

# Line Scan Lens

## XENON-SAPPHIRE 3.2/97, $\beta' = -0.7$

This high-resolution, high-speed lens is optimized for the use with 16k pixel line scan sensors. It is broadband coated and can be used in the range of 400 – 1000 nm.

The V-mount makes it easy to install and rotate into the desired azimuth position for a wide range of high resolution applications.

The XENON Sapphire 3.2/97 provides three significant stop positions that are especially marked on the stop ring:

- F#3.2 is the maximum opening of the stop and provides maximum brightness. The mechanical vignetting at this F/number is only approx. 15% at the edge of the field. The MTF for 100 lp/mm is very high up to the edge of a 58 mm field. Due to the high aperture the lens is more sensitive with respect to change of magnification.
- F#3.6 shows maximum MTF and practically diffraction limited performance over the whole field. The depth of field is bigger but the lens is still sensitive to magnification changes. At 3.6 the lens shows only slight artificial vignetting.
- F#4.1 produces more diffraction which reduces the MTF slightly but is now extremely homogenous over the entire field. The lens shows this performance for the complete magnification range from  $-0.74 < \beta' < -0.67$  and performs well for a magnification range of  $-0.76 < \beta' < -0.65$  at a 16k performance of 100 lp/mm.



XENON-SAPPHIRE lens

### Key Features

- for 16k line scan cameras (57.3mm length / pixel sizes 3.5 $\mu$ m)
- for 12k line scan cameras (62.5mm length / pixel sizes appr. 5 $\mu$ m)
- High resolution optics 400 - 1000 nm
- Robust mechanics for industrial environment
- Vibration insensitive
- Focus and iris setting lockable

### Applications

- High-resolution 16k line scan applications
- 12k TDI inspection
- Machine Vision and other imaging applications with high throughput
- Flat panel inspection
- Quality control, etc.

### Technical Specifications

#### XENON-SAPPHIRE 3.2/97

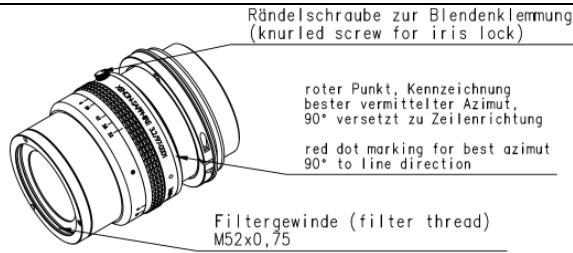
F# range	3.2 – 11.3
Focal length	97.0 mm
Image circle	62.5 mm
Beta'	-0.7 (-0.65 ... -0.76 )
Object to image distance	388 (394 ... 383) mm
Transmission	400 -1000 nm
Interface	Schneider V-mount 70
Weight	ca. 700 gr.
Code no.	1071190

### Accessories

Adapter V70 / M72 x 0.75	10 mm	Code no. # 1072419
Extension tube 5 mm		# 1072420
Extension tube 10 mm		# 1072421
Extension tube 25 mm		# 26406
Extension tube 50 mm		# 1054733

# XENON-SAPPHIRE 3.2/97

# Pyramid Imaging



## XENON SAPPHIRE 3.2/97

f= 97,00 mm	$\beta'_P= 1,03$
$s_F= -49,58$ mm	$s_{EP}= 44,85$ mm
$s'_F= 52,83$ mm	$s'_{AP}= -46,81$ mm
HH'= -12,25 mm	$\Sigma d= 79,34$ mm

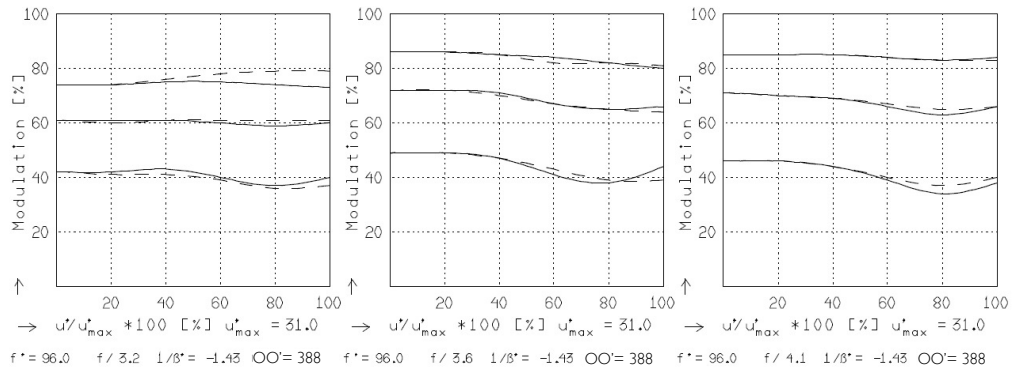
## XENON SAPPHIRE 3.2/97

MODULATION with reference to the relative image height

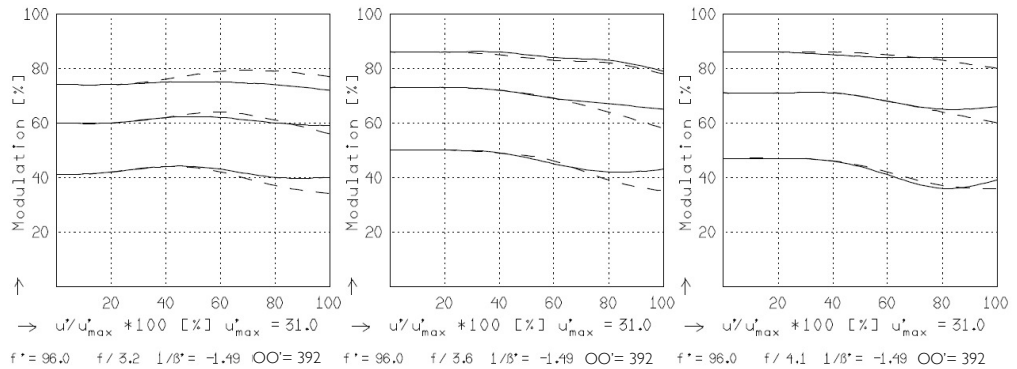
Wavelength $\lambda$	[nm]	: 525	675	625	575	475	425
Spectral weighting	[%]	: 26.5	6.4	24.2	27.8	13.6	1.5
Spatial frequency R	[1/mm]	: 25	50	100			
Image- $\emptyset$ f / 3.2	[mm]	: 62.0					
Image- $\emptyset$ f / 4.1	[mm]	: 62.0					

radial —  
tangential - -

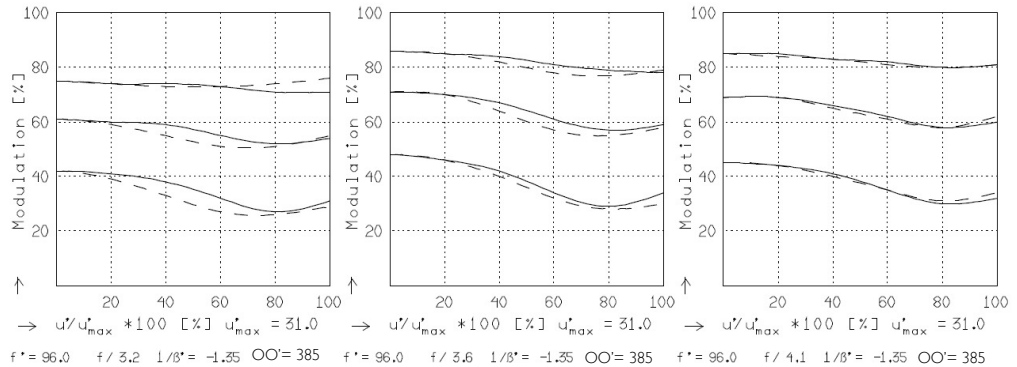
$\beta' = -0.7$



$\beta' = -0.67$

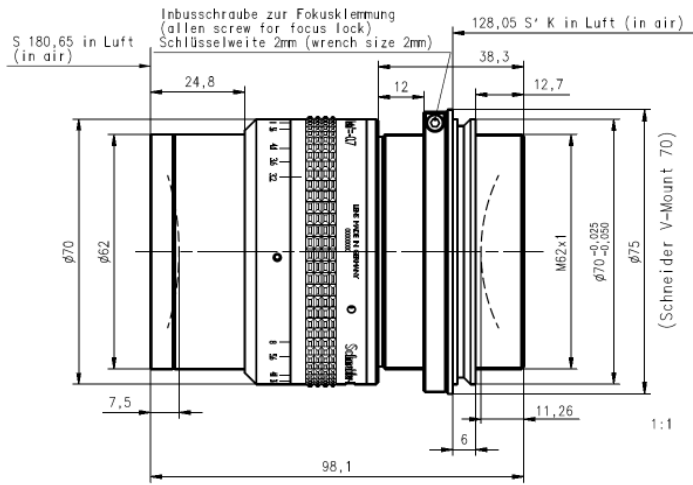


$\beta' = -0.74$



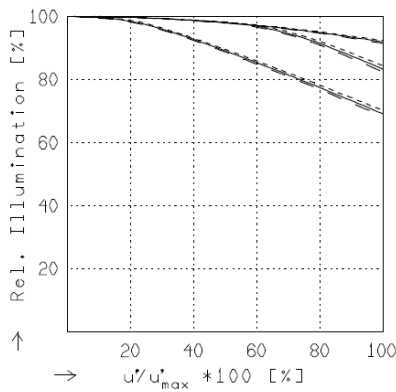
Focusing : MTF<sub>max</sub> at f / 4.8 . R = 50 1/mm.  $u'/u'_{max} = 0$

# XENON-SAPPHIRE 3.2/97



## XENON SAPPHIRE 3.2/97

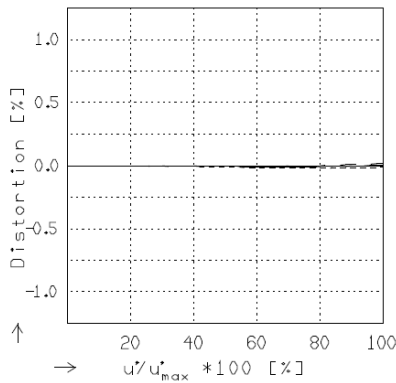
$f = 97,00 \text{ mm}$	$\beta'_P = 1,03$
$s_F = -49,58 \text{ mm}$	$s_{EP} = 44,85 \text{ mm}$
$s'_F = 52,83 \text{ mm}$	$s'_{AP} = -46,81 \text{ mm}$
$HH' = -12,25 \text{ mm}$	$\Sigma d = 79,34 \text{ mm}$



## RELATIVE ILLUMINATION

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

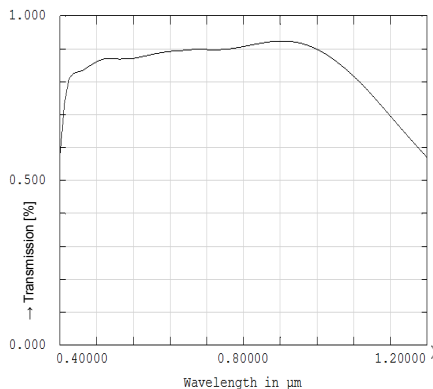
	$f / 3.2$	$f / 3.6$	$f / 4.1$
— $\beta' = -0.7000$	$u_{max}' = 31.0$	$OO' = 388$	
- - $\beta' = -0.6700$	$u_{max}' = 31.0$	$OO' = 392$	
- - - $\beta' = -0.7400$	$u_{max}' = 31.0$	$OO' = 385$	



## DISTORTION

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

— $\beta' = -0.7000$	$u_{max}' = 31.0$	$OO' = 388$
- - $\beta' = -0.6700$	$u_{max}' = 31.0$	$OO' = 392$
- - - $\beta' = -0.7400$	$u_{max}' = 31.0$	$OO' = 385$



## TRANSMITTANCE

Relative spectral transmittance is shown with reference to wavelength.



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