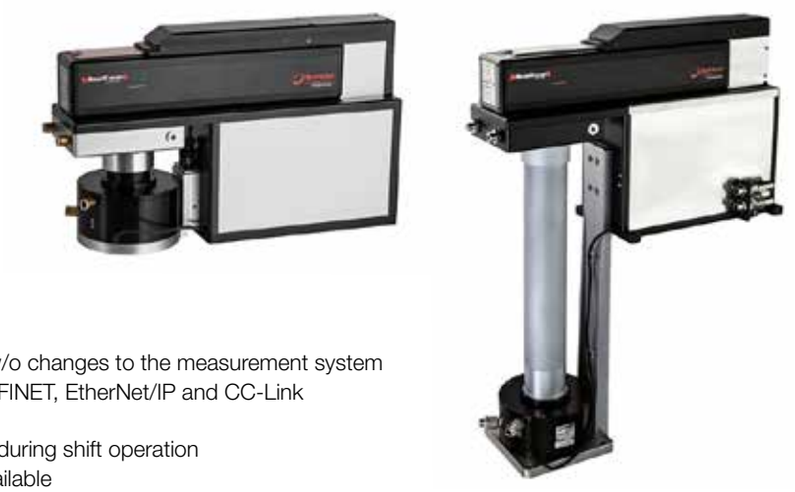
3.8.3 BeamWatch® Integrated - Beam Characterization System for Automated Manufacturing

BeamWatch Integrated is a fully automated laser measurement system designed to measure critical laser beam parameters on industrial production lines.

- Measures all the critical laser beam parameters of the focused beam up to 9999 W power (up to 30 kW on request)
  Measured laser parameters include:
  - Waist (focus spot) width and location
  - Focal shift
  - Centroid
  - M2 or K
  - Divergence
  - Beam parameter product
  - Rayleigh length
  - Beam tilt angle
  - Absolute power
- Fully automated operation
- Trend analysis with good/bad signal
- Detailed report with time stamp
- Ability to work with different types of welding heads w/o changes to the measurement system
- Industrial interface of choice in addition to GigE: PROFINET, EtherNet/IP and CC-Link
- Rugged for industrial production environment
- Short measurement time for frequent measurements during shift operation
- Two options for single-mode or multi-mode lasers available



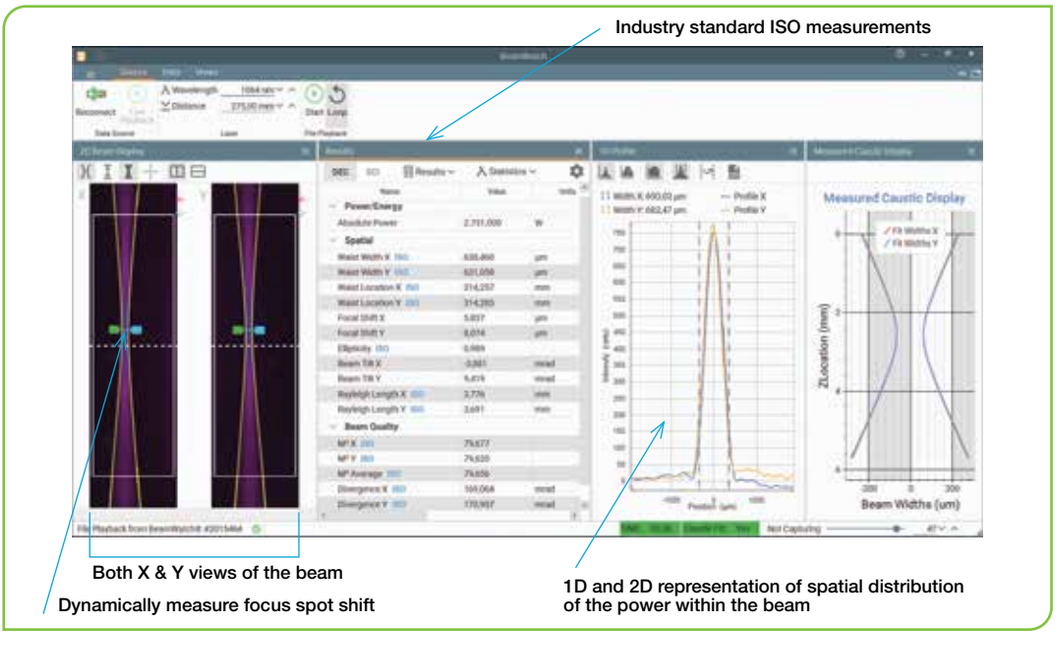
Although ever more powerful cutting and welding laser equipment is being used on modern production lines, all too frequently – due either to lack of time or to the complexity – the quality of the laser beam goes unchecked during the production process. Because laser process quality is directly linked to laser quality, this can lead to large batches of defective parts in high-throughput production lines, e.g. in the automotive industry. In addition to the significantly higher risk of loss or safety issues, neglecting to monitor the quality of the laser beam consistently makes it almost impossible to detect the root cause of problems, when they occur.

To address this issue, BeamWatch Integrated was developed. Based on the patented non-contact BeamWatch measurement principle (using Rayleigh scattering), this technology provides for the simultaneous measurements of multiple profiles along the beam caustic at video rates, delivering – in mere fractions of a second – all the beam key parameters according to ISO 13694 and ISO 11146 standards. Real-time performance also allows for detection of dynamic focal shift, while a NIST-traceable power sensor assures absolute power readings.

With its shutter and rugged design, BeamWatch Integrated is a compact and self-contained system that can accommodate different types of welding heads. A variety of interfaces makes it possible to integrate the system into production networks and automated manufacturing lines to facilitate direct transfer of measurement data.

The short measurement times allow the laser beam to be checked automatically during the loading / unloading phase, as frequently as once every produced unit. Additionally, all parameters can be read out using standard interfaces and – as part of the process monitoring – consistently documented for each individual component, as desired. Since they are based on a large amount of measurement data, trend diagrams are highly accurate and can therefore deliver useful insights for predictive maintenance.

Tolerances and limit values can be set up for measured parameters to trigger corrective actions as needed. BeamWatch Integrated operates virtually without maintenance, because contactless measurement exerts no wear on the instrument.



3.8.3.2 Beamwatch Integrated 500

- Automatically measure laser power, caustic and focus shift in real time
- Support single-mode lasers
- Fully automated operation
- Trend analysis with good/bad signal
- Detailed report with time stamp
- Ability to work with different types of welding heads w/o changes to the measurement system
- Rugged for industrial production environment
- Short measurement time for frequent measurements during shift operation

BeamWatch Integrated with 500mm distance between focus position and power meter

Specifications

Model	BW-Integrated-500-NIR-155-Profinet	BW-Integrated-500-NIR-155-Ethernet/IP	BW-Integrated-500-NIR-155-CC-Link
Beam Profiling			
Wavelength	980 - 1080 nm		
Waist width accuracy	±5 %		
Waist location accuracy	±125 µm within the BeamWatch window		
Camera field of view inside the unit	32.17 mm x 8.55 mm		
Maximum entrance/exit beam diameter	12.5 mm		
Focal shift accuracy	±50 µm		
BPP accuracy	±3.5 % RMS		
Divergence accuracy	±3.5 % RMS		
M^2 accuracy	±3.5 % RMS		
Particulate purge	Clean dry gas (Air, Nitrogen, Argon), ~5-10 L/min, 6 bar		
Power Meter			
Power range	500 W - 9999 W (up to 30 kW on request)		
Maximum power density at power meter (1)	Beam diamete / Max power density		
	< 15 mm / 10 kW/cm²		
	15 - 20 mm / 7 kW/cm²		
	20 - 40 mm / 5 kW/cm²		
	40 - 45 mm / 4 kW/cm²		
Power sensor response time	2.7 s max for 9999 W (quicker for less power)		
Backscattered power	< 1 %		
Power noise level	25 W		
Linearity with power	±2 %		
Power accuracy	±5 %		
Software			
BeamWatch Integrated software	PROFINET	EtherNet/IP	CC-Link
	Webinterface or BeamWatch Software		
Output	OK/Warning/NOK values, CSV, PDF and BeamWatch files		
Calibration Certificates			
Power Sensor	NIST traceable		
Camera	Certification		
General			
Communication	PROFINET & GigE	EtherNet/IP & GigE	CC-Link & GigE
Distance between focus and power meter	500 mm		
Power supply	24 Volts DC, 5 Amps max		
Water cooling (2)	Clean non-corrosive water, 8 L/min, 18-30 °C, 6 bar, ~2 bar pressure drop		
Weight	~20 kg		
Dimensions	21.78 in x 26.87 in x 6.78 in		
	553 mm x 682 mm x 172 mm		
Compliance	CE, UKCA, China RoHS		
Ordering information			
Part Number	**SP90527**	**SP90529**	**SP90538**

Notes:
(1) For circular beam centered within ¼ of beam diameter. IMPROPERLY CENTERED BEAM CAN CAUSE DAMAGE TO SENSOR. Maximum tilt angle on power sensor ±5 degrees. For rectangular beam please consult MKS Ophir representative
(2) Water temperature rate of change <1°C/min. The recommended flow rate can be lowered proportionately at lower than full power but should not be below 3 liter/min. The response time will be optimum with the recommended flow rate.