

## WD and Magnification Chart for Line Scan Lens / Large Area Sensor Lens

WD (mm)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	550	600	650	700	750	800	850	900	950	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200	4400	4600	4800	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	22000	24000	26000	28000	30000	32000	34000	36000	38000	40000	42000	44000	46000	48000	50000	55000	60000	65000	70000	75000	80000	85000	90000	95000	100000	110000	120000	130000	140000	150000	160000	170000	180000	190000	200000	220000	240000	260000	280000	300000	320000	340000	360000	380000	400000	420000	440000	460000	480000	500000	550000	600000	650000	700000	750000	800000	850000	900000	950000	1000000	1100000	1200000	1300000	1400000	1500000	1600000	1700000	1800000	1900000	2000000	2200000	2400000	2600000	2800000	3000000	3200000	3400000	3600000	3800000	4000000	4200000	4400000	4600000	4800000	5000000	5500000	6000000	6500000	7000000	7500000	8000000	8500000	9000000	9500000	10000000	11000000	12000000	13000000	14000000	15000000	16000000	17000000	18000000	19000000	20000000	22000000	24000000	26000000	28000000	30000000	32000000	34000000	36000000	38000000	40000000	42000000	44000000	46000000	48000000	50000000	55000000	60000000	65000000	70000000	75000000	80000000	85000000	90000000	95000000	100000000	110000000	120000000	130000000	140000000	150000000	160000000	170000000	180000000	190000000	200000000	220000000	240000000	260000000	280000000	300000000	320000000	340000000	360000000	380000000	400000000	420000000	440000000	460000000	480000000	500000000	550000000	600000000	650000000	700000000	750000000	800000000	850000000	900000000	950000000	1000000000	1100000000	1200000000	1300000000	1400000000	1500000000	1600000000	1700000000	1800000000	1900000000	2000000000	2200000000	2400000000	2600000000	2800000000	3000000000	3200000000	3400000000	3600000000	3800000000	4000000000	4200000000	4400000000	4600000000	4800000000	5000000000	5500000000	6000000000	6500000000	7000000000	7500000000	8000000000	8500000000	9000000000	9500000000	10000000000	11000000000	12000000000	13000000000	14000000000	15000000000	16000000000	17000000000	18000000000	19000000000	20000000000	22000000000	24000000000	26000000000	28000000000	30000000000	32000000000	34000000000	36000000000	38000000000	40000000000	42000000000	44000000000	46000000000	48000000000	50000000000	55000000000	60000000000	65000000000	70000000000	75000000000	80000000000	85000000000	90000000000	95000000000	100000000000	110000000000	120000000000	130000000000	140000000000	150000000000	160000000000	170000000000	180000000000	190000000000	200000000000	220000000000	240000000000	260000000000	280000000000	300000000000	320000000000	340000000000	360000000000	380000000000	400000000000	420000000000	440000000000	460000000000	480000000000	500000000000	550000000000	600000000000	650000000000	700000000000	750000000000	800000000000	850000000000	900000000000	950000000000	1000000000000	1100000000000	1200000000000	1300000000000	1400000000000	1500000000000	1600000000000	1700000000000	1800000000000	1900000000000	2000000000000	2200000000000	2400000000000	2600000000000	2800000000000	3000000000000	3200000000000	3400000000000	3600000000000	3800000000000	4000000000000	4200000000000	4400000000000	4600000000000	4800000000000	5000000000000	5500000000000	6000000000000	6500000000000	7000000000000	7500000000000	8000000000000	8500000000000	9000000000000	9500000000000	10000000000000	11000000000000	12000000000000	13000000000000	14000000000000	15000000000000	16000000000000	17000000000000	18000000000000	19000000000000	20000000000000	22000000000000	24000000000000	26000000000000	28000000000000	30000000000000	32000000000000	34000000000000	36000000000000	38000000000000	40000000000000	42000000000000	44000000000000	46000000000000	48000000000000	50000000000000	55000000000000	60000000000000	65000000000000	70000000000000	75000000000000	80000000000000	85000000000000	90000000000000	95000000000000	100000000000000	110000000000000	120000000000000	130000000000000	140000000000000	150000000000000	160000000000000	170000000000000	180000000000000	190000000000000	200000000000000	220000000000000	240000000000000	260000000000000	280000000000000	300000000000000	320000000000000	340000000000000	360000000000000	380000000000000	400000000000000	420000000000000	440000000000000	460000000000000	480000000000000	500000000000000	550000000000000	600000000000000	650000000000000	700000000000000	750000000000000	800000000000000	850000000000000	900000000000000	950000000000000	1000000000000000	1100000000000000	1200000000000000	1300000000000000	1400000000000000	1500000000000000	1600000000000000	1700000000000000	1800000000000000	1900000000000000	2000000000000000	2200000000000000	2400000000000000	2600000000000000	2800000000000000	3000000000000000	3200000000000000	3400000000000000	3600000000000000	3800000000000000	4000000000000000	4200000000000000	4400000000000000	4600000000000000	4800000000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## Large Format Lens for TFL-2 Mount

- Design for TFL-2 mount, improve accuracy of inspection
- ① Improve accuracy and quality, make stable their layout
  - ② Suitable for high resolution and large field of view
  - ③ Low aberration, high resolution and low distortion at wide range of viewing (0.5mm resolution)
  - ④ 1.0mm and 1.5mm lenses are suitable for macro imaging



## Macro Lens for Area and Line Scan Camera

Design for macro imaging, suitable for large area and line scan camera

- ① Adjustable focus and FOV
- ② Designed for macro imaging, suitable for
- ③ Suitable for inspection of small, PDA, electronic and mechanical parts, high resolution and low distortion
- ④ Compatible with large format model of high resolution camera



## Area and Line Scan Lens for Wide Field of View

Machine vision lens for large field of view

- ① Adjustable focus and FOV
- ② Designed for wide viewing distance (1.5m), suitable for wide field of view
- ③ Designed for machine vision application



## Magnification chart of Telecentric Lens for C mount



## Telecentric Lens for Image Processing

The most suitable optical system for measurement in high accuracy

Magnification value is an index to design that makes the image size in parallel to the actual size. It also shows distortion problems in cameras to help selecting the size and suitable for images to design. To read parameters is suitable for magnifying optical lens, telecentric lens, and macro lens.

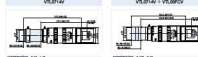


## 12 Mega Pixel Vari Focal Telecentric Lens for 1.1 inch

Vari Focal Telecentric Lens at 0.7x ~ 1.4x

Possible to change magnification range by using front converter

- ① Suitable for 12 Mega Pixel (2 inch, 3.45 μm)
- ② Large magnification
- ③ Adjustable the depth of field and the contrast
- ④ Magnification can be converted from 0.7x to 1.4x by using front converter

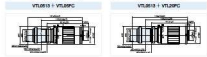
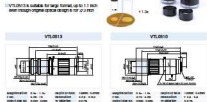


## Vari Focal Telecentric Lens

Vari Focal Telecentric Lens at 0.6x ~ 1.4x

Possible to change magnification range by using front converter

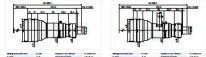
- ① Telecentric lens for wide range of magnification
- ② Suitable for large field
- ③ Magnification of 0.6x to 1.4x can be converted from 0.6x to 1.4x by using front converter
- ④ Medium wide resolution
- ⑤ 10 resolution from 0.05mm



## 12 Mega Pixel Telecentric Lens for 1.1 inch

Suitable for 6.5 Mega Pixel ~ 12 Mega Pixel sensor

- ① 0.6x telecentric lens for 1.1 Mega Pixel (3.45 μm, 3.1 μm)
- ② Super high resolution, suitable for 1.1 inch
- ③ Long working distance, 10mm with resolution 10mm
- ④ Suitable for inspection of small, PDA, electronic and mechanical parts, high resolution and low distortion
- ⑤ 10 resolution from 0.05mm



## Telecentric Lens for 1 inch

Design for 1 inch, high resolution and suitable for large field of view

- ① One of 4 Mega Pixel telecentric lens series for 1 inch
- ② 0.75x and 0.9x are available
- ③ MFD 0.75x is available for long working distance, 10mm
- ④ Compact, medium resolution
- ⑤ Adjustable the depth of field



## Low Magnification Telecentric Lens for 5 Mega Pixel

Possible to capture large field of view with high resolution

- ① Designed for the best quality in 5 Mega Pixel (3.45 μm, 3.1 μm)
- ② Suitable for 3.45 μm or smaller pixel size
- ③ 0.6x, 0.75x, 0.9x are available
- ④ Long working distance, 10mm
- ⑤ Adjustable the depth of field



## High NA Mega Pixel Telecentric Lens

High NA Mega Pixel Telecentric Lens for 1.1 inch

- ① High resolution, suitable for 1.1 inch
- ② Compact, medium resolution
- ③ Adjustable the depth of field



## Telecentric Lens for 5 Mega Pixel

Suitable for the inspection to ultra high accuracy

- ① Suitable for 5 Mega Pixel (3.45 μm, 3.1 μm)
- ② High resolution, suitable for 1.1 inch
- ③ Long working distance, 10mm with resolution 10mm
- ④ Suitable for inspection of small, PDA, electronic and mechanical parts, high resolution and low distortion
- ⑤ 10 resolution from 0.05mm



## Mega Pixel Telecentric Lens

Suitable for Mega Pixel Sensor

- ① High resolution, suitable for Mega Pixel sensor
- ② Compact, medium resolution
- ③ Adjustable the depth of field



## High NA Mega Pixel Telecentric Lens

High NA Mega Pixel Telecentric Lens for 1.1 inch

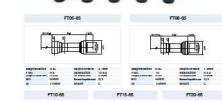
- ① High resolution, suitable for 1.1 inch
- ② Compact, medium resolution
- ③ Adjustable the depth of field



## WD65 High NA Mega Pixel Telecentric Lens

Design for Mega Pixel, Compact and high accuracy

- ① Mega Pixel telecentric lens for 1.1 inch
- ② High contrast with low distortion
- ③ Suitable for 1.1 Mega Pixel (3.45 μm, 3.1 μm)



## High NA Mega Pixel Telecentric Lens

High NA Mega Pixel Telecentric Lens for 1.1 inch

- ① High resolution, suitable for 1.1 inch
- ② Compact, medium resolution
- ③ Adjustable the depth of field



## WD110 High NA Mega Pixel Telecentric Lens

Design for Mega Pixel Compact and high durability

- 1 Mega Pixel Telecentric lens for 2.75-6.0
- 2 Suitable for 2.75mm Pixel, 2.75mm Pixel camera
- 3 High contrast with low wave aberration
- 4 UV resistant anti-reflection



PT10-110	PT20-110	PT30-110	PT40-110	PT50-110
Model	PT10-110	PT20-110	PT30-110	PT40-110
Resolution	1000	1000	1000	1000
Pixel Size	2.75	2.75	2.75	2.75
Pixel Pitch	2.75	2.75	2.75	2.75
Pixel Camera	2.75	2.75	2.75	2.75
Wave Aberration	0.05	0.05	0.05	0.05
Contrast	0.95	0.95	0.95	0.95
UV Resistant	Yes	Yes	Yes	Yes
Anti-Reflection	Yes	Yes	Yes	Yes
Material	Aluminum	Aluminum	Aluminum	Aluminum
Weight	10g	20g	30g	40g
Length	10mm	20mm	30mm	40mm
Mounting	Standard	Standard	Standard	Standard
Operating Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C	-20 to 60°C
Storage Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C	-20 to 60°C
Humidity	10 to 90% RH	10 to 90% RH	10 to 90% RH	10 to 90% RH
Shock	1000g	1000g	1000g	1000g
Vibration	10g	10g	10g	10g

PT10-110	PT20-110	PT30-110	PT40-110	PT50-110
Model	PT10-110	PT20-110	PT30-110	PT40-110
Resolution	1000	1000	1000	1000
Pixel Size	2.75	2.75	2.75	2.75
Pixel Pitch	2.75	2.75	2.75	2.75
Pixel Camera	2.75	2.75	2.75	2.75
Wave Aberration	0.05	0.05	0.05	0.05
Contrast	0.95	0.95	0.95	0.95
UV Resistant	Yes	Yes	Yes	Yes
Anti-Reflection	Yes	Yes	Yes	Yes
Material	Aluminum	Aluminum	Aluminum	Aluminum
Weight	10g	20g	30g	40g
Length	10mm	20mm	30mm	40mm
Mounting	Standard	Standard	Standard	Standard
Operating Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C	-20 to 60°C
Storage Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C	-20 to 60°C
Humidity	10 to 90% RH	10 to 90% RH	10 to 90% RH	10 to 90% RH
Shock	1000g	1000g	1000g	1000g
Vibration	10g	10g	10g	10g

## WD40 Built-in type Telecentric Lens Series

Short WD: WD40mm Suitable for small device and limited space

- 1 4.0mm telecentric lens
- 2 Suitable for mounting, chip inspection, etc.



TL40-40	TL40-40
Model	TL40-40
Resolution	4000
Pixel Size	4.0
Pixel Pitch	4.0
Pixel Camera	4.0
Wave Aberration	0.05
Contrast	0.95
UV Resistant	Yes
Anti-Reflection	Yes
Material	Aluminum
Weight	10g
Length	40mm
Mounting	Standard
Operating Temp.	-20 to 60°C
Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH
Shock	1000g
Vibration	10g

TL40-40	TL40-40
Model	TL40-40
Resolution	4000
Pixel Size	4.0
Pixel Pitch	4.0
Pixel Camera	4.0
Wave Aberration	0.05
Contrast	0.95
UV Resistant	Yes
Anti-Reflection	Yes
Material	Aluminum
Weight	10g
Length	40mm
Mounting	Standard
Operating Temp.	-20 to 60°C
Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH
Shock	1000g
Vibration	10g

## WD65 Built-in type Telecentric Lens Series

Made WD: WD65mm Short CI and High NA

- 1 4.0mm telecentric lens
- 2 TL-700 type is improved contrast and visible illumination



TL60-65	TL60-65	TL60-65	TL60-65
Model	TL60-65	TL60-65	TL60-65
Resolution	6000	6000	6000
Pixel Size	6.0	6.0	6.0
Pixel Pitch	6.0	6.0	6.0
Pixel Camera	6.0	6.0	6.0
Wave Aberration	0.05	0.05	0.05
Contrast	0.95	0.95	0.95
UV Resistant	Yes	Yes	Yes
Anti-Reflection	Yes	Yes	Yes
Material	Aluminum	Aluminum	Aluminum
Weight	10g	20g	30g
Length	60mm	65mm	70mm
Mounting	Standard	Standard	Standard
Operating Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C
Storage Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C
Humidity	10 to 90% RH	10 to 90% RH	10 to 90% RH
Shock	1000g	1000g	1000g
Vibration	10g	10g	10g

TL60-65	TL60-65	TL60-65	TL60-65
Model	TL60-65	TL60-65	TL60-65
Resolution	6000	6000	6000
Pixel Size	6.0	6.0	6.0
Pixel Pitch	6.0	6.0	6.0
Pixel Camera	6.0	6.0	6.0
Wave Aberration	0.05	0.05	0.05
Contrast	0.95	0.95	0.95
UV Resistant	Yes	Yes	Yes
Anti-Reflection	Yes	Yes	Yes
Material	Aluminum	Aluminum	Aluminum
Weight	10g	20g	30g
Length	60mm	65mm	70mm
Mounting	Standard	Standard	Standard
Operating Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C
Storage Temp.	-20 to 60°C	-20 to 60°C	-20 to 60°C
Humidity	10 to 90% RH	10 to 90% RH	10 to 90% RH
Shock	1000g	1000g	1000g
Vibration	10g	10g	10g

## WD190 Built-in type Telecentric Lens Series

Long WD: 190mm Compact and suitable for customized optical systems

- 1 4.0mm telecentric lens
- 2 TL-700 type is improved contrast and visible illumination



TL10-190	TL20-190
Model	TL10-190
Resolution	1000
Pixel Size	2.75
Pixel Pitch	2.75
Pixel Camera	2.75
Wave Aberration	0.05
Contrast	0.95
UV Resistant	Yes
Anti-Reflection	Yes
Material	Aluminum
Weight	10g
Length	190mm
Mounting	Standard
Operating Temp.	-20 to 60°C
Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH
Shock	1000g
Vibration	10g

TL10-190	TL20-190
Model	TL10-190
Resolution	1000
Pixel Size	2.75
Pixel Pitch	2.75
Pixel Camera	2.75
Wave Aberration	0.05
Contrast	0.95
UV Resistant	Yes
Anti-Reflection	Yes
Material	Aluminum
Weight	10g
Length	190mm
Mounting	Standard
Operating Temp.	-20 to 60°C
Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH
Shock	1000g
Vibration	10g

## WD220 Built-in type Telecentric Lens Series

Long WD: 220mm High resolution and compact design

- 1 Suitable for various applications, alignment, inspection, measurement, etc.
- 2 Adjustable iris for CI and CFI
- 3 Compatible with 2 Mega Pixel of 1.7-2.0



TL20-220	TL20-220
Model	TL20-220
Resolution	2200
Pixel Size	2.2
Pixel Pitch	2.2
Pixel Camera	2.2
Wave Aberration	0.05
Contrast	0.95
UV Resistant	Yes
Anti-Reflection	Yes
Material	Aluminum
Weight	10g
Length	220mm
Mounting	Standard
Operating Temp.	-20 to 60°C
Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH
Shock	1000g
Vibration	10g

## WD240 High Magnification Telecentric Lens for Long WD

Suitable for vacuum chamber, welding environment in high temperature, etc., required for long WD

- 1 Suitable for alignment, inspection, and other various applications
- 2 4, 6, 8, and 10x are available
- 3 All models are designed for in-air illumination



TL240-240	TL240-240
Model	TL240-240
Resolution	2400
Pixel Size	2.4
Pixel Pitch	2.4
Pixel Camera	2.4
Wave Aberration	0.05
Contrast	0.95
UV Resistant	Yes
Anti-Reflection	Yes
Material	Aluminum
Weight	10g
Length	240mm
Mounting	Standard
Operating Temp.	-20 to 60°C
Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH
Shock	1000g
Vibration	10g

## WD300 Telecentric Lens for Long WD

Suitable for applications required for long WD

- 1 1000W lens over 300mm
- 2 TL-300-300 is compatible with 3.0x lens
- 3 TL-300-300 is compatible with 3.0x lens



TL300-300	TL300-300
Model	TL300-300
Resolution	3000
Pixel Size	3.0
Pixel Pitch	3.0
Pixel Camera	3.0
Wave Aberration	0.05
Contrast	0.95
UV Resistant	Yes
Anti-Reflection	Yes
Material	Aluminum
Weight	10g
Length	300mm
Mounting	Standard
Operating Temp.	-20 to 60°C
Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH
Shock	1000g
Vibration	10g

## 10x Telecentric Lens

High resolution, possible to use in limited space

- 1 Compensation of 10x, smaller to microscope stage for machine vision applications
- 2 Compact design with high resolution



Technical drawing of a mechanical component, likely a lens or filter, showing dimensions and a table of specifications.

Model	TL100-100	Resolution	1000
Pixel Size	1.0	Pixel Pitch	1.0
Wave Aberration	0.05	Contrast	0.95
UV Resistant	Yes	Anti-Reflection	Yes
Material	Aluminum	Weight	10g
Length	100mm	Mounting	Standard
Operating Temp.	-20 to 60°C	Storage Temp.	-20 to 60°C
Humidity	10 to 90% RH	Shock	1000g
Vibration	10g		