

Line Scan Lens

XENON-SAPPHIRE 3.9/95, beta' = -0.23

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 3.9/95 provides three significant stop positions that are especially marked on the stop ring:

- F#3.9 is the maximum opening of the stop and provides maximum brightness. The mechanical vignetting at this F/number is only approx. 10% 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#4.8 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 4.8 the lens is basically free of artificial vignetting.
- F#5.7 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 $-0.26 < \beta < -0.21$ and performs well for a magnification range of $-0.28 < \beta < -0.20$ at a 16k performance of 100 lp/mm.



XENON-SAPPHIRE lens

Key Features

- for 16k line scan cameras (57.3mm length / pixel sizes 3.5µm)
- for 12k line scan cameras (62.5mm length / pixel sizes appr. 5µm)
- 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 3.9/95

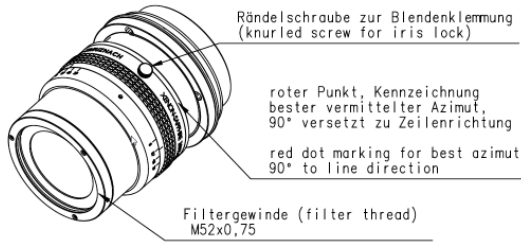
| | |
|--------------------------|--------------------------|
| F# range | 3.9 - 8 |
| Focal length | 95.1 mm |
| Image circle | 62.5 mm |
| Beta' | -0.23 (-0.20 ... -0.28) |
| Object to image distance | 617 (676 ... 548)mm |
| Transmission | 400 -1000 nm |
| Interface | Schneider V-mount 70 |
| Weight | ca. 700 gr. |
| Code no. | 1071819 |

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 |

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Pyramid Imaging



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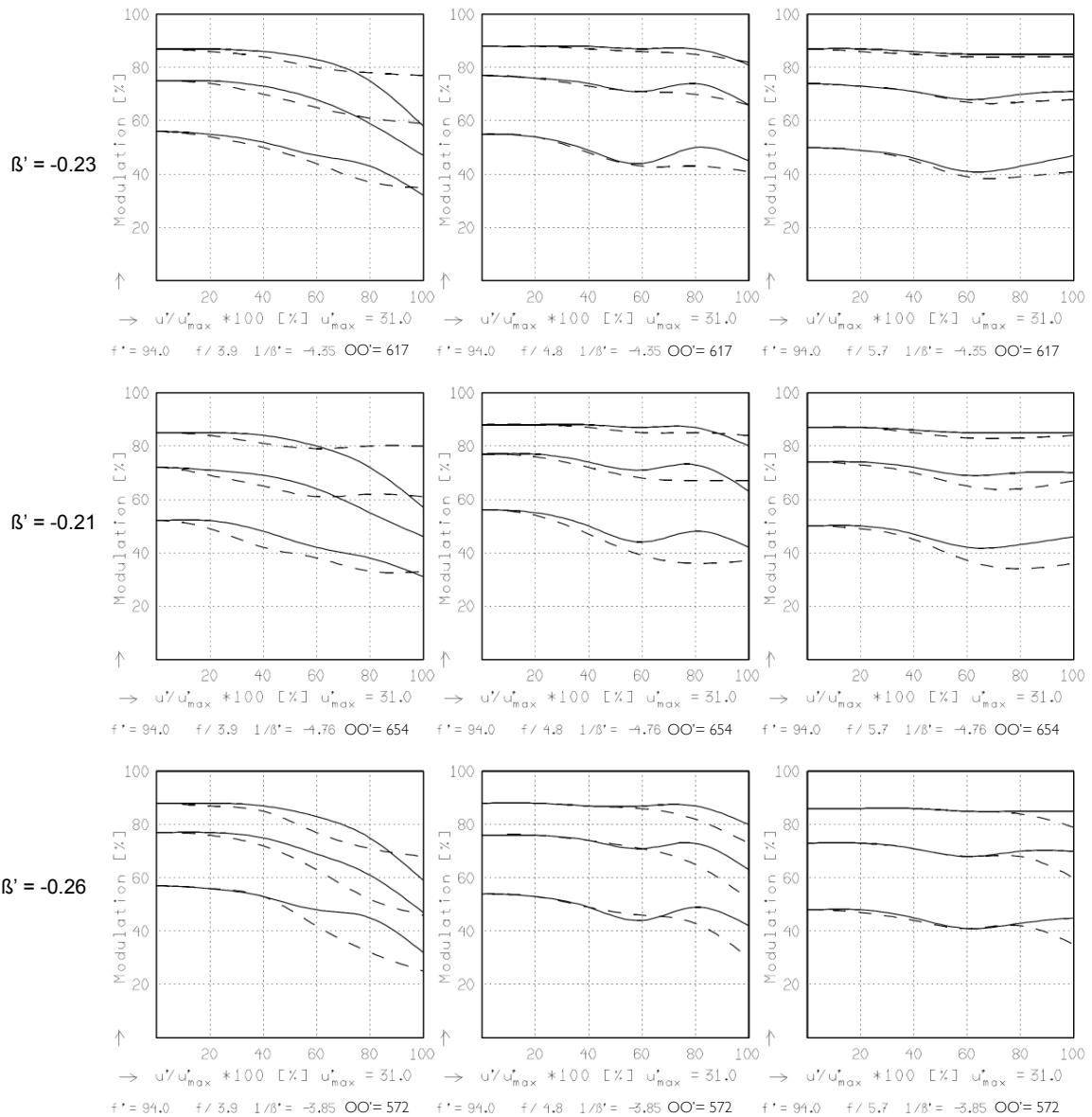
| | |
|---------------------------|-------------------------------|
| $f = 95,06 \text{ mm}$ | $\beta'_P = 1,08$ |
| $s_F = -46,09 \text{ mm}$ | $s_{EP} = 42,17 \text{ mm}$ |
| $s'_F = 54,39 \text{ mm}$ | $s'_{AP} = -48,00 \text{ mm}$ |
| $HH' = -8,80 \text{ mm}$ | $\Sigma d = 80,84 \text{ mm}$ |

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MODULATION with reference to the relative image height

| | | | | | | |
|-----------------------------------|------|-----|------|------|------|-----|
| Wavelength λ [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 / 3.9 [mm] : | 62,0 | | | | | |
| Image- \emptyset f / 5.7 [mm] : | 62,0 | | | | | |

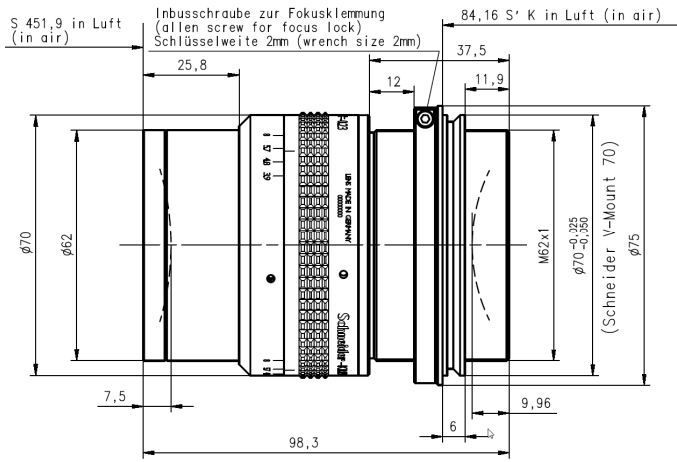
radial —
tangential - - -



Focusing : MTF_{max} at f / 4.8 , R = 50 1/mm, u'/u'_max = 0

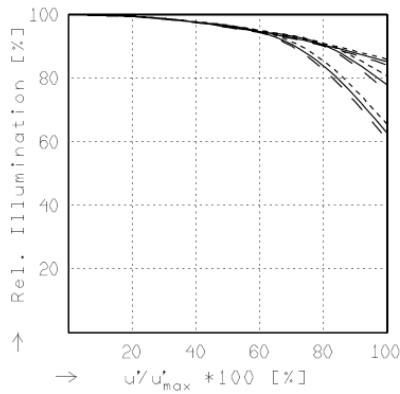
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Pyramid Imaging



XENON SAPPHIRE 3.9/95

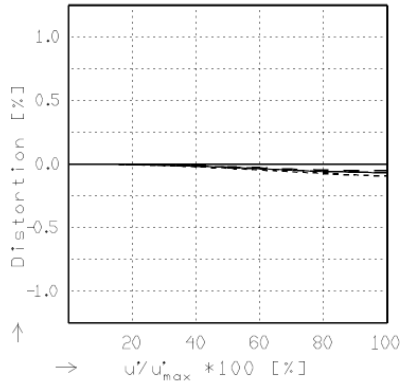
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RELATIVE ILLUMINATION

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

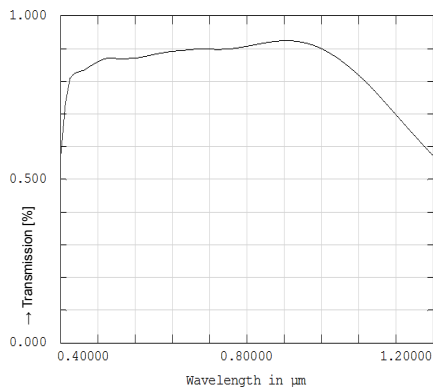
| | | |
|----------------------|----------------------|----------------------|
| $f / 3.9$ | $f / 4.8$ | $f / 5.7$ |
| — $\beta' = -0.2300$ | — $\beta' = -0.2100$ | — $\beta' = -0.2600$ |
| $u_{max}' = 31.0$ | $u_{max}' = 31.0$ | $u_{max}' = 31.0$ |
| $OO' = 617$ | $OO' = 654$ | $OO' = 572$ |



DISTORTION

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

| | | |
|----------------------|----------------------|----------------------|
| — $\beta' = -0.2300$ | — $\beta' = -0.2100$ | — $\beta' = -0.2600$ |
| $u_{max}' = 31.0$ | $u_{max}' = 31.0$ | $u_{max}' = 31.0$ |
| $OO' = 617$ | $OO' = 654$ | $OO' = 572$ |



TRANSMITTANCE

Relative spectral transmittance is shown with reference to wavelength.



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