

Optical power meters and energy meters



Overview

Laser Power Meters are ideal for measuring the energy output of laser beams for testing or laser system applications at Edmund Optics.

Key Takeaways

Energy meters measure the total energy of pulsed lasers, while optical power meters measure the average power of continuous light beams.

Optical power meters are instruments designed to measure the average power of a continuous light source, such as a continuous-wave (CW) laser, and are expressed in watts (W). They are commonly used to determine how much optical power a laser emits over time, which is critical for applications like fiber optic testing, laser alignment, and optical system calibration. Energy meters, on the other hand, measure the total energy delivered by a single pulse of a pulsed laser, expressed in joules (J). This measurement is essential for pulsed laser applications where the energy per pulse affects material processing, ablation thresholds, and nonlinear optical interactions. Some instruments combine both functions, allowing measurement of both power and energy depending on the laser type and application.

Sensor Types

- Pyroelectric detectors: Ideal for measuring short optical pulses (typically 5 μ s to 400 μ s). They use a ferroelectric crystal whose dipole moment changes when heated by a laser pulse, generating a measurable current. Care must be taken not to exceed the maximum pulse width or repetition rate.
- Semiconductor photodiodes: Suitable for low-level light measurements and continuous-wave power detection. They provide fast response and high sensitivity.

- Thermal detectors (thermopiles): Measure power by converting absorbed laser energy into heat, which generates a voltage across thermocouples. They can handle high average powers and are often used for broadband sources .

- Calorimetric sensors: Measure very high pulse energies or average powers by monitoring temperature changes in an absorbing mass or flowing coolant .

Key Specifications

- Wavelength range: The range of wavelengths the detector can accurately measure.

- Sensor diameter: The active area of the sensor, which affects beam coverage and measurement accuracy.

- Measurement units: Depending on the sensor, readings can be in watts, joules, dBm, or other units .

Applications

- Continuous-wave lasers: Optical power meters are used to monitor output power for system calibration, safety, and performance verification.

- Pulsed lasers: Energy meters are used to measure pulse energy for material processing, laser surgery, and scientific experiments.

- Fiber optics and photonics: Both meters are used to characterize optical components, fibers, and laser sources.

- Calibration and research: Benchtop and handheld meters provide accurate, repeatable measurements for laboratory and field applications .

Device Options

- Handheld meters: Portable, easy to use, suitable for field measurements.

- Benchtop meters: High-precision, compatible with multiple sensors, ideal for laboratory use.

- Virtual meters: Software-based solutions that use a PC to read sensor outputs at lower cost . Understanding whether your application requires power measurement or energy measurement is the first step in selecting the appropriate instrument, followed by choosing the correct sensor type and wavelength range for accurate results .

Article Content

Optical Power Meters

Our handheld optical power and energy meters are plug and play compatible with our wide range of calibrated optical sensors for the

Energy Meters and Optical Power Meters Information

New! Optical Meters Benchtop Power & Energy Meters Handheld Power & Energy Meters Virtual Power Meters Optical Wavelength

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Thorlabs' expanding line of optical power and energy meters includes a large selection of sensor heads,

Optical Meter

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Optical Power Meters: Understand Their Uses and

Optical power meters are indispensable instruments for testing and maintaining modern fiber

Digital Handheld Optical Power and Energy Meter

The PM100D2 and PM100D3 Optical Power and Energy Meter Consoles have a large 3.5" touchscreen

Optical Power Meter

An optical power meter is defined as an instrument used to measure power or energy from narrow band sources, such

Optical Energy Meters

What are Optical Energy Meters? An optical energy meter (or laser energy meter) is an instrument for the measurement of optical

Optical power meter

An optical power meter (OPM) is a device used to measure the power in an optical signal. The term usually refers to a device used

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Laser Power Meters

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Laser Power and Energy Meters

Measure laser power and energy with ease and precision over a huge range of wavelengths, power levels,

Optical Power Meters

VIAVI offers fast, cost-effective, and easy-to-use power meters for installation and maintenance of single mode and multimode fiber

Edmund Optics® Laser Power and Energy Meters

The Deluxe Laser Power Meter is designed for use with thermopiles and optical detectors. The Deluxe's ergonomic and low power

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