



BeamMonitor BM+

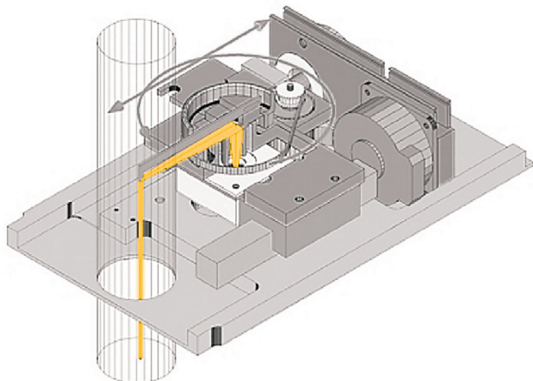


Brilliant Minds rely on Beam Analysis

Are you using an industrial laser for cutting and joining or finishing surfaces? Then surely you are no stranger to the radiant power of precision and its significance for efficiency and productivity in your company. Even the smallest deviation, a gradual increase in degradation, is an absolute economic no-go that you can now proactively combat with a reliable solution for analyzing unfocused beams: the BeamMonitor BM+.

Regular monitoring helps: The BeamMonitor BM+ is a measuring device possessing the latest electronics for performing

beam diagnostics on the unfocused, continuous wave laser beams of CO₂ and solid state lasers with high power output. Analyzing and documenting the laser parameters can allow you to further optimize working processes and/or identify undesirable deviations such as soiling, incorrect beam positioning, or faulty optics adjustment. The BeamMonitor BM+ reliably measures beam position, beam dimensions, beam symmetry, and power density distribution. Especially developed for use in harsh industrial production environments, the device can be adapted to all kinds of spacial conditions and can even be installed upside down without additional components.



Sketch to the mechanical setup of the BM+

Detecting Wear and Deviations

In practice, laser beams are often “customized” for the respective area of application using telescopes and adaptive lenses. As a result of this, the beam waist diameter and divergence of the laser beam often change dynamically, which then might change the focus dimensions or focus location in modern systems for laser cutting or welding.

The focus is therefore on penetration through the material surface, but it is “pushed” into the material for the actual cutting



process. For laser welding, one setting may be used to tack a piece, while the another is used to weld. In addition to variation, a number of other variable parameters can also be analyzed and documented. With its ability to detect wear on laser lenses, which could have a negative impact on processing results, the BeamMonitor BM+ has also earned a place in quality assurance and laser approval. Diode lasers and other solid-state lasers are checked in the collimated range and can thus be assessed with relatively little effort.

The Principle

A rotating measuring tip gathers measurements of the laser beam at points. The mirror holder is also moved linearly in order to scan the entire beam profile. One partial beam is directed to the detector at a time and measured in this way. The fast 16-bit AD converter and a high resolution of up to 1 024 x 1 024 pixels facilitate exact analysis of even the smallest disturbances in the raw beam.

The raw data generated by BM+ can be analyzed using the new LaserDiagnosticsSoftware developed by PRIMES. Here is what LDS offers standard:

- Beam measurement
- Beam position
- Measurements: single measurements, series measurements (monitor operation), and measurement of development over time (linescan)
- Displays: isometry, false colors, contour, line presentation and display of numeric results
- Data storage in PRIMES format .lpf as well as CSV and export graphic

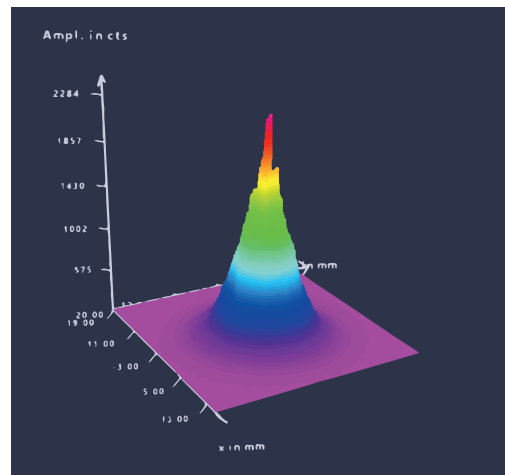
Note: During the measurement, the entire beam exits the BeamMonitor and must be absorbed as fully and securely as possible, with the PowerMonitor for example.

Easy Operation

You will love operating the BeamMonitor BM+: Our diagnostics tool LaserDiagnosticsSoftware contains extensive tools for analyzing, presenting, and preparing measurement data, including a report feature. Data communication via Ethernet connection.

Diverse Models & Options

- 1 BeamMonitor BM+ 60 and BM+ 100: Depending on the beam size and geometry, the BeamMonitor BM+ can be used with apertures of 60 or 100 mm. Both are available for CO₂ and NIR lasers. The aperture must correspond to at least 1.4 times the laser beam diameter, so that any intensity along the edge does not hit the BM+ housing, the measuring range is not unnecessarily limited, and/or a distorted measuring result is not produced.
- 2 BeamMonitor BM-HQ: Model for a detailed analysis of CO₂ irradiation with small outside dimensions, low weight of just 1.5 kg and additional linescane feature. The BM-HQ has been successfully in use for many years now and replaces the typical plexiglass penetrations for identifying the beam profile or the beam symmetry. Its mechanically scanning system measures the power density of collimated laser beams at full power.



Measurement of the power density distribution with the BM+



Technical Data

	BM+ 60	BM+ 100	BM-HQ
MEASUREMENT PARAMETERS			
Power range	50 – 25 000 W	50 – 25 000 W	50 – 10 000 W
Wavelength range	1 030 – 1 090 or 10 600 nm	1 030 – 1 090 or 10 600 nm	10 600 nm
Beam dimensions	10 – 42 mm	10 – 70 mm	5 – 35 mm
Max. power density	10 kW/cm ²	10 kW/cm ²	< 10 kW/cm ²
Max. beam divergence	100 mrad	100 mrad	< 100 mrad
Irradiation time	2 s – infinity	2 s – infinity	2 s – infinity
A/D conversion	16 bit	16 bit	14 bit
Nominal measuring frequency	0.5 Hz	0.5 Hz	0.5 Hz – Linescan 30 Hz
DETERMINED PARAMETERS			
Beam position x, y	yes	yes	yes
Beam dimensions x, y	yes	yes	yes
Power density distribution	2D, 3D	2D, 3D	2D, 3D
Linescan	optional	optional	optional
Measurement duration per plane dependent on measured parameters (like resolution, rotation speed, position of measuring window)	5 – 40 s	5 – 40 s	5 – 40 s
DEVICE PARAMETERS			
Working range x-y	60 x 60 mm	100 x 100 mm	50 x 50 mm
Measurement window sizes	0.1 x 0.1 mm – 60 x 60 mm	0.1 x 0.1 mm – 100 x 100 mm	3.5 x 3.5 mm – 45 x 45 mm
Resolution	32 x 32 – 1 024 x 1 024 px	32 x 32 – 1 024 x 1 024 px	32 x 32 – 256 x 256 px
Rotation speed of the measuring tip	1 562 min ⁻¹	1 562 min ⁻¹	2 154 min ⁻¹
Accuracy (beam diameter)	± 5 %	± 5 %	± 5 %
Reproducibility (beam diameter)	± 3 %	± 3 %	± 3 %
SUPPLY DATA			
Power supply	24 V DC ± 5 %, max. 1.8 A	24 V DC ± 5 %, max. 1.8 A	24 V DC ± 5 %, max. 0.7 A
COMMUNICATION			
Interfaces	Ethernet, RS485 ¹⁾	Ethernet, RS485 ¹⁾	Ethernet, RS485 ¹⁾
DIMENSIONS AND WEIGHT			
Dimensions (L x W x H)	316 x 212 x 83 mm	436 x 292 x 83 mm	182 x 139 x 68 mm
Weight (approx.)	9 kg	10 kg	1.5 kg
ENVIRONMENTAL CONDITIONS			
Operating temperature range	15 – 40 °C	15 – 40 °C	15 – 40 °C
Storage temperature range	5 – 50 °C	5 – 50 °C	5 – 50 °C
Reference temperature	22 °C	22 °C	22 °C
Permissible relative humidity (non-condensing)	10 – 80 %	10 – 80 %	10 – 80 %

¹⁾ Only for communication with PowerMonitor.