



Power Sensors

Single-Pulse Energy Measurements with a Thermopile

Thermopile detectors are most commonly used for doing average power measurements on pulsed and CW lasers. Thermopiles are also capable of integrating long pulse widths. This allows us to use a thermopile to measure the energy of single pulses between 1 millisecond and 10 seconds in length, and with energies from 0.5 joules to hundreds of joules. This functionality is only possible when the thermopiles are used in conjunction with a meter capable of calculating single-pulse energy measurements (the Power and Energy Meters Quick Reference Guide on page 10 lists all meters capable of this function, but FieldMax-TOP and 3sigma are good choices).

This capability is necessary when the laser pulse width exceeds the maximum pulse width rating of pyroelectric sensors. Pyroelectric sensors are typically limited to maximum pulse widths in the microsecond range. When the pulse width exceeds microseconds, a thermopile is a good solution.

A good “rule of thumb” for picking out a thermopile for this type of measurement is to compare the maximum pulse energy you need to measure with the maximum power rating of a sensor (maximum power ratings can be found in the Power Sensor Summary Specifications on pages 40-41 or in the detailed product specifications contained on pages 42-61).

One of the more common applications for this type of measurement is the medical field, especially skin resurfacing and hair removal. These laser systems often utilize high-energy diode lasers that have large beam sizes and relatively long pulses. A detector like the PM150-50C is ideal for these measurements. It has a large 50 mm aperture size and can handle pulse energies up to 150J. It can be used air-cooled for single pulse energy measurements (a PM150-50C will normally need to be water-cooled for continuous power measurements).

Application Example 1

Laser Pulse Width	50 ms
Max. Energy	10J
Solution	Choose a PM10

Application Example 2

Laser Pulse Width	300 ms
Max. Energy	80J
Solution	Choose a PM150 or PM150-50C*

* Specific sensor choice depends upon aperture and mechanical constraints.

How To Take an Energy Measurement: Before an energy measurement can be taken, the meter must be set up to measure in power mode. The user must then switch to manual range mode and select the lowest power range available that still gives a valid reading without showing an “over range” error. Once the appropriate power range has been selected, the meter can be switched into energy mode. At this point the meter is ready to take an energy measurement.

The meter typically takes 5 to 10 seconds to reset after each pulsed measurement. These types of measurements are limited to single pulses to achieve the most accurate measurements.



MODELS PM10-19C, PM150-19C AND PM150-50XC

POWER & ENERGY

Power & Energy Meters

Power Sensors

Energy Sensors

Power & Energy Accessories

Custom & OEM

Calibration & Service

BEAM DIAGNOSTICS & SPECTRAL ANALYSIS

Beam Diagnostics

Spectral Analysis

INDICES

Laser Cross-Reference Index

Part Number Index

Product Name Index