

Compact USB Power Meter with Background-Compensated Sensor Head



PM16-401

Description

The PM16 Series of USB Power Meters integrate USB interfaces with a selection of photodiode and thermal power sensors. Other sensors are available upon request; please contact Tech Support with inquiries. These power meters can be operated using any software and driver package compatible with Thorlabs' power meters. The EEPROM built into the connector contains sensor identification information and the NIST- and PTB-traceable calibration data, which is used by the power meter software. The connection cable is 1.5 m long.

The PM16-401 includes an S401C sensor head, which is optimized for high resolution and low thermal drift, power measurements from 10 μ W to 1 W in free-space and fiber-based applications. Thermal background compensation is performed by monitoring the heat flow from the housing in addition to the heat flow from the sensor element; subtracting the two mitigates the influence of the ambient temperature on the power measurement. 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.

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. Two combined 8-32- & M4-threaded mounting holes on the sensor housing accept both metric and imperial posts. For free space measurements, using the light shield that is supplied with the sensor is recommended.

Specifications

The software is compatible with Windows XP® as well as later versions of the Windows operating system. The PM16-401 requires a National Instruments VISA installation to allow the correct USB installation as a "Test and Measurement Device (IVI)". It can be downloaded from the National Instruments website (<https://www.ni.com/visa/>). Please install NI VISA first and then plug the PM16 into a free USB port. After USB installation has finished, 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

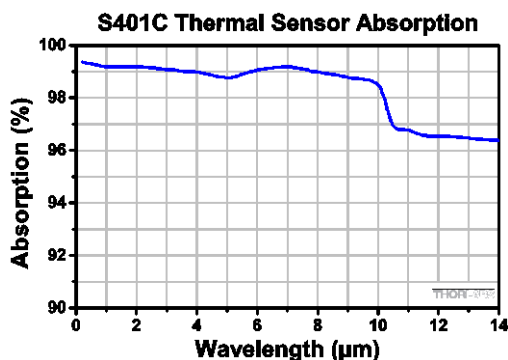
PM16-401 Specifications

Sensor Properties	
Detector Type	Thermal Surface Absorber with Background Compensation
Wavelength Range	190 nm - 20 μ m
Optical Power Working Range	10 μ W - 1 W (3 W Max for Exposure Times \leq 20 minutes)
Max Average Power Density	500 W/cm ²
Mas Pulse Energy Density	0.2 J/cm ² (1 μ s Pulse), 2 J/cm ² (1 ms Pulse)
Resolution ^a	1 μ W
Linearity	\pm 0.5%
Calibration Uncertainty ^b	\pm 3% @ 1064 nm; \pm 5% @ 190 nm - 10.6 μ m
Response Time	1.1 s (Typical Natural Response Time, 0 - 95%)
Input Aperture	\varnothing 10 mm
Active Detector Area	10 mm x 10 mm
Active Area Uniformity	\pm 1% (>1 mm Beam Diameter)
Sensor Dimensions	43 mm x 33 mm x 15 mm (1.69" x 1.3" x 0.58")
Typical Application (Laser Types)	Low-Power Lasers (Diode, Diode Arrays, HeNe, Dye, Ion Lasers (Ar+, Kr+))
Coating	Black Broadband
Cooling	Convection
Cable Length	1.5 m
Weight (of the PM16-401)	0.07 kg
Threaded Holes	8-32 & M4 Combined Thread (Two Places)
Adapter Threading	Externally SM1-Threaded (1.035"-40)
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 Type a
Connector Dimensions	65.0 mm x 20.0 mm x 10.0 mm (2.56" x 0.79" x 0.39")

a. Measured using the PM200 console with the acceleration circuit switched off. Resolution performance will be similar with Thorlabs' other power meter consoles.

b. Measurement uncertainty during calibration at the specified wavelengths for a beam diameter > 1 mm. The \pm 3% specification was determined by laser calibration, and the \pm 5% specification was determined through spectral calibration, in which values were interpolated using the laser calibration data and the absorption curve for the absorber.

d. The appropriate range is chosen internally by the power meter to achieve the best accuracy; the auto-ranging function can be deactivated.



Typical Absorbance of the S401C's Broadband Coating. There is negligible back reflection from the absorber.

Precautions and Warranty Information

These products are ESD (electro static discharge) sensitive and as a result are not covered under warranty. 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 electrostatic discharges or other voltage surges when handling or using these devices.

The user must avoid any misuse that could cause damage to the detector. Misuse includes, but is not limited to, laser exposure outside Thorlabs' published specifications, high voltage exposure outside Thorlabs' specifications, physical damage due to improper handling and exposure to harsh environments. Harsh environments include, but are not limited to, excessive temperature, vibration, humidity, chemicals or surface contaminants, exposure to flame, aggressive solvents and connection to improper electrical voltage.

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.



Manufactured By:
Thorlabs GmbH, D-85221 Dachau, Hans-Boeckler-Str. 6