

## Telecentric lens for 1.1" detectors, 110 mm working distance, magnification 0.400x



### SPECIFICATIONS

#### Optical specifications

Magnification		0.400
Image circle	(mm)	17.6
Max sensor size		1.1"
Working distance <sup>2</sup>	(mm)	110
$wf/N$ <sup>3</sup>		10
Telecentricity typical (max) <sup>4</sup>	(°)	< 0.2
Distortion typical (max) <sup>5</sup>	(%)	< 0.15
Field depth <sup>6</sup>	(mm)	3.2
Resolution (max) <sup>7</sup>	( $\mu$ m)	16

#### Mechanical specifications

Mount		C
Phase adjustment		Yes
Length <sup>9</sup>	(mm)	185.0
Front diameter	(mm)	62.0
Mass	(g)	469

### KEY ADVANTAGES

#### Cost effective design

Design has been optimized to reduce the cost without any loss in performance.

#### Long working distance

Perfect for electronic components inspection and tool pre-setting machines.

#### High numerical aperture

For small pixel size / high resolution detectors.

**TCLWD3M series** is a range of telecentric lenses specifically designed for electronic, semiconductor and faster applications.

### FIELD OF VIEW

Sensors <sup>1</sup>	(mm x mm)
1/2.5" (5.70 x 4.28 mm x mm)	14.25 x 10.70
1/1.8" (7.13 x 5.33 mm x mm)	17.82 x 13.32
2/3" (8.50 x 7.09 mm x mm)	21.25 x 17.72
1" (14.19 x 7.51 mm x mm)	35.47 x 18.77
1.1" (14.16 x 10.37 mm x mm)	35.40 x 25.92

<sup>1</sup> Object field of view. For the fields with the indication "⊙=", the image of a circular object of such diameter is fully inscribed into the detector.

<sup>2</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>3</sup> working  $f/N$ : the real  $f/N$  of a lens in operating conditions.

<sup>4</sup> Maximum angle between chief rays and optical axis on the object side. Typical (average production) values and maximum (guaranteed) values are listed.

<sup>5</sup> Percent deviation of the real image compared to an ideal, undistorted image. Typical (average production) values and maximum (guaranteed) values are listed.

<sup>6</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>7</sup> Object side, calculated with the Rayleigh criterion with  $\lambda = 520$  nm

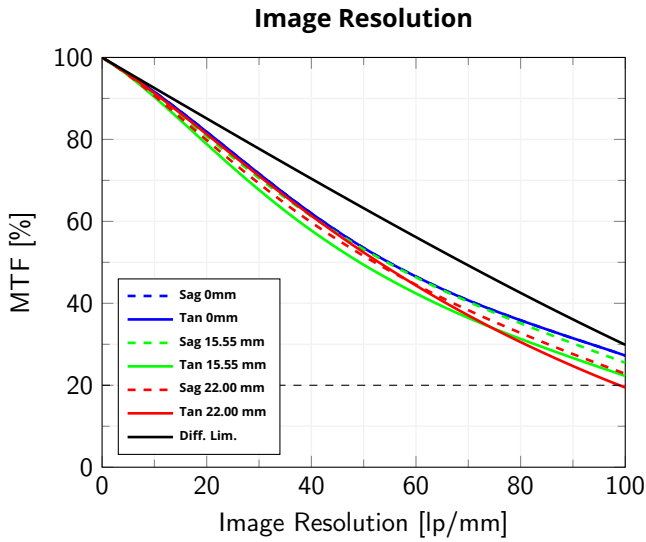
<sup>8</sup> Measured from the front end of the mechanics to the camera flange.

### COMPATIBLE PRODUCTS

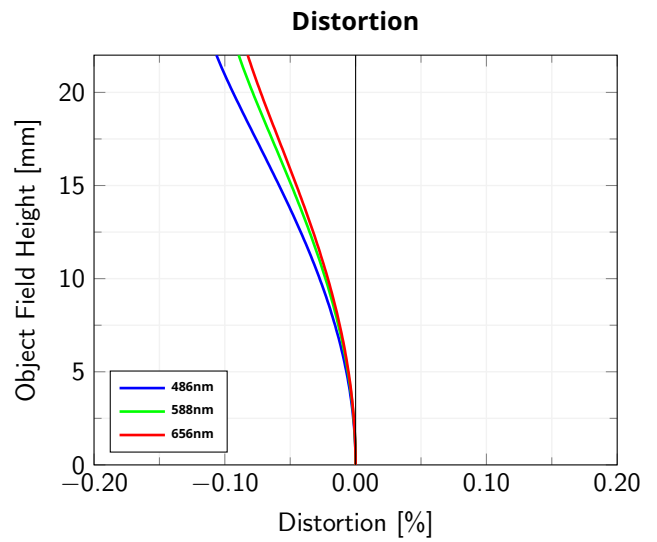
Full list of compatible products available [here](#).



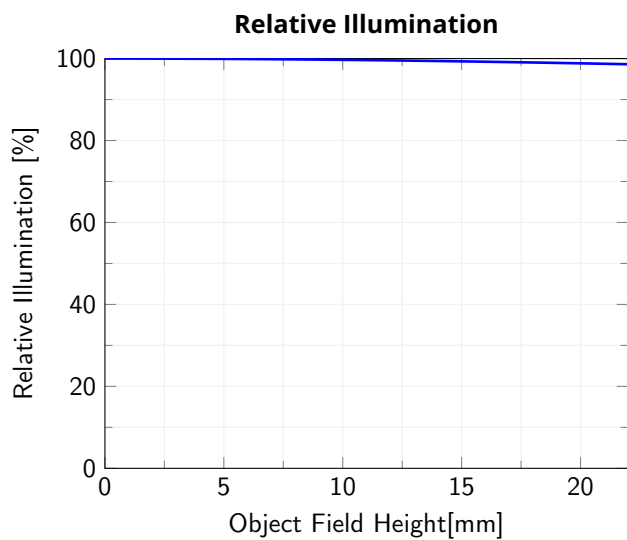
A wide selection of innovative machine vision components.



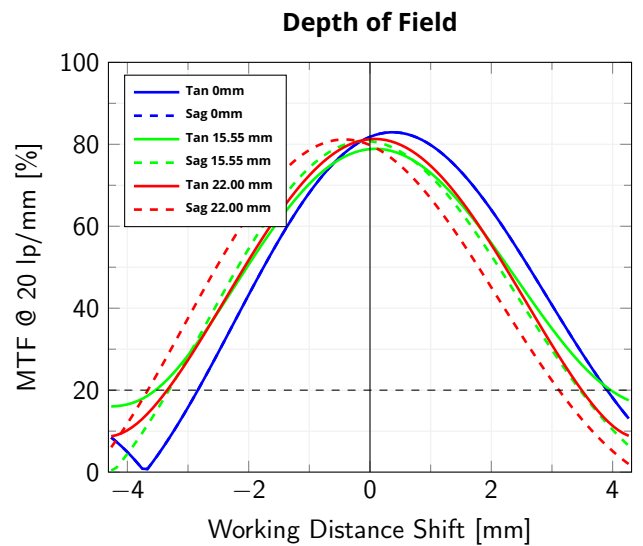
Modulation Transfer Function (MTF) vs. Image Resolution, wavelength range 486 nm - 656 nm



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