

ML 2000 Series

ATTENUATORS

CCD cameras are typically saturated with energies densities of about $\geq 30\mu\text{J}/\text{cm}^2$. To analyse laser beams or light sources exceeding the usable energy for cameras the light has to be attenuated before exposing the CCD.

MetroLux offers attenuators with different factors and damage thresholds to reduce the light intensity for your application. Variable attenuators and ND filters are available to decrease the light energy in the UV/VIS/IR range to a useful level. All attenuation factors can be realized.

Depending on the attenuator type energies up to $2000\text{W}/\text{cm}^2$ (cw) can be withstood. Our attenuators are manufactured with highest uniformity for laser applications not to influence the light distribution of your laser/light source.

ML 2100/2200

The variable beam attenuators ML2100 and ML2200 enable a continuous attenuation of the laser energy and is specially used for high-power excimer lasers. The optic components of the device consist of a dielectric filter for beam attenuation as well as a neutral optical unit to compensate the beam displacement. The continuous attenuation of the coupled laser beam is attained by changing the angle of incidence of the dielectric filter in the range of 0° to 45° .

ML2200 is designed for vacuum use.



ACCESSORIES

ML 8010 CONTROLLUX 2 STEPPER MOTOR CONTROLLER



ML 2300

The compact attenuator ML 2300 has a constant attenuation factor of approximately 400 and is suitable as a pre-attenuator for the investigation of intense laser radiation.

The ML 2300 is frequently used in combination with series-connected neutral density filters for beam profile analysis with the cameras ML 3200, ML 3000, or together with the Wavefront sensor ML 4010 Optino.

TECHNICAL SPECIFICATIONS

- Dimensions $50 \times 50 \times 120 \text{ mm}^3$
- Free aperture of the incoming, collimated ray bundle $\sim 20 \times 20 \text{ mm}^2$
- Maximum input power $\sim 100 \text{ W}/\text{cm}^2$
- Wedge material quartz, BK7
- Spectral range 185–2000 nm (quartz), 300–2000 nm (BK7)
- Non-polarizing design - Beam deviation: 90° (adjustable)
- Beam displacement: 50 mm
- Polarizing design - Beam deviation: 0° (adjustable)
- Beam displacement: 50 mm



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TABLE SUMMARY

		Wavelength	Max. Transmission	Min. Transmission	Damage threshold	Attenuation factor	max. Beam Size	Dimensions
ML 2100							50x20mm ²	100x100x100mm ³
ML 2200	Vacuum use						40x20mm ²	
							Others on request	
		193 nm	> 80%	< 1%	1.0 J/cm ²	1.12-100		
		248 nm	> 90%	< 1%	1.5 J/cm ²	1.1-100		
		266 nm	> 90%	< 1%	2.0 J/cm ²	1.1-100		
		308 nm	> 90%	< 1%	3.0 J/cm ²	1.1-100		
		355 nm	> 90%	< 1%	5.0 J/cm ²	1.1-100		
		532 nm	> 90%	< 1%	8.0 J/cm ²	1.1-100		
		1064 nm	> 90%	< 1%	15.0 J/cm ²	1.1-100		
		others on request						
ML 2300			0,25%	0,25%	100W/cm ²	400	20x20mm ²	50x50x120mm ³
							others on request	
	Quarz	185-2000nm						
	BK7	300-2000nm						
N/D FILTER							Ø 24mm/45x45mm ²	Ø 25mm/50x50mm ²
1	ND 0,9		12,6%		15W/cm ²	8	Others on request	
2	ND 1,8		1,6%		10W/cm ²	63		
3	ND 3,0		0,1%		10W/cm ²	1000		
4	ND 4,0		0,01%		10W/cm ²	10000		
5	ND 6,0		0,0001%		10W/cm ²	1000000		
	Others on request	Quarz 185-2000nm						
		BK7 350-2000nm						

HOW TO FIND THE RIGHT ATTENUATION FACTOR (PULSED LASER):

Example: The laser beam has an energy of (max.)12 mJ/cm² (= 12000µJ/cm²) the camera is saturated with 30µJ/cm². To use this camera with sufficient dynamic you need an attenuation factor of (12000µJ/cm²)/(30µJ/cm²) = 400. In this special case the ML 2300 can be used.

Note: we are specialized in customized constructions. If you have a special need, we are able to design the right attenuator for your application

ND FILTER

- 5 different N/D Filters are available for pre attenuation.
- Optical density 0.9, 1.8, 3.0, 4.0, 6.0
- The filters are provided with different thread, for example C-mount
- Different filters can be combined
- Filter set consisting of 5 different ND-filters



optical density $OD = \log(1/T)$ or $T = 10(-OD)$ where T is the fraction of transmitted light. For example, a filter with an OD of 3 transmits 0.001 or 0.1%.

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