class A electrical equipment for measurement, control and laboratory use, including Class A Radiated and Conducted Emissions ^{2,3,4}) and Immunity. ^{2,3,4})
	IEC 61000-4-2	Electrostatic Discharge Immunity (Performance Criterion B)
	IEC 61000-4-3	Radiated RF Electromagnetic Field Immunity (Performance Criterion A)
	IEC 61000-4-4	Electrical Fast Transient / Burst Immunity (Performance Criterion B)
	IEC 61000-4-6	Conducted RF Immunity (Performance Criterion A)
FCC EMC Compliance	Emissions comply with the Class A Limits of FCC Code of Federal Regulations 47, Part 15, Subpart B ^{2,3,4} .	
EC Declaration of Conformity - Low Voltage	Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities: Low Voltage Directive 2006/95/EC ⁵	
	EN 61010-1:2010	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
U.S. Nationally Recognized Testing Laboratory Listing	UL 61010-1 2 nd ed.	
Canadian Certification	CAN/CSA C22.2 No. 61010-1 3 rd ed.	
Additional Compliance	IEC 61010-1:2010	
Equipment Type	Test and Measuring	
Safety Class	Class I equipment (as defined in IEC 60950-1:2001)	
¹ Replaces 89/336/EEC.		
² Compliance demonstrated using high-quality shielded interface cables shorter than or equal to 3 meters.		
³ Emissions, which exceed the levels required by these standards, may occur when this equipment is connected to a test object.		
⁴ Minimum Immunity Test requirement		
⁵ Replaces 73/23/EEC, amended by 93/68/EEC		



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