

# TC4K090-F | DATASHEET

## Telecentric lens for 4k line scan cameras, magnification 0.319x, F mount



### SPECIFICATIONS

#### Optical specifications

Magnification		0.319
Image width	(mm)	28.7
Max sensor size		4k
Working distance <sup>1</sup>	(mm)	174.0
$wf/N^2$		16
Telecentricity typical (max) <sup>3</sup>	(°)	< 0.05 (0.10)
Distortion typical (max) <sup>4</sup>	(%)	< 0.05 (0.08)
Field depth <sup>5</sup>	(mm)	16.5
Resolution (max) <sup>6</sup>	( $\mu$ m)	32

#### Mechanical specifications

Mount <sup>7</sup>		F
Phase adjustment <sup>8</sup>		Yes
Length <sup>9</sup>	(mm)	360.7
Width	(mm)	114.0
Height	(mm)	64.0
Mass	(g)	1724

### KEY ADVANTAGES

#### Compact design

"Flat" shape for easy integration

#### Easy rotational phase and focus adjustment

Robust and precise tuning of FOV phase angle and best focus position

#### Compatible LTCL4K telecentric illuminators

with matching flat design.

#### Dedicated CMMR4K mirrors

90° deflection of the light path for usage in tight spaces and easy integration

#### Detailed test report with measured optical parameters.

**TC4K series telecentric lenses** have been designed for measurement applications using line scan cameras with a detector size up to 28.7 mm (e.g. 4096 pixels with pixel size 7  $\mu$ m)

### FIELD OF VIEW

Sensors	(mm)
Line - 2k x 5 $\mu$ m (10.24 mm)	32.10
Line - 2k x 7 $\mu$ m (14.34 mm)	44.95
Line - 4k x 5 $\mu$ m (20.48 mm)	64.20
Line - 4k x 7 $\mu$ m (28.67 mm)	89.87

<sup>1</sup> Working distance: distance between the front end of the mechanics and the object. Set this distance within  $\pm 3\%$  of the nominal value for maximum resolution and minimum distortion.

<sup>2</sup> working  $f/N$ : the real  $f/N$  of a lens in operating conditions.

<sup>3</sup> Maximum angle between chief rays and optical axis on the object side. Typical (average production) values and maximum (guaranteed) values are listed.

<sup>4</sup> Percent deviation of the real image compared to an ideal, undistorted image. Typical (average production) values and maximum (guaranteed) values are listed.

<sup>5</sup> At the borders of the field depth the image can be still used for measurement but, to get a very sharp image, only half of the nominal field depth should be considered. Pixel size used for calculation is 7  $\mu$ m.

<sup>6</sup> Object side, calculated with the Rayleigh criterion with  $\lambda = 520$  nm

<sup>7</sup> FD stands for Flange distance (in mm), defined as the distance from the mounting flange to the camera detector plane.

<sup>8</sup> Indicates the availability of an integrated camera phase adjustment feature.

<sup>9</sup> Measured from the front end of the mechanics to the camera flange.

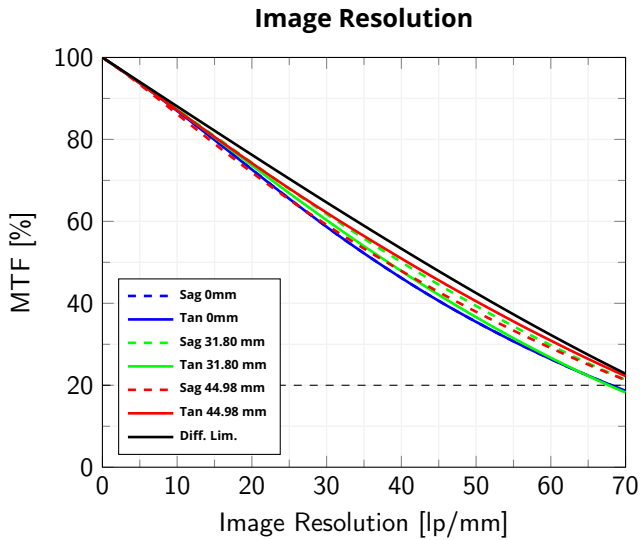
### COMPATIBLE PRODUCTS

Full list of compatible products available [here](#).

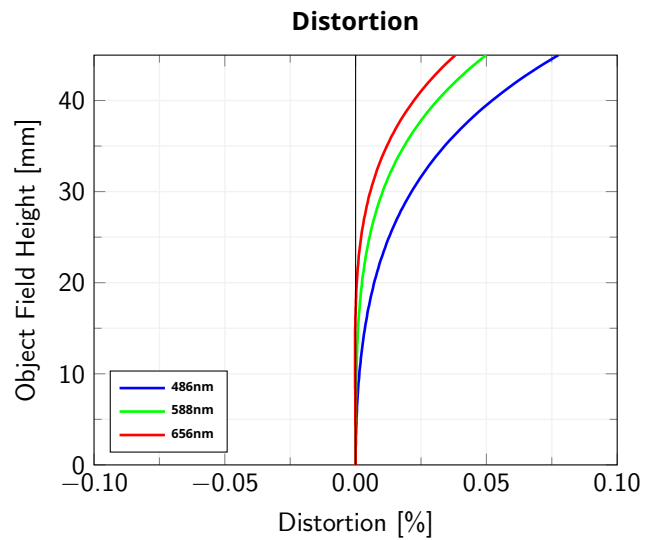


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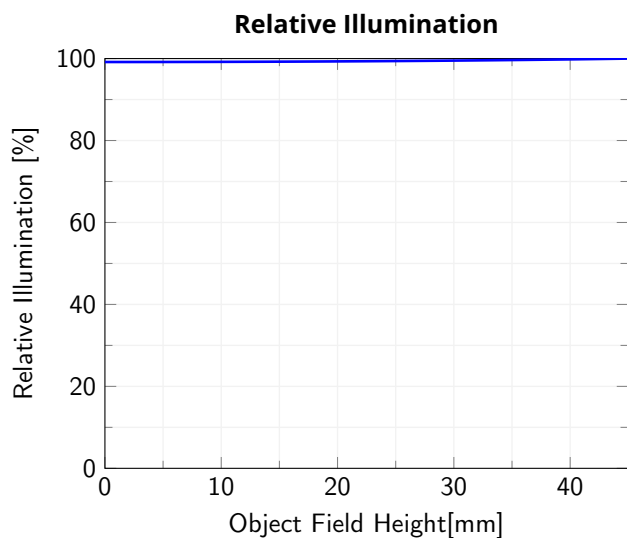
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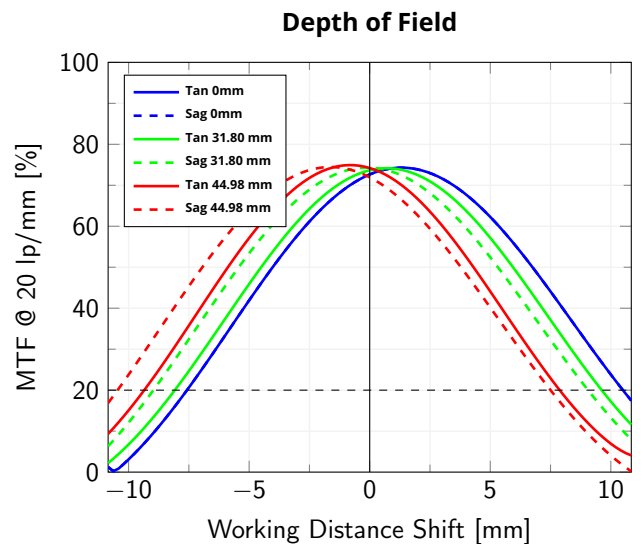
Modulation Transfer Function (MTF) vs. Image Resolution, wavelength range 486 nm - 656 nm



Object Field Height vs. Distortion, from the optical axis to the corner of the field of view



Relative illumination vs. Object Field Height, from the optical axis to the corner of the field of view



Modulation Transfer Function (MTF) @ 20 lp/mm vs. Working Distance Shift from the best focus Working Distance, wavelength range 486 nm - 656 nm

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