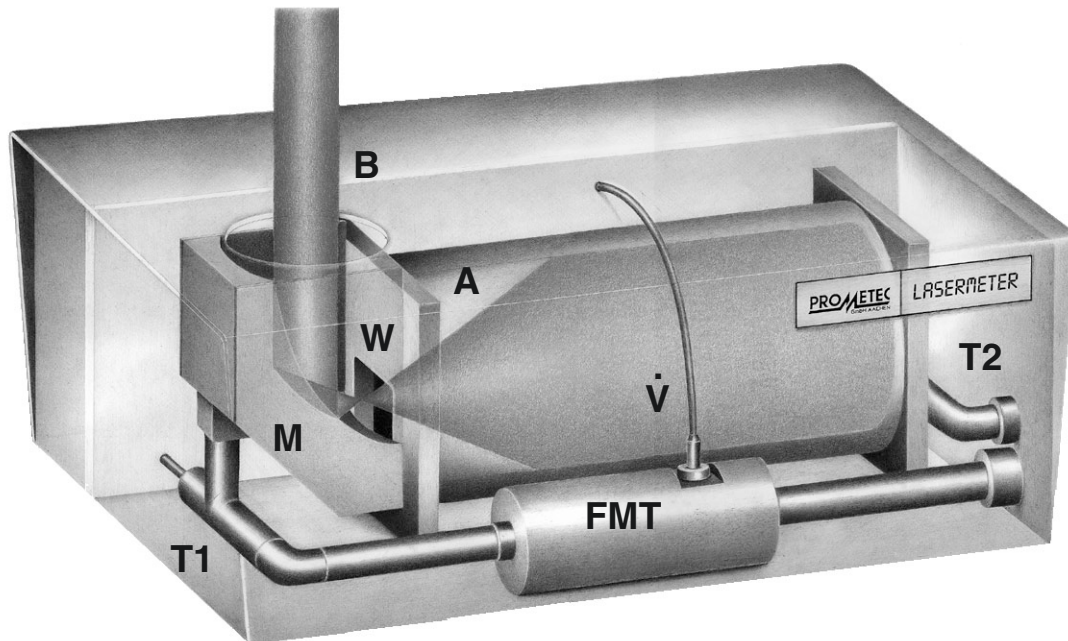


LASERMETER

Precision power meter with absorber for all high-power lasers

Measuring position in the unfocused to near-focus range



Working principle

In the LASERMETER high-power radiation meter, the laser beam entering through the beam entry aperture (B) is focused by a water-cooled gold-plated rotational paraboloid reflector (M) and deflected through a small window (W) into a water-cooled absorber tube (A). Together with the small aperture, the absorber tube cavity forms an Ulbricht globe, preventing the incident radiation from leaving the absorber system and ensuring full absorption. Within the absorber and the reflector, the power of the incident radiation is dissipated to a cooling water flow in the form of heat. An analyzing computer uses signals from a high-precision metering turbine (FMT) and two precision temperature sensors (T_1 , T_2) to calculate the absorbed beam power to an accuracy greater than $\pm 1\%$ of the measured value.

Thanks to its high precision, the LASERMETER can be used to determine the power loss from reflectors and focussing optics.

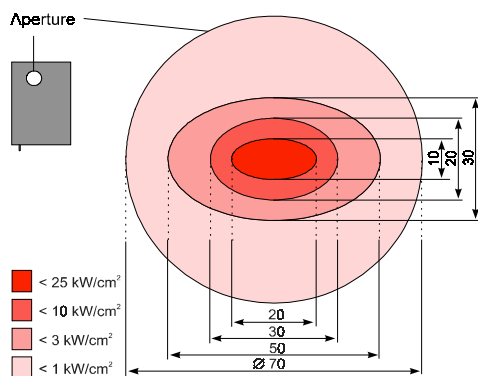
Because the incident beam is deflected, the LASER-METER is extremely flat in the beam axis. The special design of the paraboloid reflector (M) means that the LASERMETER can be subjected to very high beam intensities and beam powers. As a result, the LASERMETER can be used in the unfocused beam and in the immediate vicinity of the beam focus.

The LASERMETER can be permanently connected to the LASERSCOPE UFF 100 to form an integrated unit, thereby enabling complete laser beam diagnosis to be carried out with one system.

When used with the LASERSCOPE UFF 100, the LASERMETER is fully controlled via the RS 232 system interface to the LASERSCOPE. In this configuration, the measured beam power can be used for automatic absolute calibration of the LASERSCOPE UFF 100.

In applications without the LASERSCOPE, a computer can still be used for direct control of the LASERMETER and direct data logging via the serial interface. Analysis and control software for DOS-PC is included in the package. You can also display the measured beam power on a commercial voltmeter, via an analogue output.

The unit is also available as a pure beam absorber in the LASERSTOP version. This version contains no instrumentation or electrical components. It can be upgraded to the LASERMETER version at a later date.



Maximum permissible CO_2 -laser beam density on the rotational paraboloid reflector

Technical data

- Power meter and absorber, suited for CO_2 , Nd:YAG and other high-energy radiation, pulsed and continuous wave, unfocused and near-focus
- Measuring accuracy: $\pm 1\%$ of the measured value in the range from 1 kW to 20 kW at customary stabilised water pressure, zero error ± 5 W. Error curve or the measuring range from 250 W to 1 kW to be delivered as acceptance documentation
- Time constants for 90/98/99 % of measured value: 10/60/90 s
- Maximum permissible beam power: 20 kW cw radiation with CO_2 laser in continuous operation; up to 30 kW for a limited period with large beam diameter, taking into account the laser beam density distribution shown in the illustration
- Maximum permissible power density: 25 kW/cm^2 with cw - radiation from CO_2 lasers
- The maximum values must be halved for Nd:YAG - radiation

- With pulsed radiation, the full pulse power or power density is the maximum value, but the integral mean pulse value is measured
- Aperture: 70 mm; in combination with UFF 100: 60 mm
- RS 232 serial interface for DOS-PC and LASERSCOPE UFF 100
- Analogue voltage output: 1V/kW and 0.1 V/kW
- Threaded fitting for fixed mounting
- PROMETEC modular fitting system for LASERSCOPE UFF 100
- All water-circulation components in aluminium and stainless steel

Operational data

- Coolant input and output connections: R 1/2"
- Required coolant flow to 10 kW: >6 l/min. from 10 kW: >0.6 l/min. per absorbed kW of beam power
- Coolant pressure: typically 1.5 bar, max. 6 bar
- Power supply: 85 to 260 V; 40/400 Hz; 17.5 VA

Dimensions and weights

- Dimensions L x W x H: 400 x 300 x 160 mm³
- Height H with LASERSCOPE UFF 100: only 250 mm
- Weight without coolant: 13.5 kg (LASERSTOP: 12.5 kg)
- Coolant: approx. 0.2 l or 0.2 kg



Lasermeter