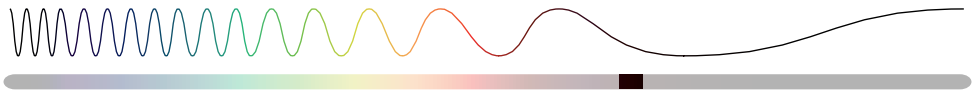
Cube M

PRIMES

- Fiber and disc laser
- Diode laser
- Ultrashort pulse laser
- CO_2 laser



● 1 030 – 1090 nm

Measure laser power with densities of up to 250 kW/cm² in confined spaces, even in the corners of your Additive Manufacturing machine.

- Caustic
- Raw beam
- Power
- Beam profile
- Pointing stability
- Vector
- Focus shift

POWER RANGE	25 W – 2 kW
BEAM QUALITY M^2	Up to single mode
BEAM DIAMETER	Focused 1 – 4 mm
HIGHLIGHT	Angle of incidence ±20° Power densities 250 kW/cm²
INTERFACES	Bluetooth, Micro-USB

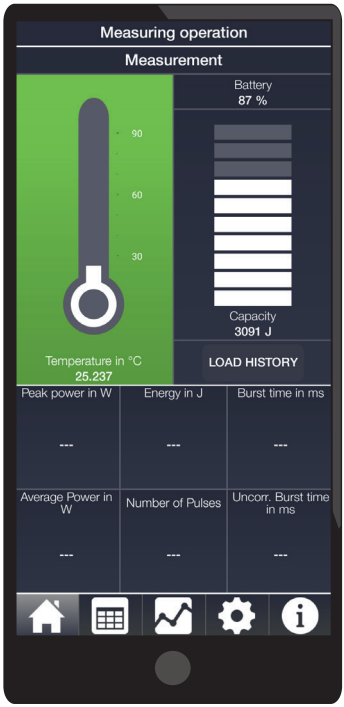
Tech Corner

Identical to the other family members and related systems, the Cube M calculates the energy of a laser pulse by determining the temperature rise within its absorber. By measuring the length of the inserted laser pulse, the effective power is calculated. Due to this linear and accurate physical fact, this measurement method is particularly suitable for measuring laser power, even with the smallest amounts of energy.

What makes the Cube M unique is the optical front end, which does not only allow power densities of up to 250 kW/cm², but also angles of incidence of up to 20°. This enables measuring laser power in scanner based processes on the entire working area.

Using the PRIMES Cube App for mobile devices with Android™, you can operate and monitor all Cube models simply and conveniently on a tablet or smartphone via Bluetooth. Entire measuring series can be recorded during the measurement or uploaded from the internal storage (14 measurements) of the Cube. It will graphically display the measured values, such as average-, or peak power, energy per pulse and pulse duration.

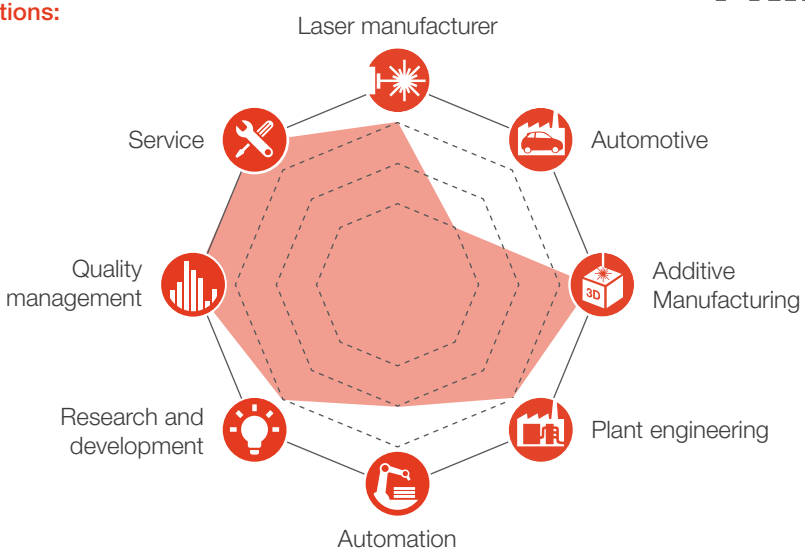
The Cube App also supplements this information with the standard deviations. You can download the PRIMES Cube App for free from the Google Play Store. Alternatively, the micro-USB interface can be used to connect the Cube with a stationary computer and operate it with our new LaserDiagnosticsSoftware (LDS).This offers even more features to control the device or to analyze and back up measurement data.



MEASUREMENT PARAMETERS	CUBE M
Power range	25 – 2 000 W [1]
Wavelength range	1 030 – 1 090 nm
Beam diameter on the protective window	1 - 4 mm
Max. power density on the protective window	250 kW/cm²
Irradiation time	0.1 – 2.0 s [1] (depending on laser power)
Min. on/off times (duty cycle) for pulsed lasers	50 µs (e.g. max. 10 kHz at 50 % duty cycle)
Max. laser rise time	< 1% of irradiation time
Energy per measurement	50 – 3 000 J
Recommended energy per measurement	300 – 500 J
Total duration until measurement value output	< 10 s
Nominal measurement frequency	300 J: 1 cycle/min; 3 000 J: 1 cycle/15 min
DEVICE PARAMETERS	
Max. absorber temperature	120 °C
Max. angle of incidence perpendicular to inlet aperture	± 20°
Max. centered tolerance	± 2.0 mm
Max. beam divergence (full angle) at an angle of incidence of 0°/20°	300 mrad/30 mrad
Accuracy Angle of incidence up to 10° Angle of incidence from 10° to 20°	 ± 3 % ± 5 %
Reproducibility	± 1 %
SUPPLY DATA	
Power supply	Built in lithium-ion battery
Temperature range for charging the lithium-ion battery	0 – 45 °C
COMMUNICATION	
Interfaces	USB/Bluetooth
Software	Cube App, LaserDiagnosticsSoftware LDS
DIMENSIONS AND WEIGHT	
Dimensions (L x W x H; without connectors)	60 x 65 x 80 mm
Weight (approx.)	800 g

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

Applications:



System description: The Cube M is an advanced version of the established Cube, designed to meet the demands of high power densities in confined spaces. Remote applications up to 2 kW and measurements even in the corners of your Additive Manufacturing machine are its strengths. **The unique optical front end allows measuring power densities of up to 250 kW/cm² with an angle of incidence of ± 20°.** This highly sophisticated optical front end is taken into account during calibration and does therefore deliver the highest accuracy.

Your benefit: The Cube M is capable of measuring multiple lasers of an Additive Manufacturing machine without cooling or interfering cables on the entire build platform. **When placed in the overlap of multiple lasers, the Cube M measures the power of all processing lasers without having to open the processing chamber door in the meantime.** Testing 4 lasers, for example, is done in less than 4 minutes, making it possible to perform a power check between each build.

CONCLUSION

The Cube M is a compact, robust and reliable solution for measuring high power densities of up to 250 kW/cm² in your remote application. Due to fast and easy measurements without cooling or cables it´s the perfect tool for your quality assurance between each build job.

For further information please visit www.primes.de/cubem

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