PRIMES

PowerMeasuringModule PMM

Fully integrated and without the need for cooling water or compressed air: The PowerMeasuringModule (PMM) measures the current laser power directly in your production environment. The highly professional power meter is intended for several applications in the area of automated production with solid-state lasers.

Automated Power Monitoring

The PowerMeasuringModule is a robust laser power measuring system which determines the optical power directly inside the processing zone during production. The device can be integrated into the system control via various available field-bus interfaces. Thanks to the direct connection with the machine control, measurements can be carried out and documented fully automated. This forms your basis for process-accompanying beam control, which is one of the main factors when it comes to quality assurance for the production with lasers.

Tried and tested in Practice

The PRIMES PowerMeasuringModule is intended for operators, such as system manufacturers or end users, which specialize in the production with lasers. The system is often employed in the field of automotive manufacturing, for example where car bodies are often welded using solid-state lasers (Nd:YAG-, fiber-, disk- or diode lasers). The systems are often robot based.

The laser power is monitored during processing breaks as necessary. In order to do so, the robot is positioned above the PowerMeasuringModule.

The measurement is done in the defocused beam.

The PowerMeasuringModule is suitable for a wide range of applications in the automated production with solid-state lasers – not only in macro- but also in micro processing.

As an option, the fields of application of the PowerMeasuringModule can also be upgraded to low average power as well as pulsed beams.

Measured Beam Parameters

Average laser power of solid-state lasers at:

- Wavelength: 900 – 1 090 nm
- Maximum laser power: 12 kW
- Measuring time, typically: 0.3 s

The principle: calorimetric measurement

The PowerMeasuringModule measures laser power calorimetrically. For the measurement the absorber is irradiated by the laser for a defined period of time. On the basis of the heat capacity of the absorber, the temperature rise as well as the irradiation time, the optical power is calculated within a few seconds. The measuring result is independent from the beam dimensions and the beam position. The irradiation time measurement increases the reliability

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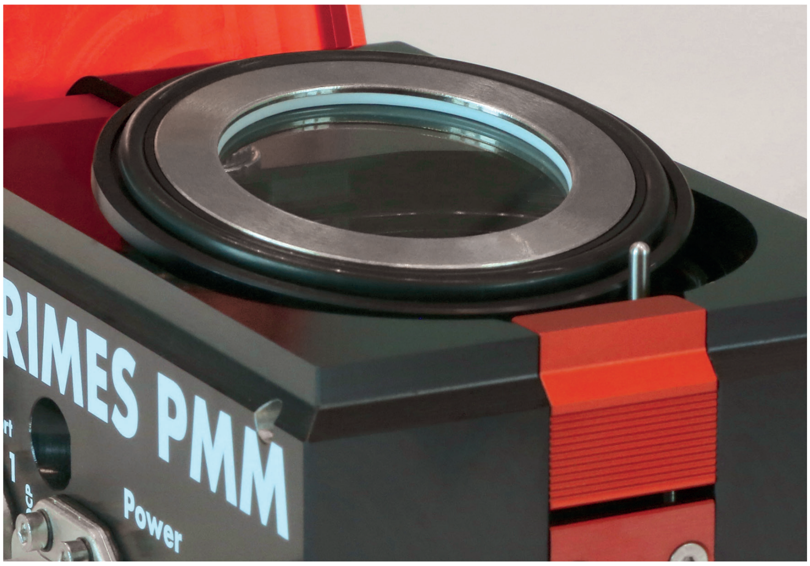
of the results. The power meter works without cooling water and compressed air. The absorber cools down due to heat dissipation to the ambient air. This, however, limits the measuring frequency of the system. The system control can query the absorber temperature at any time in order to determine whether and – if so – which new irradiation time is possible for the PowerMeasuringModule. A mechanical shutter at the entrance aperture as well as a protective window protects the measuring device from contamination.

As the maximum power density on the absorber must not exceed 1.5 kW / cm², the application of the PowerMeasuringModule requires sufficient space behind the focus.



The PowerMeasuringModule is employed especially in robot based production such as the automotive industry

Operation via System Control

The operation of the PowerMeasuringModule is exclusively effected via the machine control. The measuring process for a power measurement can be divided into three steps:

- Create measurement readiness
- Carry out measurement
- Evaluate measurement

Time-Optimized Measuring Procedure

When integrating the PowerMeasuringModule into automated industrial production, a measurement cycle, which is as short as possible, is aspired.

Advantageous: In order to reduce the measuring time, the duration of the robot's standstill can be reduced to the mere irradiation time of the PowerMeasuringModule.

The measuring procedure consists of the following steps:

1. The robot moves towards the measuring device; the shutter is opened simultaneously.
2. The shutter is open; the device is ready for operation.
3. The robot is in position.
4. The laser pulse is triggered.
5. The laser pulse is terminated.
6. The shutter is closed, the robot can move away.
7. Finally, the signal "Measurement completed" has to be awaited.

Display

The form of display of the measuring results is decided independently by the end user on the basis of the system control. The data transmission is determined by the employed fieldbus systems.

Models and Options

Generally, the PowerMeasuringModule is offered with an irradiation time measurement as well as a protective window cartridge, which can be replaced quickly and without any tools.

Select from the following models:

- PowerMeasuringModule with PROFINET® copper
- PowerMeasuringModule with PROFINET® fiber optics
- PowerMeasuringModule with PROFIBUS®
- PowerMeasuringModule with DeviceNet™
- PowerMeasuringModule with EtherNet/IP™
- PowerMeasuringModule with EtherCAT®
- PowerMeasuringModule for the application with low average powers (of 50 W) as well as pulsed radiation

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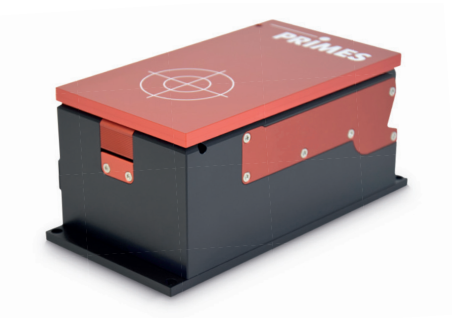
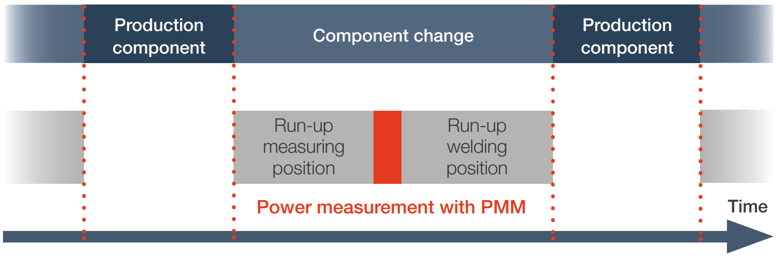


PowerMeasuringModule: Your entry to fully automated power monitoring



Time saving: This is how time optimized measuring works

Technical Data

Measurement Parameters		Standard Absorber [1]	Advanced Absorber [1]
Power range		400 – 6 000 W [2]	400 – 12 000 W [2]
Wavelength range		900 – 1 090 nm	
Max. beam dimensions		30 mm	
Exposure and evaluation		< 15 s	
Typ. beam dimensions		15 – 25 mm	
Accuracy at a angle of incidence to 5 °		± 3 %	
Reproducibility		± 1 %	
Nominal measuring frequency		400 J: 1 Zyklus/min; 3 200 J: 1 Zyklus/10 min	
Max. laser rise time		100 µs	
Max. power density (peak) on the absorber (approx. 25 mm underneath the protective window) at beam diameters	> 10 mm	1.5 kW/cm^2	4 kW/cm^2
	10 – 3 mm	2.5 kW/cm^2	5 kW/cm^2
	3 – 1.5 mm	5 kW/cm^2	10 kW/cm^2
	< 1.5 mm	6 kW/cm^2	12 kW/cm^2
	< 1 mm	8 kW/cm^2	12 kW/cm^2
Supply Data			
Power supply DC IN DC OUT		 24 V DC +25 % / -20 %; 250 mA 24 V DC / max. 5 A	
Communication			
Interfaces (alternatively)		PROFINET® copper/PROFINET® fiber optics PROFIBUS® DeviceNet™ EtherNet/IP™ EtherCAT®	
Dimensions and Weight			
Dimensions (L x W x H)		200 × 100 × 89 mm (closed), 246 x 100 × 227 mm (open)	
Weight (approx.)		2.2 kg	
Environmental Conditions			
Operating temperature range		+15 °C to +40 °C	
Permissible relative humidity (non-condensing)		10 – 80 %	

[1] Please read the information on the identification plate to determine if your device is equipped with an aluminum or copper absorber.
[2] The stated limit values are to be understood in correlation with the permitted maximum energy (E = P · t).