

### High-resolution telecentric lenses for 4/3", APS-C, APS-H and full frame sensors



#### SPECIFICATIONS

##### Optical specifications

Magnification		1.600
Image circle	(mm)	37.4
Max sensor size		2.4"
Working distance <sup>1</sup>	(mm)	163.1
Wavelegh range	(nm)	760-825
$wf/N^2$		10-32
Telecentricity typical (max) <sup>3</sup>	(°)	<0.08 (0.10)
Distortion typical (max) <sup>4</sup>	(%)	<0.08 (0.10)
Field depth <sup>5</sup>	(mm)	0.20
Resolution (max) <sup>6</sup>	( $\mu$ m)	4

##### Mechanical specifications

Mount <sup>7</sup>		F
Phase adjustment <sup>8</sup>		Yes
Length <sup>9</sup>	(mm)	230.2
Front diameter	(mm)	61.0
Mass	(g)	959

#### KEY ADVANTAGES

**Wide image circle** for sensors up to 45.7 mm.

**Excellent resolution and low distortion** for accurate measurements.

**Long working distance** perfect for the inspection of electronic components.

**Robust design** ideal for industrial environments.

Detailed **test report** with **certified** optical parameters.

**TCSE series** features very high-resolution telecentric lenses designed for various large sensor formats up to full frame. TCSE lenses offer excellent optical performance ensuring unmatched resolution and low distortion.

#### FIELD OF VIEW

Sensors	(mm x mm)
4/3" (15.29 x 15.30 mm x mm)	9.56 x 9.56
APS" (22.36 x 16.77 mm x mm)	13.97 x 10.48
CHR70M" (31.00 x 21.99 mm x mm)	19.38 x 13.74
CMV50000" (36.43 x 27.62 mm x mm)	$\varnothing = 17.26$

<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 3.45  $\mu$ 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.

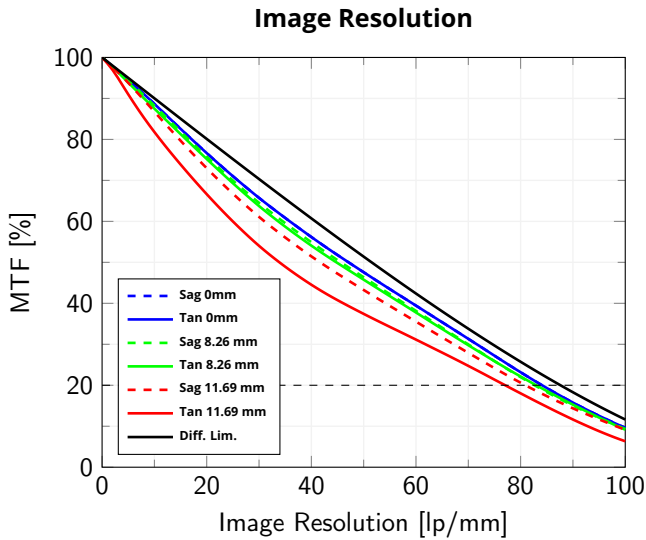
#### COMPATIBLE PRODUCTS

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

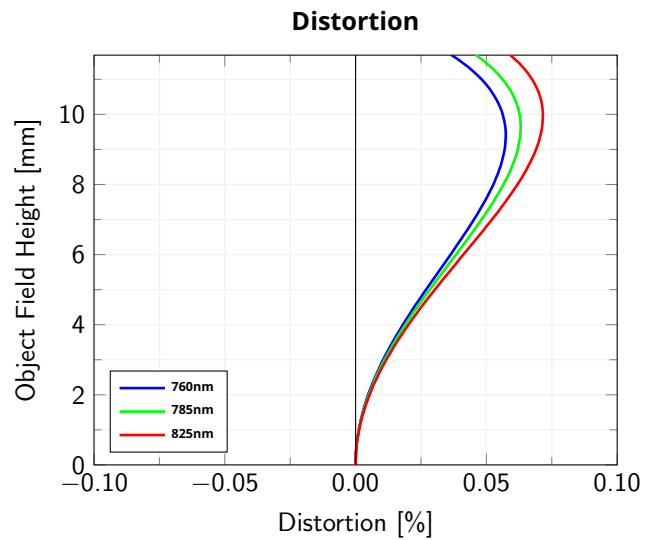


A wide selection of innovative machine vision components.

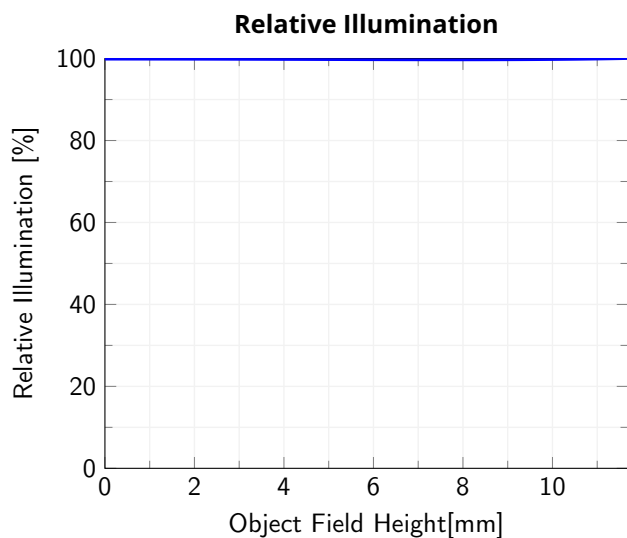
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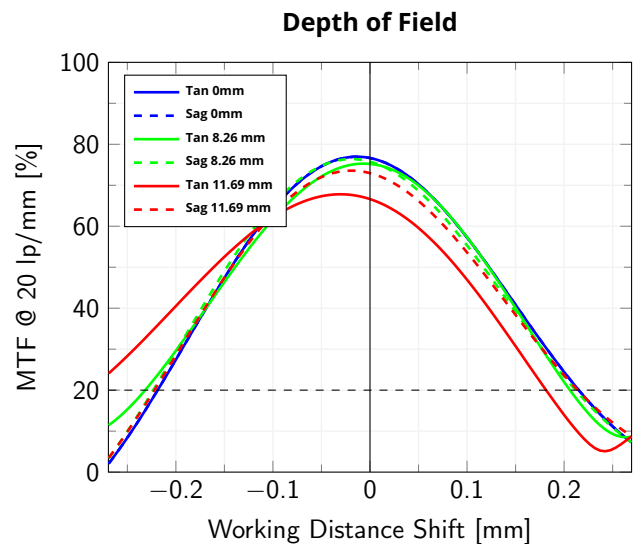
Modulation Transfer Function (MTF) vs. Image Resolution, wavelength range 760-825 nm,  $wf/N = 10$



Object Field Height vs. Distortion, from the optical axis to the corner of the field of view,  $wf/N = 10$



Relative illumination vs. Object Field Height, from the optical axis to the corner of the field of view,  $wf/N = 10$



Modulation Transfer Function (MTF) @ 20 lp/mm vs. Working Distance Shift from the best focus Working Distance, wavelength range 760-825 nm,  $wf/N = 10$

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