TELECENTRIC LENS

TELECENTRIC LENS

Magnification chart of Telecentric lens for C mount

VGA MEGA PIXEL 5 MEGA PIXEL

Magnification	compatible sensor									
	1/2	page	1/1.8	page	2/3	page	1	page	1.1	page
0.14×	MGTL014	P39	-		MGTL014VM	P35	-		-	
	-		-		MGTL014VM-180	P35	-		-	
0.17×	-		-		MGTL017VM	P35	-		-	
0.19×	-		-		MGTL019	P39	-		-	
0.22×	-		-		MGTL022VM	P35	-		-	
0.23×	-		-		MGTL023	P39	-		-	
	-		-		MGTL023H	P36	-		-	
0.275×	-		-		MGTL0275-2	P39	MGTL0275V	P33	-	
0.3×	-		-		MGTL03	P39	-		MGTL03V	P32
	-		-		MGTL03VM	P36	-		MGTL03VC	P32
	-		-		MGTL03VMC	P37	-		-	
0.345×	-		-		MGTL0345VM	P36	-		-	
	-		-		MGTL0345VMC	P37	-		-	
0.37×	-		-		-		MGTL037V	P33	-	
0.4×	-		-		MGTL04	P39	-		-	
	-		-		MGTL04VM	P36	-		-	
	-		-		MGTL04VMC	P37	-		-	
0.5×	-		TL05C-220	P50	FT05-65	P40	-		MGTL05-1.1	P39
	-		-		FT05C-65	P41	-		-	
	-		-		FT05-110	P42	-		-	
	-		-		FT05C-110	P43	-		-	
	-		-		MGTL05VM	P37	-		-	
	-		-		MGTL05VMC	P37	-		-	
0.69×	-		-		MGTL069VM	P37	-		-	
	-		-		MGTL069VMC	P37	-		-	
0.7×	-		TL07C-220	P50	-		-		-	
	-		TL07C-340	P52	-		-		-	
0.8×	-		TL08-65R	P46	-		-		-	
	-		TL08C-65R	P47	-		-		-	
	-		TL08-110R	P48	-		-		-	
	-		TL08C-110R	P49	-		-		-	
	-		-		FT08-110	P42	-		-	
	-		-		FT08C-110	P43	-		-	
1.0×	-		TL10-65R	P46	FT10-65	P40	-		MGTL10V	P37
	-		TL10C-65R	P47	FT10C-65	P41	-		MGTL10VC	P37
	-		TL10-110R	P48	FT10-110	P42	-		-	
	-		TL10C-110R	P49	FT10C-110	P43	-		-	
	-		TL10C-220	P50	TL10C-310	P52	-		-	
1.5×	-		TL15-65R	P46	FT15-65	P40	-		-	
	-		TL15C-65R	P47	FT15C-65	P41	-		-	
	-		-		FT15-110	P42	-		-	
	-		-		FT15C-110	P43	-		-	
2.0×	TL20-40	P44	TL20C-220	P50	FT20-65	P40	-		-	
	TL20C-40	P45	-		FT20C-65	P41	-		-	
	TL20-65R	P46	-		FT20-110	P43	-		-	
	TL20C-65R	P47	-		FT20C-110	P43	-		-	
	TL20-110R	P49	-		-		-		-	
	TL20C-110R	P49	-		-		-		-	
3.0×					FT30-110R	P43				
	-		-		FT30C-110R	P43	-		-	
	-		-		TL30C-65	P47	-		-	
4.0×	TL40-40	P44	TL40-65	P47	TL40-65	P47	-		-	
	TL40C-40	P45	TL40C-65	P47	TL40C-65	P47	-		-	
	-		TL40C-110R	P49	FT40-65	P41	-		-	
	-		-		FT40C-65	P41	-		-	
	-		-		FT40-110R	P43	-		-	
	-		-		FT40C-110R	P43	-		-	
	-		-		TL40C-240	P51	-		-	
6.0×	TL60-40	P45	-		FT60-110R	P43	-		-	
	TL60C-40	P45	-		FT60C-110R	P43	-		-	
	-		-		TL60-65	P47	-		-	
	-		-		TL60C-65	P47	-		-	
	-		TL60C-110R	P49	-		-		-	
	-		-		TL60C-240	P51	-		-	
8.0×	-		-		TL80-65	P47	-		-	
	-		-		TL80C-65	P47	-		-	
	-		TL80C-110R	P49	-		-		-	
	-		-		TL80C-240	P51	-		-	
10×	-		TL100C-55	P53	TL100C-240	P51	-		-	

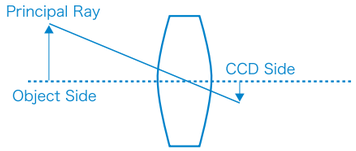
Coaxial type is 'C' included on the model name

Telecentric Lens for Image Processing

The most suitable optical system for measurement in high accuracy

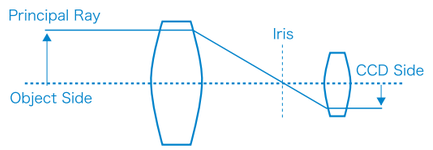
Telecentric optical system is an optical design that where the principal ray in parallel to the optical axis. It eliminates distortion problems by collimating the light entering the lens and suitable for imaging 3D objects. Co-axial illumination is suitable for recognizing object with high reflectance such as wafer, glass, and metal.

Non-telecentric lens



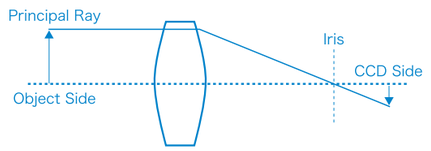
- Smaller size
- The number of lenses is fewer.
- Object size changes as the object goes up and down.

Double side telecentric lens



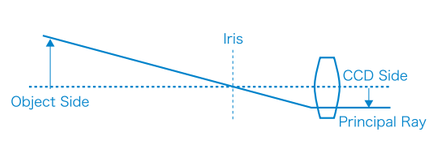
- Primary lays of object and image side are parallel to optical axis.
- Object size does not change when object goes up and down.
- Large size and high cost

Object side telecentric lens

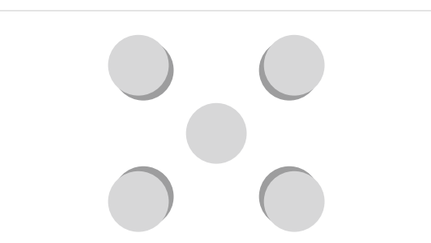


- Principal ray of object side is parallel to optical axis.
- Required for co-axial illumination
- Object size does not change when object goes up and down.
- Small size, compared to double side telecentric lens

Image side telecentric lens



- Principal ray of image side is parallel to optical axis.
- Object size changes when object size goes up and down.
- A lens for video camera should be this optical system to correct color aberration.

Standard Lens	Telecentric lens
	

Size of 3D object changes when it goes up and down when non-telecentric lens is used.
Telecentric lens is suitable for accurate measurement of 3D object.

VTL Series

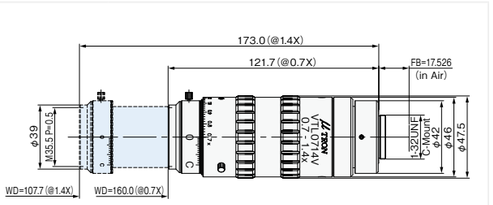
12 Mega Pixel Vari Focal Telecentric lens for 1.1 inch

NEW

Vari Focal Telecentric Lens at 0.7x - 1.4x
Possible to change magnification range by using front converter

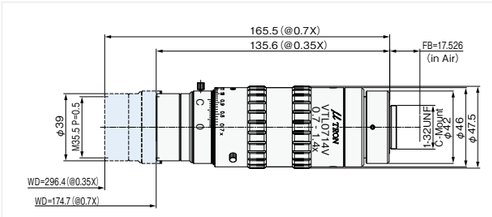
- Suitable for 12 Mega Pixel (1.1 inch, 3.45 μ m)
- Super high resolution
- Adjustable the depth of field and the Contrast
- Magnification can be converted from 0.35 x to 0.7 x by using front converter

VTL0714V



Magnification	0.7x - 1.4x
WD	160mm - 108mm
Maximum Compatible sensor	ϕ 17.6mm(1.1 inch)
Mount	C

VTL0714V + VTL05FCV



Magnification	0.35x - 0.7x
WD	296mm - 175mm
Application	For VTL0714V

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

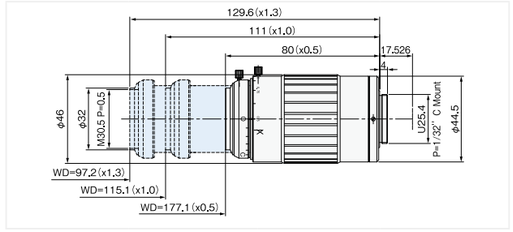
VTL Series

Vari Focal Telecentric Lens

Vari Focal Telecentric Lens at 0.5x - 1.3x
Possible to change magnification range by using front converter

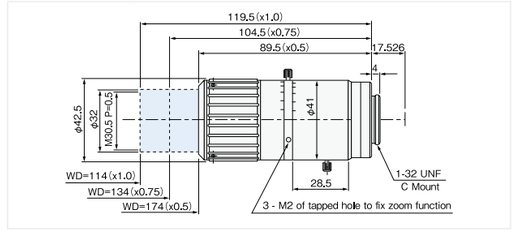
- Telecentric lens at the whole range of magnification
- Suitable for 5 Mega Pixel
- Magnification of VTL0513 can be converted from 0.25x - 2.6x by using front converter
- Reduce relative illumination
- TV distortion less than 0.01%
- VTL0513 is suitable for large format, up to 1.1 inch even though original optical design is for 2/3 inch

VTL0513



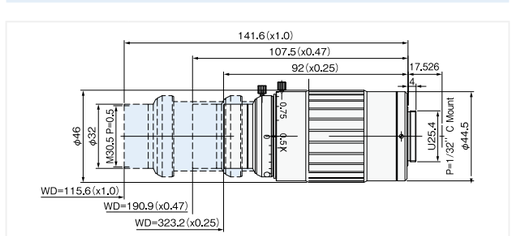
Magnification	0.5x - 1.3x	Depth of field	1.68mm - 0.47mm
F No.	5.26 - 10	Resolution	4.2 μ - 2.9 μ
Object side NA	0.048 - 0.065	TV distortion	0.01%
WD	173mm - 97mm	Maximum Compatible sensor	2/3
OI	271mm - 244mm	Mount	C

VTL0510



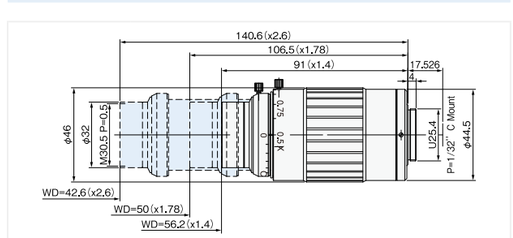
Magnification	0.5x - 1.0x	Depth of field	1.20mm - 0.47mm
F No.	3.76 - 5.89	Resolution	7.4 μ - 5 μ
Object side NA	0.066 - 0.085	TV distortion	0.01%
WD	174mm - 114mm	Maximum Compatible sensor	1/1.8
OI	281mm - 251mm	Mount	C

VTL0513 + VTL05FC



Magnification	0.25x - 1.0x
WD	323.2mm - 115.6mm
Application	For VTL0513

VTL0513 + VTL20FC



Magnification	1.4x - 2.6x
WD	56.2mm - 42.6mm
Application	For VTL0513

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

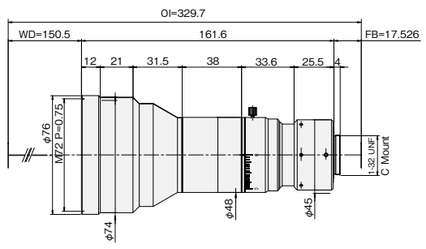
MGTL-V Series

12 Mega Pixel Telecentric Lens for 1.1 inch

Suitable for 6.5 Mega Pixel – 12 Mega Pixel sensor

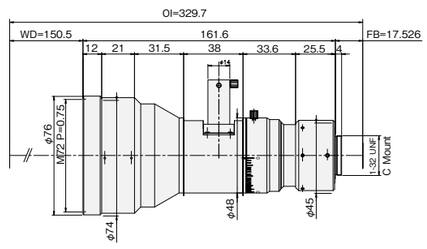
- 0.3x Bi-telecentric lens for 12 Mega Pixel (1.1 inch , 3.1 μ)
- Super high resolution, suitable 3.1 μ or smaller pixel
- Long working distance, 150mm with excellent brightness
- Variable iris, possible to adjust DOF
- Suitable for measurement and inspection, required for high accuracy
- Co-axial type is also available

MGTL03V



Magnification	0.3×	Depth of field	4.26mm
F No.	4.8	Resolution	10.8 μ
Object side NA	0.031	TV distortion	0.00%
WD	151mm	Maximum Compatible sensor	1.1
OI	330mm	Mount	C

MGTL03VC



Magnification	0.3×	Depth of field	4.26mm
F No.	4.8	Resolution	10.8 μ
Object side NA	0.031	TV distortion	0.00%
WD	151mm	Maximum Compatible sensor	1.1
OI	330mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40 μ).

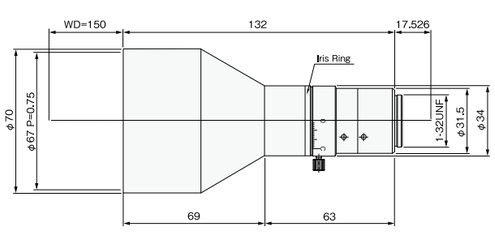
MGTL-V Series

Telecentric Lens for 1 inch

Design for 1 inch High resolution and suitable for large field of view

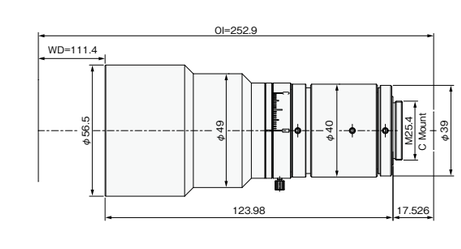
- Over 4 Mega Pixel telecentric lens series for 1inch
- 0.275x and 0.37x are available
- MGTL0275V is designed for long working distance, 150mm
- Excellent relative illumination
- Adjustable iris, possible to adjust depth of field

MGTL0275V



Magnification	0.275×	Depth of field	7.2mm
F No.	6.8	Resolution	16.8 μ
Object side NA	0.02	TV distortion	0.01%
WD	150mm	Maximum Compatible sensor	1
OI	298mm	Mount	C

MGTL037V



Magnification	0.37×	Depth of field	4.7mm
F No.	8	Resolution	14.6 μ
Object side NA	0.023	TV distortion	0.01%
WD	111mm	Maximum Compatible sensor	1
OI	253mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40 μ).

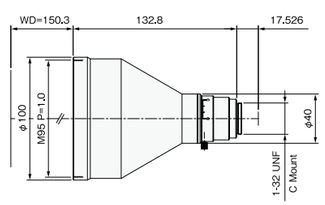
MGTL-VM Series

Low Magnification Telecentric Lens for 5 Mega Pixel

Possible to capture large field of view with high resolution

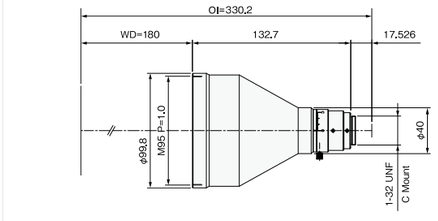
- Bring out the best quality in 5 Mega Pixel (3.45 μ of 2/3 inch)
- Suitable for 3.45 μ or smaller pixel size
- 0.14x, 0.17x, 0.22x are available
- Long working distance, WD150mm
- WD180mm type is available for 0.14x
- Compact design with low magnification
- Adjustable iris, possible to adjust depth of field

MGTL014VM



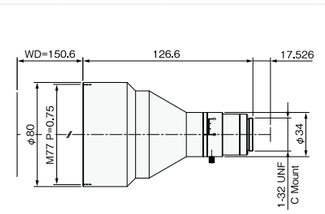
Magnification	0.14x	Depth of field	17.5mm
F No.	4.3	Resolution	20.5 μ
Object side NA	0.016	TV distortion	0.01%
WD	150.3mm	Maximum Compatible sensor	2/3
OI	300.6mm	Mount	C

MGTL014VM-180



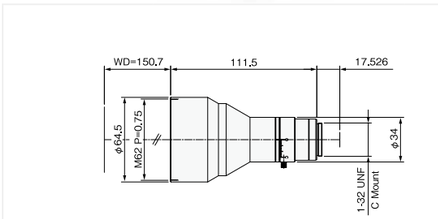
Magnification	0.14x	Depth of field	18mm
F No.	4.4	Resolution	21 μ
Object side NA	0.016	TV distortion	-0.01%
WD	180mm	Maximum Compatible sensor	2/3
OI	330.2mm	Mount	C

MGTL017VM



Magnification	0.17x	Depth of field	14.4mm
F No.	5.2	Resolution	20.5 μ
Object side NA	0.016	TV distortion	0.00%
WD	150.6mm	Maximum Compatible sensor	2/3
OI	294.7mm	Mount	C

MGTL022VM



Magnification	0.22x	Depth of field	8.5mm
F No.	5.2	Resolution	15.8 μ
Object side NA	0.021	TV distortion	0.00%
WD	150.7mm	Maximum Compatible sensor	2/3
OI	279.7mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

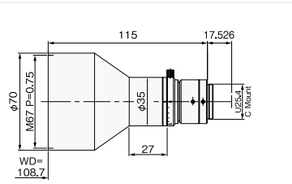
MGTL-VM Series

Telecentric Lens for 5 Mega Pixel

Suitable for the inspection in ultra high accuracy

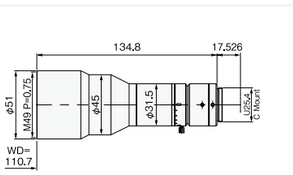
- Bring out the best quality in 5 Mega Pixel (3.45 μ of 2/3 inch)
- Suitable for 3.45 μ or smaller pixel size
- Excellent brightness, compared to Mega Pixel telecentric lenses
- Adjustable iris, possible to adjust depth of field
- 1.0x is compatible with 1.1 inch sensor
- Compact design
- Reduce hot spots of co-axial illumination

MGTL023H



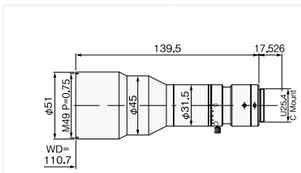
Magnification	0.23x
F No.	5.2
Object side NA	0.022
WD	109mm
OI	241mm
Depth of field	7.9mm
Resolution	8.7 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL03VM



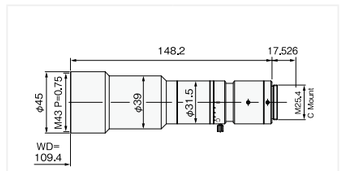
Magnification	0.3x
F No.	5.0
Object side NA	0.03
WD	111mm
OI	263mm
Depth of field	4.4mm
Resolution	6.6 μ
TV distortion	-0.04%
Maximum Compatible sensor	2/3
Mount	C

MGTL0345VM



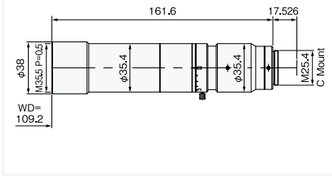
Magnification	0.345x
F No.	4.9
Object side NA	0.035
WD	111mm
OI	267mm
Depth of field	3.3mm
Resolution	5.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL04VM



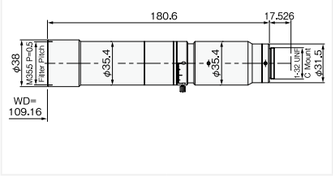
Magnification	0.4x
F No.	5.0
Object side NA	0.04
WD	109mm
OI	275mm
Depth of field	2.5mm
Resolution	4.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL05VM



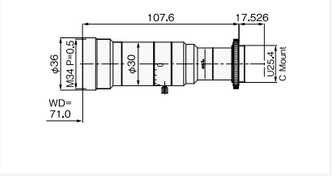
Magnification	0.5x
F No.	4.7
Object side NA	0.05
WD	109mm
OI	288mm
Depth of field	1.5mm
Resolution	3.8 μ
TV distortion	-0.03%
Maximum Compatible sensor	2/3
Mount	C

MGTL069VM



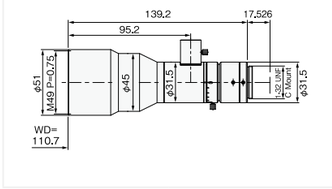
Magnification	0.69x
F No.	6.6
Object side NA	0.052
WD	109mm
OI	307mm
Depth of field	1.1mm
Resolution	3.9 μ
TV distortion	-0.04%
Maximum Compatible sensor	2/3
Mount	C

MGTL10V



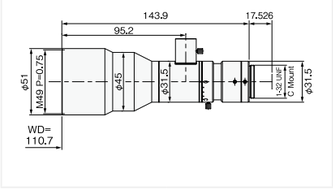
Magnification	1.0x
F No.	5.4
Object side NA	0.093
WD	71mm
OI	196mm
Depth of field	0.43mm
Resolution	2.5 μ
TV distortion	0.00%
Maximum Compatible sensor	1.1
Mount	C

MGTL03VMC



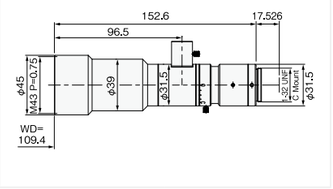
Magnification	0.3x
F No.	5.0
Object side NA	0.03
WD	111mm
OI	267mm
Depth of field	4.4mm
Resolution	6.6 μ
TV distortion	-0.04
Maximum Compatible sensor	2/3
Mount	C

MGTL0345VMC



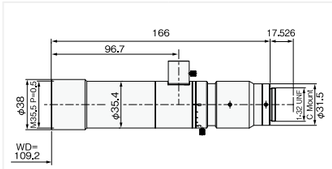
Magnification	0.345x
F No.	4.9
Object side NA	0.035
WD	111mm
OI	272mm
Depth of field	3.3mm
Resolution	5.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL04VMC



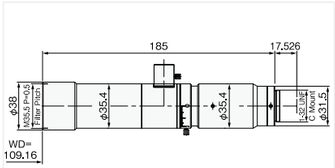
Magnification	0.4x
F No.	5.0
Object side NA	0.04
WD	109mm
OI	280mm
Depth of field	2.5mm
Resolution	4.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL05VMC



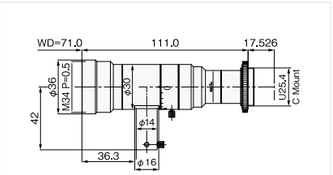
Magnification	0.5x
F No.	4.7
Object side NA	0.05
WD	109mm
OI	293mm
Depth of field	2.3mm
Resolution	3.8 μ
TV distortion	-0.03%
Maximum Compatible sensor	2/3
Mount	C

MGTL069VMC



Magnification	0.69x
F No.	6.6
Object side NA	0.052
WD	109mm
OI	312mm
Depth of field	1.1mm
Resolution	3.9 μ
TV distortion	-0.04%
Maximum Compatible sensor	2/3
Mount	C

MGTL10VC



Magnification	1.0x
F No.	5.4
Object side NA	0.093
WD	71mm
OI	200mm
Depth of field	0.43mm
Resolution	2.5 μ
TV distortion	0.00%
Maximum Compatible sensor	1.1
Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40 μ).

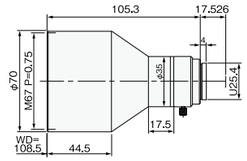
MGTL Series

Mega Pixel Telecentric Lens

Suitable for Mega Pixel Sensor

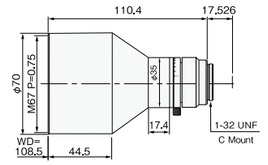
- High resolution, compatible with Mega Pixel camera
- Compact design, suitable for small device
- MGTL05-1.1 is compatible with 1.1 inch
- MGTL0275 is compatible with ϕ 12.8mm sensor
- Adjustable iris, possible to adjust depth of field
- TV distortion less than 0.05%

MGTL014



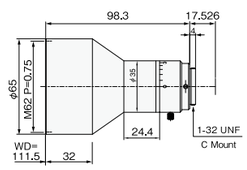
Magnification	0.14x	Depth of field	32.7mm
F No.	4.0	Resolution	19.7 μ
Object side NA	0.017	TV distortion	0.02%
WD	108mm	Maximum Compatible sensor	1/2
OI	231mm	Mount	C

MGTL019



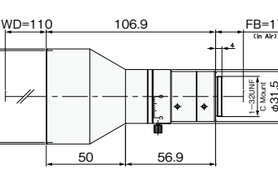
Magnification	0.19x	Depth of field	17.7mm
F No.	4.0	Resolution	14.0 μ
Object side NA	0.024	TV distortion	0.01%
WD	108mm	Maximum Compatible sensor	2/3
OI	236mm	Mount	C

MGTL023



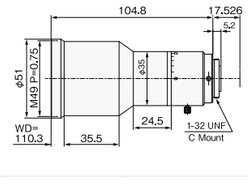
Magnification	0.23x	Depth of field	12mm
F No.	5.5	Resolution	16.0 μ
Object side NA	0.021	TV distortion	0.01%
WD	111mm	Maximum Compatible sensor	2/3
OI	227mm	Mount	C

MGTL0275-2



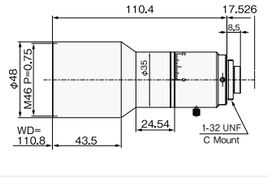
Magnification	0.275×	Depth of field	8.1mm
F No.	7.6	Resolution	18.6 μ
Object side NA	0.018	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	2/3
OI	234mm	Mount	C

MGTL03



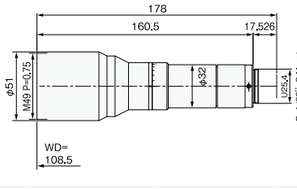
Magnification	0.3x	Depth of field	6.2mm
F No.	7.0	Resolution	16.0 μ
Object side NA	0.021	TV distortion	0.05%
WD	110mm	Maximum Compatible sensor	2/3
OI	233mm	Mount	C

MGTL04



Magnification	0.4x	Depth of field	4.6mm
F No.	9.2	Resolution	15.2 μ
Object side NA	0.022	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	2/3
OI	239mm	Mount	C

MGTL05-1.1



Magnification	0.5x	Depth of field	2mm
F No.	6.37	Resolution	8.6 μ
Object side NA	0.039	TV distortion	0.00%
WD	108mm	Maximum Compatible sensor	1.1
OI	286mm	Mount	C

* Indicated specifications are design values. *Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40 μ).
* Depth of field of MGTL014, 019, and 023 indicate values at effective F No. 8

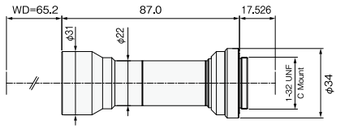
FT Series

WD65 High NA Mega Pixel Telecentric Lens

Design for Mega Pixel Compact and high durability

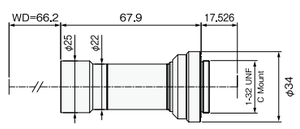
- Mega Pixel telecentric lens for 2/3 inch
- Suitable for 2 Mega Pixel - 5 Mega Pixel camera
- High contrast with co-axial illumination
- TV distortion less than 0.01%

FT05-65



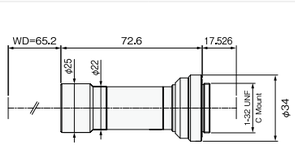
Magnification	0.5×	Depth of field	3.1mm
F No.	9.6	Resolution	12.9μ
Object side NA	0.026	TV distortion	0.00%
WD	65mm	Maximum Compatible sensor	2/3
OI	170mm	Mount	C

FT08-65



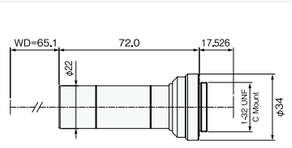
Magnification	0.8×	Depth of field	1.3mm
F No.	10	Resolution	8.4μ
Object side NA	0.04	TV distortion	0.00%
WD	66mm	Maximum Compatible sensor	2/3
OI	152mm	Mount	C

FT10-65



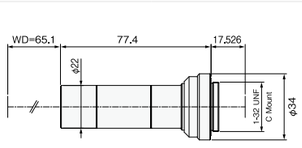
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	65mm
OI	155mm
Depth of field	0.9mm
Resolution	7.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15-65



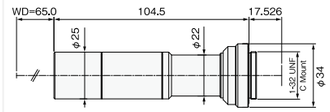
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	65mm
OI	155mm
Depth of field	0.4mm
Resolution	5.3μ
TV distortion	0.01%
Maximum Compatible sensor	2/3
Mount	C

FT20-65



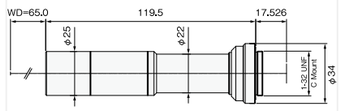
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	65mm
OI	160mm
Depth of field	0.3mm
Resolution	4.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT40-65



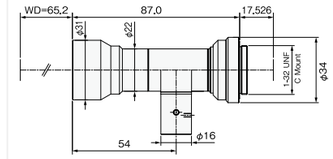
Magnification	4.0×
F No.	17.8
Object side NA	0.11
WD	65mm
OI	187mm
Depth of field	0.09mm
Resolution	3.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT60-65



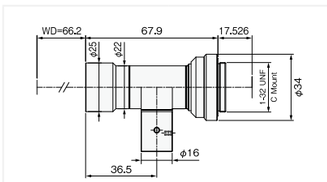
Magnification	6.0×
F No.	26.8
Object side NA	0.11
WD	65mm
OI	202mm
Depth of field	0.06mm
Resolution	3.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT05C-65



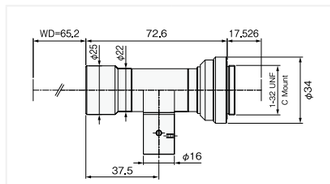
Magnification	0.5×
F No.	9.6
Object side NA	0.026
WD	65mm
OI	170mm
Depth of field	3.1mm
Resolution	12.9μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT08C-65



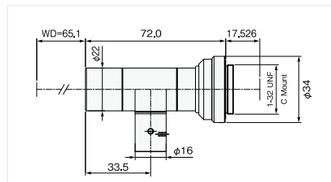
Magnification	0.8×
F No.	10
Object side NA	0.04
WD	66mm
OI	152mm
Depth of field	1.3mm
Resolution	8.4μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT10C-65



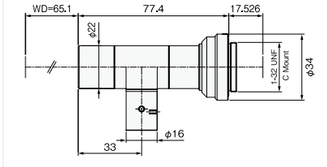
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	65mm
OI	155mm
Depth of field	0.9mm
Resolution	7.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15C-65



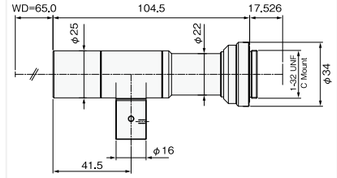
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	65mm
OI	155mm
Depth of field	0.4mm
Resolution	5.3μ
TV distortion	0.01%
Maximum Compatible sensor	2/3
Mount	C

FT20C-65



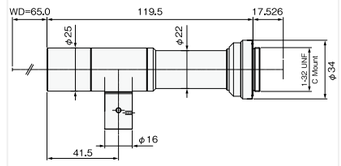
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	65mm
OI	160mm
Depth of field	0.3mm
Resolution	4.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT40C-65



Magnification	4.0×
F No.	17.8
Object side NA	0.11
WD	65mm
OI	187mm
Depth of field	0.09mm
Resolution	3.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT60C-65



Magnification	6.0×
F No.	26.8
Object side NA	0.11
WD	65mm
OI	202mm
Depth of field	0.06mm
Resolution	3.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

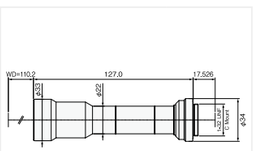
FT Series

WD110 High NA Mega Pixel Telecentric Lens

Design for Mega Pixel Compact and high durability

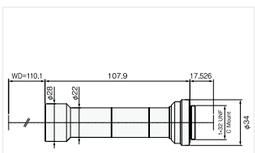
- Mega Pixel telecentric lens for 2/3 inch
- Suitable for 2 Mega Pixel - 5 Mega Pixel camera
- High contrast with co-axial illumination
- TV distortion less than 0.01%

FT05-110



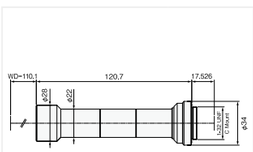
Magnification	0.5×
F No.	9.6
Object side NA	0.026
WD	110mm
OI	255mm
Depth of field	3.1mm
Resolution	12.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT08-110



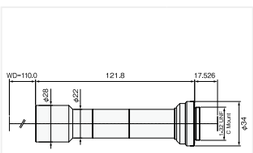
Magnification	0.8×
F No.	11.1
Object side NA	0.036
WD	110mm
OI	236mm
Depth of field	1.4mm
Resolution	9.3 μ
TV distortion	0.01%
Maximum Compatible sensor	2/3
Mount	C

FT10-110



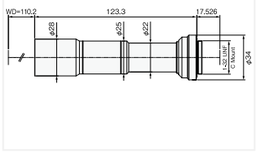
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	110mm
OI	248mm
Depth of field	0.9mm
Resolution	7.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15-110



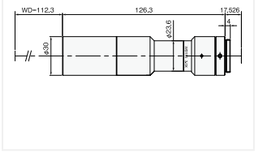
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	110mm
OI	249mm
Depth of field	0.4mm
Resolution	5.3 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT20-110



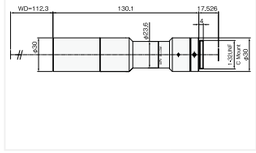
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	110mm
OI	251mm
Depth of field	0.3mm
Resolution	4.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT30-110R



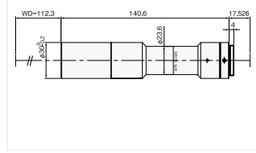
Magnification	3.0×
F No.	17.2
Object side NA	0.087
WD	112mm
OI	256mm
Depth of field	0.15mm
Resolution	3.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT40-110R



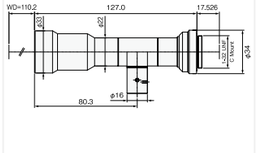
Magnification	4.0×
F No.	22.0
Object side NA	0.091
WD	112mm
OI	260mm
Depth of field	0.11mm
Resolution	3.7 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT60-110R



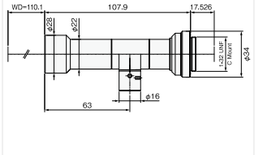
Magnification	6.0×
F No.	33.0
Object side NA	0.091
WD	112mm
OI	270mm
Depth of field	0.07mm
Resolution	3.7 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT05C-110



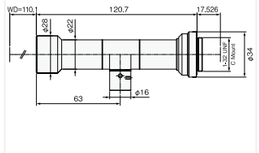
Magnification	0.5×
F No.	9.6
Object side NA	0.026
WD	110mm
OI	255mm
Depth of field	3.1mm
Resolution	12.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT08C-110



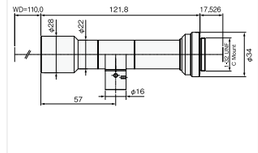
Magnification	0.8×
F No.	11.1
Object side NA	0.036
WD	110mm
OI	236mm
Depth of field	1.4mm
Resolution	9.3 μ
TV distortion	0.01%
Maximum Compatible sensor	2/3
Mount	C

FT10C-110



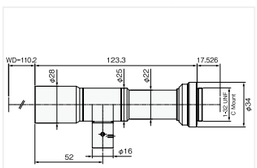
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	110mm
OI	248mm
Depth of field	0.9mm
Resolution	7.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15C-110



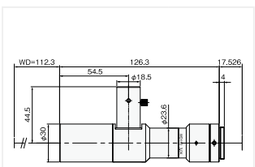
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	110mm
OI	249mm
Depth of field	0.4mm
Resolution	5.3 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT20C-110



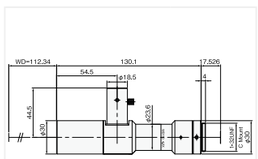
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	110mm
OI	251mm
Depth of field	0.3mm
Resolution	4.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT30C-110R



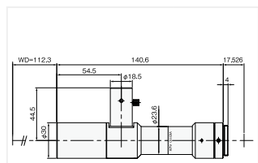
Magnification	3.0×
F No.	17.2
Object side NA	0.087
WD	112mm
OI	256mm
Depth of field	0.15mm
Resolution	3.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT40C-110R



Magnification	4.0×
F No.	22.0
Object side NA	0.091
WD	112mm
OI	260mm
Depth of field	0.11mm
Resolution	3.7 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT60C-110R



Magnification	6.0×
F No.	33.0
Object side NA	0.091
WD	112mm
OI	270mm
Depth of field	0.07mm
Resolution	3.7 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40 μ).

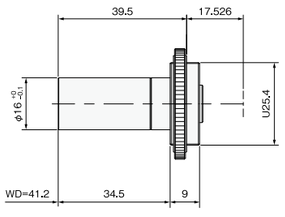
TL Series

WD40 Built-in type Telecentric Lens Series

Short WD: WD40mm　Suitable for small device and limited space

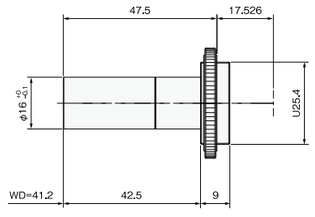
- ϕ16mm telecentric lens
- Suitable for bonding, chip mounter, etc..

TL20-40



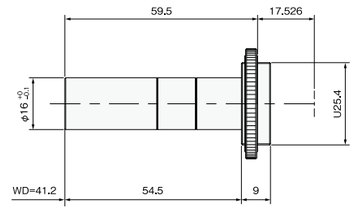
Magnification	2x	Depth of field	0.28mm
F No.	14.1	Resolution	4.7μ
Object side NA	0.071	TV distortion	0.13%
WD	40mm	Maximum Compatible sensor	1/2
OI	98mm	Mount	C

TL40-40



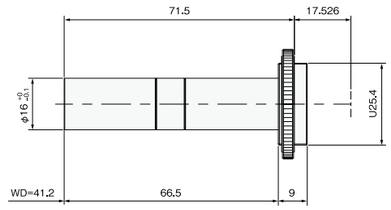
Magnification	4x	Depth of field	0.14mm
F No.	28.2	Resolution	4.7μ
Object side NA	0.071	TV distortion	-0.19%
WD	40mm	Maximum Compatible sensor	1/2
OI	106mm	Mount	C

TL60-40



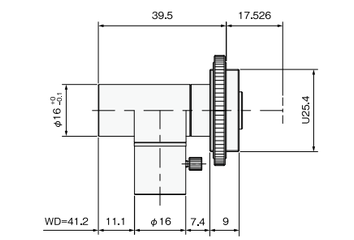
Magnification	6x	Depth of field	0.09mm
F No.	41.6	Resolution	4.7μ
Object side NA	0.072	TV distortion	-0.10%
WD	40mm	Maximum Compatible sensor	1/2
OI	118mm	Mount	C

TL80-40



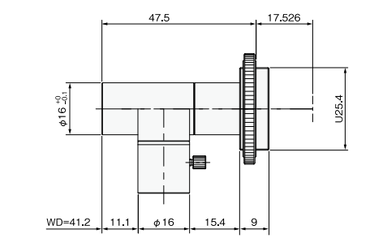
Magnification	8x	Depth of field	0.07mm
F No.	54.8	Resolution	4.6μ
Object side NA	0.073	TV distortion	0.11%
WD	40mm	Maximum Compatible sensor	1/2
OI	130mm	Mount	C

TL20C-40



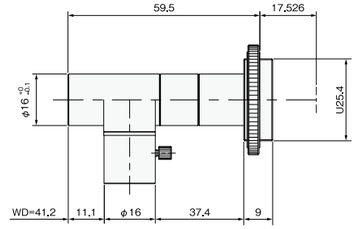
Magnification	2x	Depth of field	0.28mm
F No.	14.1	Resolution	4.7μ
Object side NA	0.071	TV distortion	0.13%
WD	40mm	Maximum Compatible sensor	1/2
OI	98mm	Mount	C

TL40C-40



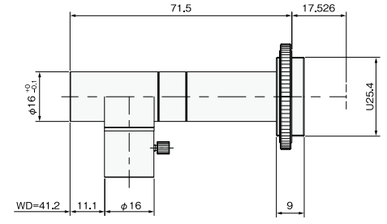
Magnification	4x	Depth of field	0.14mm
F No.	28.2	Resolution	4.7μ
Object side NA	0.071	TV distortion	-0.19%
WD	40mm	Maximum Compatible sensor	1/2
OI	106mm	Mount	C

TL60C-40



Magnification	6x	Depth of field	0.09mm
F No.	41.6	Resolution	4.7μ
Object side NA	0.072	TV distortion	-0.10%
WD	40mm	Maximum Compatible sensor	1/2
OI	118mm	Mount	C

TL80C-40



Magnification	8x	Depth of field	0.07mm
F No.	54.8	Resolution	4.6μ
Object side NA	0.073	TV distortion	0.11%
WD	40mm	Maximum Compatible sensor	1/2
OI	130mm	Mount	C

* Indicated specifications are design values.　* Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

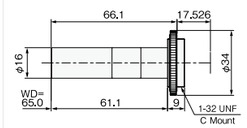
TL Series

WD65 Built-in type Telecentric Lens Series

Middle WD: WD65mm Short OI and High NA

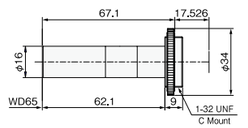
- ϕ16mm telecentric lens
- TL-**"R" type is improved contrast and relative illumination.

TL30-65



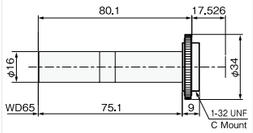
Magnification	3x
F No.	19.9
Object side NA	0.075
WD	65mm
OI	149mm
Depth of field	0.18mm
Resolution	4.47 μ
TV distortion	0.15%
Maximum Compatible sensor	2/3
Mount	C

TL40-65



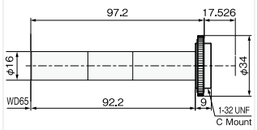
Magnification	4x
F No.	26.0
Object side NA	0.077
WD	65mm
OI	150mm
Depth of field	0.13mm
Resolution	4.36 μ
TV distortion	0.30%
Maximum Compatible sensor	2/3
Mount	C

TL60-65



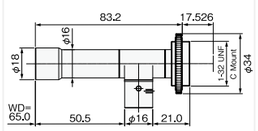
Magnification	6x
F No.	39.0
Object side NA	0.077
WD	65mm
OI	163mm
Depth of field	0.09mm
Resolution	4.36 μ
TV distortion	0.33%
Maximum Compatible sensor	2/3
Mount	C

TL80-65



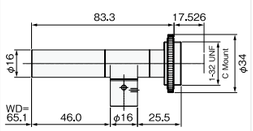
Magnification	8x
F No.	52.0
Object side NA	0.077
WD	65mm
OI	180mm
Depth of field	0.07mm
Resolution	4.36 μ
TV distortion	0.20%
Maximum Compatible sensor	2/3
Mount	C

TL08C-65R



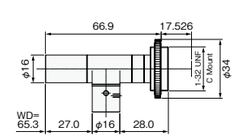
Magnification	0.8x
F No.	14.8
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.85mm
Resolution	12.3 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL10C-65R



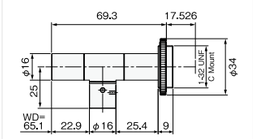
Magnification	1x
F No.	18.5
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.48mm
Resolution	12.4 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL15C-65R



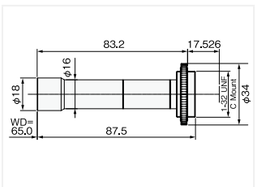
Magnification	1.5x
F No.	16.0
Object side NA	0.047
WD	65mm
OI	150mm
Depth of field	0.57mm
Resolution	7.22 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL20C-65R



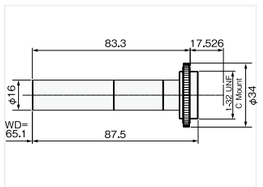
Magnification	2x
F No.	16.7
Object side NA	0.06
WD	65mm
OI	152mm
Depth of field	0.33mm
Resolution	5.6 μ
TV distortion	-0.01%
Maximum Compatible sensor	1/2
Mount	C

TL08-65R



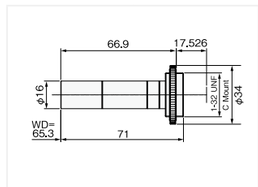
Magnification	0.8x
F No.	14.8
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.85mm
Resolution	12.3 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL10-65R



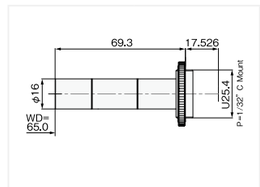
Magnification	1x
F No.	18.5
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.48mm
Resolution	12.4 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL15-65R



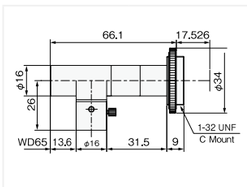
Magnification	1.5x
F No.	16.0
Object side NA	0.047
WD	65mm
OI	150mm
Depth of field	0.57mm
Resolution	7.22 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL20-65R



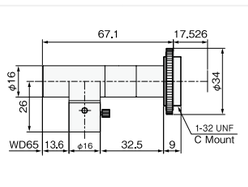
Magnification	2x
F No.	16.7
Object side NA	0.06
WD	65mm
OI	152mm
Depth of field	0.33mm
Resolution	5.6 μ
TV distortion	-0.01%
Maximum Compatible sensor	1/2
Mount	C

TL30C-65



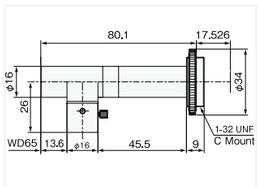
Magnification	3x
F No.	19.9
Object side NA	0.075
WD	65mm
OI	149mm
Depth of field	0.18mm
Resolution	4.47 μ
TV distortion	0.15%
Maximum Compatible sensor	2/3
Mount	C

TL40C-65



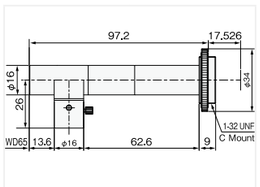
Magnification	4x
F No.	26.0
Object side NA	0.077
WD	65mm
OI	150mm
Depth of field	0.13mm
Resolution	4.36 μ
TV distortion	0.30%
Maximum Compatible sensor	2/3
Mount	C

TL60C-65



Magnification	6x
F No.	39.0
Object side NA	0.077
WD	65mm
OI	163mm
Depth of field	0.09mm
Resolution	4.36 μ
TV distortion	0.33%
Maximum Compatible sensor	2/3
Mount	C

TL80C-65



Magnification	8x
F No.	52.0
Object side NA	0.077
WD	65mm
OI	180mm
Depth of field	0.07mm
Resolution	4.36 μ
TV distortion	0.20%
Maximum Compatible sensor	2/3
Mount	C

* Indicated specifications are design values. * Resolution is calculated based on MTF.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

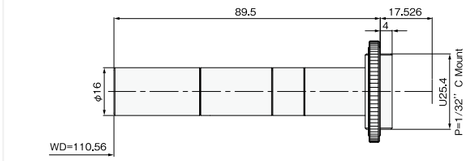
TL Series

WD110 Built-in type Telecentric Lens Series

Long WD: 110mm　Compact and suitable for customized optical systems

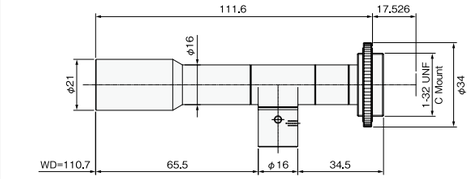
- ϕ16mm telecentric lens
- TL-**"R" type is improved contrast and relative illumination.

TL20-110R



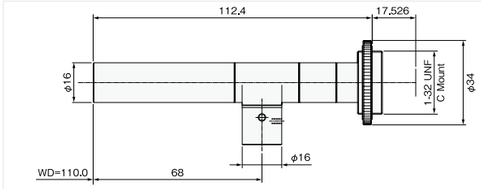
Magnification	2×	Depth of field	0.67mm
F No.	33.45	Resolution	11.2μ
Object side NA	0.03	TV distortion	-0.03%
WD	110mm	Maximum Compatible sensor	1/2
OI	218mm	Mount	C

TL08C-110R



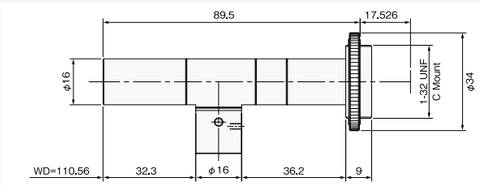
Magnification	0.8×	Depth of field	2.09mm
F No.	16.7	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	111mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

TL10C-110R



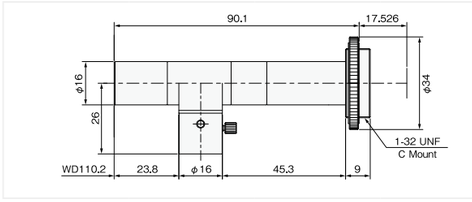
Magnification	1×	Depth of field	1.67mm
F No.	20.9	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

TL20C-110R



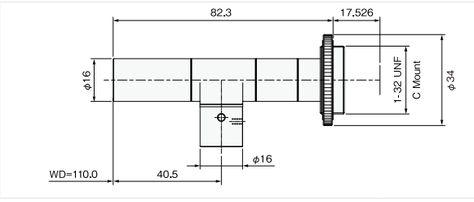
Magnification	2×	Depth of field	0.67mm
F No.	33.45	Resolution	11.2μ
Object side NA	0.03	TV distortion	-0.03%
WD	110mm	Maximum Compatible sensor	1/2
OI	218mm	Mount	C

TL30C-110



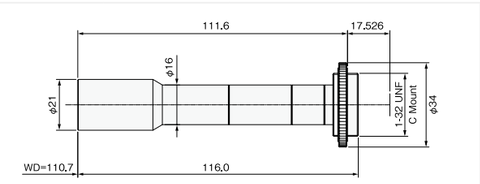
Magnification	3×	Depth of field	0.27mm
F No.	30.4	Resolution	6.8μ
Object side NA	0.049	TV distortion	0.06%
WD	110mm	Maximum Compatible sensor	2/3
OI	218mm	Mount	C

TL40C-110R



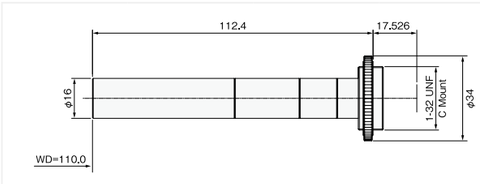
Magnification	4×	Depth of field	0.22mm
F No.	44.4	Resolution	7.5μ
Object side NA	0.045	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	210mm	Mount	C

TL08-110R



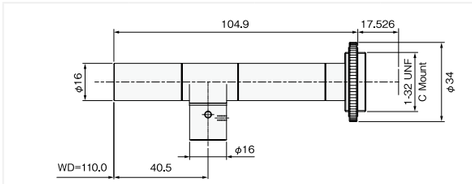
Magnification	0.8×	Depth of field	2.09mm
F No.	16.7	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	111mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

TL10-110R



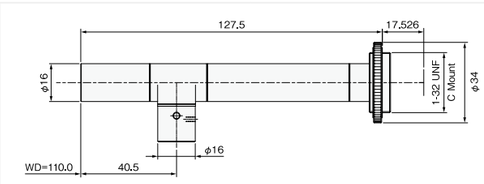
Magnification	1×	Depth of field	1.67mm
F No.	20.9	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

TL60C-110R



Magnification	6×	Depth of field	0.15mm
F No.	66.7	Resolution	7.5μ
Object side NA	0.045	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	232mm	Mount	C

TL80C-110R



Magnification	8×	Depth of field	0.11mm
F No.	88.9	Resolution	7.5μ
Object side NA	0.045	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	255mm	Mount	C

* Indicated specifications are design values.　* Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

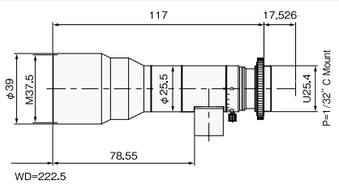
TL Series

WD220 Built-in type Telecentric Lens Series

Long WD: 220mm High resolution and compact design

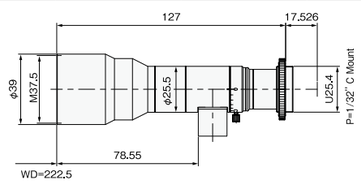
- Suitable for various applications, alignment, inspection, measurement, etc..
- Adjustable iris for 0.5x and 0.7x
- Compatible with 2 Mega Pixel of 1/1.8 inch

TL05C-220



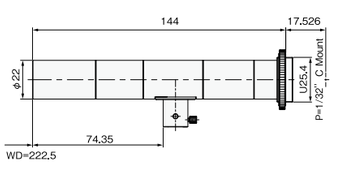
Magnification	0.5x	Depth of field	2.17mm
F No.	6.79	Resolution	9.1 μ
Object side NA	0.037	TV distortion	0.02%
WD	222mm	Maximum Compatible sensor	1/1.8
OI	357mm	Mount	C

TL07C-220



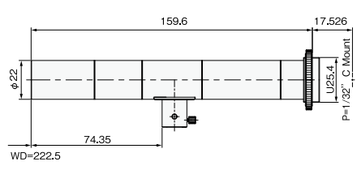
Magnification	0.7x	Depth of field	1.55mm
F No.	9.50	Resolution	9.1 μ
Object side NA	0.037	TV distortion	0.02%
WD	222mm	Maximum Compatible sensor	1/1.8
OI	367mm	Mount	C

TL10C-220



Magnification	1x	Depth of field	1.07mm
F No.	13.35	Resolution	9.0 μ
Object side NA	0.037	TV distortion	0.00%
WD	222mm	Maximum Compatible sensor	1/1.8
OI	384mm	Mount	C

TL20C-220



Magnification	2x	Depth of field	0.53mm
F No.	26.42	Resolution	8.8 μ
Object side NA	0.038	TV distortion	0.04%
WD	222mm	Maximum Compatible sensor	1/1.8
OI	400mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

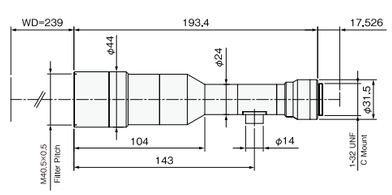
TL Series

WD240 High Magnification Telecentric Lens for Long WD

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

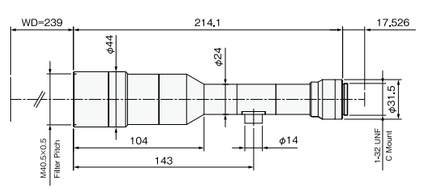
- Suitable for alignment, inspection, and other various applications
- 4, 6, 8, and 10x are available
- All models are designed for co-axial illumination

TL40C-240



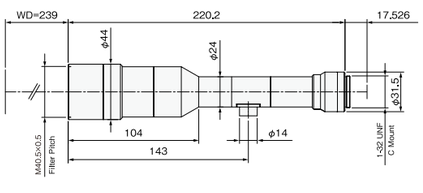
Magnification	4x	Depth of field	0.14mm
F No.	28.6	Resolution	4.8 μ
Object side NA	0.07	TV distortion	0.22%
WD	239mm	Maximum Compatible sensor	2/3
OI	450.0mm	Mount	C

TL60C-240



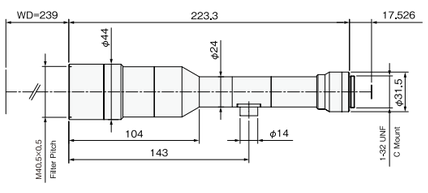
Magnification	6x	Depth of field	0.1mm
F No.	42.9	Resolution	4.8 μ
Object side NA	0.07	TV distortion	0.0%
WD	239mm	Maximum Compatible sensor	2/3
OI	470.6mm	Mount	C

TL80C-240



Magnification	8x	Depth of field	0.07mm
F No.	57.1	Resolution	4.8 μ
Object side NA	0.07	TV distortion	0.03%
WD	239mm	Maximum Compatible sensor	2/3
OI	476.7mm	Mount	C

TL100C-240



Magnification	10x	Depth of field	0.06mm
F No.	71.4	Resolution	4.8 μ
Object side NA	0.07	TV distortion	0.32%
WD	239mm	Maximum Compatible sensor	2/3
OI	479.8mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

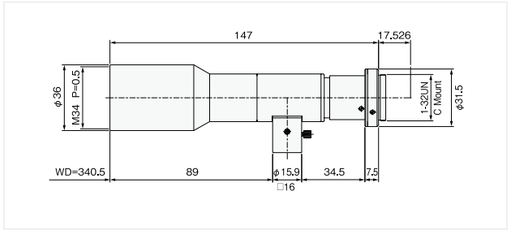
TL Series

WD300 Telecentric Lens for Long WD

Suitable for applications required for long WD

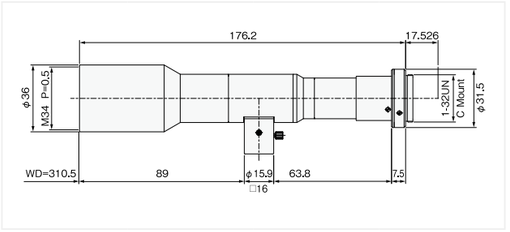
- LONG WD, over 300mm
- TL10C-310 is compatible with 2/3 inch
- TV distortion is less than 0.00%

TL07C-340



Magnification	0.7x	Depth of field	1.9mm
F No.	11.6	Resolution	11.2μ
Object side NA	0.03	TV distortion	0.00%
WD	341mm	Maximum Compatible sensor	1/1.8
OI	506mm	Mount	C

TL10C-310



Magnification	1.0x	Depth of field	1.2mm
F No.	15.5	Resolution	10.5μ
Object side NA	0.032	TV distortion	0.00%
WD	311mm	Maximum Compatible sensor	2/3
OI	505mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).

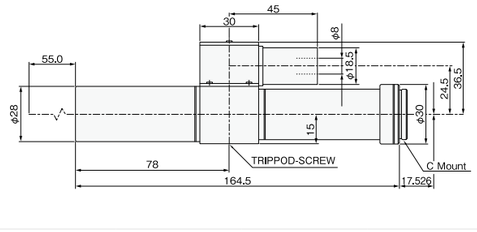
TL Series

10x Telecentric Lens

High resolution, possible to use in limited space

- Magnification of 10x, similar to microscopic range for machine vision applications
- Compact design with high resolution

TL100C-55



Magnification	10x	Depth of field	0.023mm
F No.	29.7	Resolution	2μ
Object side NA	0.17	TV distortion	0.02%
WD	55mm	Maximum Compatible sensor	1/1.8
OI	237mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2 inch camera (permissible circle of confusion 40μ).