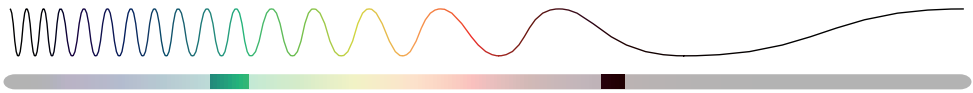
FocusParameterMonitor

PRIMES

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



515 – 545 nm

1030 – 1090 nm

A compact, PLC integrated measurement solution for inline beam characterisation featuring an industry proven power measurement combined with best-in-class beam analysis.

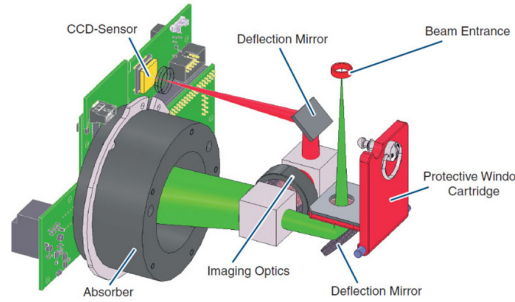
- Caustic
- Raw beam
- Power
- Beam profile
- Pointing stability
- Vector
- Focus shift

POWER RANGE	400 W – 8 kW
BEAM QUALITY M^2	single mode multi mode
BEAM DIAMETER	75 µm up to 2000 µm
HIGHLIGHT	Auton. beam characterisation and process parameters
INTERFACES	PROFINET, PROFINET M12 PROFIBUS, Ethernet

Tech Corner

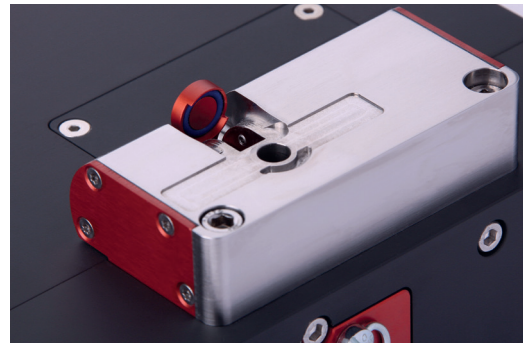
The FocusParameterMonitor FPM is a unique tool specifically designed to meet the needs of quality assurance and predictive maintenance in a production line. It is a fully integrated sensor providing information on laser power and beam distribution in seconds. The autonomous working principle does not require any external cooling.

The laser beam that enters the aperture is initially split into two beams. Both are then guided to the individual measuring components: The majority of the beam is absorbed on a beam dump and used to measure power, while a small fraction of the beam passes through an imaging optic and additional attenuators. The integrated camera provides a magnified image of the power density distribution. Information such as the spot location and beam diameter are calculated from this image.



The FPM is designed to measure short laser pulses. Most of the times this is closer to the real laser process than a measurement that is performed in continuous operation. The measured focus position will be much closer to the actual focus position during the laser process.

To achieve the compact design (comparable to a shoe box), there are no internal moving parts. An external linear axis must be used for performing a beam caustic by measuring at different positions along the beam propagation. The FPM features a dust proof housing and only needs a small flow of clean air for dust purging. Once the initial setup and integration into the production line is completed, the FPM requires virtually no maintenance.

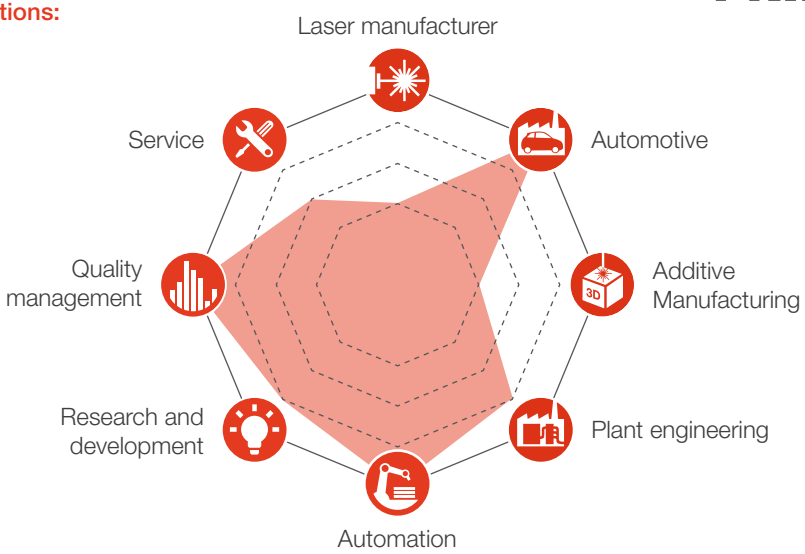


Both the measurement frequency and the measurement values can be defined by the customer. The FPM will send all measurement results to the PLC and additionally the results can be displayed in a browser using the integrated webserver. This website can be used as a visual representation of the results and be saved for quality assurance.

MEASUREMENT PARAMETERS	FPM
Beam dimensions	75 – 2000 µm[1)]
Wavelength range	515 – 545 nm, 1030 – 1090 nm
Max. laser power	8 kW
E_{Min}/E_{Max} per measuring cycle (depending on absorber temperature)	120 J/3 000 J
Max. beam divergence (depending on configuration)	60, 100, 120, 160 mrad
Max. power density (60 mm below entrance opening)	1 MW/cm²
Laser pulse duration	0.3 – 1 s
SUPPLY DATA	
Power supply	24 V DC ± 5 %, max. 0.5 A
Compressed air pressure Flow rate Specification of compressed air according	1 – 2 bar 10 – 15 l/min ISO 8573-1:2010 [1:4:2]
COMMUNICATION	
Interfaces (alternatively)	PROFINET, PROFINET M12, Ethernet, PROFIBUS
DIMENSIONS AND WEIGHT	
Dimensions (L × W × H) (without connectors)	210 × 185 × 153 mm
Weight (approx.)	10 kg
ENVIRONMENTAL CONDITIONS	
Operating temperature range	15 – 40 °C
Storage temperature range	5 – 50 °C
Reference temperature	22 °C
Permissible relative humidity (non-condensing)	10 – 80 %
PROTECTION	
Protection category (with the closure closed)	IP 64
Protection class	III

[1)] 40 µm possible with increased measurement uncertainty.

Applications:



System description: The FPM is a compact, autonomous sensor that measures laser power, power density distribution and beam propagation. It is designed for integration into a production line and can perform measurements during part changes or other down times within a fraction of a second. **The FPM is the ideal tool to monitor the overall performance of your laser station.**

Your benefit: The FPM can fully autonomously perform caustic measurements conforming to ISO 11146, using power density distributions. It is easy to integrate, since there is no cooling needed. The operating principle that requires short laser pulses closely resembles high precision welding tasks (e.g. battery welding, hairpin welding). **Especially for large and cost intensive parts at the beginning of a value chain, such as batteries and fuel cells, the documentation and monitoring of the tools used (including the laser) becomes more important. Errors in the beam distribution can be identified before they lead to a defective part, and the condition of the laser is documented, should a part fail in a later process.**

CONCLUSION

The FPM measures power and beam characteristics online within a production line. The measurement results can be documented for quality assurance. It has a compact design and features field proven PRIMES technology. It is almost maintenance free and will trigger a warning you if the process starts to drift outside of allowed limits.

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

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