Cube

Power in the Palm of Your Hand

The Cube 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 Cube, as a mobile and compact power probe, enables the determination of laser power directly beneath the processing head in the processing zone.

In Practice

The measurement system is designed to monitor laser power in day to day production. The compact design enables the Cube to undertake power measurements even in the smallest of places that usually do not accommodate a measurement device. The Cube 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).

Easy handling by Cube App for Android

Using the Bluetooth connection with the PRIMES Cube, a convenient control of the laser power meter with a mobile Android device like tablet or smartphone is possible. Aside from the graphic display and backup of the measured values stored in the Cube, it is possible to define presets for measurement series and transfer them to the Cube using the Bluetooth connection.

The readings laser power, pulse duration and energy per pulse can be displayed graphically on the mobile device. In addition, a standard deviation evaluation of the measured values is possible with the PRIMES Cube App.

The PRIMES Cube App is available in the Google Play Store as free download.

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 Cube measures the incident laser energy and the irradiation time. The calculated laser power has an accuracy of ± 3 %, with a repeatability of ± 1 %. The typical working temperature range of the Cube lies between +15 °C and +40 °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

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

Beam power at a glance:
Cube with measurement result

Measurement results at hand: Enabled by the Cube App

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	
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/cm² 2.5 kW/cm² 5 kW/cm² 6 kW/cm² 8 kW/cm²
Max. laser rise time	100 µs	
Beam entrance perpendicular to inlet aperture	± 10 degree	
Supply Data		
Power supply	Lithium cell, which can be charged via a micro-USB port	
Communication		
Interfaces	USB/Bluetooth	
Dimensions and Weight		
Dimensions (L x W x H) (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 %	

[1] **The stated limit values are to be understood in correlation with the permitted maximum energy (E = P · t).**