

PowerMeasuringCube PWC

Power in the Palm of Your Hand

The PowerMeasuringCube (PWC) is designed for power measurements of solid state lasers.

In the processing zone, laser power is one of the key parameters for the result of laser materials processing. A loss of power can lead to serious quality issues of the processed part. This is why laser power must be measured directly in or near the processing zone. The PowerMeasuringCube, as a mobile and compact power probe, enables the determination of laser power directly beneath the processing head in the processing zone.



PowerMeasuringCube

In Practice

The measurement system is designed to monitor laser power in day to day production. The compact design enables the PWC to undertake power measurements even in the smallest of places that usually do not accommodate a measurement device. The PWC is protected against shock and vibration as well as dust by a robust housing. It is also equipped with an integrated LCD. Operating power is provided via a Lithium cell, which can be charged via a micro-USB port.

The device has an internal ring buffer, which stores the laser 14 measurements, the last of which can be viewed directly on the display. The ring buffer itself is larger and can be accessed via Bluetooth or the LaserDiagnosticsSoftware (LDS).

Measurement Principle

The absorber of the calorimetric measurement system is irradiated by a laser for a short period of time. The temperature difference of the absorber between start and finish of the laser pulse is measured. From the temperature rise, the microprocessor based electronics is able to calculate laser power to a high degree of accuracy. An interlock signal is provided in order to turn off the laser beam emission, should the absorber overheat. The usage of this signal is strongly recommended.

Measurement Values – System Parameters

The PowerMeasuringCube measures the incident laser energy and the irradiation time. The calculated laser power has an accuracy of $\pm 3\%$, with a repeatability of $\pm 1\%$. The typical working temperature range of the PWC lies between $+15\text{ }^{\circ}\text{C}$ and $+40\text{ }^{\circ}\text{C}$.

System parameters for the Laser:

- Wavelength: 900 – 1090 nm
- Power range: 25 – 8000 W (average power)
- Measurement time = Pulse duration: 0.1 – 2 s

Laser power and irradiation time stand in direct relationship for the measurement.

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Technical Data

Measurement Parameters		
Beam dimensions	15 – 25 mm	
Wavelength range	900 – 1090 nm	
Power range	25 – 8000 W ¹⁾	
Irradiation time	0.1 – 2.0 s ¹⁾ (depending on laser power)	
Total duration until measurement value output	< 15 s	
Nominal measurement frequency	300 J: 1 Cycle/min; 3000 J: 1 Cycle/15 min	
Accuracy	± 3 %	
Reproducibility	± 1 %	
Limit Values		
Max. absorber temperature	120 °C	
Energy per measurement	50 – 3000 J	
Max. amount of heat from cooling	3000 J	
Recommended energy per measurement	300 – 500 J	
Max. power density (peak) at beam diameters	> 10 mm 10 – 3 mm 3 – 1.5 mm 1.5 – 1 mm < 1 mm	1.5 kW/cm ² 2.5 kW/cm ² 5 kW/cm ² 6 kW/cm ² 8 kW/cm ²
Max. laser rise time	100 µs	
Beam entrance vertical to inlet aperture	± 10 Degree	
Supply Data		
Power supply	Lithium cell, which can be charged via a micro-USB port	
Dimensions and Weight		
Dimensions (LxWxH) (without connectors)	60 x 65 x 65 mm	
Weight	approx. 400 g	
Environmental Conditions		
Operating temperature range	15 – 40 °C	
Storage temperature range	5 – 50 °C	
Permissible relative humidity (non-condensing)	10 – 80 %	
Communication		
Interfaces	USB/Bluetooth	

¹⁾ The given limit values must not be exceeded.



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