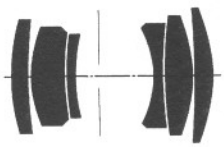
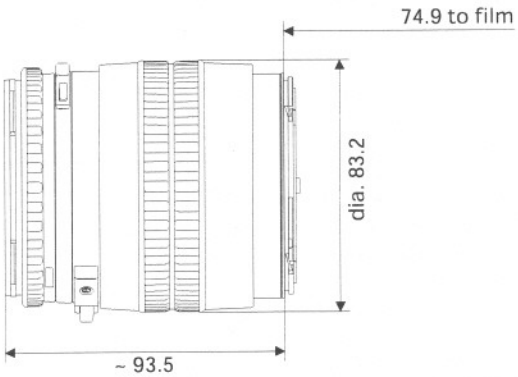
Makro-Planar® T* 4/120 CFi





HASSELBLAD

This is the must-have lens for every photographer doing serious close-up work. We believe that no studio photographer specialising in advertising, product photography, food, technical, industrial, can really do without it. Combined with a motorized Hasselblad SLR or the Hasselblad FlexBody for creative selective tilting of the sharpness zone, the **Makro-Planar**® T* 4/120 CFi lens is the compact workhorse lens for day-to-day studio work.
Optically, well-designed makro-lenses like the **Makro-Planar**® T* 4/120 CFi lens differ from other lenses in two ways.
Firstly: Their performance is optimized for subjects like the one you're just looking at: A flat page slightly larger than a human head with intricate detail plus color. Which means, the image quality and light distribution is extremely good, even in the corners and even at full aperture. This is exactly what is needed for serious professional copy work of subjects that are smaller than the ones ideally photographed with the Carl Zeiss **Planar**® T* 3,5/100 CFi lens, e. g. delicate drawings (so the two lenses complement each other very well in the hands of a demanding photographer).
Secondly: A basic type of lens design is chosen that maintains its performance characteristics very constantly on a high level over a wide range of reduction ratios or distances.
Like from half life-size (1:2) to infinity, in the case with the **Makro-Planar**® T* 4/120 CFi lens.

It is based on the Carl Zeiss **Planar**® lens design type, which offers very good close-up potential and is therefore also chosen as the basis for the ultra high resolution Carl Zeiss S-**Planar**® lenses for the microchip-industry, which are, in their new version, called Starlith, the most sophisticated lenses of our day.
Although the **Makro-Planar**® T* 4/120 CFi lens can be and should be used for subjects as small as half life-size, the built in focusing helicoid allowes only to focus down to a single page. This has been done for a safety purpose: Since most of the Hasselblad SLR cameras in use with professional photographers today do not incorporate TTL exposure metering, we believe that the lens should not easily focus down to such reduction ratios without warning, where exposure compensation is absolutely critical for professional results. Adding an extension ring for closer focusing should remind the photographer to apply the necessary compensation, too. Those photographers who prefer a makro lens that can focus from infinity to life size should also investigate the Carl Zeiss **Makro-Planar**® T* 5,6/135 CF lens combined with the Hasselblad automatic bellows extension.
Preferred use: Close-ups of all kind, products, industrial, documentation, copy work, digital photography

Cat. No. of lens:	**10 78 84**
Number of elements:	6
Number of groups:	4
Max. aperture:	f/4
Focal length:	120.9 mm
Negative size:	55 x 55 mm
Angular field 2w:	diagonal 36.6 °, side 26 °
Spectral range:	visible spectrum
Aperture scale:	4 - 5.6 - 8 - 11 - 16 - 22 - 32
Mount:	Prontor CFi shutter
Filter connection:	bayonet for Hasselblad series 60
Weight:	approx. 695 g
Focusing range:	∞ to 0.8 m
Close-limit field size:	254 x 254 mm
Entrance pupil:	
Position*:	30.2 mm behind the first lens vertex
Diameter*:	29.7 mm
Exit pupil:	
Position*:	41.9 mm in front of the last lens vertex
Diameter*:	33.5 mm
Position of principal planes:	
H:	43.1 mm behind the first lens vertex
H':	27.5 mm in front of the last lens vertex
Back focal distance:	93.4 mm
Distance between first and last lens vertex:	61.0 mm

* for 1 : ∞

ZEISS

Performance data:
Makro-Planar® T* 4/120 CFi
Cat. No. 10 78 84

1. MTF Diagrams

The image height u - calculated from the image center - is entered in mm on the horizontal axis of the graph. The modulation transfer T (MTF = Modulation Transfer Factor) is entered on the vertical axis. Parameters of the graph are the spatial frequencies R in cycles (line pairs) per mm given at the top of this page. The lowest spatial frequency corresponds to the upper pair of curves, the highest spatial frequency to the lower pair. Above each graph, the f-number k is given for which the measurement was made. "White" light means that the measurement was made with a subject illumination having the approximate spectral distribution of daylight. Unless otherwise indicated, the performance data refer to large object distances, for which normal photographic lenses are primarily used.

2. Relative illuminance

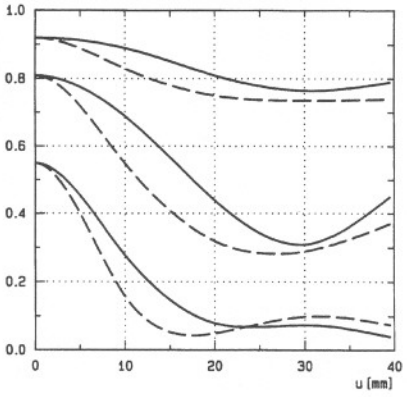
In this diagram the horizontal axis gives the image height u in mm and the vertical axis the relative illuminance E, both for full aperture and a moderately stopped-down lens. The values for E are determined taking into account vignetting and natural light decrease.

3. Distortion

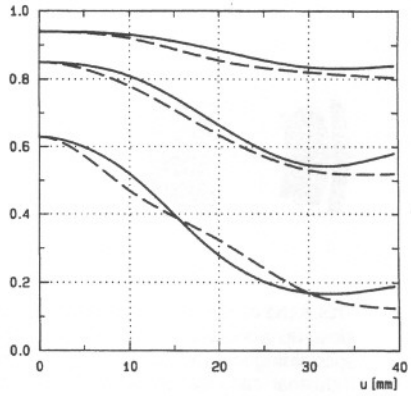
Here again the image height u is entered on the horizontal axis in mm. The vertical axis gives the distortion V in % of the relevant image height. A positive value for V means that the actual image point is further from the image center than with perfectly distortion-free imaging (pincushion distortion); a negative V indicates barrel distortion.

Modulation transfer T as a function of image height u. Slit orientation: tangential — — — sagittal ———
White light. Spatial frequencies R = 10, 20 and 40 cycles/mm

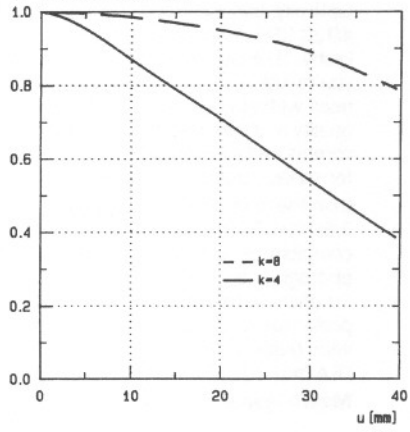
T f-number k = 4



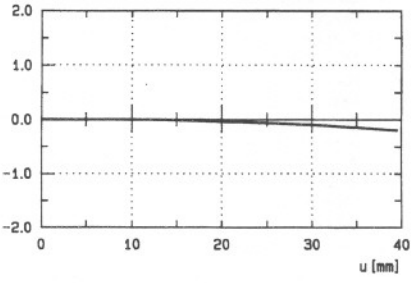
T f-number k = 8



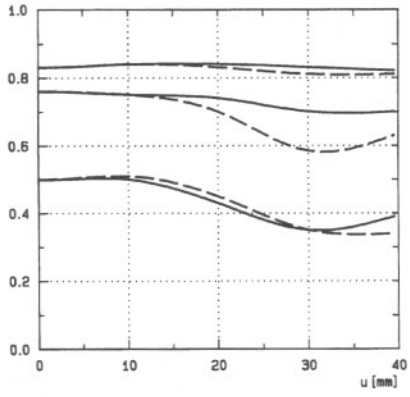
E Relative illuminance



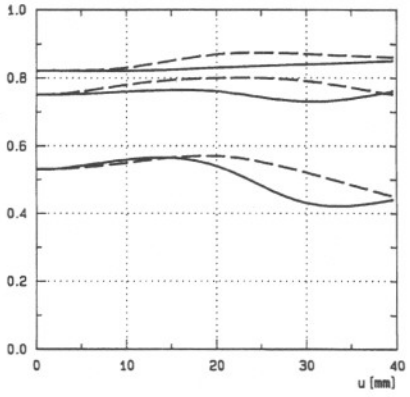
V Distortion in % of image height u



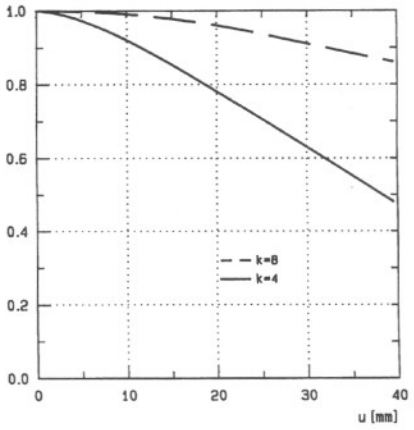
T f-number k = 4; i.s. = 1:5



T f-number k = 8; i.s. = 1:5



E Relative illuminance; i.s. = 1:5



V Distortion in % of image height u; i.s. = 1:5