

## Line scan lens

### Makro-Symmar 5.6/120-0.5x

Wherever complex web and surface inspections are concerned, the line scan image capture method is used in most cases. Due to the principle used, this method requires a very careful choice of camera and an optimally adapted lens in order to achieve maximum system performance. It is essential to observe important application-specific and physical parameters: the size of the CCD or CMOS imaging sensor in the camera defines the minimum required image circle of the lens.



Makro-Symmar 5.6/120

#### Key Features

- Very high optical image quality in the large sensor range
- Vibration-insensitive for stable optical performance
- Reverse position of the lens possible to enlarge the magnification range
- Lockable distance and aperture settings
- Use in best azimuth position possible
- Industry-compatible V-mount interface
- 100% quality control guarantees reliability and constant quality
- Low maintenance requirements, therefore high system availability

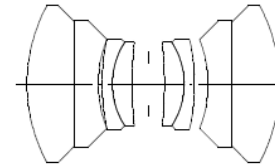
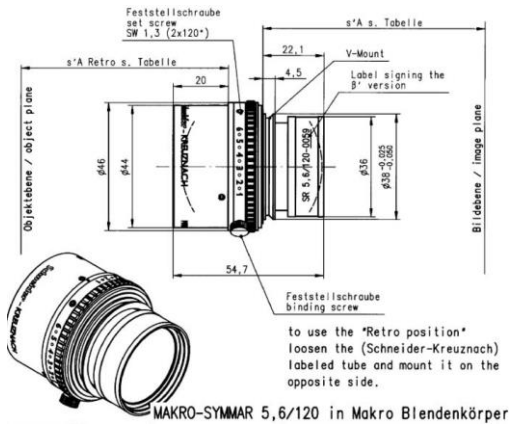
#### Applications

- Web and surface inspections
- Quality control
- FPD inspection
- PCB inspection
- OLED inspection
- Line scan applications

#### Technical Specifications

F-number	5.6
Focal length	119.8 mm
Image circle	86 mm
Magnification	-0.5
Transmission	400 - 1000 nm
Interface	V-Mount
Weight	170 gr.
Option	Optical filter

## Makro-Symmar 5.6/120-0.5



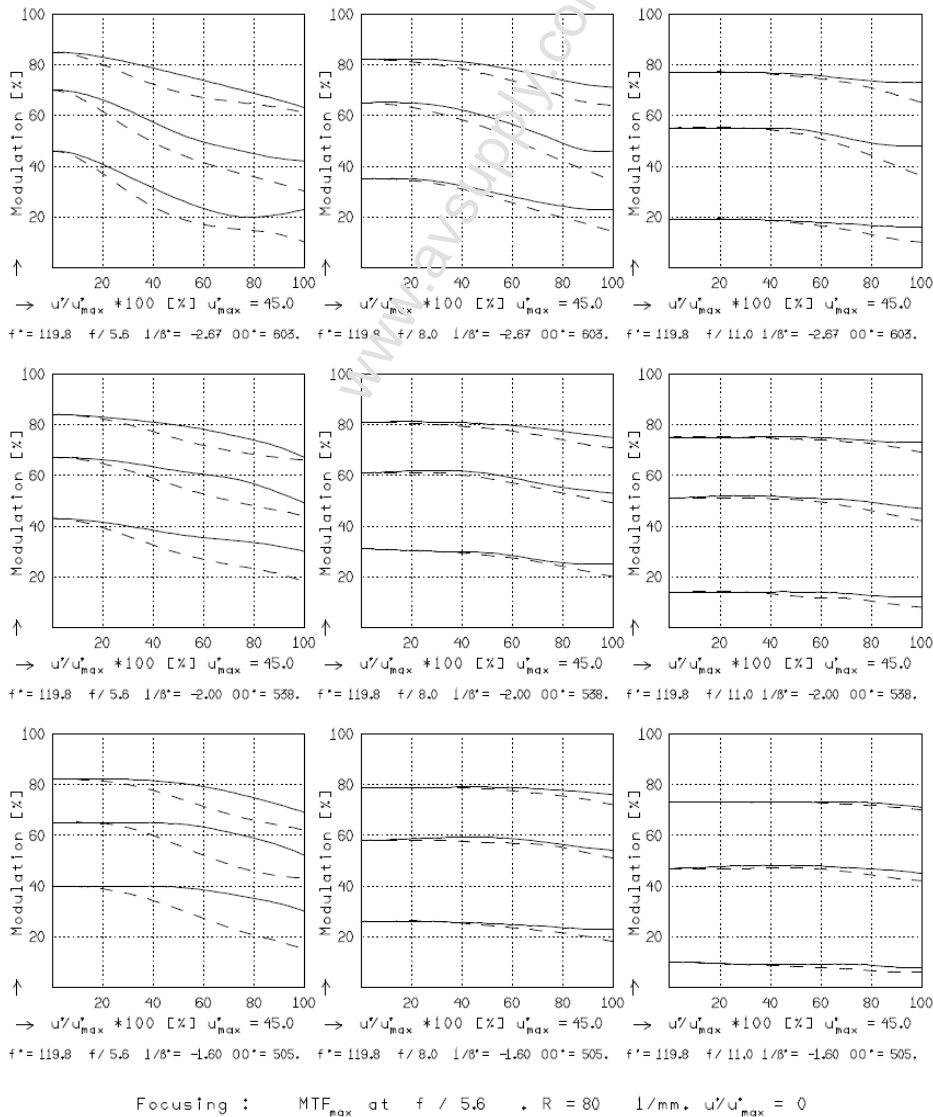
M-SR 5.6/120 BETA -0.375..-0.625

$f^* = 119.8 \text{ mm}$   $\beta_p = 0.986$   
 $s_F = -95.1 \text{ mm}$   $s_{EP} = 26.1 \text{ mm}$   
 $s_F^* = 93.9 \text{ mm}$   $s_{AP}^* = -24.2 \text{ mm}$   
 $HH^* = -0.5 \text{ mm}$   $\Sigma d = 49.7 \text{ mm}$

M-SR 5.6/120 BETA -0.375..-0.625

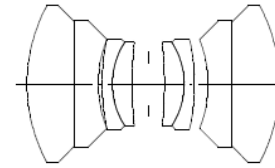
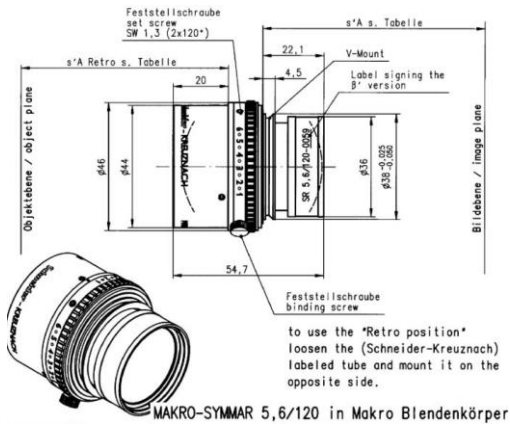
MODULATION with reference to the relative image height

Wavelength $\lambda$ [nm]	555	655	605	505	455	405
Spectral weighting [%]	19.6	23.7	22.2	15.7	12.1	6.7
Spatial frequency R [1/mm]	20	40	80			
Format [mm X mm]	90.0	X	0.0			
Diagonal $2u'$ [mm]	90.0					



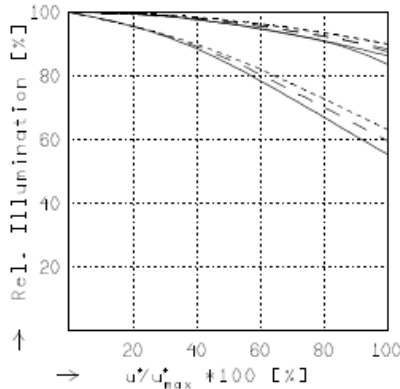
Focusing :  $MTF_{max}$  at  $f / 5.6$  ,  $R = 80$  1/mm.  $u/u'_{max} = 0$

## Makro-Symmar 5.6/120-0.5



M-SR 5.6/120 BETA -0.375...-0.625

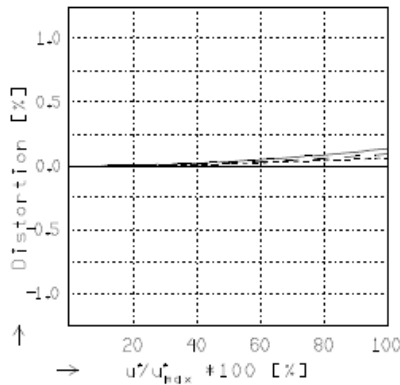
$f^* = 119.8 \text{ mm}$      $\beta_p = 0.986$   
 $s_F = -95.4 \text{ mm}$      $s_{EP} = 26.1 \text{ mm}$   
 $s_F^* = 93.9 \text{ mm}$      $s_{AP}^* = -24.2 \text{ mm}$   
 $HH^* = -0.5 \text{ mm}$      $\Sigma d = 49.7 \text{ mm}$



### RELATIVE ILLUMINATION

The relative illumination is shown for the given focal distances or magnifications.

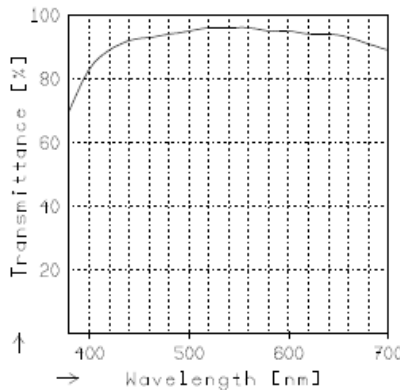
$f / 5.6$	$f / 8.0$	$f / 11.0$
— $\beta' = -0.3750$	$u_{max}^* = 45.1$	$00^* = 603.$
- - $\beta' = -0.5000$	$u_{max}^* = 45.0$	$00^* = 538.$
... $\beta' = -0.6250$	$u_{max}^* = 45.0$	$00^* = 505.$



### DISTORTION

Distortion is shown for the given focal distances or magnifications. Positive values indicate pincushion distortion and negative values barrel distortion.

— $\beta' = -0.3750$	$u_{max}^* = 45.0$	$00^* = 603.$
- - $\beta' = -0.5000$	$u_{max}^* = 45.0$	$00^* = 538.$
... $\beta' = -0.6250$	$u_{max}^* = 45.0$	$00^* = 505.$



### TRANSMITTANCE

Relative spectral transmittance is shown with reference to wavelength.