FocusParameterMonitor FPM

The FocusParameterMonitor (FPM) enables a fast determination of laser beam parameters. The measuring procedures are controlled completely by means of the available machine programs.

Measuring Laser Beams Quickly

The FocusParamterMonitor FPM is the first system on the market that enables a fast determination of laser beam parameters in the processing zone. Its advantages: It can be integrated into the system easily. Moreover, the field-bus interface (PROFINET, PROFIBUS) enables a fast connection with many industrial controls and networks. The FocusParameterMonitor was initially designed for laser beam measurement in a special application – the laser seam stepper.

The FocusParameterMonitor consists of three main components: the power measuring unit, the beam analysis unit and the field-bus interface. These components are built into a stable aluminum housing. Both an electrically operated shutter and a replaceable protective window, which is flushed with compressed air, protect the beam aperture from contamination.

The beam parameters of the processing zone are measured periodically. These automated monitoring form the basis for secure processing quality.

In Practice

A typical field of application of the FocusParameterMonitor is the automated periodic monitoring of laser applications – especially with regard to the production with high power lasers with a low beam divergence such as remote welding or the application of a laser seam stepper in sheet metal processing.

Measured Beam Parameters

- Laser power
- Beam dimensions
- Beam position

at:

- Wavelength: 1030 – 1090 nm
- Max laser power: 8 kW
- Measuring time, typically: 0.3 s (for beam analysis)

Measuring Procedure – the Principle

An electronic shutter and a protective window at the beam entrance protect the measuring system from contamination. The beam coming from the laser and the processing optics is guided into the system via a deflection mirror.

The beam is guided to the PRIMES measuring component via a beam splitter and an additional diffraction mirror. The laser power is measured calorimetrically. In order to do so, the absorber is irradiated by the laser for a defined period of time.

By means of the known heat capacity, the temperature rise of the absorber and the irradiation time, the power is determined. The camera-based beam analysis system measures both the beam geometry and the beam position by means of a CCD sensor. A field-bus interface then transfers the measuring data to the system control. No additional PC is needed.

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Flexible Mounting, Fully Automated Operation

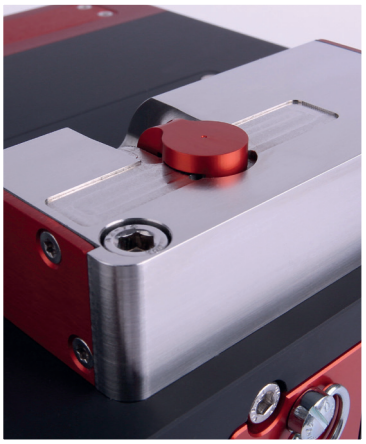
The FocusParameterMonitor can be mounted both horizontally and vertically. However, due to the danger of contamination, vertical mounting with a horizontal beam incidence is recommended. Operation is fully automated. Due to the connection with the machine control, the measuring procedures can be controlled completely by means of available machine programs. Communication occurs vie the field bus system.

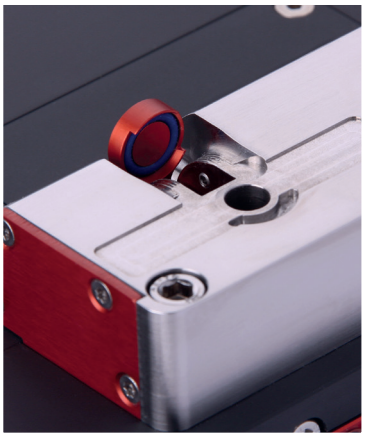
Models and Options

For both models of the FocusParameterMonitor a field-bus interface (PROFIBUS, PROFINET) is available. All models are equipped with a replaceable protective window.

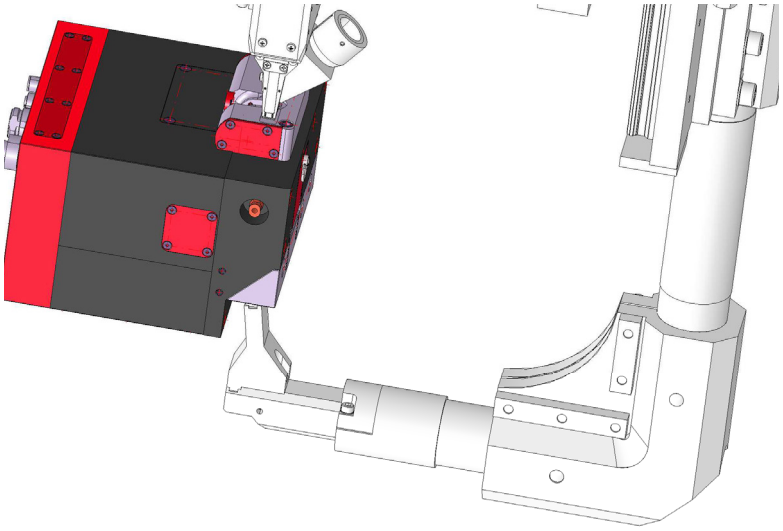
- FocusParameterMonitor magnification 1:1,
  maximum divergence 60 mrad
- FocusParameterMonitor magnification 2:1,
  maximum divergence 100 mrad

An option is currently being developed which also enables the display of the measured power density distribution over fieldbus systems.



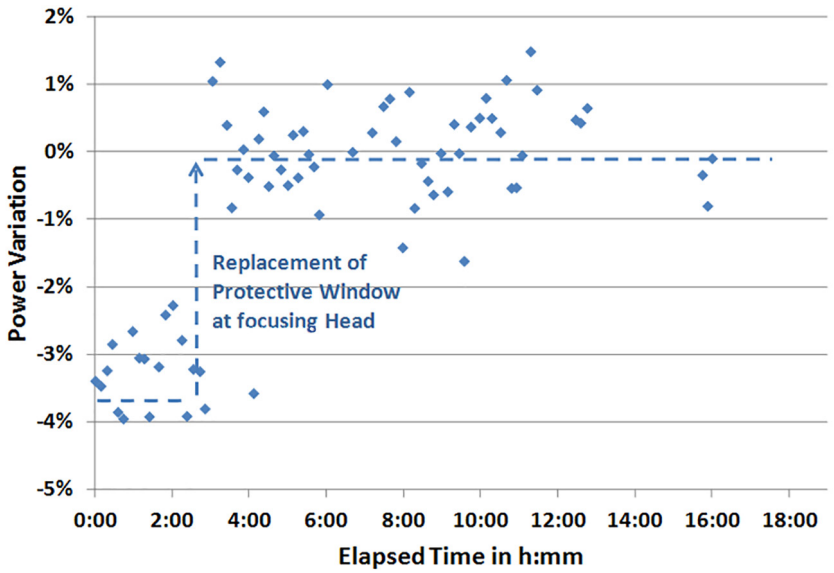


Shutter of the FPM



Application of the FPM with IPG Laser Seam Stepper

FocusParameterMonitor FPM



Technical Data

Measurement Parameters	
Power range (300 ms; 3000 J)	400 – 8000 W
Irradiation time	0.3 – 1 s
Wavelength range	1030 – 1090 nm
Focus dimensions	100 – 1000 µm
Energy per measuring cycle	100 – 3000 J
Max. beam divergence (depending on configuration)	60 or 100 mrad
Max. power density (60 mm below aperture on protective window)	typ. 1 MW/cm²
Max. spot diameter at the aperture	2 mm
Max. focus position within the device	15 mm
Supply Data	
Power supply	24 V DC ± 5 %, max. 0.5 A
Compressed air (clean, oil-free, dry, particles < 10 nm)	10 – 15 l/min
Min. pressure	1 bar
Max. pressure	2 bar
Communication	
Interfaces (alternatively)	PROFINET, PROFIBUS
Dimensions and Weight	
Dimensions (L × W × H) (without connectors)	210 × 153 × 185 mm
Weight	approx. 10 kg
Environmental Conditions	
Operating temperature range	+10 °C up to +40 °C
Permissible relative hunidity (non condensing)	10 – 80 %
Protection	
Protective class (with closed cover)	IP64
Protection category	III