

LINE SENSOR LENS / LARGE AREA SENSOR LENS

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

Model No.	Image Circle	∞	0.3x	0.4x	0.5x	0.6x	0.7x	0.8x	0.9x	1x	1.5x	2x	3.5x	Page
LS05	φ36				188mm (0.5x)									P14
LS07	φ36						151mm (0.7x)							P14
LS10	φ36									123mm (1.0x)				P14
LS15	φ36										102mm (1.5x)			P14
LSTL10H-F	φ44									113mm (1.0x)				P16
LSTL15H-F	φ44										109mm (1.5x)			P16
LSTL20H-F	φ44											109mm (2.0x)		P16
SP05	φ62				276mm (0.5x)									P8
SP07	φ62						211mm (0.7x)							P8
SP10	φ62									165mm (1.0x)				P8
SP14	φ86										112mm (1.4x)			P8
SP20	φ100											90mm (2.0x)		P8
LSP350	φ62												100mm (3.5x)	P7
XLS03	φ90	680mm (0.2x)	477mm (0.3x)	376mm (0.4x)										P10
XLS05	φ90			386mm (0.4x)	324mm (0.5x)	274mm (0.625x)								P10
XLS075	φ90					279mm (0.625x)	246mm (0.75x)	222mm (0.875x)						P10
XLS10	φ90							215mm (0.875x)		197mm (1.0x)	177mm (1.2x)			P10
XLS14	φ90									185mm (1.2x)	170mm (1.4x)	154mm (1.7x)		P10
XLS20	φ90										157mm (1.7x)	146mm (2.0x)	133mm (2.5x)	P10

Display : WD (Magnification)

Model No.	Image Circle	∞	0.05x	0.1x	0.15x	0.2x	0.25x	0.3x	0.35x	0.4x	0.45x	0.5x	Page
LSF2528	φ44	1,000mm (0.025x)			142mm (0.15x)								P20
LSF3528	φ44	1,413mm (0.025x)			223mm (0.15x)								P20
LSF5028	φ44	2,064mm (0.025x)						163mm (0.3x)					P20
MS1828	φ30.7				100mm (0.15x)								P22
MS2524	φ30.7	999mm (0.025x)				120mm (0.2x)							P22
MS3520	φ30.7	1,429mm (0.025x)								100mm (0.39x)			P22
FV3526L	φ36		507mm (0.07x)			178mm (0.2x)							P26
FV5026W	φ45	2,063mm (0.025x)				297mm (0.18x)							P27
FV5026L	φ45			521mm (0.1x)		250mm (0.22x)							P26
HB5014	φ45	2,058mm (0.025x)				266mm (0.2x)							P27
WF5045	φ62	2,070mm (0.025x)				276mm (0.2x)							P18
FV8528W	φ62	3,423mm (0.025x)				463mm (0.2x)							P27
FV8528L	φ62					450mm (0.2x)				250mm (0.4x)			P26

LSP350

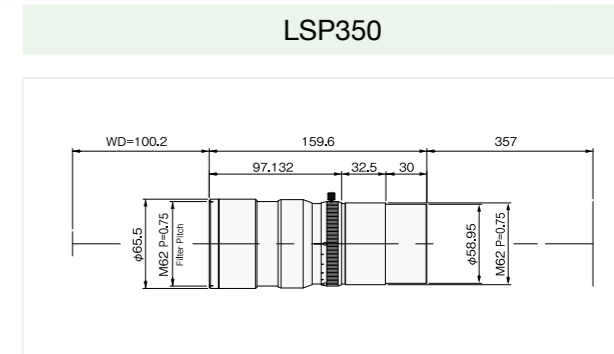


Super High Resolution of 3.5x Lens for 8K/12K Line Scan Camera

Suitable for the inspection in high accuracy such as LCD, TFT, and wafer



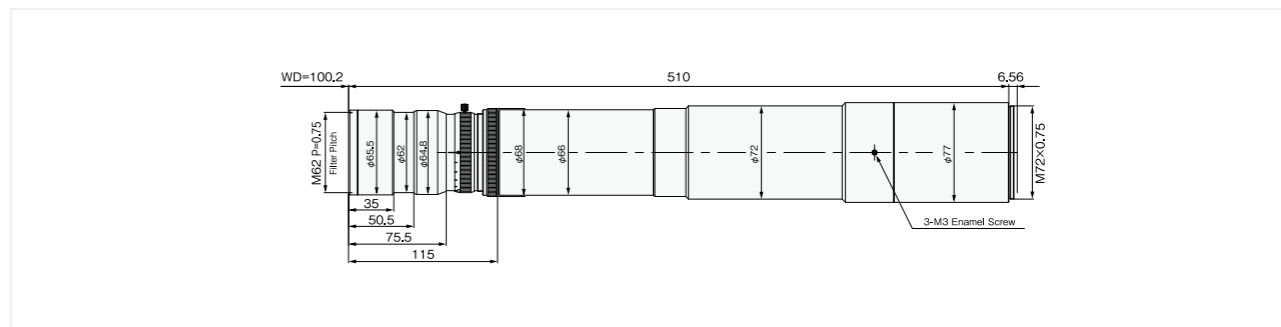
- Compatible with 8K and 12K line scan camera
- Maximum compatible sensor is 62mm
- Long working distance, WD100mm
- Reduce relative illumination and excellent uniformity
- Very low distortion
- Excellent brightness, suitable for high speed applications
- Customized mount is available



Magnification	3.5x	OI	616mm
F No.	11	Maximum Compatible sensor	φ 62mm
WD	100mm		

※Indicated specifications are design values.

Dimension of LSP350 + Dalsa HS Mount



* Please ask for customized mount.

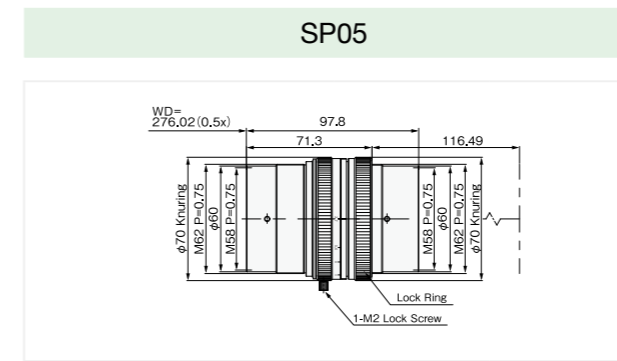
SP Series



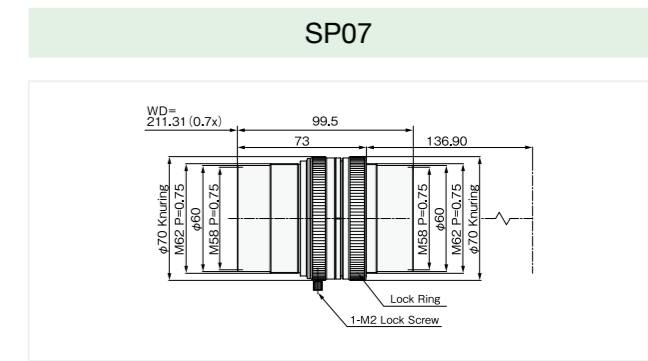
Super High Resolution Lens for 8K/12K Line Scan Camera

Suitable for high speed and high-end applications

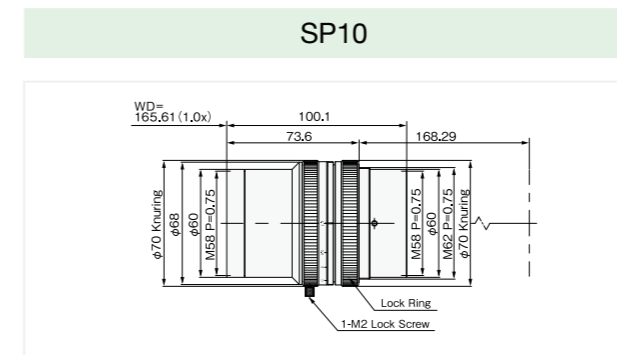
- Compatible with 8K and 12K and 16K, ϕ 62mm sensor
- Magnification can be changed by reversing a lens
- Reduce relative illumination and excellent uniformity
- Very low distortion
- Excellent brightness, ∞ F No. 2.7
- Customized mount is available



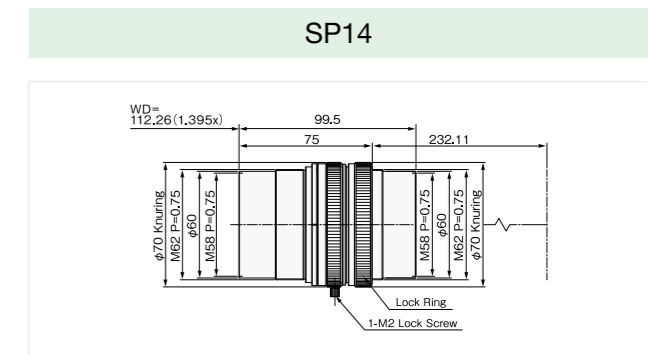
Magnification	0.5x	OI	463mm
F No.	4.3	Maximum	
WD	276mm	Compatible sensor	ϕ 62mm



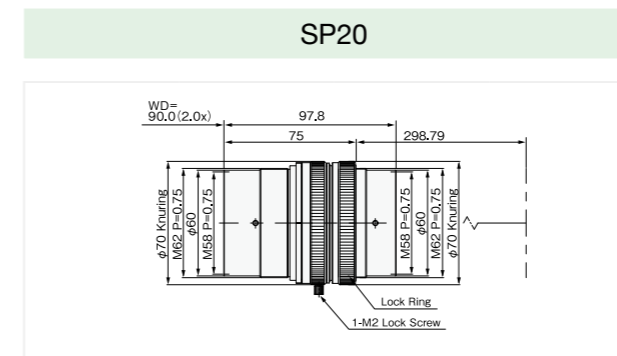
Magnification	0.7x	OI	421mm
F No.	5	Maximum	
WD	211mm	Compatible sensor	ϕ 62mm



Magnification	1.0x	OI	407mm
F No.	5.8	Maximum	
WD	165mm	Compatible sensor	ϕ 62mm



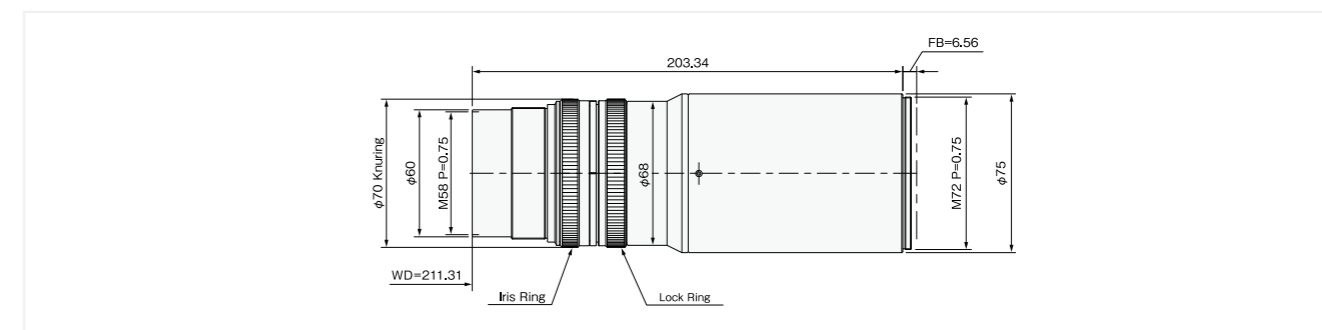
Magnification	1.4x	OI	419mm
F No.	6.8	Maximum	
WD	112mm	Compatible sensor	ϕ 86mm



Magnification	2.0x	OI	463mm
F No.	8.6	Maximum	
WD	90mm	Compatible sensor	ϕ 100mm

* Indicated specifications are design values.

Dimension of SP07 + Dalsa HS Mount



* Please ask for customized mount.

XLS Series



Line Scan Lens for Large Image Circle, φ90mm

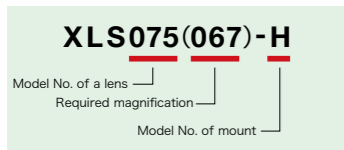
Compatible with large image circle, up to φ90mm sensor

- ▣ Suitable for large sensor such as 「5μ x 12288 bit」, 「3.5μ x 16384 bit」, 「5μ x 16384bit」, etc...
- ▣ Suitable for large area sensor of high resolution such as 20 Mega Pixel, 25 Mega Pixel, and 29 Mega Pixel
- ▣ Reduce color aberration, suitable for 3 line sensor
- ▣ Excellent uniformity of brightness and resolution
- ▣ Possible to adjust ±0.05x from the original magnification by using the optional mount
- ▣ Customized mount is available
- ▣ 「SP Series (Page 8)」 is suitable if brightness is essential for the application



How to request if magnification is other than standard.

Ex.) 0.67x for Dalsa P3-12K

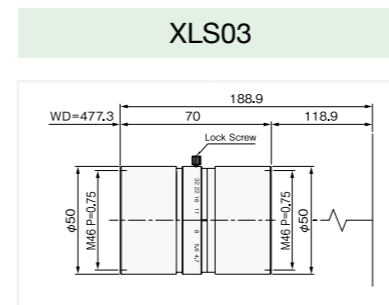


* If a lens is not used at the standard magnification, adjustable range is not ±0.05x.
 * Please select one of XLS series which magnification is the closest from required magnification.

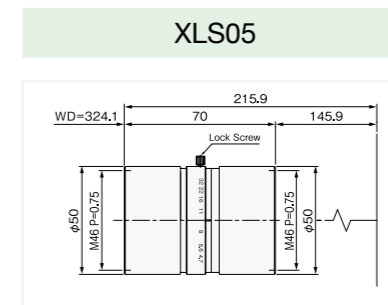
Model No. of Mount

Model	Compatible Camera	Screw Pitch	Back Focal Distance
XLS□□□-F	F Mount Camera	F Mount	46.5mm
XLS□□□-Q	NED : 3 Line Camera NUCli7300	M84.5 (P=0.5)	41mm
XLS□□□-N	NED : CLISBee 8k	M72 (P=0.75)	31.8mm
XLS□□□-M	DALSA : Piranha2 8k / TAKEX : TL-16000CL	M72 (P=0.75)	19.55mm
XLS□□□-D	DALSA : Piranha4 8k Piranha HS 3 16k	M72 (P=0.75)	12mm
XLS□□□-DX	DALSA : Piranha XL16K	M90 (P=1)	12mm
XLS□□□-E	e2V : ELiixA+ Colour 16K	M95 (P=1)	9.4mm
XLS□□□-H	DALSA : Piranha3 12k Piranha HS 8k 12k Piranha ES 8k	M72 (P=0.75)	6.56mm

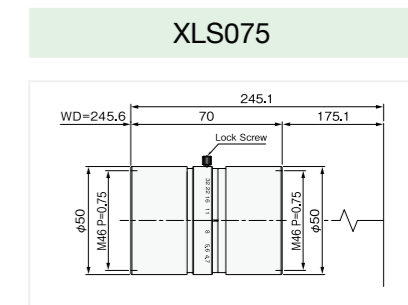
* ±0.05x can be adjusted from the standard magnification by using the mount mentioned above.
 * Customized mount is also available. Please contact us for further information.



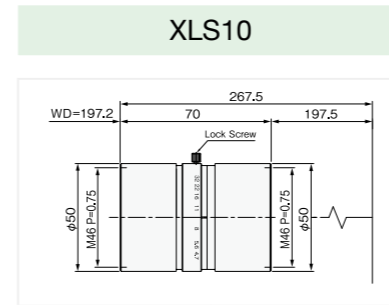
Magnification	0.3x
∞F No.	4.7
F No.	6.0
WD	477mm
OI	666mm
Maximum Compatible sensor	φ 90mm



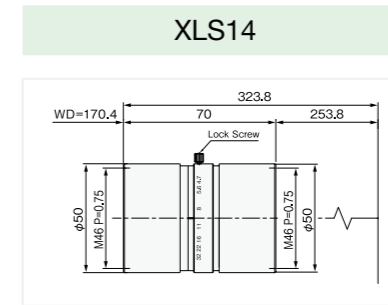
Magnification	0.5x
∞F No.	4.7
F No.	7.0
WD	324mm
OI	540mm
Maximum Compatible sensor	φ 90mm



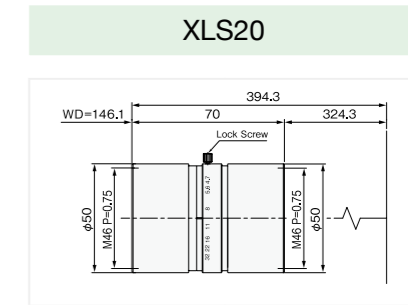
Magnification	0.75x
∞F No.	4.7
F No.	8.1
WD	246mm
OI	491mm
Maximum Compatible sensor	φ 90mm



Magnification	1.0x
∞F No.	4.7
F No.	9.0
WD	197mm
OI	465mm
Maximum Compatible sensor	φ 90mm

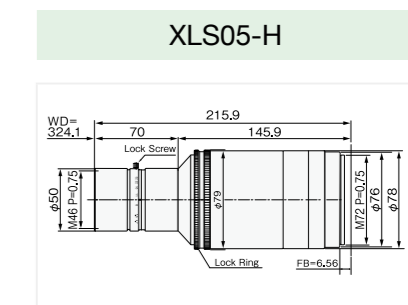
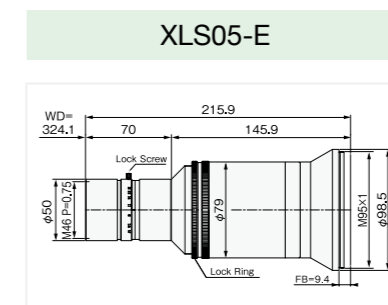
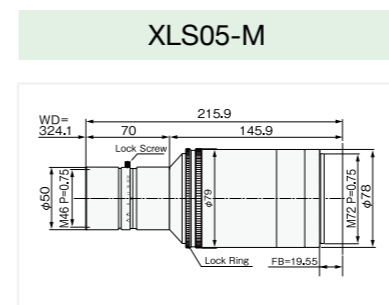
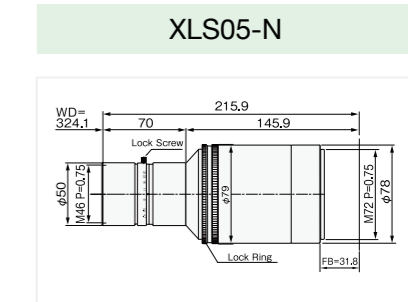
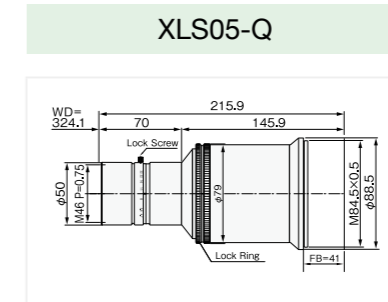
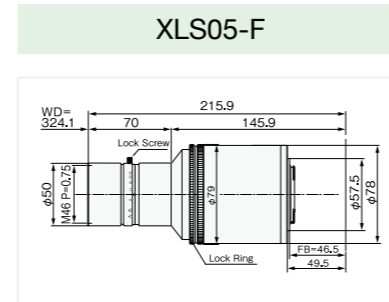


Magnification	1.4x
∞F No.	4.7
F No.	11.4
WD	170mm
OI	494mm
Maximum Compatible sensor	φ 90mm



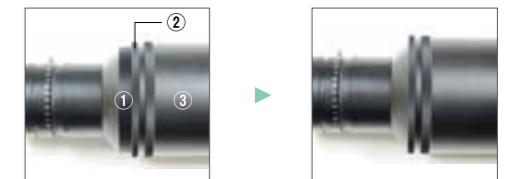
Magnification	2.0x
∞F No.	4.7
F No.	14.5
WD	146mm
OI	540mm
Maximum Compatible sensor	φ 90mm

Example of a lens with mount (XLS05)



How to adjust magnification

- Mount tube is composed by three mechanical parts ①, ②, and ③.
- Magnification increases by extending the mount and decreases by shortening.



* Indicated specifications are design values.

XLS Series

LARGE FORMAT $\phi 82$

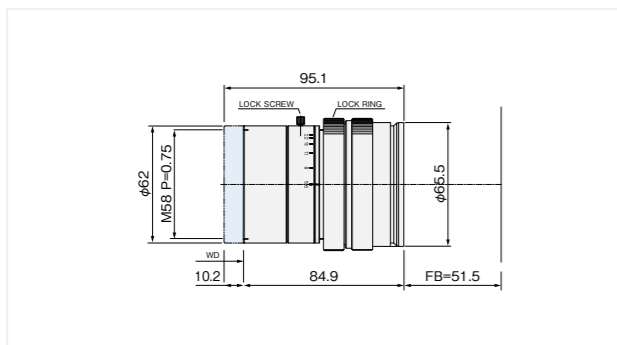
Area and Line Scan Lens for 47 Mega Pixel and 16K x 5 μ

XLS Series for Large Field of View

- Compatible with large image circle, $\phi 82\text{mm}$
- Suitable for line scan 16K x 5 μ , 16K x 3.5 μ , 12K x 5 μ and area scan 47 Mega Pixel, 29 Mega Pixel, etc..
- Two types are available: 0.125x – 0.3x and 0.125x – ∞
- Adjustable magnification by lock ring
- Design for wide angle, suitable for large field of view in limited space
- Excellent uniformity and very low distortion

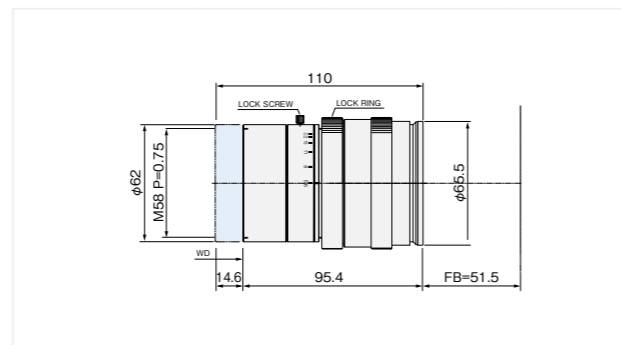


XLS01



Magnification	∞ -0.125x	Optical distortion	-0.02%
∞ FNO	5.6	Maximum Compatible sensor	$\phi 82\text{mm}$
Range of WD	∞ -705mm		

XLS02

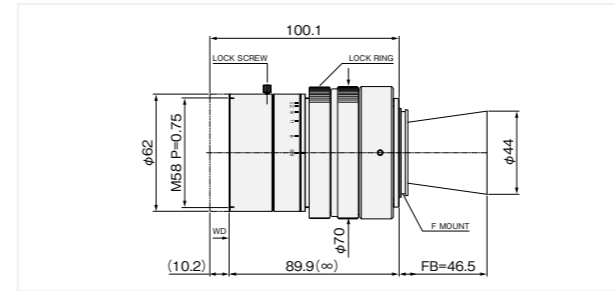


Magnification	0.125x-0.3x	Optical distortion	-0.02%
∞ FNO	5.6	Maximum Compatible sensor	$\phi 82\text{mm}$
Range of WD	705mm-315mm		

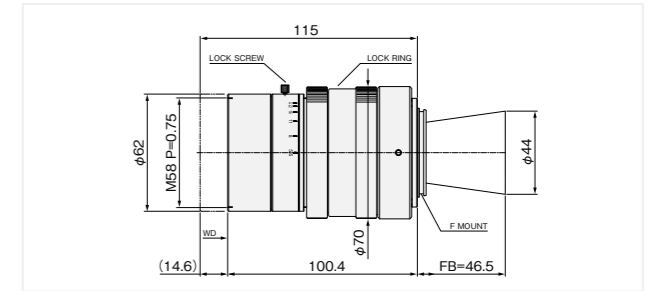
* Indicated specifications are design values.

Example of a lens with mount (XLS01/XLS02)

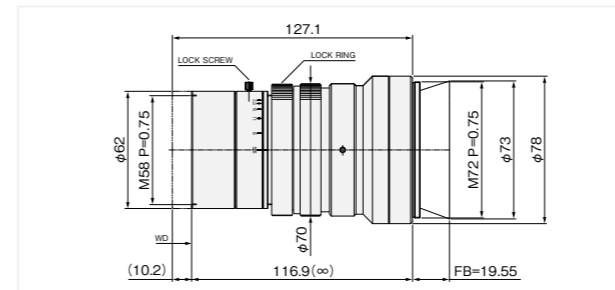
XLS01-F



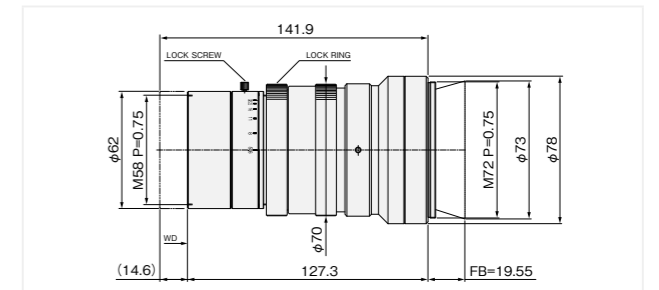
XLS02-F



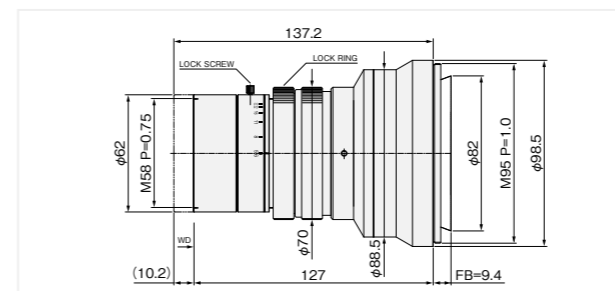
XLS01-M



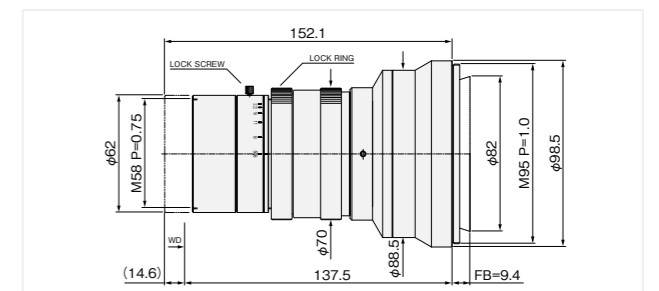
XLS02-M



XLS01-E



XLS02-E



Model No. of Mount

Model	Compatible Camera	Screw Pitch	Back Focal Distance
XLS□□□-F	F Mount Camera	F Mount	46.5mm
XLS□□□-Q	NED : 3 Line Camera NUCLi7300	M84.5 (P=0.5)	41mm
XLS□□□-N	NED : CLISBee 8k	M72 (P=0.75)	31.8mm
XLS□□□-M	DALSA : Piranha2 8k / TAKEX : TL-16000CL	M72 (P=0.75)	19.55mm
XLS□□□-D	DALSA : Piranha4 8k Piranha HS 3 16k	M72 (P=0.75)	12mm
XLS□□□-DX	DALSA : Piranha XL16K	M90 (P=1)	12mm
XLS□□□-E	e2V : ELiixA+ Colour 16K	M95 (P=1)	9.4mm
XLS□□□-H	DALSA : Piranha3 12k Piranha HS 8k 12k Piranha ES 8k	M72 (P=0.75)	6.56mm

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

How to adjust magnification, focus

- To adjust the focus, at first loosening ②, and rolling ①. By loosening
- ②, to change magnification.

* XLS01 = ∞ ~0.125x XLS02 = 0.125x~0.3x



In case of low magnification



In case of high magnification

* Indicated specifications are design values.

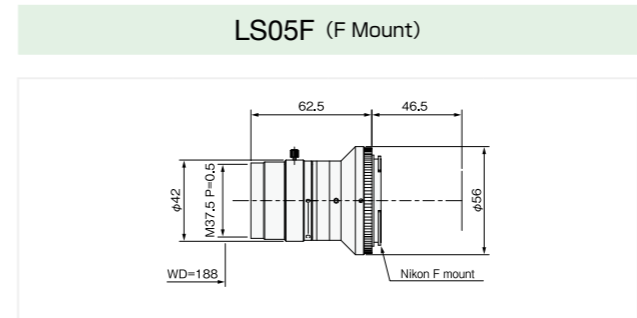
LS Series



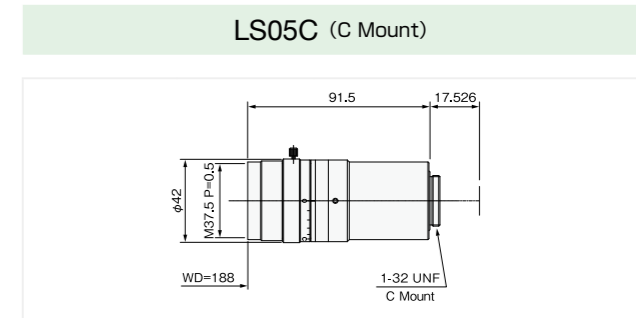
Fixed Magnification Lens for F Mount

High Resolution and high contrast
Suitable for LCD, film, and PCB inspection

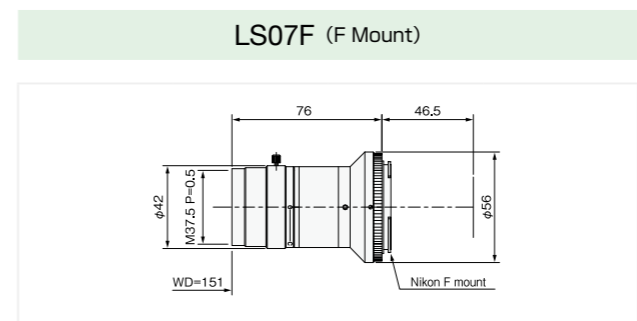
- ▶ Excellent uniformity
- ▶ High resolution from the center to the edge of image
- ▶ Compact design
- ▶ High durability
- ▶ Optical distortion less than 0.1%
- ▶ Suitable for area sensor, over 1 inch
- ▶ TFL- II mount is available



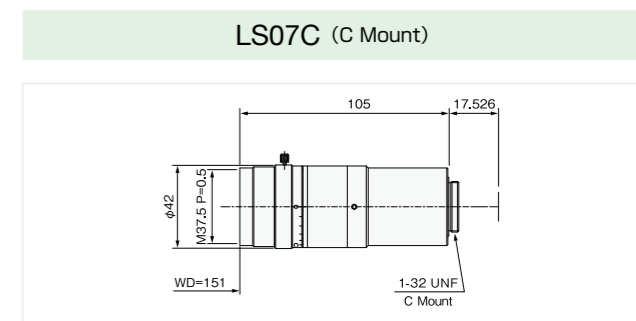
Magnification	0.5x	Resolution	11 μ
WD	188mm	Optical distortion	-0.01%
Depth of field	0.94mm	Maximum Compatible sensor	φ 36mm
F No.	5.1	Mount	F



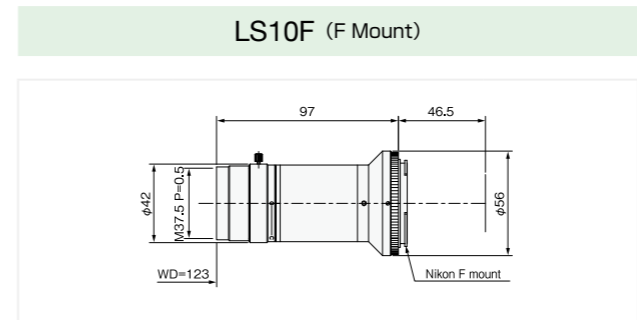
Magnification	0.5x	Resolution	11 μ
WD	188mm	Optical distortion	-0.01%
Depth of field	0.94mm	Maximum Compatible sensor	4/3 (φ 22.6mm)
F No.	5.1	Mount	C



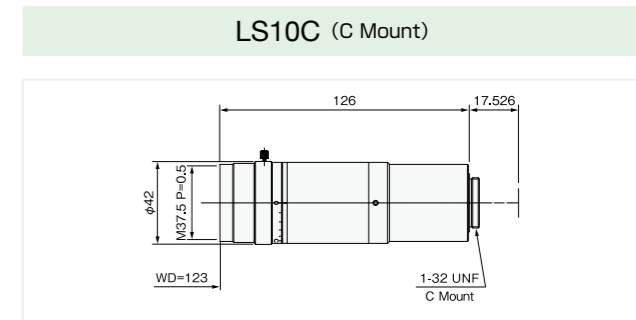
Magnification	0.7x	Resolution	10 μ
WD	151mm	Optical distortion	-0.07%
Depth of field	0.54mm	Maximum Compatible sensor	φ 36mm
F No.	6	Mount	F



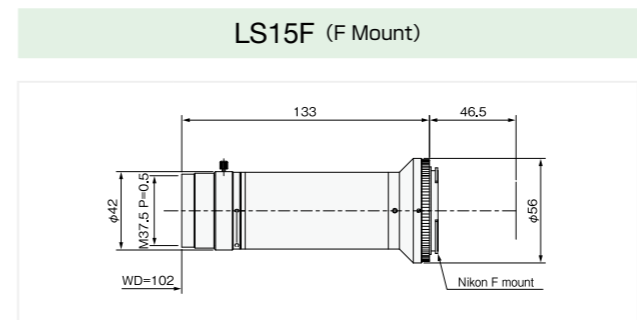
Magnification	0.7x	Resolution	10 μ
WD	151mm	Optical distortion	-0.07%
Depth of field	0.54mm	Maximum Compatible sensor	4/3 (φ 22.6mm)
F No.	6	Mount	C



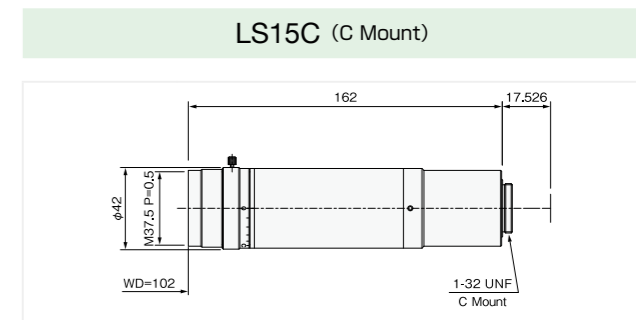
Magnification	1.0x	Resolution	8 μ
WD	123mm	Optical distortion	-0.01%
Depth of field	0.31mm	Maximum Compatible sensor	φ 36mm
F No.	7.5	Mount	F



Magnification	1.0x	Resolution	8 μ
WD	123mm	Optical distortion	-0.01%
Depth of field	0.31mm	Maximum Compatible sensor	4/3 (φ 22.6mm)
F No.	7.5	Mount	C



Magnification	1.5x	Resolution	7 μ
WD	102mm	Optical distortion	0.26%
Depth of field	0.17mm	Maximum Compatible sensor	φ 36mm
F No.	9.9	Mount	F



Magnification	1.5x	Resolution	7 μ
WD	102mm	Optical distortion	0.26%
Depth of field	0.17mm	Maximum Compatible sensor	4/3 (φ 22.6mm)
F No.	9.9	Mount	C

* Indicated specifications are design values. * Resolution is calculated based on MTF. * Resolution indicates a theoretical resolution at wavelength of 550nm.
* Depth of field is calculated assuming F No. (∞) 5.6 and resolution of 14 μ camera.

WF Series



High Resolution and Wide Angle Lens for Large Image Circle, $\phi 62\text{mm}$

Suitable for large field of view in limited space

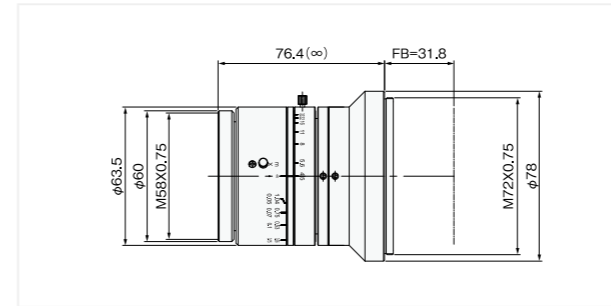
- ▶ The widest angle for $\phi 62\text{mm}$ in machine vision industry
- ▶ Suitable for $16\text{K} \times 3.5 \mu$, $12\text{K} \times 5 \mu$, $8\text{K} \times 7 \mu$, etc..
- ▶ Possible to capture the large field of view by one camera in limited space

WF5045- □

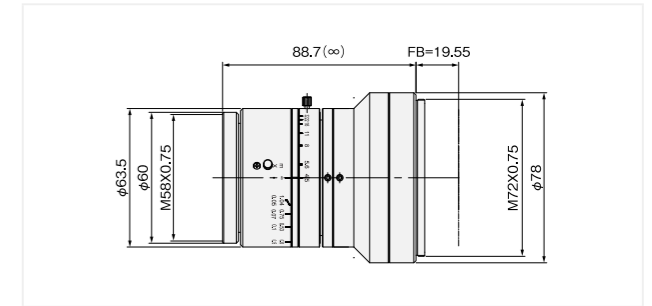
Focal length	50mm	Optical distortion	-0.01%
∞ F No.	4.5	Maximum Compatible sensor	$\phi 62.5\text{mm}$
Range of WD	276mm - ∞	Mount	M72 or F
Magnification at MOD	0.2x		



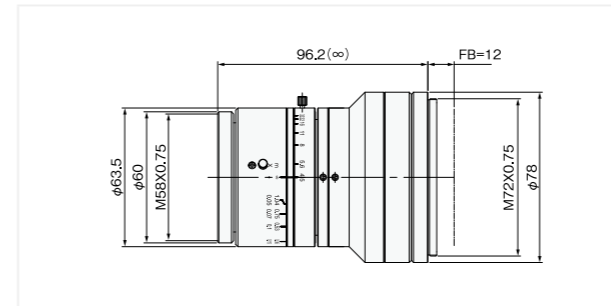
WF5045-N (FB=31.8mm)



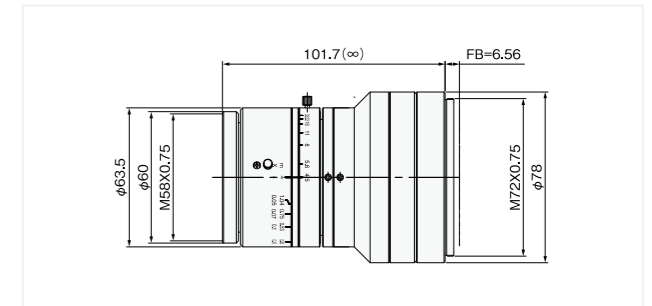
WF5045-M (FB=19.55mm)



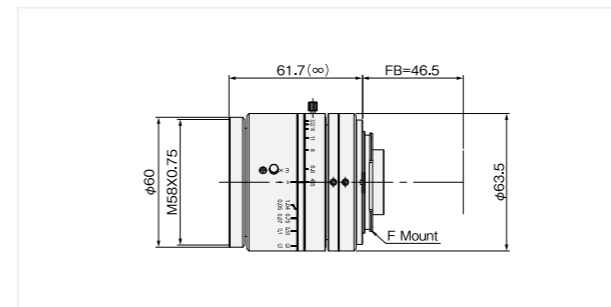
WF5045-D (FB=12mm)



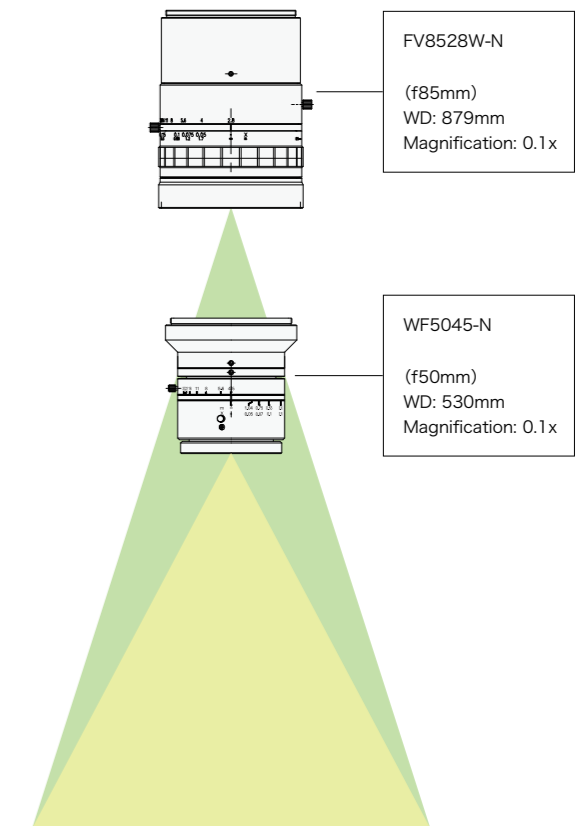
WF5045-H (FB=6.56mm)



WF5045-F (FB=46.5mm)



Conceptual Drawing



LSF Series

LARGE FORMAT $\phi 44$

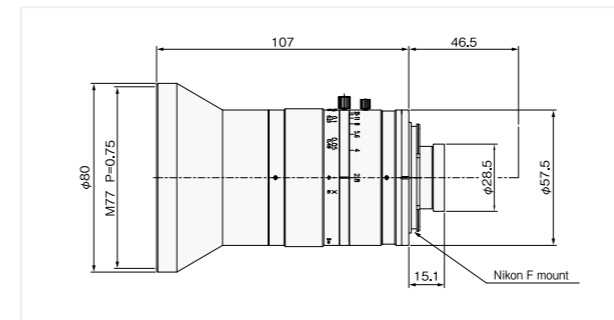
High Resolution and Wide Angle Lens for Area and Line Scan Camera

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, 20 Mega Pixel, 25 Mega Pixel, and 29 Mega Pixel

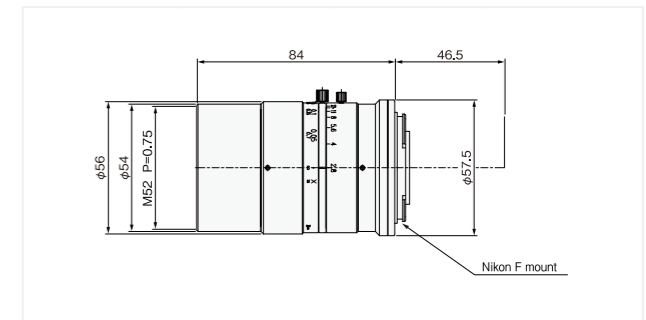


LSF2528-F



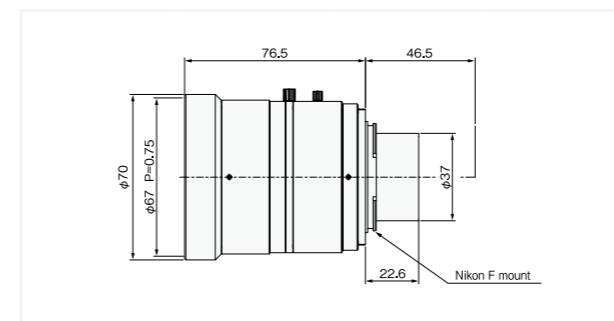
Focal length	25mm	Optical distortion	0.66%
∞ F No.	2.8	Maximum Compatible sensor	$\phi 44$ mm
Range of WD	140mm - ∞	Mount	F
Magnification at MOD	0.15x		

LSF3528-F



Focal length	35mm	Optical distortion	-0.31%
∞ F No.	2.8	Maximum Compatible sensor	$\phi 44$ mm
Range of WD	230mm - ∞	Mount	F
Magnification at MOD	0.15x		

LSF5028-F



Focal length	50mm	Optical distortion	-0.40%
∞ F No.	2.8	Maximum Compatible sensor	$\phi 44$ mm
Range of WD	190mm - ∞	Mount	F
Magnification at MOD	0.3x		

* 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 □□□□-U58	Baumer	M58 (P = 0.75)	12mm
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, Baumer	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.

MS Series



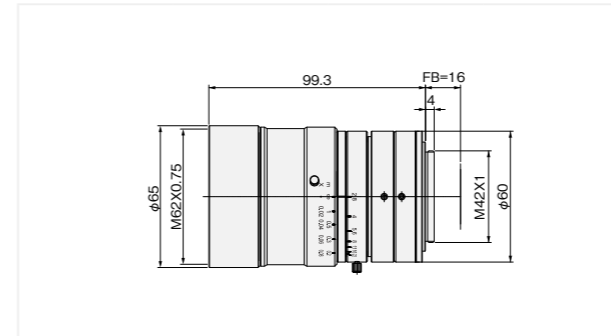
12 Mega Pixel Lens for Large format, φ30mm

High resolution lens for 4/3 inch 8 Mega Pixel and 12 Mega Pixel

- Suitable for large format, 12 Mega Pixel (φ 30mm) and line scan, 8192 x 3.5 μ
- Standard mount is M42
- Adopt screw mount, stable mount mechanism without rattling
- Achieve low distortion and wide angle for large format, φ 30mm
- Stable performance at different working distance by floating design



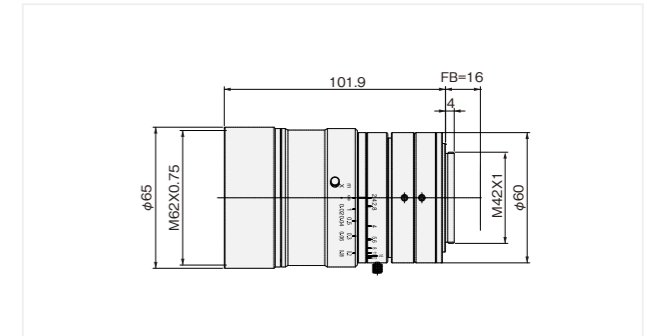
MS1828- □



Focal length	18mm	Magnification at MOD	0.15x
∞F No.	2.8	TV distortion	0.52%
Range of WD	100mm - ∞	Maximum Compatible sensor	φ 30.7
Mount	M42, TFL- II, or C		

* Drawing is for B42 mount (M42 x 1, FB16.1mm)

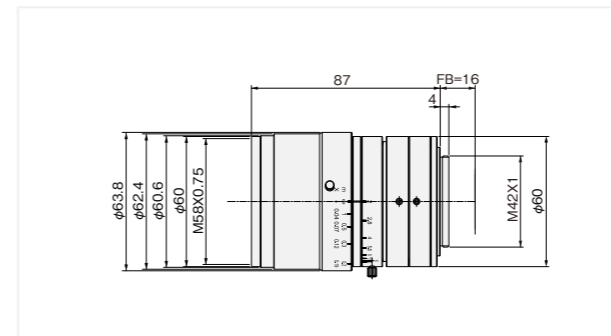
MS2524- □



Focal length	25mm	Magnification at MOD	0.2x
∞F No.	2.4	TV distortion	-0.27%
Range of WD	120mm - ∞	Maximum Compatible sensor	φ 30.7
Mount	M42, TFL- II, or C		

* Drawing is for B42 mount (M42 x 1, FB16.1mm)

MS3520- □



Focal length	35mm	Magnification at MOD	0.39x
∞F No.	2.0	TV distortion	-0.11%
Range of WD	100mm - ∞	Maximum Compatible sensor	φ 30.7
Mount	M42, TFL- II, or C		

* Drawing is for B42 mount (M42 x 1, FB16.1mm)

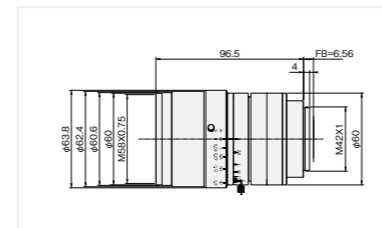
Model No. of Mount

D42	6.56mm	(M42 P=1mm)
V42	11.48mm	(M42 P=1mm)
S42	10mm	(M42 P=1mm)
B42	16mm	(M42 P=1mm)
TFL II	17.5mm	(M48 P=0.75mm)
C	C Mount	

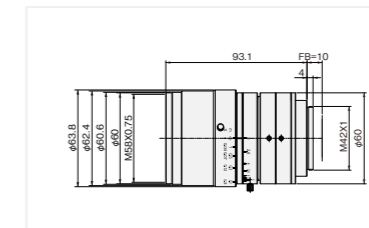
□ = Mount
* Please ask for customized mount for different back focal distance.

Standard Mount (MS3520- □)

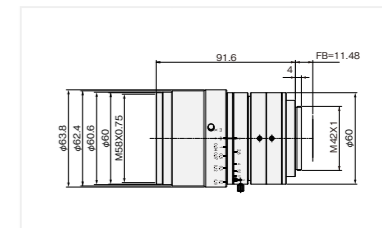
MS3520-D42



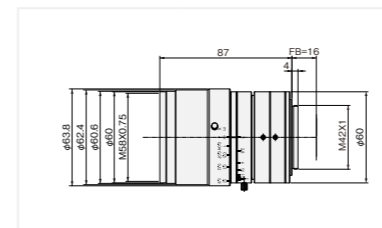
MS3520-S42



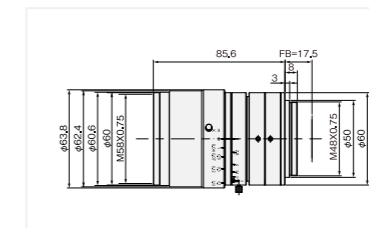
MS3520-V42



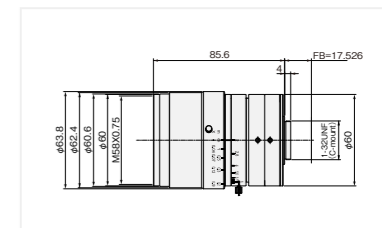
MS3520-B42



MS3520-TFL II



MS3520-C



FV-L Series



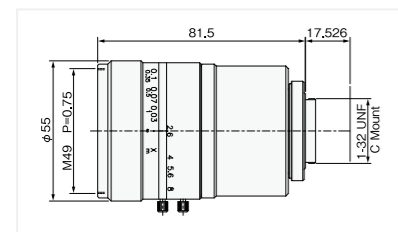
Macro Lens for Area and Line Scan Camera

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

- Adjustable focus and iris
- Design for macro imaging, suitable for machine vision application
- Suitable for inspection of wafer, PCB, electronic parts, etc..., required for high resolution at short working distance
- FV8528L-M is compatible with M72 mount
- Compatible with large image format of high resolution area camera

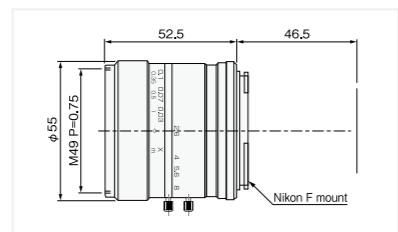


FV3526L-C



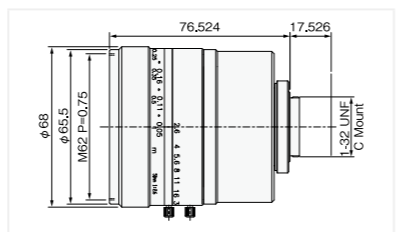
Focal length	35mm
∞ F No.	2.6
Range of WD	0.18m - ∞
Magnification at MOD	0.2x
Optical distortion	-0.05%
Maximum Compatible sensor	1.2 inch (φ 21.4mm)
Mount	C

FV3526L-F



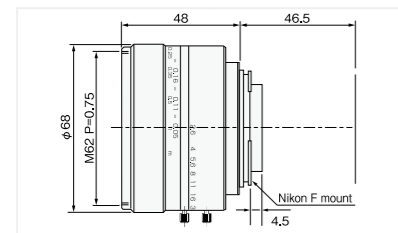
Focal length	35mm
∞ F No.	2.6
Range of WD	0.18m - ∞
Magnification at MOD	0.2x
Optical distortion	-0.42%
Maximum Compatible sensor	φ 36mm
Mount	F

FV5026L-C



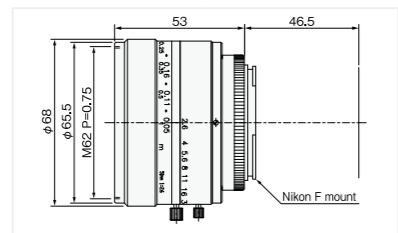
Focal length	50mm
∞ F No.	2.6
Range of WD	0.25m - 1m
Magnification at MOD	0.22x
Optical distortion	-0.01%
Maximum Compatible sensor	1.2 inch (φ 21.4mm)
Mount	C

FV5026L-F



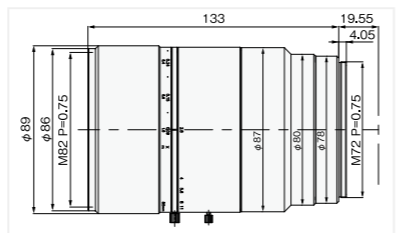
Focal length	50mm
∞ F No.	2.6
Range of WD	0.25 - 1m
Magnification at MOD	0.22x
Optical distortion	-0.24%
Maximum Compatible sensor	φ 45mm
Mount	F

FV5026L II -F



Focal length	50mm
∞ F No.	2.6
Range of WD	0.17m - 0.35m
Magnification at MOD	0.32x
Optical distortion	-0.80%
Maximum Compatible sensor	φ 45mm
Mount	F

FV8528L-□



Focal length	85mm
∞ F No.	2.8
Range of WD	0.25m - 0.45m
Magnification at MOD	0.4x
Optical distortion	-0.18%
Maximum Compatible sensor	φ 62mm
Mount	F or M72

* Indicated specifications are design value. □ = Mount: F = Nikon F Mount, M = Dalsa P2 (FB19.55mm), H = Dalsa P2-HS and P3 (FB6.56mm), N = NED ClisBee (FB31.8mm)

FV-W Series



Area and Line Scan Lens for Wide Field of View

Machine vision lens for large field of view

- Adjustable focus and iris
- Design for infinite distance (∞), suitable for wide field of view
- Design for machine vision application



HB5014-F

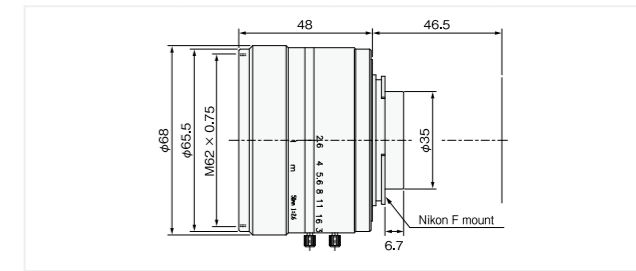


Line Scan Lens for Large Aperture

Large aperture and design for machine vision

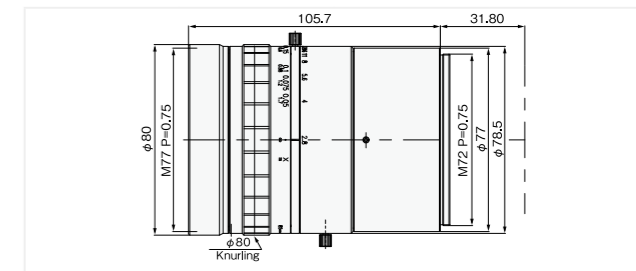
- Excellent brightness, F No. 1.4
- Suitable for high speed applications such as printing, food inspection, etc..
- Metal design, avoid aged deterioration of plastic and gum, concerned about photographic lenses
- Suitable for large image circle and high speed camera

FV5026W-F



Focal length	50mm	Optical distortion	0.23%
∞ F No.	2.6	Maximum Compatible sensor	φ 45mm
Range of WD	0.32m - ∞	Mount	F
Magnification at MOD	0.18x		

FV8528W-□

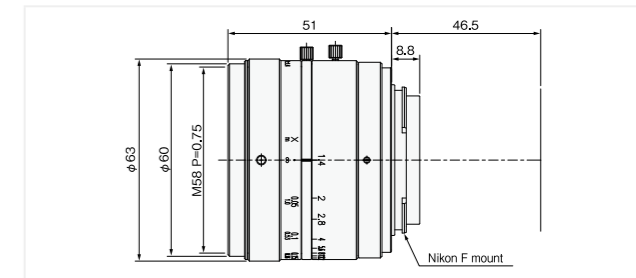


Focal length	85 mm	Optical distortion	0.04%
∞ F No.	2.8	Maximum Compatible sensor	φ 62mm
Range of WD	0.46m - ∞	Mount	F or M72
Magnification at MOD	0.2x		

* Indicated specifications are design value. □ = Mount: F = Nikon F Mount, M = Dalsa P2 (FB19.55mm), H = Dalsa P2-HS and P3 (FB6.56mm), N = NED ClisBee (FB31.8mm)



HB5014-F



Focal length	50mm	Optical distortion	0.17%
∞ F No.	1.4	Maximum Compatible sensor	φ 45mm
Range of WD	0.27m - ∞	Mount	F
Magnification at MOD	0.2x		

* Indicated specifications are design values.