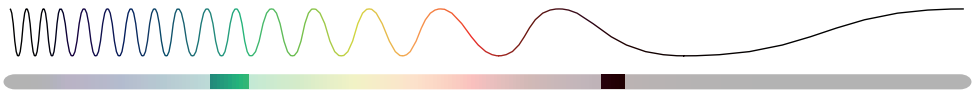
FocusParameterMonitor

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 industrially proven power measurement combined with best-in-class beam analysis.

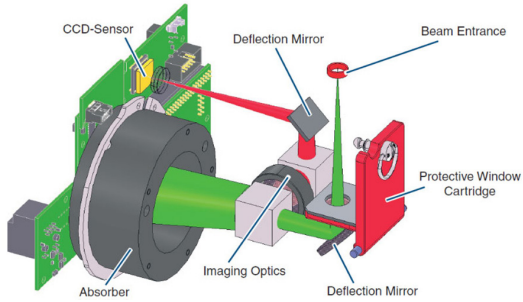
- Caustic
- Raw beam
- Power
- Beam profile
- Pointing stability
- Vector
- Focus shift

POWER RANGE	400 W – 8 kW
BEAM QUALITY M^2	Single mode and Multi mode
BEAM DIAMETER	40 µm up to 2000 µm
SPECIAL FEATURE	Auton. beam characterisation and process parameters
INTERFACES	PROFINET®, PROFIBUS®, Ethernet (Webserver)

Tech Corner

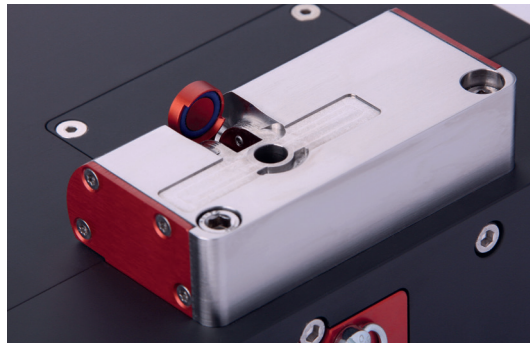
The FocusParameterMonitor FPM is a unique tool specifically designed to meet the needs of quality assurance and predictive maintenance in a production line. It is a fully integrated sensor providing information on laser power and beam distribution in seconds. The autonomous working principle does not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

The laser beam that enters the aperture is initially split into two beams. Both are then guided to the separated measuring components: The main beam is dumped in an absorber measuring the power, while a small section of the beam is running 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 then a measurement that is performed in cw operation. The measured focus position will be much closer to the focus positon during the laser process.

To achieve the compact design (comparable to a small shoe box), there are no internal moving parts. For measuring a caustic we rely on the external z-axis, e.g. of highly automated production lines, to measure the power density distribution at different z-positions. The FPM features a dust proof housing and only needs a bit of clean air for dust purging.



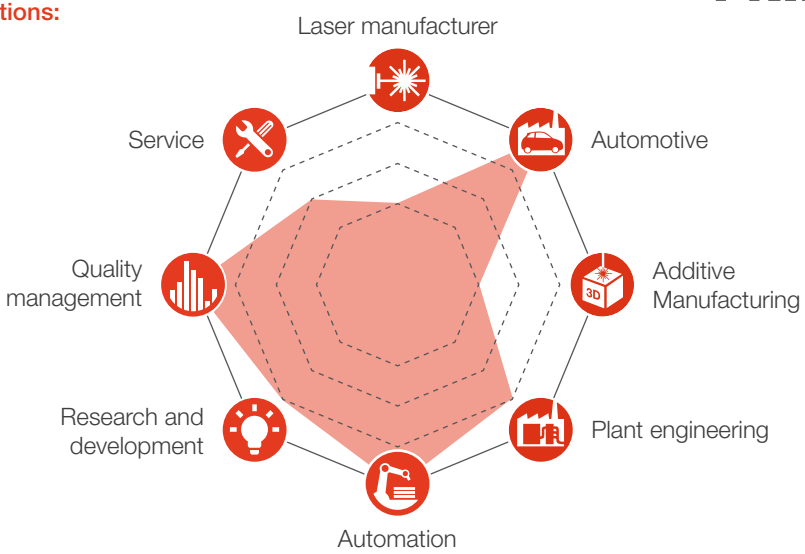
To achieve minimal measurement times and enable measuring during part changes, we decided to sacrifice some conveniences for speed. This means that the FPM needs be setup on time for the measurement task, but takes almost no maintenance or care from that point on.

You can freely decide how often you want to measure and what you want to measure. The FPM will send all measurement results to the SPS, an additional option is the build in webserver, displaying the results in a website. This website can be used as a visual representation of the results and be saved for quality assurance.

MEASUREMENT PARAMETERS	FPM
Power range (300 ms; 3000 J)	400 – 8 000 W
Wavelength range	515 – 545 nm, 1030 – 1090 nm
Beam dimensions	40 – 2000 µm
Max. power density (60 mm below aperture on protective window)	1 MW/cm²
Max. beam divergence (depending on configuration)	60, 100 or 160 mrad
Irradiation time	0.3 – 1 s
Energy per measuring cycle	100 – 3 000 J
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)	PROFIBUS®, PROFINET®, PROFINET M12, Ethernet (optionally)
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

PRIMES

Applications:



System description: The FPM is a compact, autonomous sensor that measures laser power, power density distribution and caustic inline. It is designed for the integration in 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 perform measurements of a caustic conform to ISO 11146, using power density distributions fully autonomously. It is easy to integrate, since there is no cooling needed. The operation principle that requires short laser pulses closely reassembles the welding process of high precision tasks (e.g. battery welding, hairpin welding). **Especially for parts that have high costs and areas 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. On hand errors in the beam distribution can be identified before it leads 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 in 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 warn you if your process starts to drift out of allowed bounds.

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

PRIMES GmbH | Max-Planck-Straße 2 | 64319 Pfungstadt | Germany | www.primes.de
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