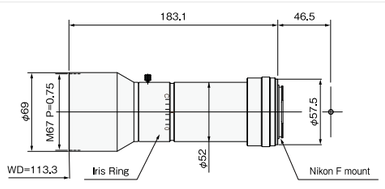
LSTL-H Series

High Resolution Telecentric Lens for ϕ 44mm Sensor

The highest NA in the optical industry

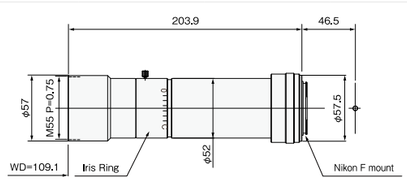
- Telecentric lens for large format, ϕ44mm
- Suitable for large area sensor of high resolution, 12 Mega, 16 Mega, and 29 Mega
- Design for large aperture
- Excellent uniformity of brightness and resolution
- Suitable for high speed and precise measurement
- Adjustable iris, possible to adjust depth of field
- M58 and M42 mount are also available

LSTL10H-F



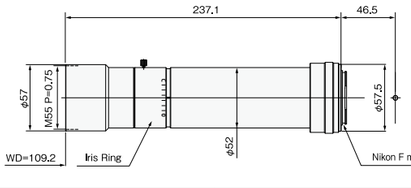
Magnification	1.0×	Resolution	4.3μ
WD	113mm	Optical distortion	0.01%
Depth of field	0.31mm	Maximum Compatible sensor	ϕ44mm
F No.	6.4	Mount	F

LSTL15H-F



Magnification	1.5×	Resolution	3.5μ
WD	109mm	Optical distortion	0.02%
Depth of field	0.17mm	Maximum Compatible sensor	ϕ44mm
F No.	7.8	Mount	F

LSTL20H-F



Magnification	2.0×	Resolution	2.9μ
WD	109mm	Optical distortion	-0.02%
Depth of field	0.12mm	Maximum Compatible sensor	ϕ44mm
F No.	8.7	Mount	F

Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Back Focal Distance
LSTL□□H-V58	SVS: SVCam-HR	M58 (P = 0.75)	11.48mm
LSTL□□H-B42	Basler	M42 (P = 1)	16mm
LSTL□□H-B42/2	Basler	M42 (P = 0.75)	16mm
LSTL□□H-V42	SVS	M42 (P = 1)	11.48mm
LSTL□□H-S42	Sentech	M42 (P = 1)	10mm
LSTL□□H-D42	Dalsa: Spyder 3	M42 (P = 1)	6.56mm

* Customized mount is also available. Please contact us for further information.

* Indicated specifications are design values. * Resolution indicates the theoretical resolution at wavelength of 550nm.
* Depth of field is calculated assuming F No.(∞) 5.6 and resolution of 14μ camera. * Drawing is for F mount.

LSTL-TW Series

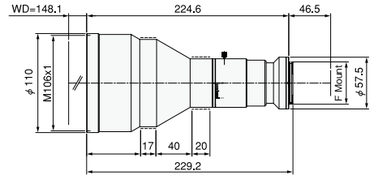
NEW

Telecentric Lens for Large Format, ϕ 28mm Sensor

Suitable for middle-sized line and large area sensor

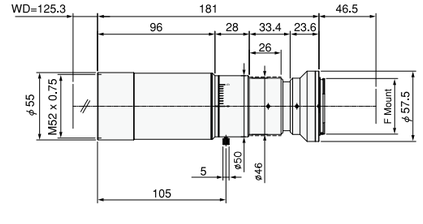
- Low Magnification Telecentric lens series for large format
- Minimize focus shift at different wavelength
- LSTL078TW-F is suitable for visible – NIR
- LSTL03TW-F is designed for long working distance, 150mm
- Adjustable iris, possible to adjust depth of field
- Customized mount is available

NEW LSTL03TW-F



Magnification	0.3×	Depth of field	8.6mm
F No.	9.7	Resolution	22.4μ
Object side NA	0.015	TV distortion	0.01%
WD	148.1mm	Maximum Compatible sensor	ϕ28.2mm
OI	419.2mm	Mount	F

NEW LSTL078TW-F



Magnification	0.78×	Depth of field	1.3mm
F No.	9.8	Resolution	8.4μ
Object side NA	0.04	TV distortion	0.00%
WD	125.3mm	Maximum Compatible sensor	ϕ28.2mm
OI	352.8mm	Mount	F

* 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" camera (permissible circle of confusion 40μ).

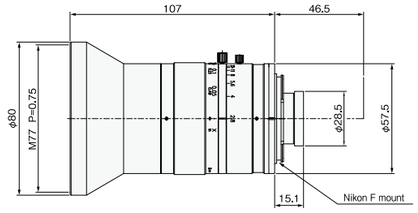
LSF Series

High Resolution and Wide Angle Lens for Area and Line Scan Camera

Excellent relative illumination High resolution at whole working distance

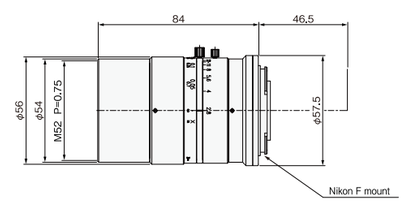
- Design for high resolution and low distortion, stable performance at whole working distance
- Possible to use for small pixel size, 3.5 μ line scan camera
- Very low color aberration, compatible with 3-line camera
- 「LSF5028-F」 is possible to use at 0.3x without extension ring
- Wide angle, f25mm is available
- Suitable for large area sensor, 12 Mega, 16 Mega, and 29 Mega

LSF2528-F



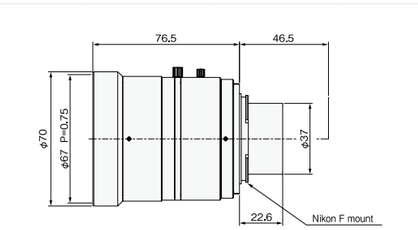
Focal length	25mm	Optical distortion	0.66%
∞F No.	2.8	Maximum Compatible sensor	ϕ44mm
Range of WD	140mm - ∞	Mount	F
Magnification at MOD	0.15×		

LSF3528-F



Focal length	35mm	Optical distortion	-0.31%
∞F No.	2.8	Maximum Compatible sensor	ϕ44mm
Range of WD	230mm - ∞	Mount	F
Magnification at MOD	0.15×		

LSF5028-F



Focal length	50mm	Optical distortion	-0.40%
∞F No.	2.8	Maximum Compatible sensor	ϕ44mm
Range of WD	190mm - ∞	Mount	F
Magnification at MOD	0.3×		

* Indicated specifications are design value.

Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Back Focal Distance
LSF □□□□-V58	SVS: SVCam-HR	M58 (P = 0.75)	11.48mm
LSF □□□□-B42	Basler	M42 (P = 1)	16mm
LSF □□□□-B42/2	Basler	M42 (P = 0.75)	16mm
LSF □□□□-V42	SVS	M42 (P = 1)	11.48mm
LSF □□□□-S42	Sentech	M42 (P = 1)	10mm
LSF □□□□-D42	Dalsa: Spyder 3	M42 (P = 1)	6.56mm

* Customized mount is also available. Please contact us for further information.

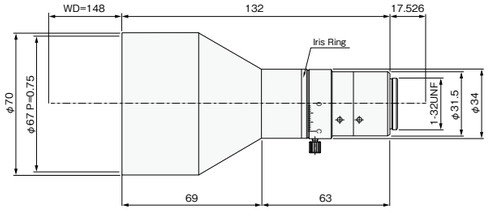
MGTL-V Series

Telecentric Lens for 1”

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

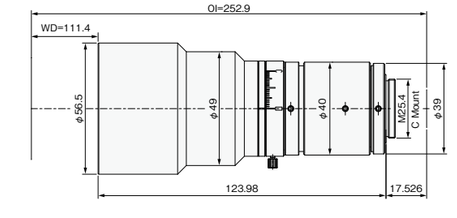
- Over 4 mega pixel telecentric lens series for 1”
- 0.275x and 0.37x are available
- MGTL0275V is designed for long working distance, 148mm
- Excellent relative illumination
- Adjustable iris, possible to adjust depth of field

MGTL0275V



Magnification	0.275×	Depth of field	7.2mm
F No.	6.8	Resolution	16.8μ
Object side NA	0.02	TV distortion	0.01%
WD	148mm	Maximum Compatible sensor	1
OI	298mm	Mount	C

MGTL037V



Magnification	0.37×	Depth of field	4.7mm
F No.	8	Resolution	14.6μ
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" camera (permissible circle of confusion 40μ).

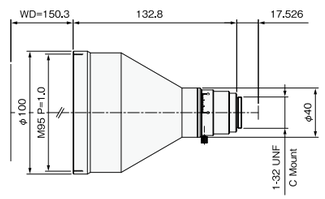
MGTL Series

Low Magnification Telecentric Lens for 5 Mega Pixel

Possible to capture large field of view with high resolution

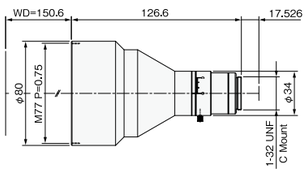
- Bring out the best quality in 5 mega pixel (3.45 μ of 2/3")
- 0.14x, 0.17x, 0.22x are available
- Long working distance, WD150mm
- Compact design with low magnification
- Adjustable iris, possible to adjust depth of field

MGTL014VM



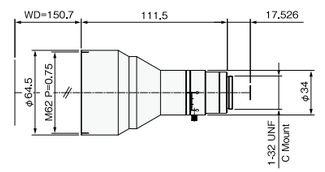
Magnification	0.14x	Depth of field	17.5mm
F No.	4.3	Resolution	20.5μ
Object side NA	0.016	TV distortion	0.01%
WD	150.3mm	Maximum Compatible sensor	2/3
OI	300.6mm	Mount	C

MGTL017VM



Magnification	0.17x	Depth of field	14.4mm
F No.	5.2	Resolution	20.5μ
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	15.8μ
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" camera (permissible circle of confusion 40μ).

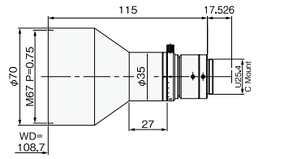
MGTL Series

Telecentric Lens for 5 Mega Pixel

Suitable for the inspection in ultra high accuracy

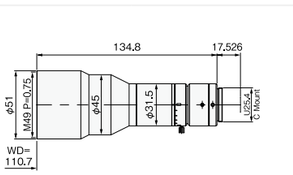
- Bring out the best quality in 5 mega pixel (3.45 μ of 2/3")
- Excellent brightness, compared to mega pixel telecentric lenses
- Adjustable iris, possible to adjust depth of field
- 1.0x is compatible with 1.1" sensor
- Compact design
- Reduce hot spots of co-axial illumination

MGTL023H



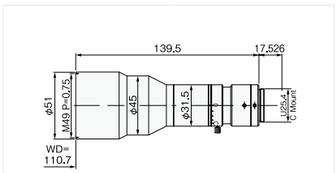
Magnification	0.23x
F No.	5.2
Object side NA	0.022
WD	109mm
OI	241mm
Depth of field	7.9mm
Resolution	8.7 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL03VM



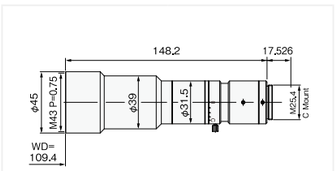
Magnification	0.3x
F No.	5.0
Object side NA	0.03
WD	111mm
OI	263mm
Depth of field	4.4mm
Resolution	6.6 μ
TV distortion	-0.04%
Maximum Compatible sensor	2/3
Mount	C

MGTL0345VM



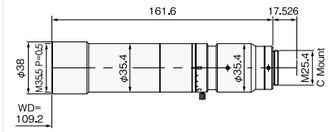
Magnification	0.345x
F No.	4.9
Object side NA	0.035
WD	111mm
OI	267mm
Depth of field	3.3mm
Resolution	5.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL04VM



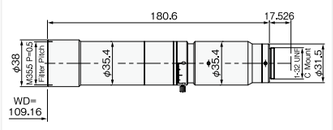
Magnification	0.4x
F No.	5.0
Object side NA	0.04
WD	109mm
OI	275mm
Depth of field	2.5mm
Resolution	4.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL05VM



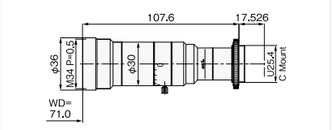
Magnification	0.5x
F No.	4.7
Object side NA	0.05
WD	109mm
OI	288mm
Depth of field	2.3mm
Resolution	3.8 μ
TV distortion	-0.03%
Maximum Compatible sensor	2/3
Mount	C

MGTL069VM



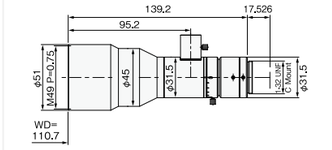
Magnification	0.69x
F No.	6.6
Object side NA	0.052
WD	109mm
OI	307mm
Depth of field	1.1mm
Resolution	3.9 μ
TV distortion	-0.04%
Maximum Compatible sensor	2/3
Mount	C

MGTL10V



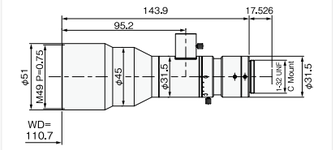
Magnification	1.0x
F No.	5.4
Object side NA	0.093
WD	71mm
OI	196mm
Depth of field	0.43mm
Resolution	2.5 μ
TV distortion	0.00%
Maximum Compatible sensor	1.1
Mount	C

MGTL03VMC



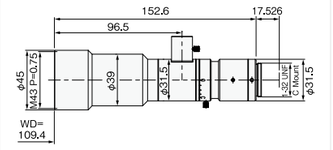
Magnification	0.3x
F No.	5.0
Object side NA	0.03
WD	111mm
OI	267mm
Depth of field	4.4mm
Resolution	6.6 μ
TV distortion	-0.04
Maximum Compatible sensor	2/3
Mount	C

MGTL0345VMC



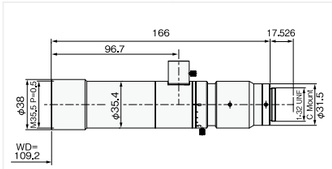
Magnification	0.345x
F No.	4.9
Object side NA	0.035
WD	111mm
OI	272mm
Depth of field	3.3mm
Resolution	5.5 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL04VMC



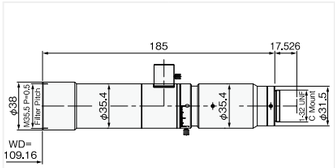
Magnification	0.4x
F No.	5.0
Object side NA	0.04
WD	109mm
OI	280mm
Depth of field	2.5mm
Resolution	4.9 μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

MGTL05VMC



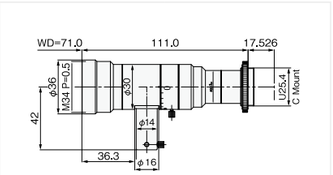
Magnification	0.5x
F No.	4.7
Object side NA	0.05
WD	109mm
OI	293mm
Depth of field	2.3mm
Resolution	3.8 μ
TV distortion	-0.03%
Maximum Compatible sensor	2/3
Mount	C

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" camera (permissible circle of confusion 40μ).

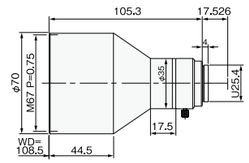
MGTL Series

Mega Pixel Telecentric Lens

Suitable for Mega Pixel Sensor

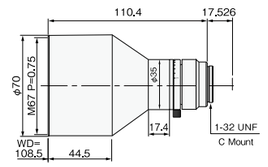
- High resolution, compatible with mega pixel camera
- Compact design, suitable for small device
- MGTL05-1.1 is compatible with 1.1”
- MGTL0275 is compatible with ϕ 12.8mm sensor
- Adjustable iris, possible to adjust depth of field
- TV distortion less than 0.05%

MGTL014



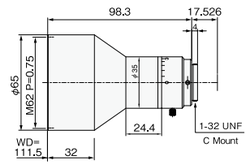
Magnification	0.14x	Depth of field	32.7mm
F No.	4.0	Resolution	19.7μ
Object side NA	0.017	TV distortion	0.02%
WD	108mm	Maximum Compatible sensor	1/2
OI	231mm	Mount	C

MGTL019



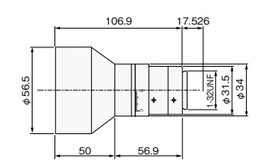
Magnification	0.19x	Depth of field	17.7mm
F No.	4.0	Resolution	14.0μ
Object side NA	0.024	TV distortion	0.01%
WD	108mm	Maximum Compatible sensor	2/3
OI	236mm	Mount	C

MGTL023



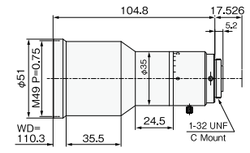
Magnification	0.23x	Depth of field	12mm
F No.	5.5	Resolution	16.0μ
Object side NA	0.021	TV distortion	0.01%
WD	111mm	Maximum Compatible sensor	2/3
OI	227mm	Mount	C

NEW MGTL0275



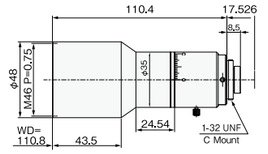
Magnification	0.275×	Depth of field	8.1mm
F No.	7.6	Resolution	18.6μ
Object side NA	0.018	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	2/3
OI	234mm	Mount	C

MGTL03



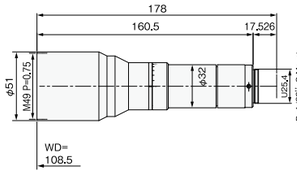
Magnification	0.3x	Depth of field	6.2mm
F No.	7.0	Resolution	16.0μ
Object side NA	0.021	TV distortion	0.05%
WD	110mm	Maximum Compatible sensor	2/3
OI	233mm	Mount	C

MGTL04



Magnification	0.4x	Depth of field	4.6mm
F No.	9.2	Resolution	15.2μ
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	8.6μ
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" camera (permissible circle of confusion 40μ).
* Depth of field of MGTL014, 019, and 023 indicate values at effective F No. 8

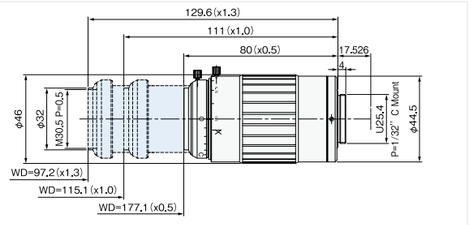
VTL Series

Vari Focal Telecentric Lens

Telecentric lens at the whole range of magnifications (0.5x - 1.3x)
Possible to change magnification range by using front converter

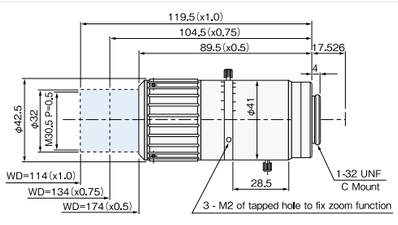
- Telecenric lens at the whole range of magnification
- Suitable for 5 mega pixel camera
- Magnification of VTL0513 can be converted from 0.25x - 2.6x by using front converter
- Reduce relative illumination
- TV distortion less than 0.01%
- VTL0513 is suitable for large format, up to 1.1" even though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

VTL0513



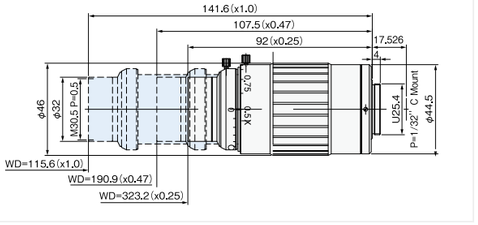
Magnification	0.5x - 1.3x	Depth of field	1.68mm - 0.47mm
F No.	5.26 - 10	Resolution	4.2 μ - 2.9 μ
Object side NA	0.048 - 0.065	TV distortion	0.01%
WD	173mm - 97mm	Maximum Compatible sensor	2/3
OI	271mm - 244mm	Mount	C

VTL0510



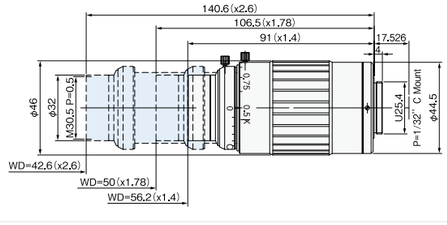
Magnification	0.5x - 1.0x	Depth of field	1.20mm - 0.47mm
F No.	3.76 - 5.89	Resolution	7.4 μ - 5 μ
Object side NA	0.066 - 0.085	TV distortion	0.01%
WD	174mm - 114mm	Maximum Compatible sensor	1/1.8
OI	281mm - 251mm	Mount	C

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" camera (permissible circle of confusion 40μ).

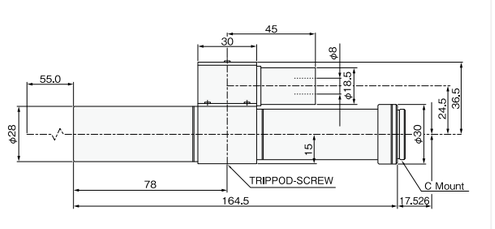
TL Series

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	2 μ
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" camera (permissible circle of confusion 40μ).

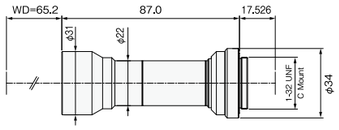
FT Series

WD65 High NA　Mega Pixel Telecentric Lens

Design for Mega Pixel　Compact and high durability

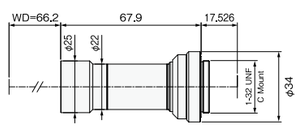
- Mega pixel telecentric lens for 2/3”
- Suitable for 2 mega - 5 mega pixel camera
- High contrast with co-axial illumination
- TV distortion less than 0.01%

FT05-65



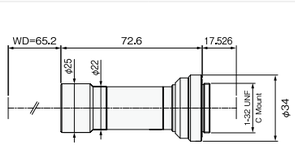
Magnification	0.5×	Depth of field	3.1mm
F No.	9.6	Resolution	12.9μ
Object side NA	0.026	TV distortion	0.00%
WD	65mm	Maximum Compatible sensor	2/3
OI	170mm	Mount	C

FT08-65



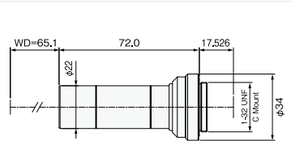
Magnification	0.8×	Depth of field	1.3mm
F No.	10	Resolution	8.4μ
Object side NA	0.04	TV distortion	0.00%
WD	66mm	Maximum Compatible sensor	2/3
OI	152mm	Mount	C

FT10-65



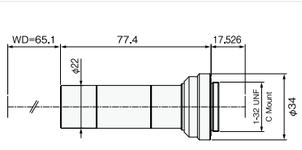
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	65mm
OI	155mm
Depth of field	0.9mm
Resolution	7.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15-65



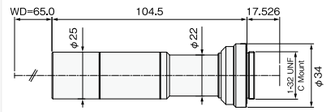
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	65mm
OI	155mm
Depth of field	0.4mm
Resolution	5.3μ
TV distortion	0.01%
Maximum Compatible sensor	2/3
Mount	C

FT20-65



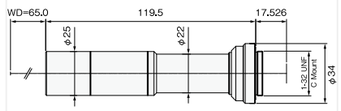
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	65m
OI	160mm
Depth of field	0.3mm
Resolution	4.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT40-65



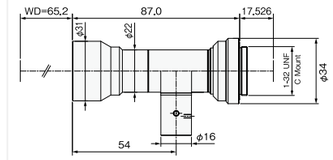
Magnification	4.0×
F No.	17.8
Object side NA	0.11
WD	65mm
OI	187mm
Depth of field	0.09mm
Resolution	3.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT60-65



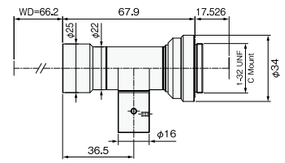
Magnification	6.0×
F No.	26.8
Object side NA	0.11
WD	65mm
OI	202mm
Depth of field	0.06mm
Resolution	3.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT05C-65



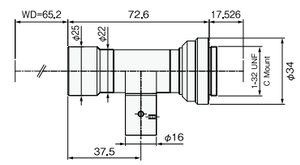
Magnification	0.5×
F No.	9.6
Object side NA	0.026
WD	65mm
OI	170mm
Depth of field	3.1mm
Resolution	12.9μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT08C-65



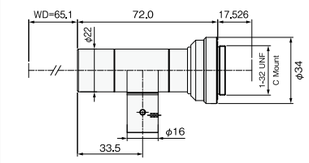
Magnification	0.8×
F No.	10
Object side NA	0.04
WD	66mm
OI	152mm
Depth of field	1.3mm
Resolution	8.4μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT10C-65



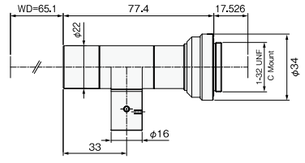
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	65mm
OI	155mm
Depth of field	0.9mm
Resolution	7.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15C-65



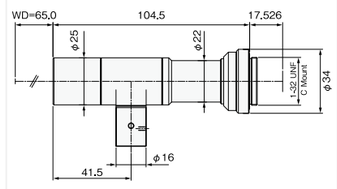
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	65mm
OI	155mm
Depth of field	0.4mm
Resolution	5.3μ
TV distortion	0.01%
Maximum Compatible sensor	2/3
Mount	C

FT20C-65



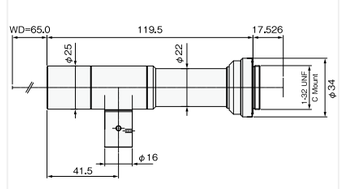
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	65m
OI	160mm
Depth of field	0.3mm
Resolution	4.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

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" camera (permissible circle of confusion 40μ).

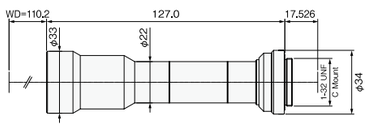
FT Series

WD110 High NA Mega Pixel Telecentric Lens

Design for Mega Pixel Compact and high durability

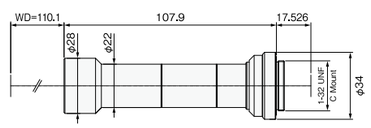
- Mega pixel telecentric lens for 2/3”
- Suitable for 2 mega - 5 mega pixel camera
- High contrast with co-axial illumination
- TV distortion less than 0.01%

FT05-110



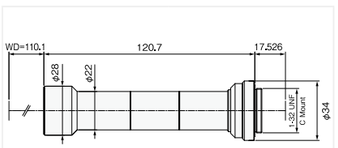
Magnification	0.5×	Depth of field	3.1mm
F No.	9.6	Resolution	12.9μ
Object side NA	0.026	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	2/3
OI	255mm	Mount	C

FT08-110



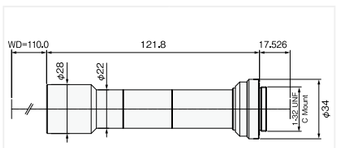
Magnification	0.8×	Depth of field	1.4mm
F No.	11.1	Resolution	9.3μ
Object side NA	0.036	TV distortion	0.01%
WD	110mm	Maximum Compatible sensor	2/3
OI	236mm	Mount	C

FT10-110



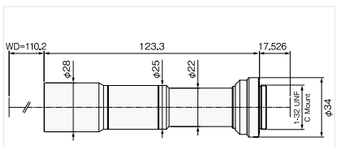
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	110mm
OI	248mm
Depth of field	0.9mm
Resolution	7.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15-110



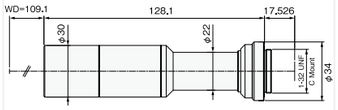
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	110mm
OI	249mm
Depth of field	0.4mm
Resolution	5.3μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT20-110



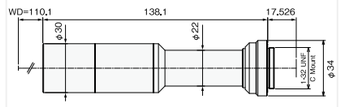
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	110mm
OI	251mm
Depth of field	0.3mm
Resolution	4.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT40-110



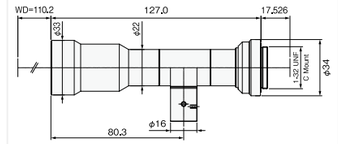
Magnification	4.0×
F No.	22.2
Object side NA	0.09
WD	109mm
OI	255mm
Depth of field	0.11mm
Resolution	3.7μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT60-110



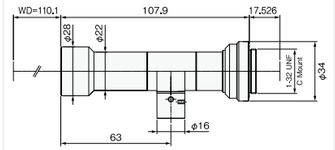
Magnification	6.0×
F No.	33.3
Object side NA	0.09
WD	110mm
OI	266mm
Depth of field	0.07mm
Resolution	3.7μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT05C-110



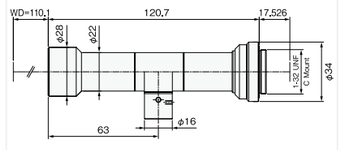
Magnification	0.5×
F No.	9.6
Object side NA	0.026
WD	110mm
OI	255mm
Depth of field	3.1mm
Resolution	12.9μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT08C-110



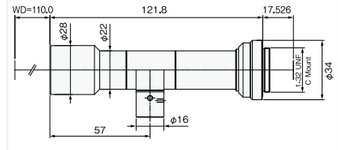
Magnification	0.8×
F No.	11.1
Object side NA	0.036
WD	110mm
OI	236mm
Depth of field	1.4mm
Resolution	9.3μ
TV distortion	0.01%
Maximum Compatible sensor	2/3
Mount	C

FT10C-110



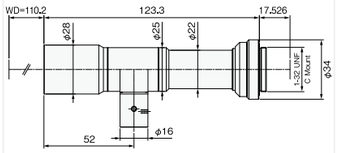
Magnification	1.0×
F No.	11.1
Object side NA	0.045
WD	110mm
OI	248mm
Depth of field	0.9mm
Resolution	7.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT15C-110



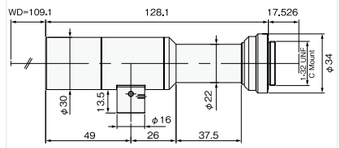
Magnification	1.5×
F No.	11.9
Object side NA	0.063
WD	110mm
OI	249mm
Depth of field	0.4mm
Resolution	5.3μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT20C-110



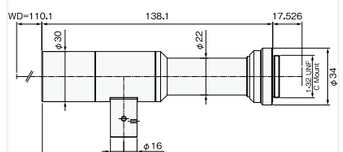
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	110mm
OI	251mm
Depth of field	0.3mm
Resolution	4.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT40C-110



Magnification	4.0×
F No.	22.2
Object side NA	0.09
WD	109mm
OI	255mm
Depth of field	0.11mm
Resolution	3.7μ
TV distortion	0.00%
Maximum Compatible sensor	2/3
Mount	C

FT60C-110



Magnification	6.0×
F No.	33.3
Object side NA	0.09
WD	110mm
OI	266mm
Depth of field	0.07mm
Resolution	3.7μ
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" camera (permissible circle of confusion 40μ).

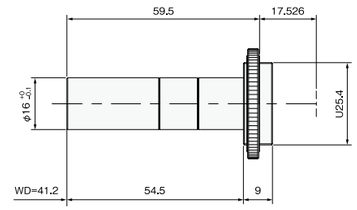
TL Series

WD40 Built-in type Telecentric Lens Series

Short WD: WD40mm　Suitable for small device and limited space

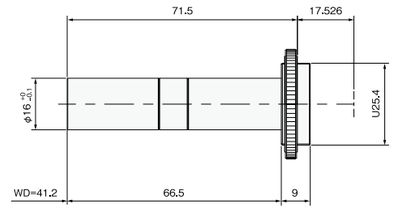
- ϕ16mm telecentric lens
- Suitable for bonding, chip mounter, etc..

TL60-40



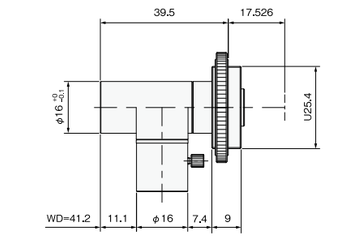
Magnification	6x	Depth of field	0.09mm
F No.	41.6	Resolution	4.7μ
Object side NA	0.072	TV distortion	-0.10%
WD	40mm	Maximum Compatible sensor	1/2
OI	118mm	Mount	C

TL80-40



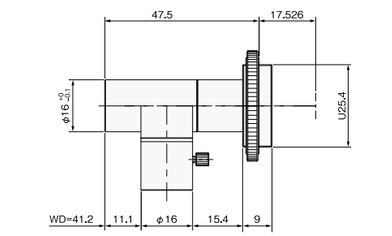
Magnification	8x	Depth of field	0.07mm
F No.	54.8	Resolution	4.6μ
Object side NA	0.073	TV distortion	0.11%
WD	40mm	Maximum Compatible sensor	1/2
OI	130mm	Mount	C

TL20C-40



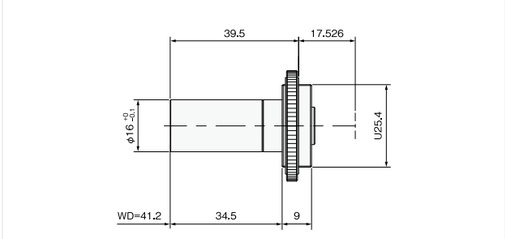
Magnification	2x	Depth of field	0.28mm
F No.	14.1	Resolution	4.7μ
Object side NA	0.071	TV distortion	0.13%
WD	40mm	Maximum Compatible sensor	1/2
OI	98mm	Mount	C

TL40C-40



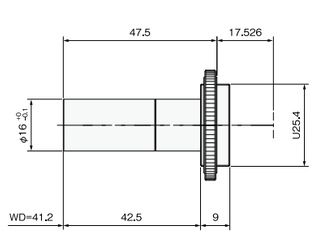
Magnification	4x	Depth of field	0.14mm
F No.	28.2	Resolution	4.7μ
Object side NA	0.071	TV distortion	-0.19%
WD	40mm	Maximum Compatible sensor	1/2
OI	106mm	Mount	C

TL20-40



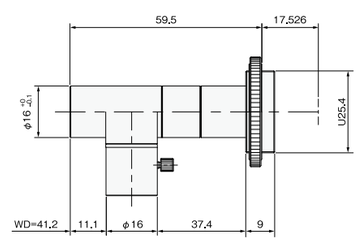
Magnification	2x	Depth of field	0.28mm
F No.	14.1	Resolution	4.7μ
Object side NA	0.071	TV distortion	0.13%
WD	40mm	Maximum Compatible sensor	1/2
OI	98mm	Mount	C

TL40-40



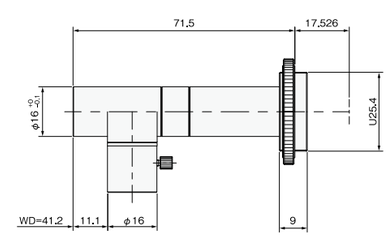
Magnification	4x	Depth of field	0.14mm
F No.	28.2	Resolution	4.7μ
Object side NA	0.071	TV distortion	-0.19%
WD	40mm	Maximum Compatible sensor	1/2
OI	106mm	Mount	C

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" camera (permissible circle of confusion 40μ).

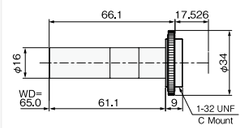
TL Series

WD65 Built-in type Telecentric Lens Series

Middle WD: WD65mm Short OI and High NA

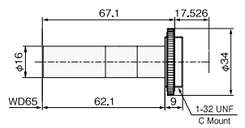
- ϕ16mm telecentric lens
- TL-**"R" type is improved contrast and relative illumination.

TL30-65



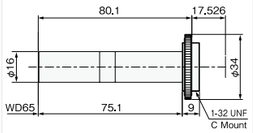
Magnification	3x
F No.	19.9
Object side NA	0.075
WD	65mm
OI	149mm
Depth of field	0.18mm
Resolution	4.47 μ
TV distortion	0.15%
Maximum Compatible sensor	2/3
Mount	C

TL40-65



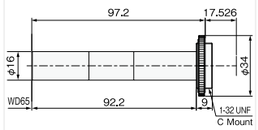
Magnification	4x
F No.	26.0
Object side NA	0.077
WD	65mm
OI	150mm
Depth of field	0.13mm
Resolution	4.36 μ
TV distortion	0.30%
Maximum Compatible sensor	2/3
Mount	C

TL60-65



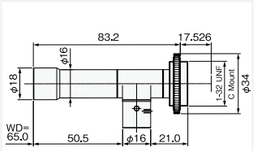
Magnification	6x
F No.	39.0
Object side NA	0.077
WD	65mm
OI	163mm
Depth of field	0.09mm
Resolution	4.36 μ
TV distortion	0.33%
Maximum Compatible sensor	2/3
Mount	C

TL80-65



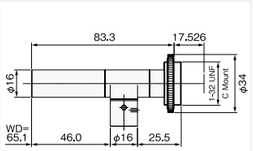
Magnification	8x
F No.	52.0
Object side NA	0.077
WD	65mm
OI	180mm
Depth of field	0.07mm
Resolution	4.36 μ
TV distortion	0.20%
Maximum Compatible sensor	2/3
Mount	C

TL08C-65R



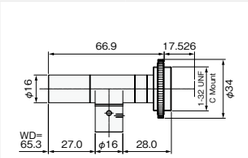
Magnification	0.8x
F No.	14.8
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.85mm
Resolution	12.3 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL10C-65R



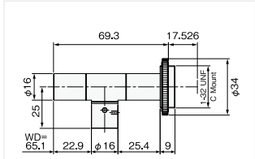
Magnification	1x
F No.	18.5
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.48mm
Resolution	12.4 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL15C-65R



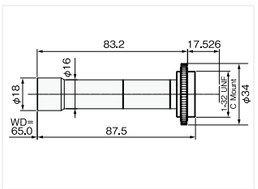
Magnification	1.5x
F No.	16.0
Object side NA	0.047
WD	65mm
OI	150mm
Depth of field	0.57mm
Resolution	7.22 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL20C-65R



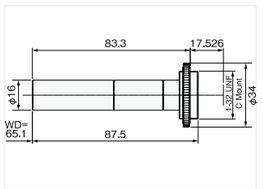
Magnification	2x
F No.	16.7
Object side NA	0.06
WD	65mm
OI	152mm
Depth of field	0.33mm
Resolution	5.6 μ
TV distortion	-0.01%
Maximum Compatible sensor	1/2
Mount	C

TL08-65R



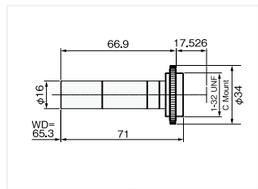
Magnification	0.8x
F No.	14.8
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.85mm
Resolution	12.3 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL10-65R



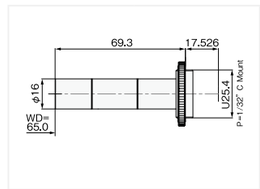
Magnification	1x
F No.	18.5
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.48mm
Resolution	12.4 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL15-65R



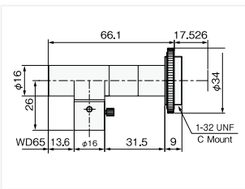
Magnification	1.5x
F No.	16.0
Object side NA	0.047
WD	65mm
OI	150mm
Depth of field	0.57mm
Resolution	7.22 μ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8
Mount	C

TL20-65R



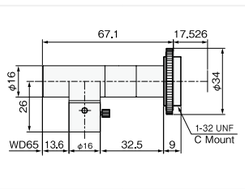
Magnification	2x
F No.	16.7
Object side NA	0.06
WD	65mm
OI	152mm
Depth of field	0.33mm
Resolution	5.6 μ
TV distortion	-0.01%
Maximum Compatible sensor	1/2
Mount	C

TL30C-65



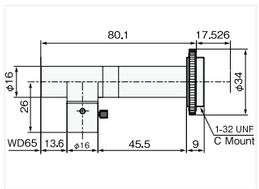
Magnification	3x
F No.	19.9
Object side NA	0.075
WD	65mm
OI	149mm
Depth of field	0.18mm
Resolution	4.47 μ
TV distortion	0.15%
Maximum Compatible sensor	2/3
Mount	C

TL40C-65



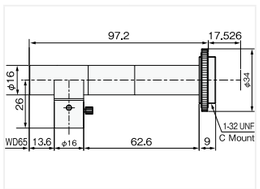
Magnification	4x
F No.	26.0
Object side NA	0.077
WD	65mm
OI	150mm
Depth of field	0.13mm
Resolution	4.36 μ
TV distortion	0.30%
Maximum Compatible sensor	2/3
Mount	C

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" camera (permissible circle of confusion 40μ).

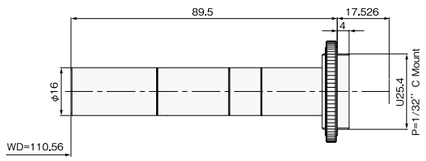
TL Series

WD110 Built-in type Telecentric Lens Series

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

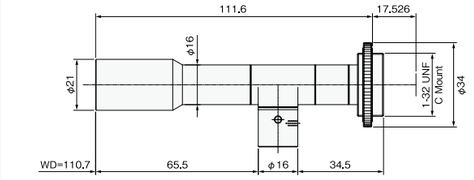
- ϕ16mm telecentric lens
- TL-**"R" type is improved contrast and relative illumination.

TL20-110R



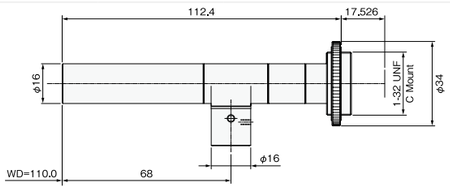
Magnification	2×	Depth of field	0.67mm
F No.	33.45	Resolution	11.2μ
Object side NA	0.03	TV distortion	-0.03%
WD	110mm	Maximum Compatible sensor	1/2
OI	218mm	Mount	C

TL08C-110R



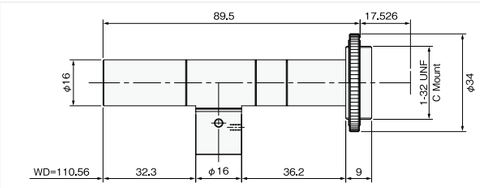
Magnification	0.8×	Depth of field	2.09mm
F No.	16.7	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	111mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

TL10C-110R



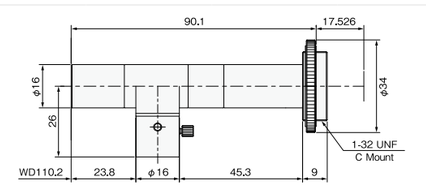
Magnification	1×	Depth of field	1.67mm
F No.	20.9	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

TL20C-110R



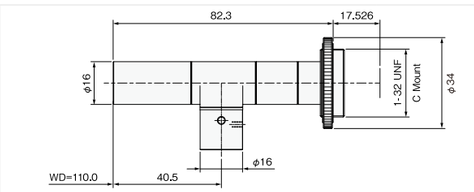
Magnification	2×	Depth of field	0.67mm
F No.	33.45	Resolution	11.2μ
Object side NA	0.03	TV distortion	-0.03%
WD	110mm	Maximum Compatible sensor	1/2
OI	218mm	Mount	C

TL30C-110



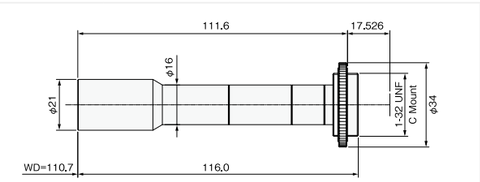
Magnification	3×	Depth of field	0.27mm
F No.	30.4	Resolution	6.8μ
Object side NA	0.049	TV distortion	0.06%
WD	110mm	Maximum Compatible sensor	2/3
OI	218mm	Mount	C

TL40C-110R



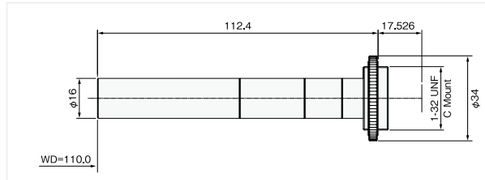
Magnification	4×	Depth of field	0.22mm
F No.	44.4	Resolution	7.5μ
Object side NA	0.045	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	210mm	Mount	C

TL08-110R



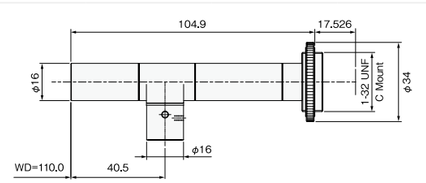
Magnification	0.8×	Depth of field	2.09mm
F No.	16.7	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	111mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

TL10-110R



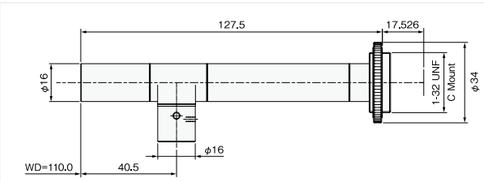
Magnification	1×	Depth of field	1.67mm
F No.	20.9	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8
OI	240mm	Mount	C

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" camera (permissible circle of confusion 40μ).

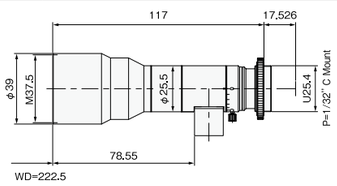
TL Series

WD220 Built-in type Telecentric Lens Series

Long WD: 220mm High resolution and compact design

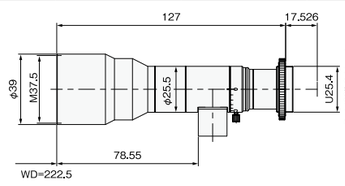
- Suitable for various applications, alignment, inspection, measurement, etc..
- Adjustable iris for 0.5x and 0.7x
- Compatible with 2 mega pixel of 1/1.8”

TL05C-220



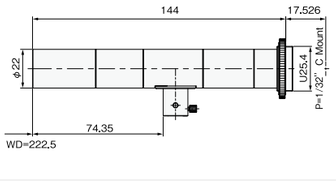
Magnification	0.5x	Depth of field	2.17mm
F No.	6.79	Resolution	9.1 μ
Object side NA	0.037	TV distortion	0.02%
WD	222mm	Maximum Compatible sensor	1/1.8
OI	357mm	Mount	C

TL07C-220



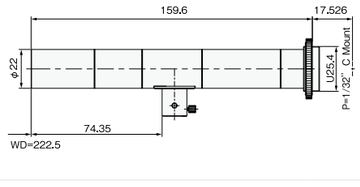
Magnification	0.7x	Depth of field	1.55mm
F No.	9.50	Resolution	9.1 μ
Object side NA	0.037	TV distortion	0.02%
WD	222mm	Maximum Compatible sensor	1/1.8
OI	367mm	Mount	C

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" camera (permissible circle of confusion 40μ).

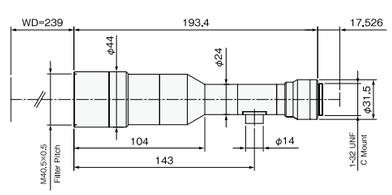
TL Series

WD240 High Magnification Telecentric Lens for Long WD

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

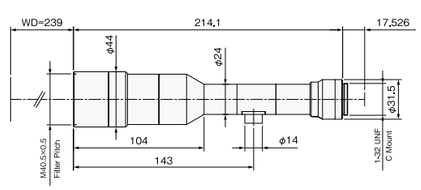
- Suitable for alignment, inspection, and other various applications
- 4, 6, 8, and 10x are available
- All models are designed for co-axial illumination

TL40C-240



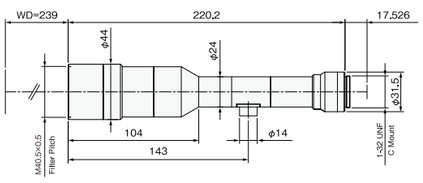
Magnification	4x	Depth of field	0.14mm
F No.	28.6	Resolution	4.8 μ
Object side NA	0.07	TV distortion	0.22%
WD	239mm	Maximum Compatible sensor	2/3
OI	450.0mm	Mount	C

TL60C-240



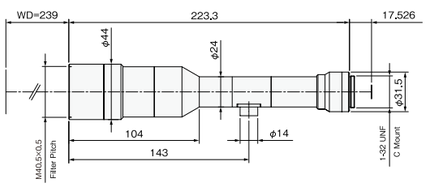
Magnification	6x	Depth of field	0.1mm
F No.	42.9	Resolution	4.8 μ
Object side NA	0.07	TV distortion	0.0%
WD	239mm	Maximum Compatible sensor	2/3
OI	470.6mm	Mount	C

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	479.8 mm	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" camera (permissible circle of confusion 40μ).

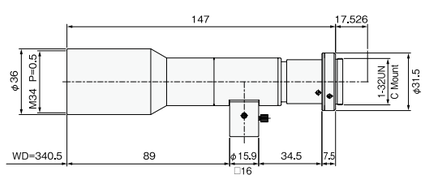
TL Series

WD300mm Telecentric Lens for Super Long WD

Suitable for applications required for super long WD

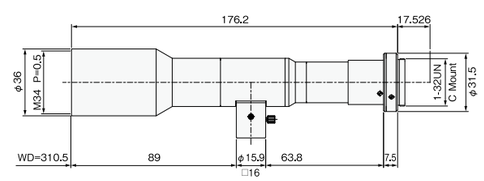
- Super long WD, over 300mm
- TL10C-310 is compatible with 2/3”
- TV distortion is less than 0.00%

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

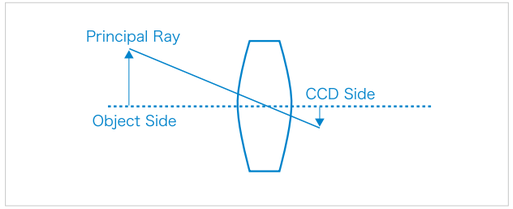
* Indicated specifications are design values. ＊Resolution indicates a theoretical resolution at a wavelength of 550nm.
*Depth of field is calculating assuming a horizontal 320 TV resolution using 1/2" camera (permissible circle of confusion 40μ).

Telecentric Lens for Image Processing

The most suitable optical system for measurement in high accuracy

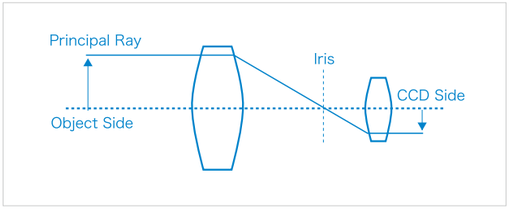
Telecentric optical system is an optical design that where the principal ray in parallel to the optical axis. It eliminates distortion problems by collimating the light entering the lens and suitable for imaging 3D objects. Co-axial illumination is suitable for recognizing object with high reflectance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

Non-telecentric lens



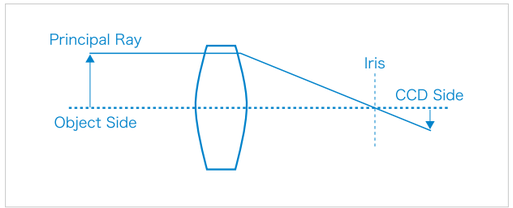
- Smaller size
- The number of lenses is fewer.
- Object size changes as the object goes up and down.

Double side telecentric lens



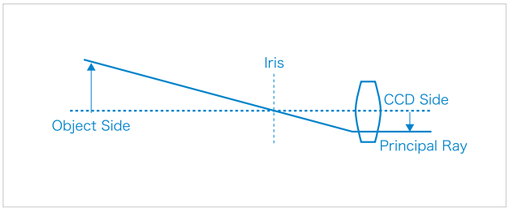
- Primary lays of object and image side are parallel to optical axis.
- Object size does not change when object goes up and down.
- Large size and high cost

Object side telecentric lens

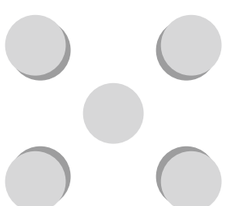


- Principal ray of object side is parallel to optical axis.
- Required for co-axial illumination
- Object size does not change when object goes up and down.
- Small size, compared to double side telecentric lens

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.