

HighPower-MSM-Industry

The HighPower-MicoSpotMonitor-Industry (HP-MSM-I) expands the family of camera based beam diagnostics systems by a reference system for production integrated beam monitoring and power measurement with self-testing functionality.

The HP-MSM-I measures and characterizes the focused beam of brilliant multi-kilowatt fiber lasers under processing conditions, records the beam distribution out of the fiber, and monitors the emitted laser power.

Aside from laser power, the spatial focus position and the focus geometry (diameter, divergence, and Rayleigh length) as well as calculated parameters such as beam parameter product and M^2 are monitored.

Measuring Procedure – the Principle

The combination of proven PRIMES measurement principles in a dust-proof and industrial housing in connection with a field bus interface make the HP-MSM-I an ideal measurement tool for automated manufacturing.

The measurement objective, the beam attenuators from the HP-MSM and the well established camera based measuring principle are employed here. A high level of reproducibility is ensured by the integrated protective window changer, the air purged beam entrance, and the mechanical shutter. The beam parameters can be monitored by using either the integrated fiber connector or the beam entrance for focused beams.

Laser power is monitored using the calorimetric principle and can be ve-

rified with the internal electronic reference if required.

All measured beam parameters can be compared to predefined limit values in the processing window. The results are transferred back to the machine control. A correction of parameters such as laser power can therefore be undertaken automatically.

Data comparisons over a long period of time can also provide information regarding necessary service work on the laser and optical components of the system. Thus, the documentation of the measurement results assists in the

effective planning and cost reduction of service and maintenance.

In Practice

The HP-MSM-I is the optimum measurement tool for quality assurance in automated production. Applications in which reliability and durability of processed parts is paramount, like in the automotive or aeronautical industries, are the target markets. PRIMES therefore orientates itself towards system manufacturers and laser users in production environments.



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Measured Beam Parameters

- Power density distribution in individual measurement planes
- Focus dimensions
- Spatial focus position (against mechanical reference)
- Power

Measurements are carried out in conformity with ISO 11146.

Operation

Various operating modes, from manual measurements up to fully automated measurements using the machine con-

trol, are available for the HP-MSM-I. Fully-automated operation, which is mainly used for quality assurance, runs parallel to the production process. Measurements are time stamped and stored automatically for successive analysis.

In order to quickly gain meaningful measurement data regarding the spatial focus position, the so-called "fast caustic" measurement has proven very successful. Here, only a few measurement planes of a reference caustic are repeatedly measured.

When the current results correlate with the reference values, no further measurements are necessary. During service and maintenance, further measurement

routines can be implemented via the system control. This enables a fast and effective evaluation of faults.

Models and Options

- Interchangeable fiber adapters (QBH, LLK-D, HLC-16)
- PROFIBUS
- PROFINET

Technical Data

Measurement Parameters	
Power range	20W – 8kW (beam geometry measurement), 500W – 8kW (power measurement)
Wavelength range	1030 – 1090nm
Focus diameter	15µm – 1 mm
Working Principle of the Measurement System	
<ul style="list-style-type: none"> • 2- dimensional recording of the power density distribution of a focused beam or fiber delivered beams • 6-level switchable optical attenuator 0 – 100 dB • Beam entrance with reference geometry and mechanical shutter • Fiber connector (LLK-D, QBH, HLC-16), optionally interchangeable • 3 planes for vertical and horizontal beam incidence • Dustproof housing • 4 internal protective windows on rotating plate 	
Supply Data	
Power supply	230V DC ± 5 %, max. 20 A
Communication	
Interfaces	Ethernet, PROFIBUS or PROFINET
Dimensions and Weight	
Dimensions (LxWxH) (excluding connectors)	800mm x 420mm x 550mm
Weight	150kg
Environmental Conditions	
Operating temperature range	+10 °C up to +40 °C (below dew point)
Permissible relative humidity (non condensing)	10 – 80 %