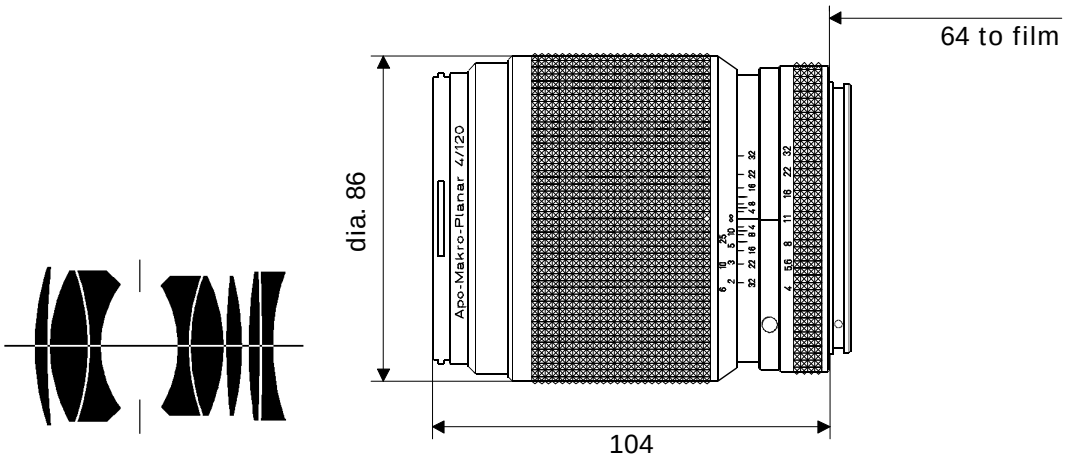
Apo-Makro-Planar® T* 4/120



CONTAX® 645

The Apo-**Makro-Planar**® T* 4/120 lens has been designed with the goal to create a medium format lens of outstanding performance and versatility. It covers subjects from infinity to life size (1:1) without additional accessories. And it uses the latest in optical glass with floating elements (FLE) to keep the performance on top level in the entire focusing range.

The Apo-**Makro-Planar**® T* 4/120 lens even reaches the extreme image quality level of dedicated Carl Zeiss S-**Planar**® high resolution copy lenses at life-size copying tasks, a unique benefit only available with Contax® cameras.

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 infinity to life-size (1:1). It is based on the **Planar**® lens design type, which offers very good close-up potential in the first place and has therefore also been chosen as the basis for the ultra high resolution Carl Zeiss S-**Planar**® lenses for the production of microchips, which are the most sophisticated lenses of our day.

The Apo-**Makro-Planar**® T* 4/120 lens is targeted at the meticulous close-up photographer who is in full control of the technical aspects of his picture taking situation, and who expects uncompromising image quality as reward for his efforts. He is used to do very careful and well thought placement of the focus himself, and he would not use the autofocus on his imaging projects. Considering this need from professional photographers and keen amateurs alike, the Apo-**Makro-Planar**® T* 4/120 lens is equipped with a high quality precision mechanism for smooth manual focusing and no autofocus.

The aperture ranges from f/4 to f/45 for both a bright viewfinder image and adequate control of depth of field in close-up photography. All aperture settings can be used with truly professional photo results, even wide open. This is due to both the inherent qualities of the Carl Zeiss **Planar**® lens design and apochromatic color correction. Considering the outstanding imaging potential of this lens it has been kept remarkably lightweight and compact.

Preferred use: Close-ups of all kind, beauty, flowers and blossoms, nature, products, industrial, subjects with demanding details, documentation

Cat. No. of lens:	**10 78 86**
Number of elements:	8
Number of groups:	5
Max. aperture:	1:4
Focal length:	120.1mm
Negative size:	41.5 x 56mm
Angular field 2w:	32°
Mount:	Contax 645 Mount
Filter connection:	screw-in type, thread M72 x 0.75
Focusing range:	∞ bis M 1:1
Aperture scale:	4 - 5.6 - 8 - 11 - 16 - 22 - 32 - 45
Weight:	approx. 796 g

Entrance pupil*	
Position:	23.2mm behind the first lens vertex
Diameter:	29.9mm
Exit pupil*	
Position:	25.5mm in front of the last lens vertex
Diameter:	29.8mm
Position of principal planes*:	
H:	22.0mm behind the first lens vertex
H':	26.6mm in front of the last lens vertex
Back focal distance*:	93.5mm
Distance between first and last lens vertex*:	51.1mm

* at ∞

Performance data:

Apo-Makro-Planar® T* 4/120

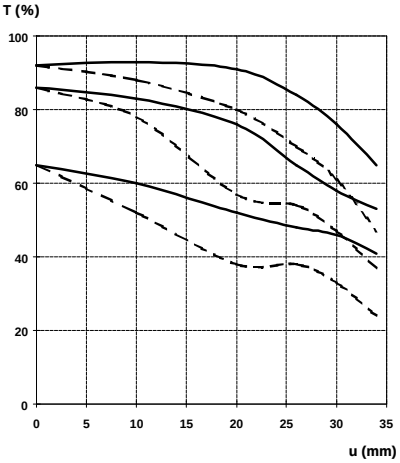
Cat. No. 10 78 86

1. MTF Diagrams

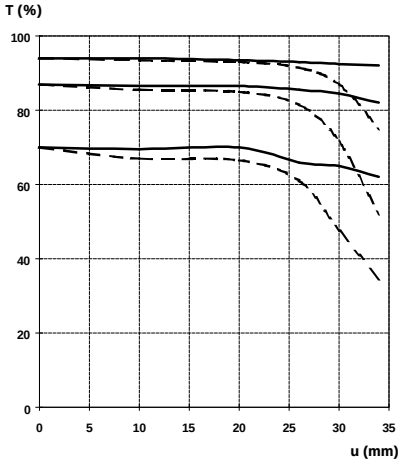
The image height u - calculated from the image center - is entered in mm on the horizontal axis of the graph. The modulation transfer T (MTF = Modulation Transfer Factor) is entered on the vertical axis. Parameters of the graph are the spatial frequencies R in cycles (line pairs) per mm given at the 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.

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

f-number **k = 4**



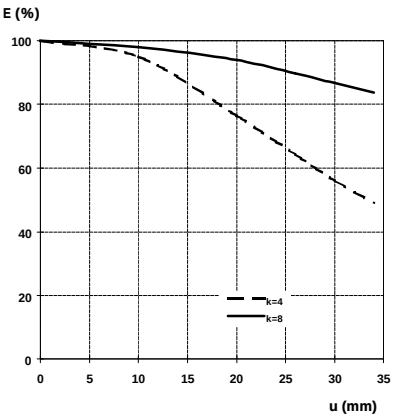
f-number **k = 8**



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.

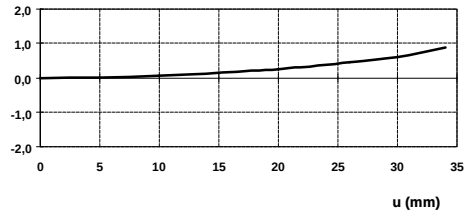
Relative illuminance



3. Distortion

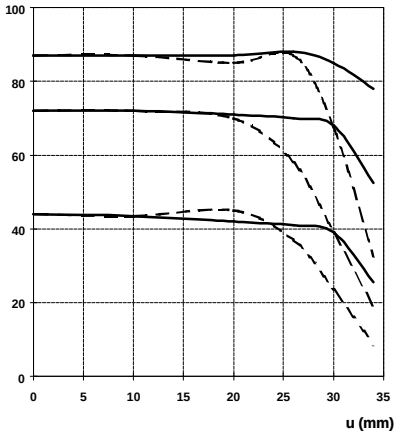
Here again the image height u is entered on the horizontal axis in mm. The vertical axis gives the distortion V in % of the relevant image height. A positive value for V means that the actual image point is further from the image center than with perfectly distortion-free imaging (pincushion distortion);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

Distortion in % of image height u



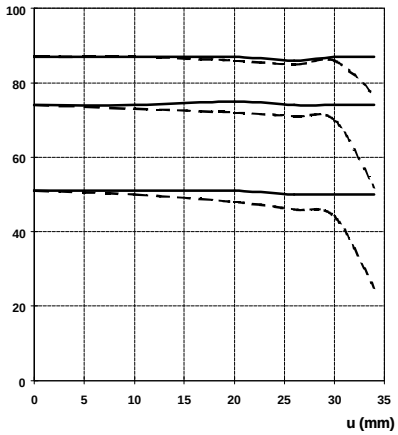
f-number k = 4 M 1:1

T (%)



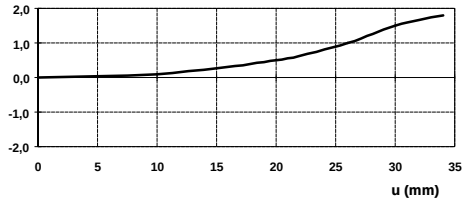
f-number k = 8 M 1:1

T (%)



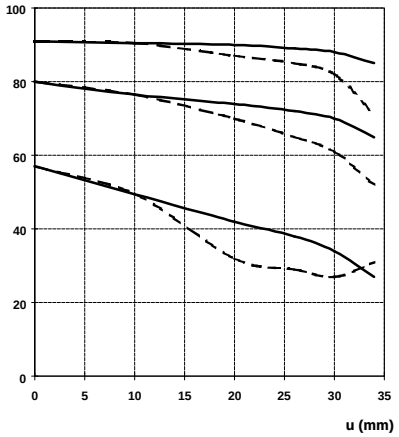
Distortion in % of image height u; M 1:1

V



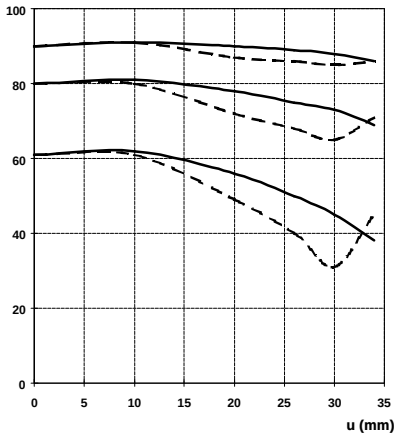
f-number k = 4 M 1:2

T (%)



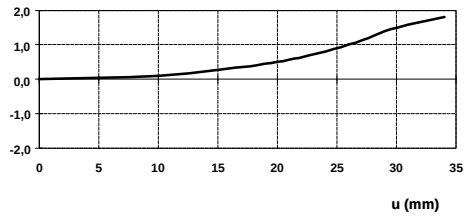
f-number k = 8 M 1:2

T (%)



Distortion in % of image height u; M 1:2

V



Subject to change.
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