

# PowerMonitor PM



Fiber and disc laser



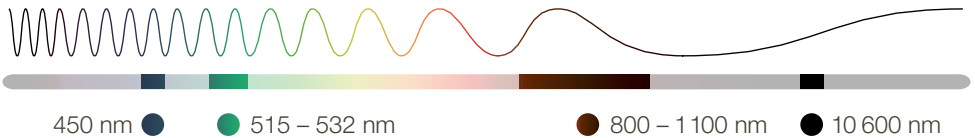
Diode laser



Ultrashort pulse laser



CO<sub>2</sub> laser



**Unique and robust power meter for measuring high powers as well as high intensities, delivering most exact and trustable results.**



Caustic



Raw beam



Power



Beam profile



Pointing stability



Vector

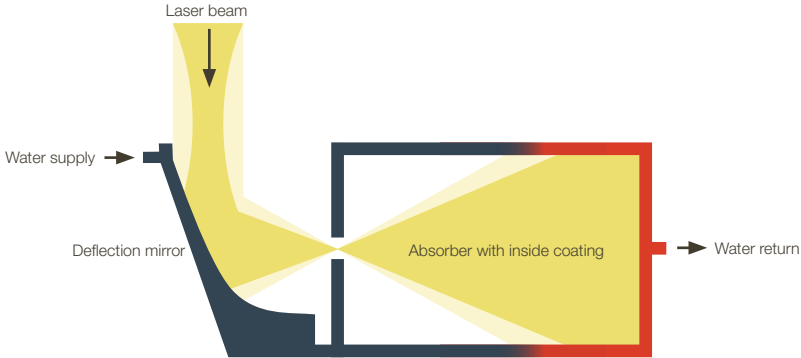


Focus shift

POWER RANGE	PM 48 PM 100 PM HP 75	0,3 – 8 kW 1 – 25 kW 3 – 75 kW
BEAM QUALITY M <sup>2</sup>	Single mode – multi mode	
BEAM DIAMETER	PM 48 PM 100 PM HP 75	up to 24 mm up to 50 mm up to 45 mm
HIGHLIGHT	Absorption of high-intensity continuous radiation	
INTERFACES	RS485 / USB / Interlock / Analog out	

# Tech Corner

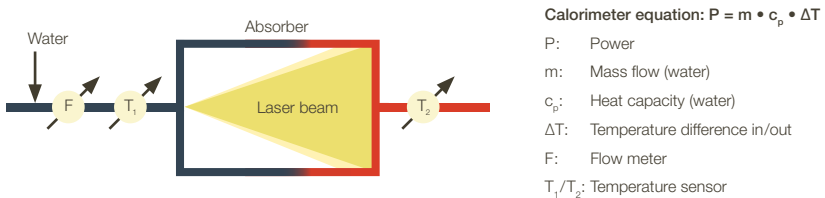
Unlike standard power meters whose design is typically based on a flat absorber, the PowerMonitor provides a water cooled cylindrical absorber. The Integrating-Spheres-like setup, combined with its entrance mirror, maximizes the wavelength independent absorption to over 99 %. Thanks to the innovative design, the absorber can allow very high degrees of absorption with very little back-reflection.



Schematic beam path in the PowerMonitor with cylindrical absorber and deflection mirror

The laser power is measured calorimetrically. Two separate temperature sensors determine the temperature rise between in- and outlet. Furthermore, the mass flow is measured using a highly accurate flow meter.

The unique design and sophisticated calibration with production-proven laser sources, guarantees unrivaled accuracy and quality.



**Calorimeter equation:**  $P = m \cdot c_p \cdot \Delta T$

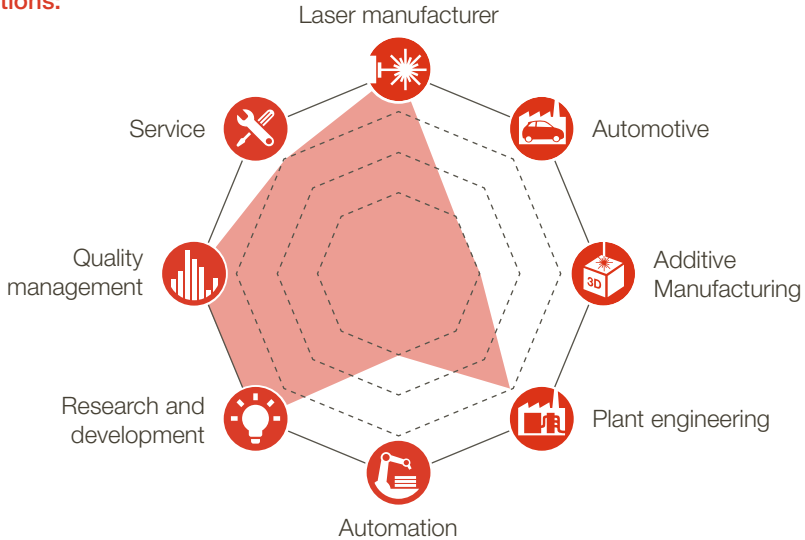
- P: Power
- m: Mass flow (water)
- $c_p$ : Heat capacity (water)
- $\Delta T$ : Temperature difference in/out
- F: Flow meter
- $T_1/T_2$ : Temperature sensor

The PowerMonitor can be used as a stand-alone power meter, providing the most relevant information on its integrated display. It can also be used along with our new LaserDiagnosticsSoftware LDS for a more detailed data analysis or parallel operation of a focus analyzing device like the FocusMonitor. Measuring the nominal power directly out of a fiber is also possible, when the available fiber receivers such as LLK-D, QBH or HLC-16 are mounted.

Laser safety has always the top priority when working with high-power lasers. The integrated interlock prevents the device from getting damaged in case of a critical water flow status or a closed shutter.

MEASUREMENT PARAMETERS	PM 48	PM 100	PM HP75
Power range	0.3 – 8 kW	1 – 25 kW	3 – 75 kW
Wavelength range	450 nm, 515 – 532 nm, 800 – 1 100 nm and 10 600 nm		1 000 nm – 1 100 nm
Irradiation time	continuous (cw)	continuous (cw)	continuous (cw)
Max. power density at 450 nm, 515 – 532 nm at 800 – 1 100 nm, 10 600 nm at 1 000 nm – 1 100 nm	10 kW/cm <sup>2</sup> 15 kW/cm <sup>2</sup> –	5 kW/cm <sup>2</sup> 5 kW/cm <sup>2</sup> –	– – 12 kW/cm <sup>2</sup>
Min divergence full angle (Convergent)/ Max divergence full angle (Divergent)	- 50 mrad +160 mrad	- 50 mrad +180 mrad	- 50 mrad +180 mrad
DEVICE PARAMETERS			
Entrance aperture	48 mm	100 mm	90 mm
Accuracy at 450 nm, 515 – 532 nm at 800 – 1 100 nm, 10 600 nm at 1 000 nm – 1 100 nm	± 2.5 % ± 2.0 % ± 2.0 %	± 3.5 % ± 3.0 % ± 3.0 %	– – ± 3.0 %
Reproducibility	± 1 %	± 1 %	± 1 %
Time constant	15 s up to 99 % of final value	60 s up to 99 % of final value	
SUPPLY DATA			
Power Supply	24 V ± 5 %, max. 0.5 A		
Cooling water pressure (min./max.) Min. cooling water flow Min. cooling water flow (interlock) Max. cooling water flow	2 bar/6 bar 0.7 l/min/kW 4 l/min 12 l/min	1 bar/4 bar 0.7 l/min/kW 8 l/min 30 l/min	1 bar/3 bar 0.7 l/min/kW 25 l/min 150 l/min
Cooling water temperature T <sub>in</sub> Stability of cooling water temperature	Dew point temper. < T <sub>in</sub> < 30 °C < 1 k/min or < 0.08 k/5 sec		
Compressed air for automatic operation of the shutter Pressure (min./max.) Purity class	2 bar/4 bar ISO 8573-1:2010 [7:4:4]		
COMMUNICATION			
Interfaces	RS485 / USB / Interlock / Analog out		
DIMENSIONS AND WEIGHT			
Dimensions (LxWxH) (with connectors and device feet)	394 × 242 × 125 mm	580 × 330 × 215 mm	600 × 330 × 215 mm
Weight (approx.)	10 kg	44 kg	52 kg

## Applications:



**System description:** The PowerMonitor PM is a calorimetric laser power meter that is, due to its special absorption design, unique on the market! A highest degree of wavelength-independent absorption at greatest measuring accuracies makes it optimally suited for the most challenging demands. Depending on the used version and calibration, the system can be operated from VIS to NIR over to CO<sub>2</sub> at power levels up to 25 kW. **Special versions of the PM even allow power measurements at up to 50 or 75 kW.**

**Your benefit:** The PowerMonitor is a powerful and reliable tool for precise power measurements of high power and high intensity laser beams. With wavelength independence and the versatile setup possibilities, it can be flexibly applied to a variety of scenarios in many fields – either as a stand-alone power meter, or in combination with a beam profiler or fiber adapter. Besides the high absorption degree (> 99%) and measurement accuracy ( $\pm 2\%$ ), its long-term stability, robustness and laser safety have also been proven even in the toughest industrial environment.

## CONCLUSION

The output power level of lasers has continuously climbed in recent years, and the relevant applications are booming. All these trends make the accurate measurement of high-power lasers more important than ever, not only for laser manufacturers, but also for machine builders and all laser users. The PowerMonitor is the perfect tool to meet such challenges and always delivers most exact and trustable measuring results.



For further information please visit [www.primes.de/pm](http://www.primes.de/pm)