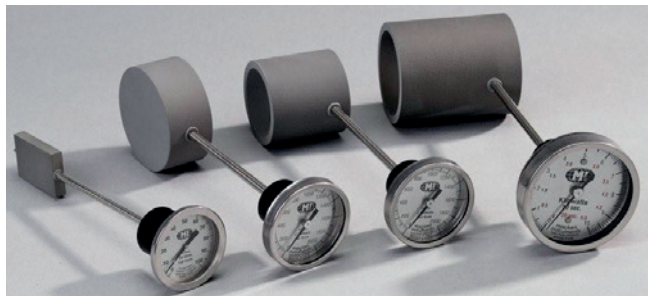


Analog laser power probes – quick and easy



Laser power measurements should be quick and easy. They should not involve time consuming set-up and alignment problems. Ideally, the measurements should also be able to be made at any point in an optical system where losses are likely to occur. Unfortunately, most laser power meters have sacrificed ease of use to gain continuous power readings. However, in most laboratory and production situations, the usual requirement is for a quick spot-check of power with a minimum of disruption. Even when tuning up a laser, researchers have found that it is best to tune for a desirable mode pattern.

The Power Probes are calorimeter-type power meters which measure laser power using a timed exposure. They display average power absorbed on a calibrated readout scale and can be used with continuous or repetitively pulsed lasers ranging from small 2 watt YAG lasers to large 10,000 watt CO₂ lasers.

Taking measurements

Each power probe is a self-contained unit consisting of an absorbing head, a temperature measuring mechanism, a zeroing knob and a readout dial. In operation, the dial is zeroed. Then the absorbing head on the end of the Power Probe is exposed to the laser beam for a specified time interval. After the power probe has been removed from the laser beam, the average laser power can be read out on the dial. The process takes about one minute. If it is necessary to make several power measurements in succession, the absorbing head can be rapidly cooled by immersing in a beaker of water between measurements.

Select features

- The absorbing head of a Power Probe is conveniently sized. An absorbing head is large enough to be easily used, yet small enough to be inserted between optical components to measure the laser power without disturbing set-up.
- The hand-held meter requires only about one minute to make a power measurement.
- The absorbent coating is very tough, resisting mechanical abrasion and water immersion.
- A zero adjustment mechanism has been incorporated into the design to expedite and simplify the power measurement process.
- An accurate and durable all-metal construction has been used to insure a long life.

Model	Power Range [W]	Damage Threshold [W/cm ²]	Exposure Time[s]	Division [W]	Absorbing Head [cm]	Length [cm]	Weight [g]	Accuracy [%]	Repeatability [%]
P20Y	0 – 20	3000	30	0.2	4.58 × 2.54	22	89	±5	±1.5
P50Y	0 – 50	3000	20	0.5	4.58 × 2.54	22	98	±5	±1.5
P100Y/	0 – 100	3000	20	1	5.08 × 3.18	22	120	±5	±1.5
P100C	0 – 100	10000	20	1	5.08 × 3.18	22	120	±5	±1.5
P200Y	0 – 200	2500	20	2	5.08 Ø	22	157	±5	±1.5
P200C	0 – 200	7000	20	2	5.08 Ø	22	157	±5	±1.5
P500Y	0 – 500	2000	20	5	5.08 Ø	22	183	±5	±1.5
P500C	0 – 500	4000	20	5	5.08 Ø	22	183	±5	±1.5
P1000Y	0 – 1000	1750	20	10	6.35 Ø	22	287	±5	±1.5
P1000C	0 – 1000	2500	20	10	6.35 Ø	22	287	±5	±1.5
P2000Y	0 – 2000	1200	20	20	7.62 Ø	22	522	±5	±1.5
P2000C	0 – 2000	1500	20	20	7.62 Ø	22	522	±5	±1.5
P4000Y	0 – 4000	900	20	25	8.89 Ø	28	753	±5	±1.5
P4000C	0 – 4000	1100	20	25	8.89 Ø	28	753	±5	±1.5
P10KY	0 – 5000 0 – 10000	750	20 10	50 100	8.89 Ø	28	1144	±5	±1.5
P10KC	0 – 5000 0 – 10000	900	20 10	50 100	8.89 Ø	28	1144	±5	±1.5

Wavelength for Y-Models: 900 nm – 1250 nm, Wavelength for C-Models: 8 µm – 11 µm

Analog laser power probes – quick and easy

Conical laser power probes



Conical head power probes are used to measure high power density CO₂ laser beams which may damage the standard flat surfaced power probes. The conical absorbing cavity exhibits a high heat dissipation. There are two models of Conical Power Probes: C2K, C4K and C10K. Table 1 below gives specifications for these models. Table 2 gives approximate damage threshold for both the flat surface and conical power probes.

Conical power probe specifications

Model	C2K	C4K	C10K
Power Range with 10 s exposure time [W]	0 – 2000	0 – 4000	0 – 10000
Power Range with 20 s exposure time [W]	–	–	0 – 5000
Absorbing Head, Ø [cm]	6,2	7,0	7,6
Conus, Ø [cm]	5,08	5,7	6,35
Weight [g]	535	1000	1160
Accuracy [%]	±5%	±5%	±5%
Repeatability [%]	±1.5%	±1.5%	±1.5%

Explanation of damage threshold

High power lasers that can cut metal can also damage the absorbing head of a power probe if the beam is too concentrated. It has been found that it is not possible to quote a single number for the power density that will damage a power probe. The damage threshold is also a function of the total power in the beam and whether the absorbing head is moved during the exposure.

For a CO₂ laser, there is no loss in absorbtivity (no damage) when the coating is heated to the point where it exhibits a visible bleached spot but no other change. There is damage when metallic areas can be seen on the surface. In operation, power densities should be kept substantially below the indicated damage threshold.

Approximate damage threshold

Power in a CO ₂ laser beam [W]	Exposure Time [s]	Flat Probes ¹ [W/cm ²]	Conical Probes ² [W/cm ²]
100	20	10.000	15.000
200	20	7.000	11000
500	20	4.000	8.000
1.000	20	2.500	5.000
2.000	20	1.500	3.000
5.000	20	1.100	2.200
10.000	10	900	1.800

¹ Model P500C, P1000C, P2000C, P10KC, H3C und H4C.

² Model C2K, C4K und C10K

