μ·TRON

MACHINE VISION

LENS・LIGHTING・OPTICAL ACCESSORIES GENERAL CATALOGUE 2023

PHILOSOPHY

Pursue further improvement of our own technology and create unique products for the market development

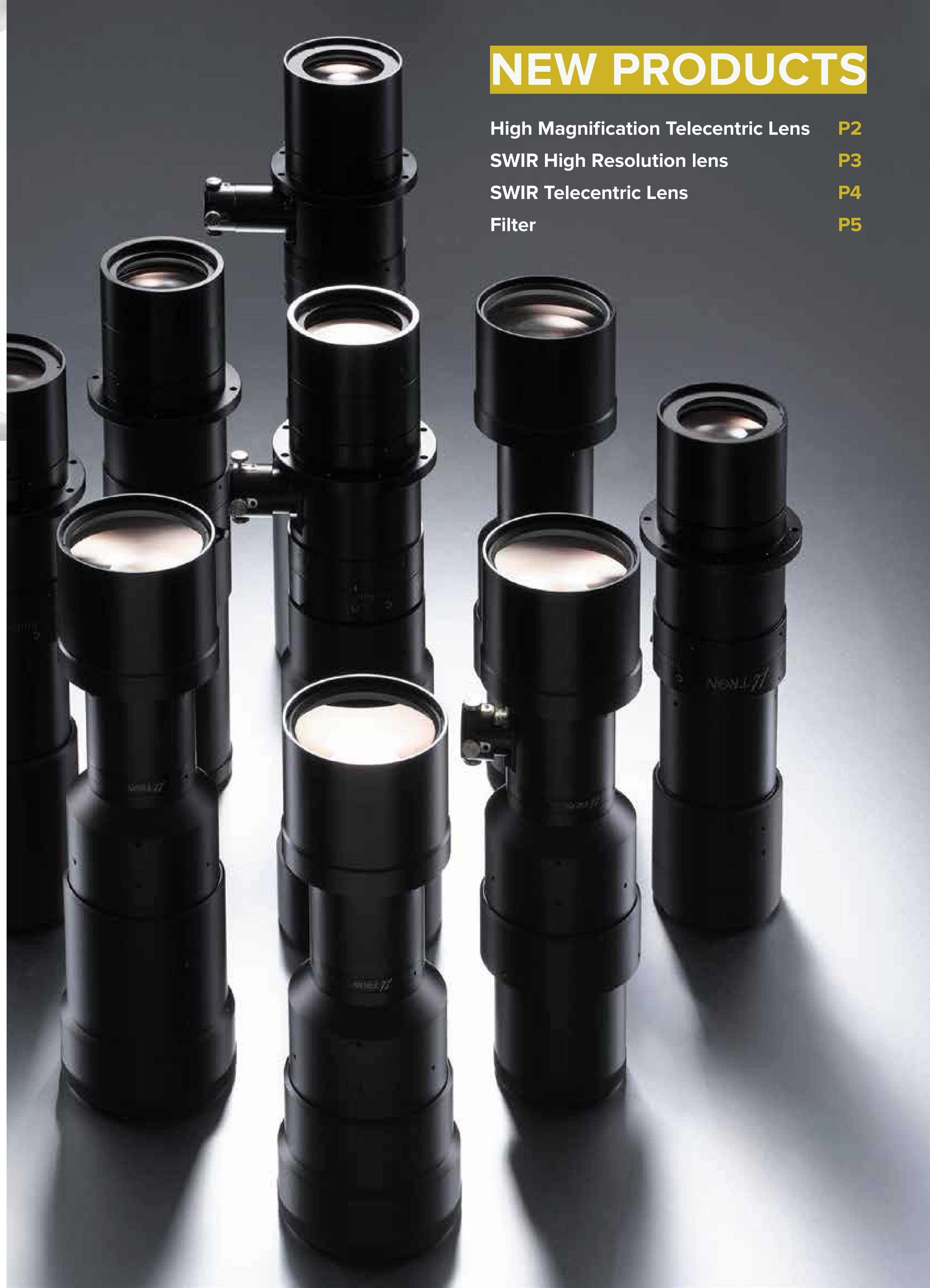
GREETING

Nowadays demand of vision in the market has been increasing not only for TV, also for cell-phone and information technology, and requirement of vision has been developing for ultra HD.

We focus on this market trend and strive to create next-generation technology for machine vision, security, and broadcast.

COMPANY PROFILE

Company Name	Myutron Inc.
Address	3-31-14, Nishikoiwa, Edogawa-ku, Tokyo, 133-0057, Japan
Representative	Keiji Watanabe
Business	· Design, manufacture, and supply lenses for machine vision · Design, manufacture, and supply optical systems for machine vision · Design, manufacture, and supply lenses for surveillance · Design, manufacture, and supply for OEM



NEW PRODUCTS

NEW PRODUCTS

BTL SERIES

151MP | 127MP | 65MP | 16K-5µm | 16K-3.5µm

Large Format
High NA / High Magnification Telecentric Lens

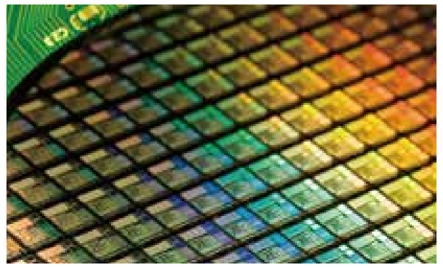
1.5× 2× 2.5× 3× 3.5× 4× 5×

FEATURES

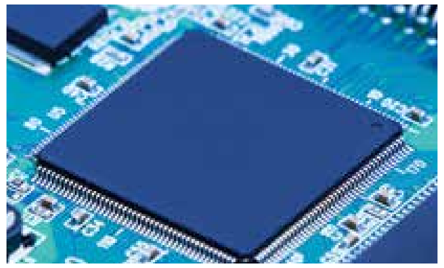
- Line up for 12 kinds of High Magnification Telecentric Lens
- Ultra high brightness and NA

More detail information Contact

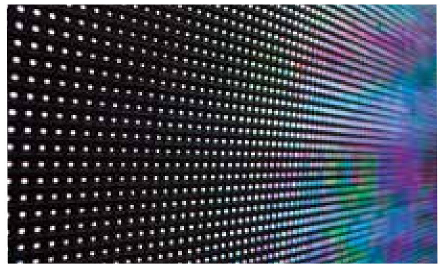
Application



【Semiconductor】



【High density board】



【Micro LED】

NEW PRODUCTS

SWIR

SWIR High Resolution lens for Large Format

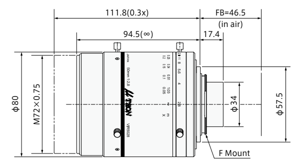
Possible to use from visible - 2000nm
Design to transmit SWIR

Features

- Possible to use from visible - 2000nm • Design to transmit SWIR
- Suitable for InGaAs Line sensor camera : 2K (10um – 12.5um), 1K (25um)
- Super high resolution, Low distortion, and excellent uniformity of brightness

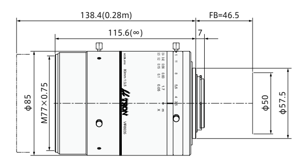
Specification

VIR5028SW-F



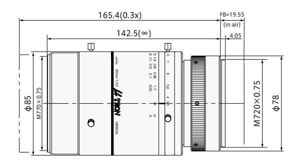
Focal length	50mm
∞F No.	2.8
Range of WD	178mm - ∞
Magnification at MOD	0.3x
Maximum Compatible sensor	ϕ48mm
Mount	F

VIR8035SW-F



Focal length	80mm
∞F No.	3.5
Range of WD	280mm - ∞
Magnification at MOD	0.3x
Maximum Compatible sensor	ϕ67mm
Mount	F

VIR8035SW-M



Focal length	80mm
∞F No.	3.5
Range of WD	280mm - ∞
Magnification at MOD	0.3x
Maximum Compatible sensor	ϕ67mm
Mount	M72

SWIR

Low magnification SWIR Telecentric Lens for 1.1”

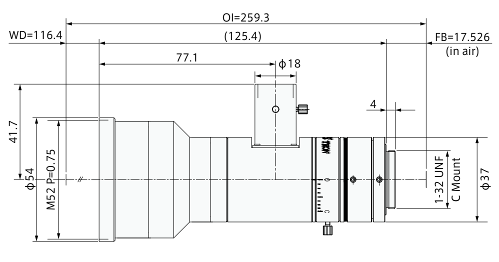
Possible to capture differences and defects that cannot be seen in visible ray

Features

- New line up for FTV-SWIR series : 0.5x and 0.7x
- Suitable for Sony’s InGaAs SWIR sensor (1.3MP, 5μm/pixel)
- Special design to transmit SWIR 950nm-1800nm
- Possible to capture differences and defects that cannot be seen in visible ray

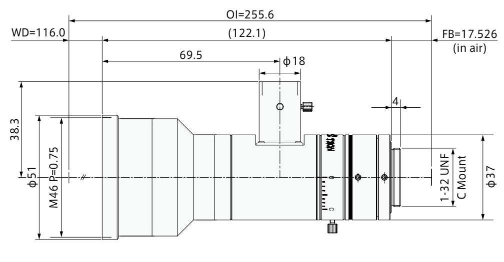
Specification

FTV05C-110SW



Magnification	0.5×
WD	116.4mm
Maximum Compatible sensor	1.1”

FTV07C-110SW



Magnification	0.7×
WD	116.0mm
Maximum Compatible sensor	1.1”

NEW PRODUCTS

VC Series

Visible ray cut filter

Features

- Suitable for SWIR Telecentric lens and SWIR Fixed Focal lens
- Cut visible ray wavelength range
- Better optical performance for SWIR wavelength range

Specification

Wave length Visible ray cut

Model	Screw Pitch	Lens
VC340	M34.0 P=0.5	FTV40C-110SW
VC375	M37.5 P=0.5	FTV10 (C) -110SW/FTV20 (C) -110SW
VC405	M40.5 P=0.5	HS1214V-SW/HS1614V-SW/HS2514V-SW/HS3516V-SW/HS5016V-SW/HS7520V-SW
VC460	M46.0 P=0.75	HS10028V-SW, FTV07C-110SW
VC580	M58.0 P=0.75	HS0818V-SW

BD Series

SWIR bandpass filter

Features

- Suitable for SWIR Telecentric lens and SWIR Fixed Focal lens
- Line up Wave length : 940nm / 1000nm / 1100nm / 1200nm / 1300nm / 1450nm / 1550nm

  *Please contact for different wave length

Specification

Wave length : 940nm

Model	Screw Pitch
BD340 (940)	M34.0 P=0.5
BD375 (940)	M37.5 P=0.5
BD405 (940)	M37.5 P=0.5
BD460 (940)	M46.0 P=0.75
BD580 (940)	M58.0 P=0.75

Wave length : 1000nm

Model	Screw Pitch
BD340(1000)	M34.0 P=0.5
BD375(1000)	M37.5 P=0.5
BD405(1000)	M37.5 P=0.5
BD460(1000)	M46.0 P=0.75
BD580(1000)	M58.0 P=0.75

Wave length : 1100nm

Model	Screw Pitch
BD340(1100)	M34.0 P=0.5
BD375(1100)	M37.5 P=0.5
BD405(1100)	M37.5 P=0.5
BD460(1100)	M46.0 P=0.75
BD580(1100)	M58.0 P=0.75

Wave length : 1200nm

Model	Screw Pitch
BD340(1200)	M34.0 P=0.5
BD375(1200)	M37.5 P=0.5
BD405(1200)	M37.5 P=0.5

Wave length : 1300nm

Model	Screw Pitch
BD340(1300)	M34.0 P=0.5
BD375(1300)	M37.5 P=0.5
BD405(1300)	M37.5 P=0.5
BD460(1300)	M46.0 P=0.75
BD580(1300)	M58.0 P=0.75

Wave length : 1450nm

Model	Screw Pitch
BD340(1450)	M34.0 P=0.5
BD375(1450)	M37.5 P=0.5
BD405(1450)	M37.5 P=0.5
BD460(1450)	M46.0 P=0.75
BD580(1450)	M58.0 P=0.75

Wave length : 1550nm

Model	Screw Pitch
BD340(1550)	M34.0 P=0.5
BD375(1550)	M37.5 P=0.5
BD405(1550)	M37.5 P=0.5
BD460(1550)	M46.0 P=0.75
BD580(1550)	M58.0 P=0.75

Lens for filter

Screw Pitch	Lens
M34.0 P=0.5	FTV40C-110SW
M37.5 P=0.5	FTV10 (C) -110SW/FTV20 (C) -110SW
M40.5 P=0.5	HS1214V-SW/HS1614V-SW/HS2514V-SW/HS3516V-SW/ HS5016V-SW/HS7520V-SW
M46.0 P=0.75	HS10028V-SW/FTV07C-110SW
M58.0 P=0.75	HS0818V-SW

INDEX

LENS
SERIES

LINE SENSOR LENS / LARGE AREA SENSOR LENS

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

Display : WD (Magnification)

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)									P19
LS07	φ36						151mm (0.7x)							P19
LS10	φ36									123mm (1.0x)				P19
LS15	φ36										102mm (1.5x)			P19
UL035	φ67		367mm (0.35x)											P12
UL05	φ67				270mm (0.5x)									P12
UL07	φ67						204mm (0.7x)							P12
UL10	φ67									132mm (1.0x)				P12
SP05	φ67				276mm (0.5x)									P13
SP07	φ67						211mm (0.7x)							P13
SP10	φ67									165mm (1.0x)				P13
SP14	φ86										112mm (1.4x)			P13
SP20	φ100											90mm (2.0x)		P13
LSP350	φ67												100mm (3.5x)	P11
XLS03	φ90	680mm (0.2x)	477mm (0.3x)	376mm (0.4x)										P15
XLS05	φ90			386mm (0.4x)	324mm (0.5x)	274mm (0.625x)								P15
XLS075	φ90					279mm (0.625x)	246mm (0.75x)	222mm (0.875x)						P15
XLS10	φ90							215mm (0.875x)		197mm (1.0x)	177mm (1.2x)			P15
XLS14	φ90									185mm (1.2x)	170mm (1.4x)	154mm (1.7x)		P15
XLS20	φ90										157mm (1.7x)	146mm (2.0x)	133mm (2.5x)	P15

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
MS1828	φ30.7	713mm (0.025x)			97mm (0.15x)								P27
MS2524	φ30.7	999mm (0.025x)				118mm (0.2x)							P27
MS3520	φ30.7	1,429mm (0.025x)								93mm (0.39x)			P27
LSF2528	φ44	1,000mm (0.025x)			142mm (0.15x)								P24
LSF3528	φ44	1,413mm (0.025x)			223mm (0.15x)								P24
LSF5028	φ44	2066mm (0.025x)						178mm (0.3x)					P24
LSF10528	φ48	4392mm (0.025x)						433mm (0.3x)					P25
LSF20035	φ48	7980mm (0.025x)						850mm (0.3x)					P25
FV3526L	φ36	1432mm (0.025x)				178mm (0.2x)							P29
FV5026L	φ45		994mm (0.052x)			246mm (0.22x)							P29
FV5026LⅡ	φ45				352mm (0.15x)				173mm (0.32x)				P28
FV5026W	φ45	2,063mm (0.025x)				297mm (0.18x)							P30
HB5014	φ45	2,058mm (0.025x)				266mm (0.2x)							P31
VIR5028	φ48	2,054mm (0.025x)						170mm (0.3x)					P20
VIR8035	φ67	3,305mm (0.025x)						280mm (0.3x)					P20
WF5045	φ62	2,070mm (0.025x)				266mm (0.2x)							P22
FV8528L	φ62			1,000mm (0.09x)						250mm (0.4x)			P29
FV8528W	φ67	3,423mm (0.025x)				463mm (0.2x)							P30
XLS01	φ82	3,345mm (0.025x)			705mm (0.125x)								P16
XLS02	φ82			705mm (0.125x)				315mm (0.3x)					P16

LINE SENSOR LENS / LARGE AREA SENSOR LENS

LSP350

LARGE FORMAT

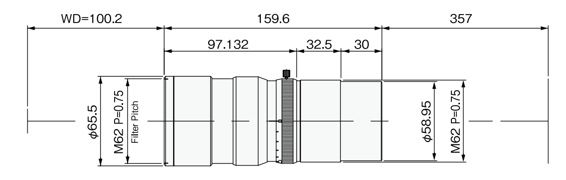
φ67

Super High Resolution of 3.5x Lens for Line Sensor Camera

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

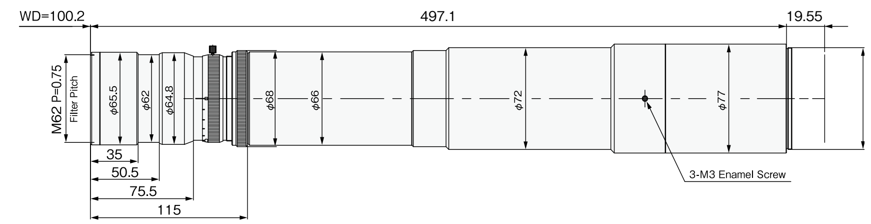
- Suitable for Area Sensor Camera 151 Mega Pixel-3.76μm
- Suitable for Line Sensor Camera such as 16K x 3.5μm and 8K x 7μm
- Maximum compatible sensor is φ67mm
- Long working distance, WD100mm
- Reduce relative illumination and excellent uniformity
- F and M72 mount are available

LSP350



Magnification	3.5x	OI	616mm
F No.	11	Maximum Compatible sensor	φ67mm
WD	100mm		

Dimension of LSP350 + M Mount (M72x0.75 FB19.55mm)



* Example of camera mount. * Indicated Specifications are design values.

UL Series

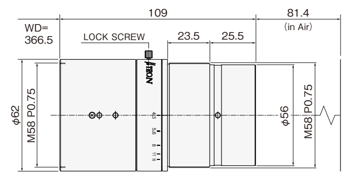
LARGE FORMAT | 151MP | ϕ67

151Mega Pixel Super High Resolution Lens

Large Format φ67mm

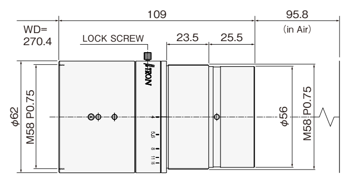
- Suitable for Area Sensor Camera 151 Mega Pixel-3.76μm、127 Mega Pixel-3.45um , 120 Mega Pixel-2.2μm,and Line Sensor Camera 16K x3.5μm
- Super high resolution, Low distortion, excellent uniformity of brightness and resolution
- Low color aberration, compatible 3-line camera
- F and M72 mount are available

UL035



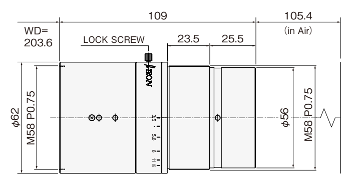
Magnification	0.35x	OI	556.9mm
F No.	5.8	Optical Distortion	-0.01%
Object side NA	0.030	Image Circle	ϕ67mm
WD	366.5mm	Mount	F, M72

UL05



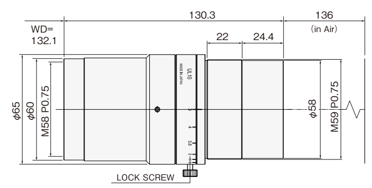
Magnification	0.5 x	OI	475.2mm
F No.	6.0	Optical Distortion	0.01%
Object side NA	0.042	Image Circle	ϕ67mm
WD	270.4mm	Mount	F, M72

UL07



Magnification	0.7 x	OI	418mm
F No.	3.5 / (6.0)	Optical Distortion	0.01%
Object side NA	0.058	Image Circle	ϕ67mm
WD	203.6mm	Mount	F, M72

UL10



Magnification	1.0 x	OI	398.4mm
F No.	6.0	Optical Distortion	0.00%
Object side NA	0.083	Image Circle	ϕ67mm
WD	132.1mm	Mount	F, M72

* Indicated Specifications are design values.

LINE SENSOR LENS / LARGE AREA SENSOR LENS

SP Series

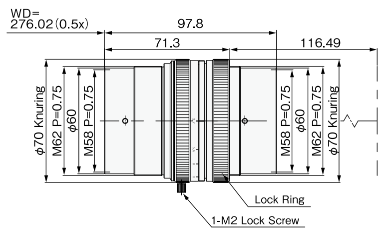
LARGE FORMAT | ϕ67-100

Super High Resolution Lens for 16K x 3.5μm and 8K x 7μm Line Sensor Camera

Suitable for high speed and high-end applications

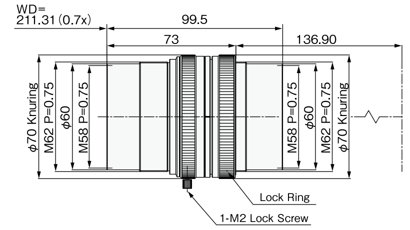
- Suitable for Line Sensor Camera such as 16K x 3.5μm and 8K x 7μm
- Reduce relative illumination and excellent uniformity
- Very low distortion
- Excellent brightness, ∞F No. 2.7
- F and M72 mount are available

SP05



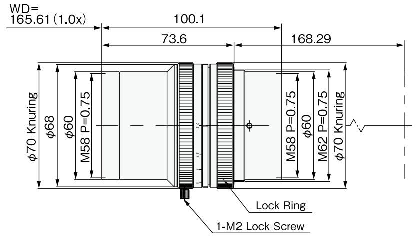
Magnification	0.5x	OI	463mm
F No.	4.3	Maximum Compatible sensor	ϕ67mm
WD	276mm		

SP07



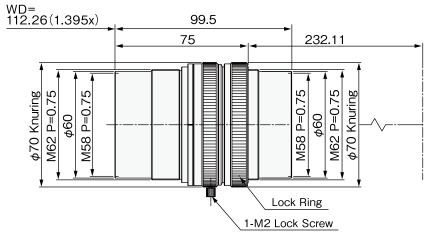
Magnification	0.7x	OI	421mm
F No.	5	Maximum Compatible sensor	ϕ67mm
WD	211mm		

SP10



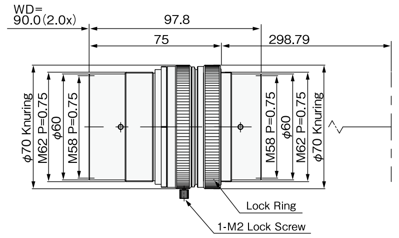
Magnification	1.0x	OI	407mm
F No.	5.8	Maximum Compatible sensor	ϕ67mm
WD	165mm		

SP14



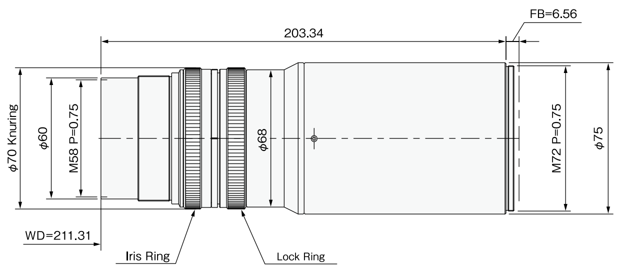
Magnification	1.4x	OI	419mm
F No.	6.8	Maximum Compatible sensor	ϕ86mm
WD	112mm		

SP20



Magnification	2.0x	OI	463mm
F No.	8.6	Maximum Compatible sensor	ϕ100mm
WD	90mm		

Dimension of SP07 + H Mount (M72x0.75 FB6.56mm)



* Example of camera mount. * Indicated Specifications are design values.

XLS Series

LARGE FORMAT　φ90

Line Sensor, Large Area Sensor Lens for Image Circle, φ90mm

Compatible with large image circle, up to φ90mm sensor

- Suitable for Line Sensor Camera such as 16K x 5um, 23K x 3.5um, 16K x 5um
- Suitable for large Area Sensor Camera of high resolution such as 65 Mega Pixel, 50 Mega pixel, and 25 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
- F, M95, M90, M84.5 and M72 mount are available

How to request if magnification is other than standard.

Ex.) 0.67x for F mount

XLS075(067)-F

Model No. of a lens — XLS075
Required magnification — (067)
Model No. of mount — F

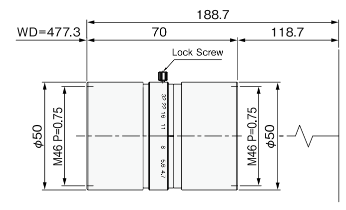
* If a lens is not used at the standard magnification, adjustable range is not ±0.05x.
* Please select one of XLS series which magnification is the closest from required magnification.

Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Flange Back
XLS□□□-F	F Mount Camera	F Mount	46.5mm
XLS□□□-E	TELEDYNE e2V	M95 (P=1)	9.4mm
XLS□□□-DX	TELEDYNE DALSA	M90 (P=1)	12mm
XLS□□□-Q	NED	M84.5 (P=0.5)	41mm
XLS□□□-N	NED	M72 (P=0.75)	31.8mm
XLS□□□-M	TELEDYNE DALSA/TAKEX	M72 (P=0.75)	19.55mm
XLS□□□-D	TELEDYNE DALSA	M72 (P=0.75)	12mm
XLS□□□-VW	VIEWORKS	M72 (P=0.75)	10.2mm

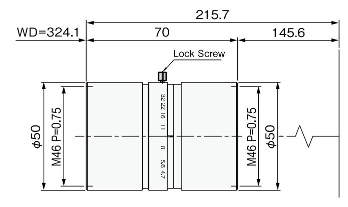
* ±0.05x can be adjusted from the standard magnification by using the mount mentioned above.
* Customized mount is also available. Please contact us for further information.

XLS03



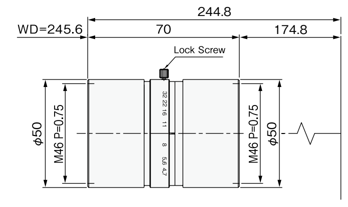
Magnification	0.3×
∞F No.	4.7
F No.	6.0
WD	477mm
OI	666mm
Maximum Compatible sensor	φ90mm

XLS05



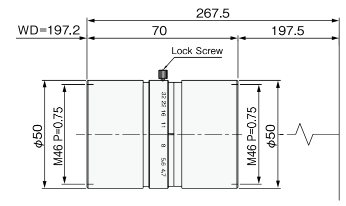
Magnification	0.5×
∞F No.	4.7
F No.	7.0
WD	324mm
OI	540mm
Maximum Compatible sensor	φ90mm

XLS075



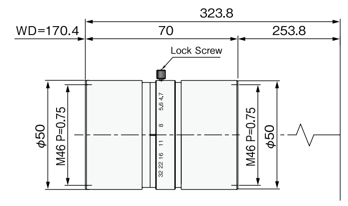
Magnification	0.75×
∞F No.	4.7
F No.	8.1
WD	246mm
OI	491mm
Maximum Compatible sensor	φ90mm

XLS10



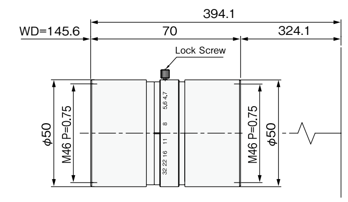
Magnification	1.0×
∞F No.	4.7
F No.	9.0
WD	197mm
OI	465mm
Maximum Compatible sensor	φ90mm

XLS14



Magnification	1.4×
∞F No.	4.7
F No.	11.4
WD	170mm
OI	494mm
Maximum Compatible sensor	φ90mm

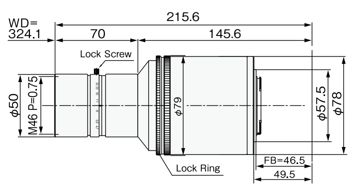
XLS20



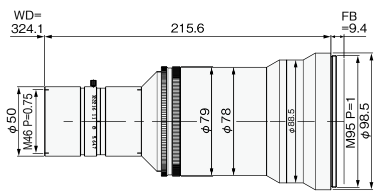
Magnification	2.0×
∞F No.	4.7
F No.	14.5
WD	146mm
OI	540mm
Maximum Compatible sensor	φ90mm

Example of lens with mount (XLS05)

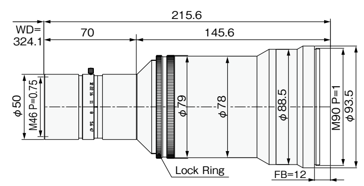
XLS05-F



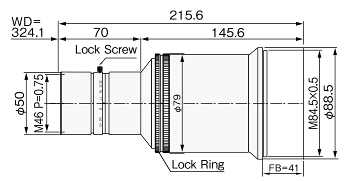
XLS05-E



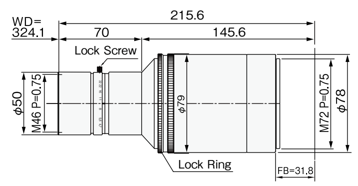
XLS05-DX



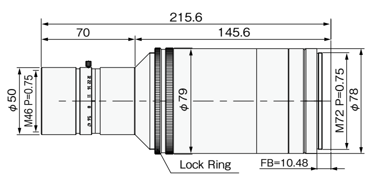
XLS05-Q



XLS05-N

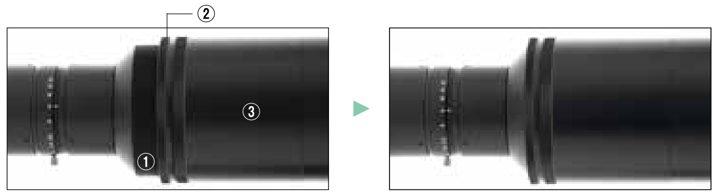


XLS05-VW



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

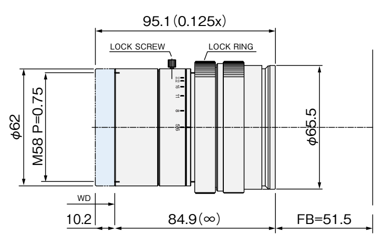
φ82

Area Sensor and Line Sensor Lens for 151 Mega Pixel and 16K x 5μm

XLS Series for Large Field of View

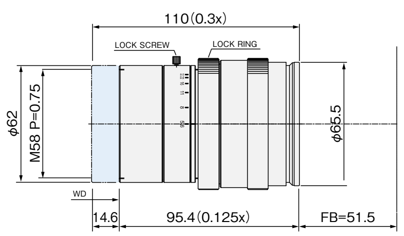
- Compatible with large image circle, φ82mm
- Suitable for Area Sensor Camera, 151 Mega Pixel, and Line Sensor Camera such as 16K x 5μm, 16K x 3.5μm
- Adjustable magnification by lock ring
- Design for wide angle, suitable for large field of view in limited space
- Excellent uniformity and very low distortion
- F, M95, M90, M84.5 and M72 mount are available

XLS01



Magnification	∞-0.125x	Optical distortion	-0.02%
∞FNO	5.6	Maximum Compatible sensor	φ82mm
Range of WD	∞-705mm		

XLS02

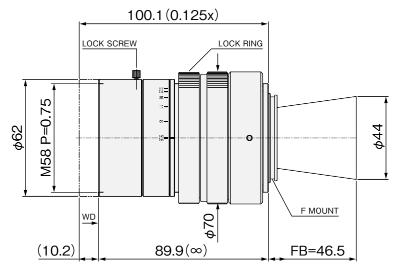


Magnification	0.125x-0.3x	Optical distortion	-0.02%
∞FNO	5.6	Maximum Compatible sensor	φ82mm
Range of WD	705mm-315mm		

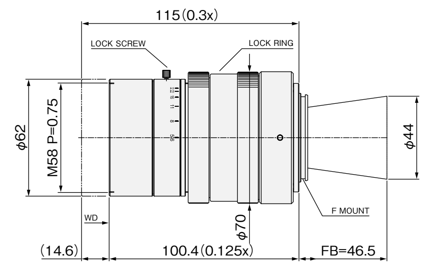
* Indicated Specifications are design values.

Example of lens with mount (XLS01/XLS02)

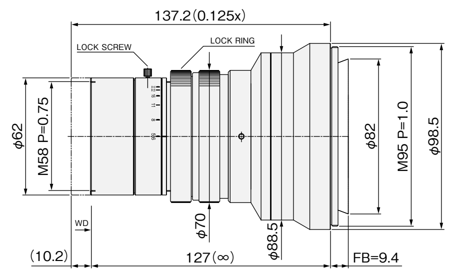
XLS01-F



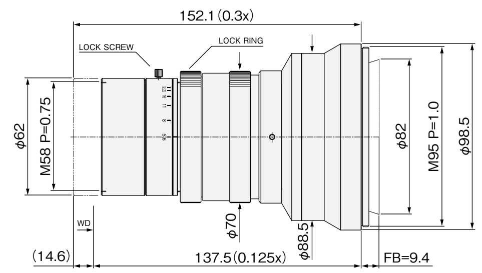
XLS02-F



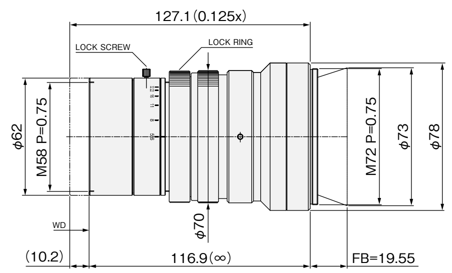
XLS01-E



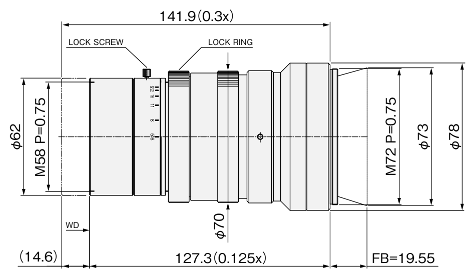
XLS02-E



XLS01-M



XLS02-M



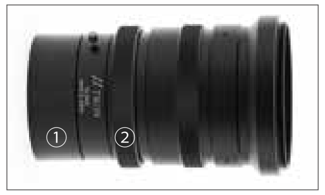
Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Flange Back
XLS□□□-F	F Mount Camera	F Mount	46.5mm
XLS□□□-E	TELEDYNE e2V	M95 (P=1)	9.4mm
XLS□□□-DX	TELEDYNE DALSA	M90 (P=1)	12mm
XLS□□□-Q	NED	M84.5 (P=0.5)	41mm
XLS□□□-N	NED	M72 (P=0.75)	31.8mm
XLS□□□-M	TELEDYNE DALSA/TAKEX	M72 (P=0.75)	19.55mm
XLS□□□-D	TELEDYNE DALSA	M72 (P=0.75)	12mm
XLS□□□-VW	VIEWORKS	M72 (P=0.75)	10.2mm

* ±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.

How to adjust magnification, focus

● To adjust the focus, at first loosing ②, and rolling ①. By loosing
● 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.

LINE SENSOR LENS / LARGE AREA SENSOR LENS

LS Series

LARGE FORMAT

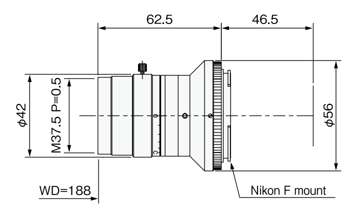
ϕ22.6-36

Compact Macro Lens for Large format

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

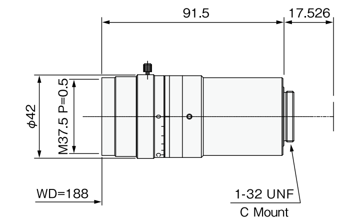
- Excellent uniformity
- High resolution from the center to the edge of image
- Compact design
- High durability
- Optical distortion less than 0.1%
- C mount type is suitable for area sensor, 4/3"

LS05F (F Mount)



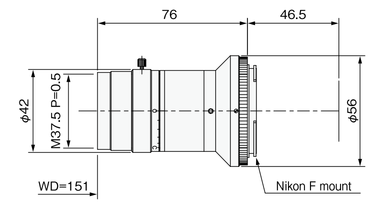
Magnification	0.5×	Resolution	11μ
WD	188mm	Optical distortion	-0.01%
Depth of field	0.94mm	Maximum Compatible sensor	ϕ36mm
F No.	5.1	Mount	F

LS05C (C Mount)



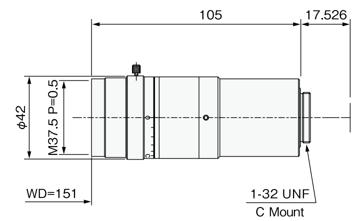
Magnification	0.5×	Resolution	11μ
WD	188mm	Optical distortion	-0.01%
Depth of field	0.94mm	Maximum Compatible sensor	4/3 (ϕ22.6mm)
F No.	5.1	Mount	C

LS07F (F Mount)



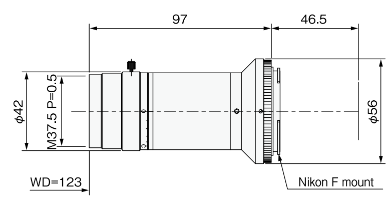
Magnification	0.7×	Resolution	10μ
WD	151mm	Optical distortion	-0.07%
Depth of field	0.54mm	Maximum Compatible sensor	ϕ36mm
F No.	6	Mount	F

LS07C (C Mount)



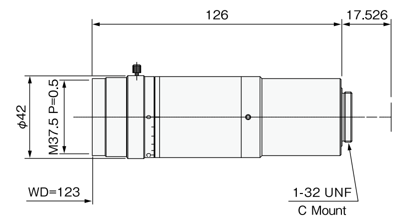
Magnification	0.7×	Resolution	10μ
WD	151mm	Optical distortion	-0.07%
Depth of field	0.54mm	Maximum Compatible sensor	4/3 (ϕ22.6mm)
F No.	6	Mount	C

LS10F (F Mount)



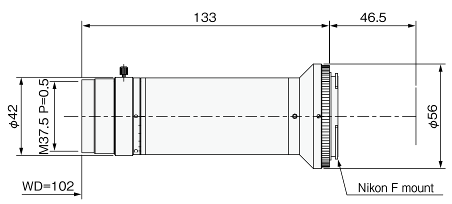
Magnification	1.0×	Resolution	8μ
WD	123mm	Optical distortion	-0.01%
Depth of field	0.31mm	Maximum Compatible sensor	ϕ36mm
F No.	7.5	Mount	F

LS10C (C Mount)



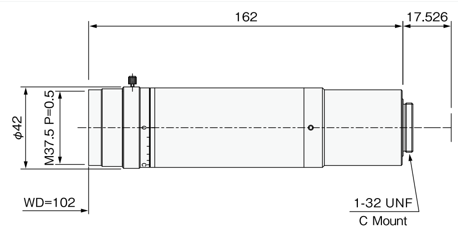
Magnification	1.0×	Resolution	8μ
WD	123mm	Optical distortion	-0.01%
Depth of field	0.31mm	Maximum Compatible sensor	4/3 (ϕ22.6mm)
F No.	7.5	Mount	C

LS15F (F Mount)



Magnification	1.5×	Resolution	7μ
WD	102mm	Optical distortion	0.26%
Depth of field	0.17mm	Maximum Compatible sensor	ϕ36mm
F No.	9.9	Mount	F

LS15C (C Mount)



Magnification	1.5×	Resolution	7μ
WD	102mm	Optical distortion	0.26%
Depth of field	0.17mm	Maximum Compatible sensor	4/3 (ϕ22.6mm)
F No.	9.9	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at wavelength of 550nm.
* Depth of field is calculated assuming F No. 22 and resolution of 7μm camera.

VIR Series

LARGE FORMAT | 151MP | ϕ48-67

Super High Resolution Lens for Large Format

151MP【Focal length 80mm】
120MP【Focal length 50mm】

- Suitable for Area Sensor Camera 151MP-3.76µm/Pixel,120MP-2.2µm/Pixel
- Suitable for Line Sensor Camera 16K-3.5µm/Pixel
- Super high resolution, Low distortion, and excellent uniformity of brightness
- Realizes color reproduction in color images
- Available for Visible – 2000nm type product

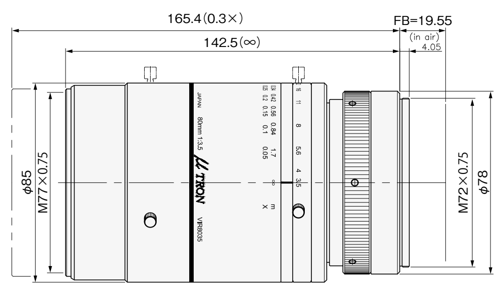
VIR8035-□

Focal length	80mm	Magnification at MOD	0.3×
∞ F No.	3.5	Maximum Compatible sensor	ϕ67mm
Range of WD	280mm - ∞	Mount	M72 or F

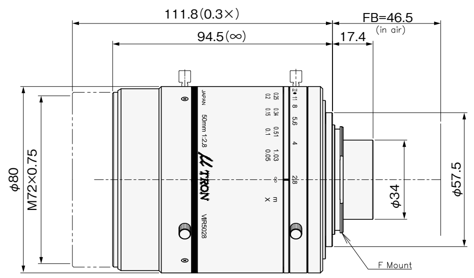
VIR5028-F

Focal length	50mm	Magnification at MOD	0.3×
∞ F No.	2.8	Maximum Compatible sensor	ϕ48mm
Range of WD	170mm - ∞	Mount	F

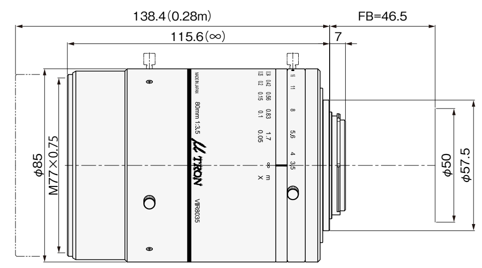
VIR8035-M（FB=19.55mm）



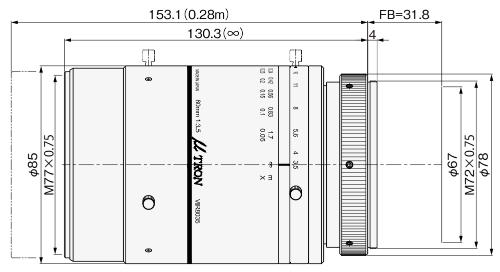
VIR5028-F（FB=46.5mm）



VIR8035-F（FB=46.5mm）



VIR8035-N（FB31.8mm）



Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Flange Back
VIR8035-M	VIEWORKS(151MP)、SVS(151MP)	M72 (P=0.75)	19.55mm
VIR□□□-F	F Mount Camera	F Mount	46.5mm
VIR8035-N	NED	M72 (P=0.75)	31.8mm
VIR8035-D	TELEDYNE DALSA	M72 (P=0.75)	12mm
VIR8035-VW	VIEWORKS	M72 (P=0.75)	10.2mm

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

WF Series

LARGE FORMAT | φ62

High Resolution and Wide View Lens for φ62mm

Suitable for wide field of view in limited space

- f50mm is available
- The widest angle for φ62mm in machine vision industry
- Suitable for Line Sensor Camera such as 16K x 3.5µm, 12K x 5µm, 8K x 7µm
- Possible to capture the large field of view by one camera in limited space
- F and M72 mount are available

WF5045- □

Focal length	50mm	Optical distortion	-0.01%
∞ F No.	4.5	Maximum Compatible sensor	φ 62.5mm
Range of WD	266mm - ∞	Mount	M72 or F
Magnification at MOD	0.2x		

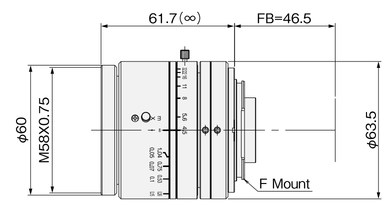
Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Flange Back
WF5045 -F	F Mount Camera	F Mount	46.5mm
WF5045-N	NED	M72 (P=0.75)	31.8mm
WF5045-M	TELEDYNE DALSA/TAKEX	M72 (P=0.75)	19.55mm
WF5045-D	TELEDYNE DALSA	M72 (P=0.75)	12mm
WF5045-VW	VIEWORKS	M72 (P=0.75)	10.2mm

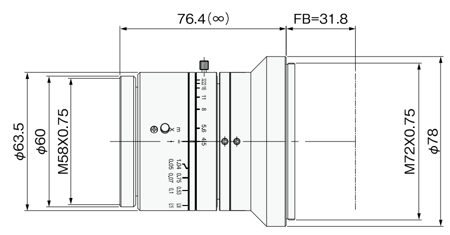
* Customized mount is also available. Please contact us for further information.

LINE SENSOR LENS / LARGE AREA SENSOR LENS

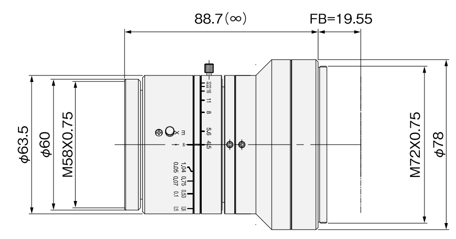
WF5045-F（FB=46.5mm）



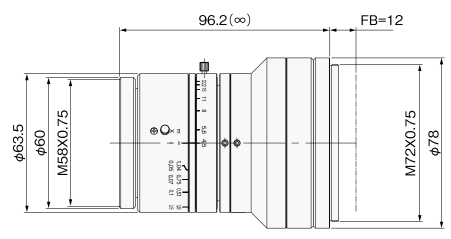
WF5045-N（FB=31.8mm）



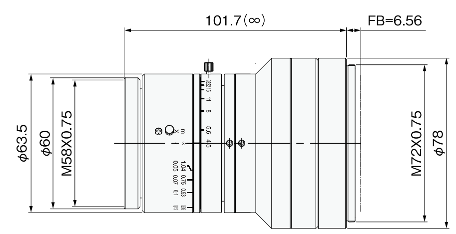
WF5045-M（FB=19.55mm）



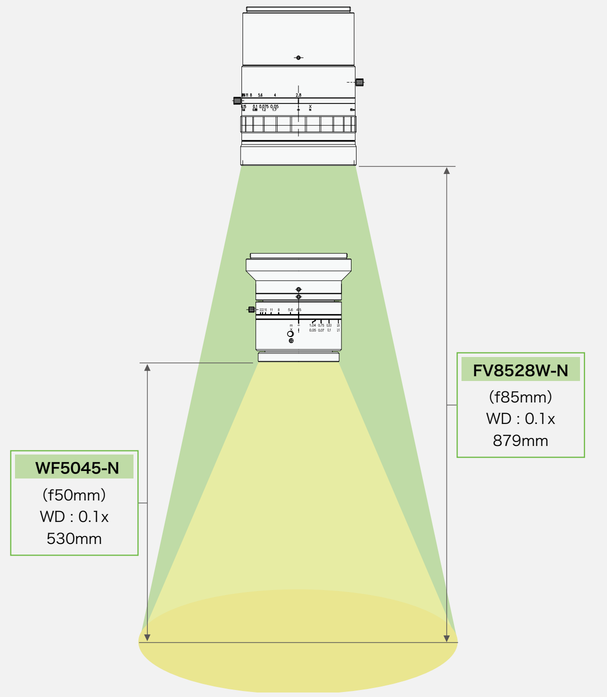
WF5045-D（FB=12mm）



WF5045-H（FB=6.56mm）



Conceptual Drawing



Possible to capture the Large field view by short WD

LSF Series

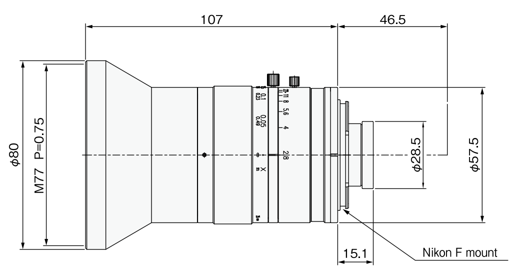
LARGE FORMAT ϕ44

High Resolution and Wide View Lens for Area and Line Sensor Camera

Excellent relative illumination
High resolution at whole working distance

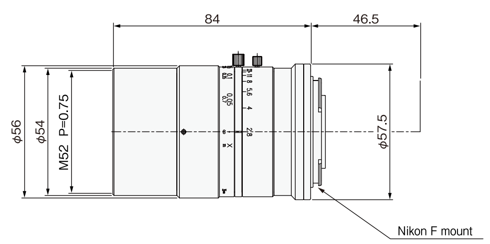
- Design for high resolution and low distortion, stable performance at whole working distance
- Suitable for Large Area Sensor Camera such as 25 Mega Pixel and 20 Mega Pixel
- Possible to use for small pixel size, 3.5µm
- Very low color aberration, compatible with 3-line camera
- 「LSF5028-F」 is possible to use at 0.3x without extension ring
- F, M58, M48 and M42 mount are available

LSF2528-F



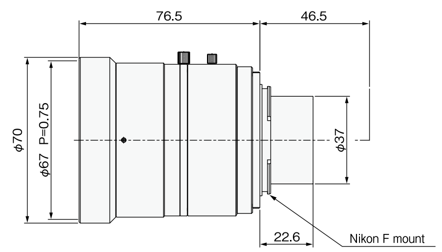
Focal length	25mm	Optical distortion	0.66%
∞F No.	2.8	Maximum Compatible sensor	ϕ44mm
Range of WD	142mm - ∞	Mount	F
Magnification at MOD	0.15x		

LSF3528-F



Focal length	35mm	Optical distortion	-0.31%
∞F No.	2.8	Maximum Compatible sensor	ϕ44mm
Range of WD	223mm - ∞	Mount	F
Magnification at MOD	0.15x		

LSF5028-F



Focal length	50mm	Optical distortion	-0.40%
∞F No.	2.8	Maximum Compatible sensor	ϕ44mm
Range of WD	178mm - ∞	Mount	F
Magnification at MOD	0.3x		

Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Flange Back
LSF□□□□-V58	SVS	M58 (P = 0.75)	11.48mm
LSF□□□□-U58	BAUMER	M58 (P=0.75)	12mm
LSF□□□□-TFL II	TOSHIBA TELI, ADIMEC	M48(P=0.75)	17.5mm
LSF□□□□-B42	BASLER	M42 (P = 1)	16mm
LSF□□□□-B42/2	BASLER	M42 (P = 0.75)	16mm
LSF□□□□-D42/2	TELEDYNE DALSA	M42 (P = 1)	12mm
LSF□□□□-V42	SVS	M42 (P = 1)	11.48mm
LSF□□□□-S42	SENTECH	M42 (P = 1)	10mm
LSF□□□□-D42	TELEDYNE DALSA	M42 (P = 1)	6.56mm

* Indicated Specifications are design values.

LINE SENSOR LENS / LARGE AREA SENSOR LENS

LSF Series

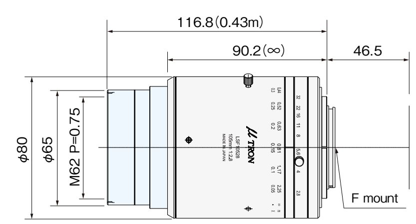
LARGE FORMAT ϕ48

Long Focal High Resolution Lens for φ48mm

High Sensitivity CMOS sensor

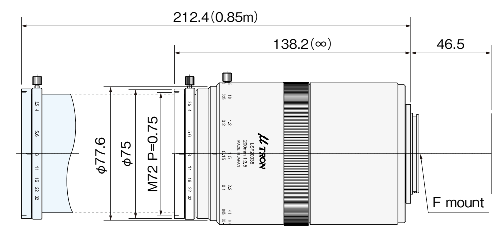
- Long focal distance, f105mm and f200mm
- Suitable for 65 Mega Pixel, 50 Mega Pixel, and 31 Mega Pixel
- Possible to use for small pixel size, 3.2µm
- Magnification at MOD 0.3x
- Stable performance at different WD by floating design
- F, M58, and M42 mount are available

LSF10528-F



Focal length	105mm
∞ F No.	2.8
Rang of WD	433mm ~ ∞
Magnification at MOD	0.3x
TV distortion	0.10%
Maximum Compatible sensor	ϕ48mm
Mount	F

LSF20035-F



Focal length	200mm
∞ F No.	3.5
Rang of WD	850mm ~ ∞
Magnification at MOD	0.3x
TV distortion	0.14%
Maximum Compatible sensor	ϕ48mm
Mount	F

* Indicated Specifications are design values.

MS Series

LARGE FORMAT φ30.7

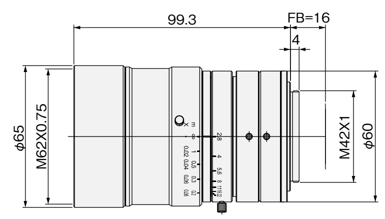
31 Mega Pixel Lens for Large format, φ30mm

High resolution lens for 31 Mega Pixel

- Suitable for large format, 31 Mega Pixel – 3.45µm and Line Sensor Camera , 8K x 3.5µm
- Adopt screw mount, stable mount mechanism without rattling
- Achieve low distortion and wide angle for large format, φ30.7mm
- Stable performance at different working distance by floating design
- M48, M42 and M35 mount are available

LINE SENSOR LENS / LARGE AREA SENSOR LENS

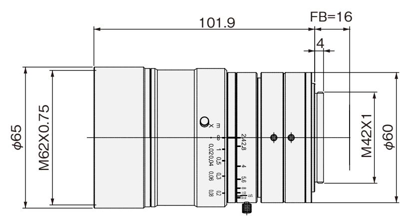
MS1828- □



Focal length	18mm	Magnification at MOD	0.15x
∞F No.	2.8	TV distortion	0.52%
Range of WD	97mm - ∞	Maximum Compatible sensor	Φ30.7mm
Mount	M42,TFL- II ,TFL		

* Drawing is for B42 mount (M42 x 1, FB16mm)
* Indicated specifications are design value. * □ = Mount

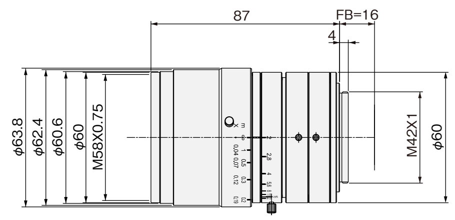
MS2524- □



Focal length	25mm	Magnification at MOD	0.2x
∞F No.	2.4	TV distortion	-0.27%
Range of WD	118mm - ∞	Maximum Compatible sensor	Φ30.7mm
Mount	M42,TFL- II ,TFL		

* Drawing is for B42 mount (M42 x 1, FB16mm)
* Indicated specifications are design value. * □ = Mount

MS3520- □



Focal length	35mm	Magnification at MOD	0.39x
∞F No.	2.0	TV distortion	-0.11%
Range of WD	93mm - ∞	Maximum Compatible sensor	Φ30.7mm
Mount	M42,TFL- II ,TFL		

* Drawing is for B42 mount (M42 x 1, FB16mm)
* Indicated specifications are design value. * □ = Mount

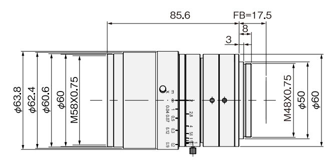
Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Flange Back
MS□□□□-TFLII	TOSHIBA TELI, ADIMEC	M48 P=0.75mm	17.5mm
MS□□□□-B42	BASLER	M42 P=1mm	16mm
MS□□□□-D42/2	TELEDYNE DALSA	M42 P=1mm	12mm
MS□□□□-V42	SVS	M42 P=1mm	11.48mm
MS□□□□-S42	SENTECH	M42 P=1mm	10mm
MS□□□□-D42	TELEDYNE DALSA	M42 P=1mm	6.56mm
MS□□□□-TFL	LUCID	M35 P=0.75mm	17.526mm

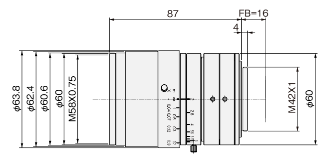
* Possible to customize the mount

Example of lens with mount (MS3520)

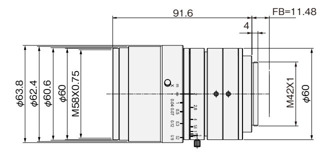
MS3520-TFL II



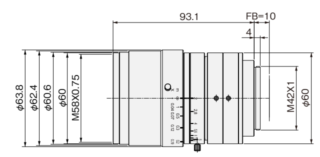
MS3520-B42



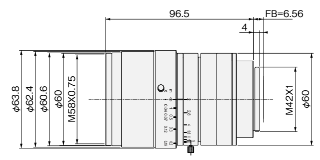
MS3520-V42



MS3520-S42



MS3520-D42



FV-L Series

LARGE FORMAT

ϕ22.6-62

Macro Lens for Area and Line Sensor Camera

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

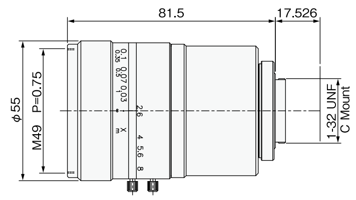
- Adjustable focus and iris
- Design for macro imaging
- Suitable for inspection of wafer, PCB, electronic parts, etc…, required for high resolution at short working distance
- FV8528L is compatible with M72 mount
- Compatible with large image format of high resolution area camera

Model No. for Different Mount

Model	Compatible Camera	Screw Pitch	Flange Back
FV8528L -F	F Mount Camera	F Mount	46.5mm
FV8528L-N	NED	M72 (P=0.75)	31.8mm
FV8528L-M	TELEDYNE DALSA/TAKEX	M72 (P=0.75)	19.55mm
FV8528L-D	TELEDYNE DALSA	M72 (P=0.75)	12mm
FV8528L-VW	VIEWORKS	M72 (P=0.75)	10.2mm

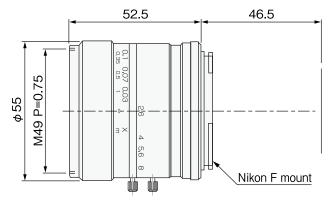
* Customized mount is also available. Please contact us for further information.

FV3526L-C



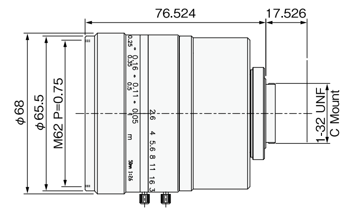
Focal length	35mm	Optical distortion	-0.05%
∞F No.	2.6	Maximum Compatible sensor	4/3" (ϕ22.6mm)
Range of WD	0.18m - ∞	Mount	C
Magnification at MOD	0.2×		

FV3526L-F



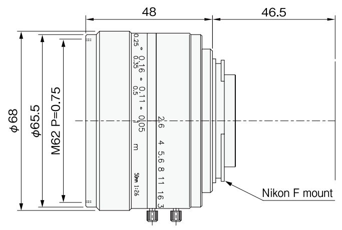
Focal length	35mm	Optical distortion	-0.42%
∞F No.	2.6	Maximum Compatible sensor	ϕ36mm
Range of WD	0.18m - ∞	Mount	F
Magnification at MOD	0.2×		

FV5026L-C



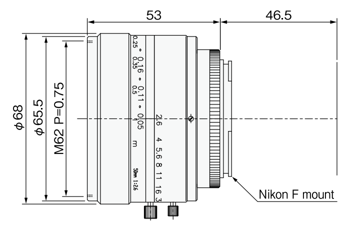
Focal length	50mm	Optical distortion	-0.01%
∞F No.	2.6	Maximum Compatible sensor	4/3" (ϕ22.6mm)
Range of WD	0.25m - 1m	Mount	C
Magnification at MOD	0.22×		

FV5026L-F



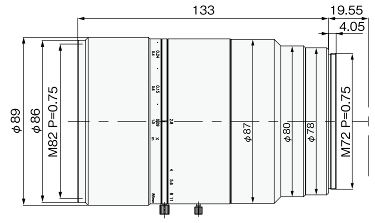
Focal length	50mm	Optical distortion	-0.24%
∞F No.	2.6	Maximum Compatible sensor	ϕ45mm
Range of WD	0.25 - 1m	Mount	F
Magnification at MOD	0.22×		

FV5026L Ⅱ -F



Focal length	50mm	Optical distortion	-0.80%
∞F No.	2.6	Maximum Compatible sensor	ϕ45mm
Range of WD	0.17m - 0.35m	Mount	F
Magnification at MOD	0.32×		

FV8528L- □



* Drawing is for FV8528L-M (M72 P=0.75 FB19.55mm)

Focal length	85mm	Optical distortion	-0.18%
∞F No.	2.8	Maximum Compatible sensor	ϕ62mm
Range of WD	0.25m - 1m	Mount	F or M72
Magnification at MOD	0.4×		

* Indicated specifications are design value. * □ = Mount

FV-W Series

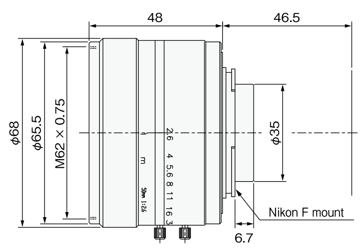
LARGE FORMAT | ϕ45-67

Wide Field of View Lens for Area and Line Sensor Camera

Design for Machine Vision application

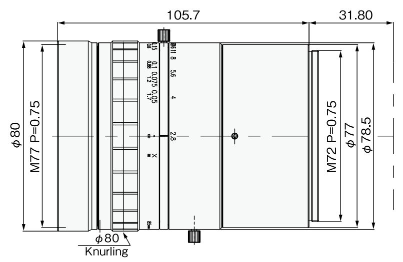
- Adjustable focus and iris
- Design for infinite distance (∞), suitable for wide field of view
- f50mm and f85 mm are available
- FV8528W is compatible with M72 mount

FV5026W-F



Focal length	50mm	Optical distortion	0.23%
∞F No.	2.6	Maximum Compatible sensor	ϕ 45mm
Range of WD	0.3m - ∞	Mount	F
Magnification at MOD	0.18×		

FV8528W-☐



Focal length	85 mm	Optical distortion	0.04%
∞F No.	2.8	Maximum Compatible sensor	ϕ 67mm
Range of WD	0.46m - ∞	Mount	F or M72
Magnification at MOD	0.2×		

* Indicated specifications are design value.

LINE SENSOR LENS / LARGE AREA SENSOR LENS

HB5014-F

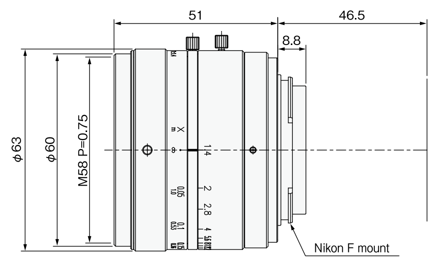
LARGE FORMAT | ϕ45

High brightness Lens for Line Sensor Camera

Excellent brightness, F No.1.4

- f50mm is available
- 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

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	0.2×		

* Indicated specifications are design values.

TELECENTRIC LENS

TELECENTRIC LENS

Magnification chart of Telecentric Lens

VGA | MEGA PIXEL | 5 MEGA PIXEL | 4-9 MEGA PIXEL | 12-25 MEGA PIXEL | Large Format

Magnification	Compatible Sensor											
	1/2	page	1/1.8	page	2/3	page	1	page	1.1	page	Large Format	page
0.12×	-		-		-		MGTL012V	P35	-		-	
0.132×	-		-		-		-		MGTL0132V	P35	-	
0.14×	MGTL014	P57	-		MGTL014VM	P53	-		-		-	
	-		-		MGTL014VM-180	P53	-		-		-	
0.15×	-		-		-		MGTL015V	P35	-		-	
0.164×	-		-		-		-		MGTL0164V	P35	-	
0.17×	-		-		MGTL017VM	P53	-		-		-	
0.19×	-		-		MGTL019	P57	-		-		-	
	-		-		MGTL019VM	P53	-		-		-	
0.2×	-		-		-		MGTL02V	P35	-		-	
0.22×	-		-		MGTL022VM	P53	-		MGTL022V	P35	LSTL022T-F	P37
0.23×	-		-		MGTL023	P57	-		-		-	
	-		-		MGTL023H	P54	-		-		-	
0.275×	-		-		MGTL0275-2	P57	MGTL0275V	P51	-		LSTL0275T-F	P37
0.3×	-		-		MGTL03	P57	-		MGTL03V	P50	LSTL03TW-F	P37
	-		-		MGTL03VM	P54	-		MGTL03VC	P50	-	
	-		-		MGTL03VMC	P55	-				-	
0.345×	-		-		MGTL0345VM	P54	-		MGTL0345V	P50	-	
	-		-		MGTL0345VMC	P55	-		-		-	
0.35×	-		-		-		-		-		LSTL035H-F	P39
0.366×	-		-		-		-		-		LSTL0366T-F	P37
0.37×	-		-		-		MGTL037V	P51	-		-	
0.4×	-		-		MGTL04	P57	-		-		-	
	-		-		MGTL04VM	P54	-		-		-	
	-		-		MGTL04VMC	P55	-		-		-	
0.5×	-		TL05C-220	P68	FT05-65R	P57	-		MGTL05-1.1	P57	LSTL05H-F	P39
	-		-		FT05C-65R	P59	-		FTV05-110	P41	-	
	-		-		FT05-110	P60	-		FTV05C-110	P42	-	
	-		-		FT05C-110	P61	-		FTV05-150	P44	-	
	-		-		MGTL05VM	P55	-		FTV05C-150	P45	-	
	-		-		MGTL05VMC	P55	-		-		-	
0.55×	-		-		-		-		-		LSTL055TW-F	P33
0.69×	-		-		MGTL069VM	P55	-		-		-	
	-		-		MGTL069VMC	P55	-		-		-	
0.7×	-		TL07C-220	P68	-		-		FTV07-110	P41	-	
	-		TL07C-340	P70	-		-		FTV07C-110	P42	-	
	-		-		-		-		FTV07-150	P44	-	
	-		-		-		-		FTV07C-150	P45	-	
0.78×	-		-		-		-		-		LSTL078TW-F	P37
0.8×	-		TL08-65R	P64	-		-		FTV08-110	P41	-	
	-		TL08C-65R	P65	-		-		FTV08C-110	P42	-	
	-		TL08-110R	P66	FT08-65R	P58	-		FTV08-150	P44	-	
	-		TL08C-110R	P67	FT08C-65R	P59	-		FTV08C-150	P45	-	
	-		-		FT08-110	P60	-		-		-	
	-		-		FT08C-110	P61	-		-		-	

Coaxial type is 'C' included on the model name

SWIR

Magnification	Compatible Sensor											
	1/2	page	1/1.8	page	2/3	page	1	page	1.1	page	Large Format	page
1.0×	TL10C-40	P63	TL10-65R	P64	FT10-65R	P58	-		MGTL10V	P55	LSTL10H-F	P39
	-		TL10C-65R	P65	FT10C-65R	P59	-		MGTL10VC	P55	-	
	-		TL10-110R	P66	FT10-110	P60	-		FTV10-110	P41	-	
	-		TL10C-110R	P67	FT10C-110	P61	-		FTV10C-110	P42	-	
	-		TL10C-220	P68	TL10C-310	P70	-		FTV10-150	P44	-	
	-		-		-		-		FTV10C-150	P45	-	
	-		-		-		-		FTV10-110SW	P47	-	
	-		-		-		-		FTV10C-110SW	P47	-	
1.5×	-		TL15-65R	P64	FT15-65R	P58	-		FTV15-110	P41	LSTL15H-F	P39
	-		TL15C-65R	P65	FT15C-65R	P59	-		FTV15C-110	P42	-	
	-		-		FT15-110	P60	-		FTV15-150	P44	-	
	-		-		FT15C-110	P61	-		FTV15C-150	P45	-	
2.0×	TL20-40	P62	TL20C-220	P68	FT20-65R	P59	-		FTV20-110	P41	LSTL20H-F	P39
	TL20C-40	P63	-		FT20C-65R	P59	-		FTV20C-110	P42	-	
	TL20-65R	P64	-		FT20-110	P61	-		FTV20-150	P44	-	
	TL20C-65R	P65	-		FT20C-110	P61	-		FTV20C-150	P45	-	
	TL20-110R	P67	-		-				FTV20-110SW	P47	-	
	TL20C-110R	P67	-		-		-		FTV20C-110SW	P47	-	
	-		-				-		-		-	
3.0×	-		-		FT30-65R	P59	-		FTV30-110	P41	-	
	-		-		FT30C-65R	P59	-		FTV30C-110	P42	-	
	-		-		FT30-110R	P61	-		FTV30-150	P44	-	
	-		-		FT30C-110R	P61	-		FTV30C-150	P45	-	
	-		-		TL30C-110	P67	-		FTV30C-110SW	P47	-	
4.0×	TL40-40	P62	TL40C-110R	P67	TL40-65	P65	-		FTV40-110	P41	-	
	TL40C-40	P63	-		TL40C-65	P65	-		FTV40C-110	P42	-	
	-		-		FT40-65R	P59	-		FTV40-150	P44	-	
	-		-		FT40C-65R	P59	-		FTV40C-150	P45	-	
	-		-		FT40-110R	P61	-		FTV40C-110SW	P47	-	
	-		-		FT40C-110R	P61	-		-		-	
	-		-		TL40C-240	P69	-		-		-	
6.0×	TL60-40	P63	TL60C-110R	P67	FT60-65R	P59	-		FTV60-110	P41	-	
	TL60C-40	P63	-		FT60C-65R	P59	-		FTV60C-110	P42	-	
	-		-		FT60-110R	P61	-		FTV60-150	P44	-	
	-		-		FT60C-110R	P61	-		FTV60C-150	P45	-	
	-		-		TL60-65	P65	-		-		-	
	-		-		TL60C-65	P65	-		-		-	
	-		-		TL60C-240	P69	-		-		-	
8.0×	-		TL80C-110R	P67	TL80-65	P65	-		-		-	
	-		-		TL80C-65	P65	-		-		-	

MGTL-V Series

12-25MP

ϕ16-18.1

Low Magnification Telecentric Lens for Large 1”-1.1”

Suitable for F mount and C mount high resolution camera

- Suitable for 25 Mega Pixel and 12 Mega Pixel
- Designed for long working distance, 200mm that can secure enough space to set up
- Adjustable iris, possible to adjust depth of field and contrast
- Possible to capture wide view with large format, high resolution camera
- Flange adapter is available

FG-L Series

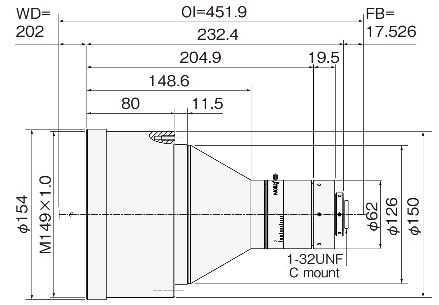
Flange adapter for large format low magnification telecentric lens

- Suitable for wide field of view telecentric lens
- Possible to hold heavy lens
- Improve safety in a vibrating environment such as equipment installation

Model	Lenses	
FG01L	MGTL0132V	MGTL012V
FG02L	MGTL0164V	MGTL015V
FG04L	MGTL022V	MGTL02V

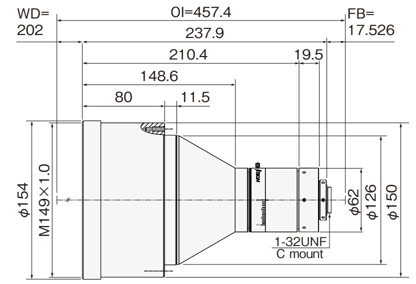
Accessories: Screw M4 x 16 (8 pieces)

MGTL012V



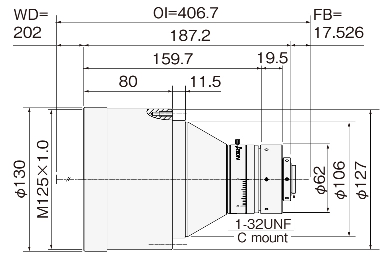
Magnification	0.12×	Depth of field	33mm
F No.	6.0	Resolution	34 µm
Object side NA	0.010	TV distortion	0.03%
WD	202mm	Image Circle	ϕ 16 mm
OI	451.9mm	Mount	C

MGTL0132V



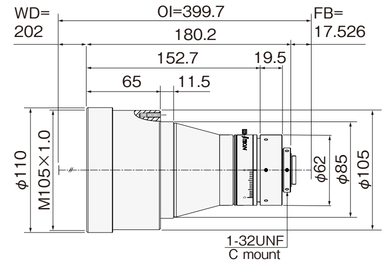
Magnification	0.132×	Depth of field	27.6mm
F No.	6.0	Resolution	31 µm
Object side NA	0.011	TV distortion	0.03%
WD	202mm	Image Circle	ϕ 18.1mm
OI	457.4mm	Mount	C

MGTL015V



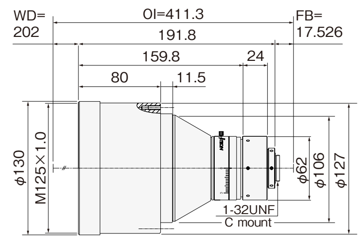
Magnification	0.15×	Depth of field	21mm
F No.	6.0	Resolution	27 µm
Object side NA	0.013	TV distortion	0.01%
WD	202mm	Image Circle	ϕ 16 mm
OI	406.7mm	Mount	C

MGTL02V



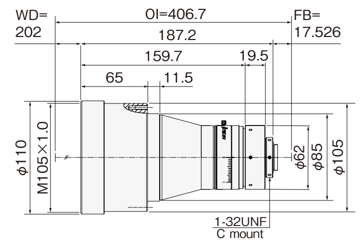
Magnification	0.2×	Depth of field	12mm
F No.	6.0	Resolution	20 µm
Object side NA	0.017	TV distortion	0.00%
WD	202mm	Image Circle	ϕ 16 mm
OI	399.7mm	Mount	C

MGTL0164V



Magnification	0.164×	Depth of field	18mm
F No.	6.0	Resolution	25 µm
Object side NA	0.014	TV distortion	0.00%
WD	202mm	Image Circle	ϕ 18.1mm
OI	411.3mm	Mount	C

MGTL022V



Magnification	0.22×	Depth of field	9.9mm
F No.	6.0	Resolution	18 µm
Object side NA	0.018	TV distortion	0.00%
WD	202mm	Image Circle	ϕ 18.1mm
OI	406.7mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40µm.

LSTLSeries

LARGE FORMAT

ϕ28.2-30.8

Low Magnification Telecentric Lens for φ30mm

Suitable for F mount high resolution camera

- Reduces the focus difference due to wavelength
- LSTL078TW-F is suitable for visible – NIR
- Adjustable iris, possible to adjust depth of field

FG-L Series

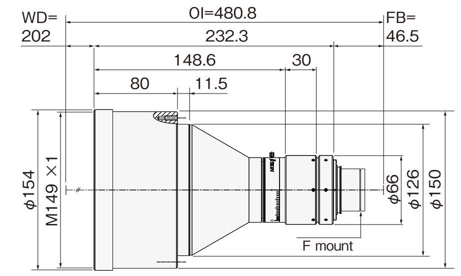
Flange adapter for large format low magnification telecentric lens

- Suitable for wide field of view telecentric lens
- Possible to hold heavy lens
- Improve safety in a vibrating environment such as equipment installation

Model	Lenses
FG01L	LSTL022T-F
FG02L	LSTL0275T-F
FG04L	LSTL0366T-F

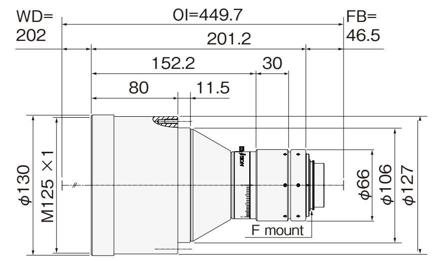
Accessories: Screw M4 x 16 (8 pieces)

LSTL022T-F



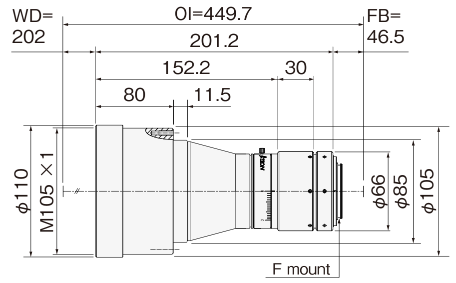
Magnification	0.22×	Depth of field	9.9mm
F No.	6.0	Resolution	18.3 µm
Object side NA	0.018	TV distortion	0.02%
WD	202mm	Image Circle	ϕ 29mm
OI	480.8mm	Mount	F/M42

LSTL0275T-F



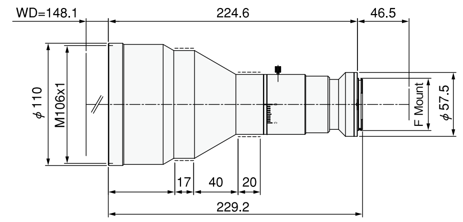
Magnification	0.275×	Depth of field	6.4mm
F No.	6.0	Resolution	14.7 µm
Object side NA	0.023	TV distortion	-0.01%
WD	202mm	Image Circle	ϕ 29 mm
OI	449.7mm	Mount	F/M42

LSTL0366T-F



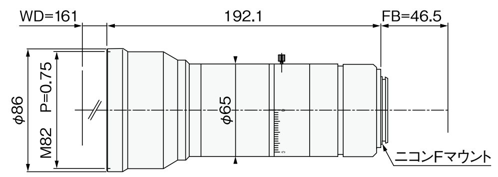
Magnification	0.366×	Depth of field	3.6mm
F No.	6.0	Resolution	11 µm
Object side NA	0.031	TV distortion	0.00%
WD	202mm	Image Circle	ϕ 29 mm
OI	449.6mm	Mount	F/M42

LSTL03TW-F



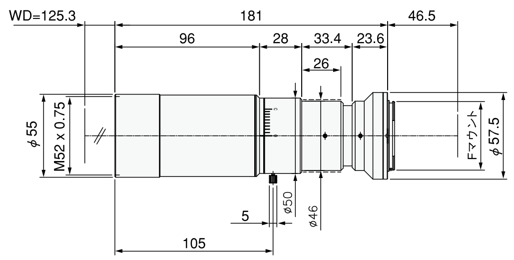
Magnification	0.3×	Depth of field	8.6mm
F No.	9.7	Resolution	22.4 µm
Object side NA	0.015	TV distortion	0.01%
WD	148.1mm	Image Circle	ϕ 28.2mm
OI	419.2mm	Mount	F

LSTL055TW-F



Magnification	0.55×	Depth of field	1.37mm
F No.	5.17	Resolution	6.33 µm
Object side NA	0.053	TV distortion	0.021%
WD	161.0mm	Image Circle	ϕ 30.8mm
OI	399.6mm	Mount	F

LSTL078TW-F



Magnification	0.78×	Depth of field	1.3mm
F No.	9.8	Resolution	8.4 µm
Object side NA	0.04	TV distortion	0.00%
WD	125.3mm	Image Circle	ϕ 28.2mm
OI	352.8mm	Mount	F

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40 µm.

LSTL-H Series

LARGE FORMAT

ϕ 44-48

Telecentric Lens for Large Format, φ48mm

Very high NA

- Line up : 0.35x, 0,5x, 1.0x, 1.5x and 2.0x
- Suitable for large area sensor of high resolution,120 Mega Pixel, 71 Mega Pixel, and 50 Mega Pixel
- 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

FG-L Series

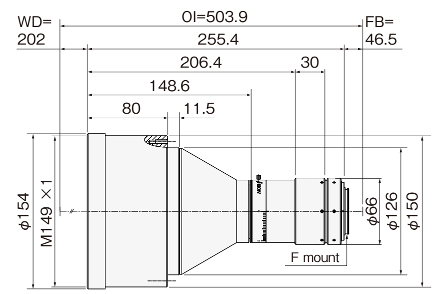
Flange adapter for large format low magnification telecentric lens

- Suitable for wide field of view telecentric lens
- Possible to hold heavy lens
- Improve safety in a vibrating environment such as equipment installation

Model	Lenses
FG01L	LSTL035H-F
FG03L	LSTL05H-F

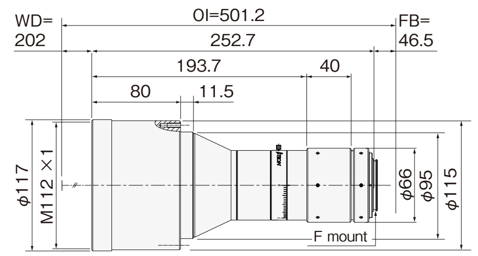
Accessories: Screw M4 x 16 (8 pieces)

LSTL035H-F



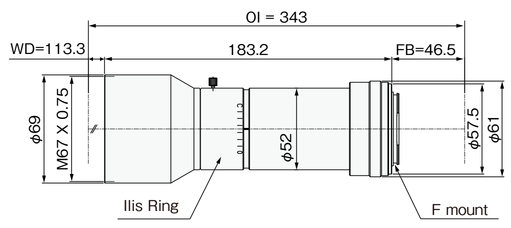
Magnification	0.35×	Depth of field	3.9mm
F No.	6.0	Resolution	11.5μm
Object side NA	0.029	TV distortion	-0.01%
WD	202mm	Image Circle	ϕ48mm
OI	503.9mm	Mount	F/M42

LSTL05H-F



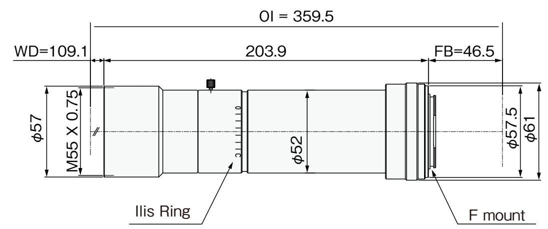
Magnification	0.5x	Depth of field	1.9mm
F No.	6.0	Resolution	8.0μm
Object side NA	0.042	TV distortion	0.01%
WD	202mm	Image Circle	ϕ48mm
OI	501.2mm	Mount	F/M42

LSTL10H-F



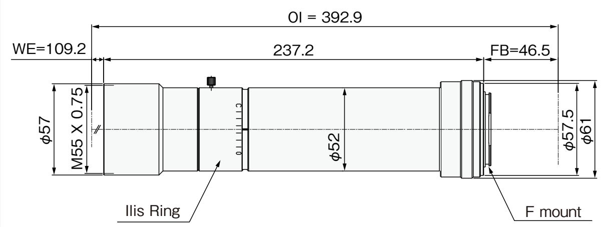
Magnification	1.0x	Depth of field	0.31mm
F No.	6.4	Resolution	4.3μm
Object side NA	0.077	TV distortion	0.01%
WD	113mm	Image Circle	ϕ44mm
OI	343.0mm	Mount	F

LSTL15H-F



Magnification	1.5x	Depth of field	0.17mm
F No.	7.8	Resolution	3.5μm
Object side NA	0.095	TV distortion	0.02%
WD	109.1mm	Image Circle	ϕ44mm
OI	359.5mm	Mount	F

LSTL20H-F



Magnification	2.0x	Depth of field	0.12mm
F No.	8.7	Resolution	2.9μm
Object side NA	0.12	TV distortion	-0.02%
WD	109mm	Image Circle	ϕ44mm
OI	392.9mm	Mount	F

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40μm.

FTV Series

25MP 1.1″

25 Mega Pixel Telecentric Lens for 1.1"

Possible to capture wide view with 1”-1.1” camera

WD 110 mm Series 0.5x-6.0x

- Suitable for 1.1”, 25 Mega Pixel (2.5μm/Pixel) camera
- 0.5x-2.0x are adjustable iris, possible to adjust depth of field and contrast

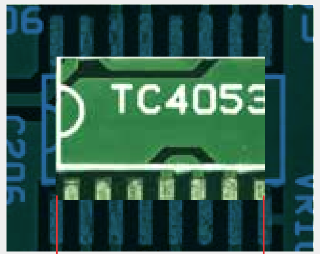
View comparison image

Magnification : 1x

View comparison image between 1.1"12Mega Pixel camera and 2/3" 5 Mega Pixel camera

Possible to capture about 1.7x field of view

2/3" 5Mega Pixel



8.47mm

1.1" 12Mega Pixel

14.13mm

MSL22 □ Series

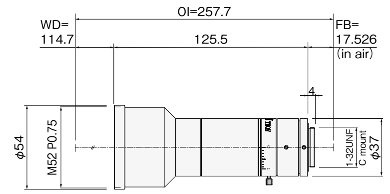
LED Spotlight

Design for FTV series, Telecentric Lens for 25 Mega Pixel

□= light color(R=RED、G=GREEN、B=BLUE、W=WHITE)

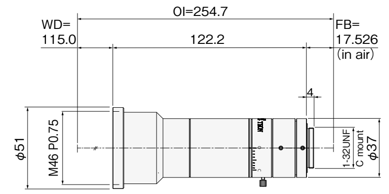
▶ The detail information is written Page 118-119

FTV05-110



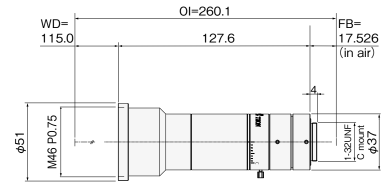
Magnification	0.5x
F No.	6.3
Object side NA	0.040
WD	114.7mm
OI	257.7mm
Depth of field	2.02mm
Resolution	8.5 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV07-110



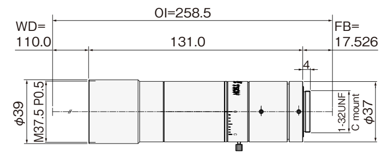
Magnification	0.7x
F No.	6.4
Object side NA	0.055
WD	115.0mm
OI	254.7mm
Depth of field	1.05mm
Resolution	6.1 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV08-110



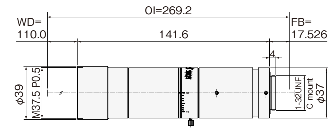
Magnification	0.8x
F No.	6.2
Object side NA	0.064
WD	115.0mm
OI	260.1mm
Depth of field	0.78mm
Resolution	5.2 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV10-110



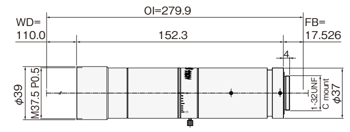
Magnification	1.0x
F No.	7.0
Object side NA	0.071
WD	110mm
OI	258.5mm
Depth of field	0.56mm
Resolution	4.7 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV15-110



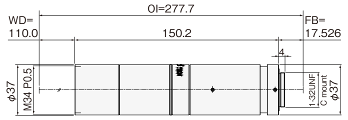
Magnification	1.5x
F No.	10.1
Object side NA	0.074
WD	110mm
OI	269.2mm
Depth of field	0.36mm
Resolution	4.5 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV20-110



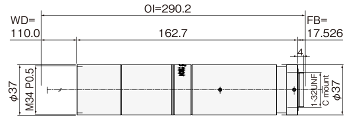
Magnification	2.0x
F No.	11.5
Object side NA	0.087
WD	110mm
OI	279.9mm
Depth of field	0.23mm
Resolution	3.9 µm
TV distortion	0.01%
Maximum Compatible sensor	1.1"
Mount	C

FTV30-110



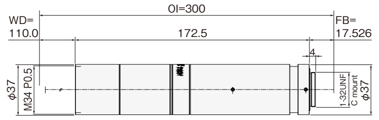
Magnification	3.0x
F No.	16.0
Object side NA	0.094
WD	110mm
OI	277.7mm
Depth of field	0.14mm
Resolution	3.6 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV40-110



Magnification	4.0x
F No.	20.0
Object side NA	0.100
WD	110mm
OI	290.2mm
Depth of field	0.10mm
Resolution	3.4 µm
TV distortion	-0.01%
Maximum Compatible sensor	1.1"
Mount	C

FTV60-110

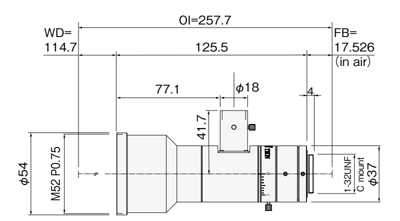


Magnification	6.0x
F No.	30.0
Object side NA	0.100
WD	110mm
OI	300.0mm
Depth of field	0.07mm
Resolution	3.4 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40 µm.

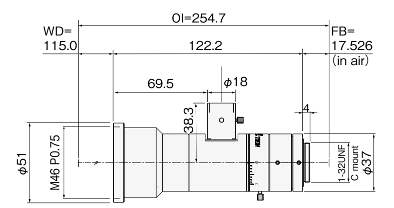
TELECENTRIC LENS

FTV05C-110



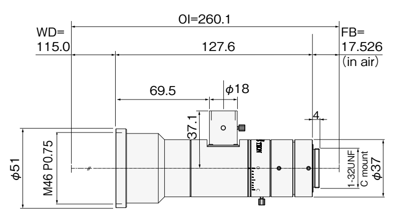
Magnification	0.5×
F No.	6.3
Object side NA	0.040
WD	114.7mm
OI	257.7mm
Depth of field	2.02mm
Resolution	8.5 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV07C-110



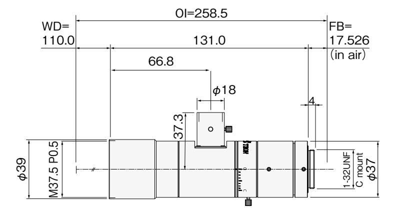
Magnification	0.7×
F No.	6.4
Object side NA	0.055
WD	115.0mm
OI	254.7mm
Depth of field	1.05mm
Resolution	6.1 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV08C-110



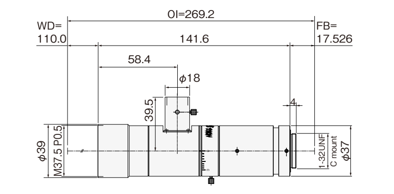
Magnification	0.8×
F No.	6.2
Object side NA	0.064
WD	115.0mm
OI	260.1mm
Depth of field	0.78mm
Resolution	5.2 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV10C-110



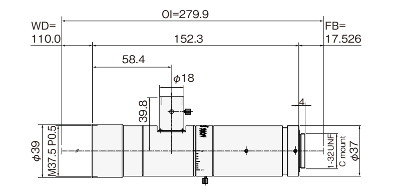
Magnification	1.0×
F No.	7.0
Object side NA	0.071
WD	110mm
OI	258.5mm
Depth of field	0.56mm
Resolution	4.7 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV15C-110



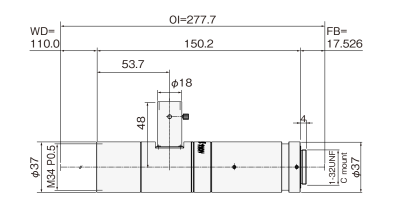
Magnification	1.5×
F No.	10.1
Object side NA	0.074
WD	110mm
OI	269.2mm
Depth of field	0.36mm
Resolution	4.5 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV20C-110



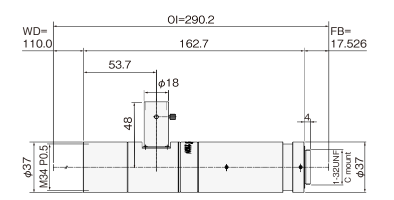
Magnification	2.0×
F No.	11.5
Object side NA	0.087
WD	110mm
OI	279.9mm
Depth of field	0.23mm
Resolution	3.9 µm
TV distortion	0.01%
Maximum Compatible sensor	1.1"
Mount	C

FTV30C-110



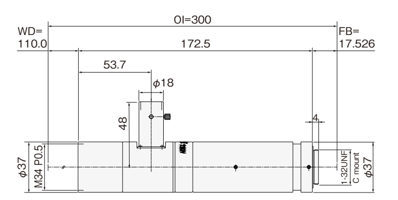
Magnification	3.0×
F No.	16.0
Object side NA	0.094
WD	110mm
OI	277.7mm
Depth of field	0.14mm
Resolution	3.6 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV40C-110



Magnification	4.0×
F No.	20.0
Object side NA	0.100
WD	110mm
OI	290.2mm
Depth of field	0.10mm
Resolution	3.4 µm
TV distortion	-0.01%
Maximum Compatible sensor	1.1"
Mount	C

FTV60C-110



Magnification	6.0×
F No.	30.0
Object side NA	0.100
WD	110mm
OI	300.0mm
Depth of field	0.07mm
Resolution	3.4 µm
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 calculated assuming permissible circle of confusion is 40 µm.

FTV Series

25MP 1.1"

25 Mega Pixel Telecentric Lens for 1.1"

Possible to capture wide view with 1"-1.1" camera

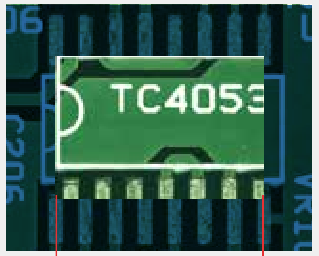
WD 150 mm Series 0.5x-6.0x

- Suitable for 1.1", 25 Mega Pixel (2.5µm/Pixel) camera
- 0.5x-2.0x are adjustable iris, possible to adjust depth of field and contrast

View comparison image

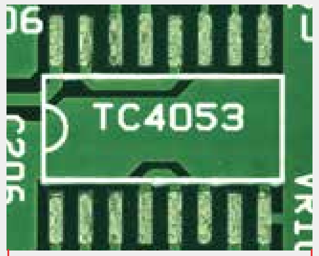
Magnification : 1x
View comparison image between 1.1"12Mega Pixel camera and 2/3" 5 Mega Pixel camera
Possible to capture about 1.7x field of view

2/3" 5Mega Pixel



8.47mm

1.1" 12Mega Pixel



14.13mm

MSL22 □ Series

LED Spotlight

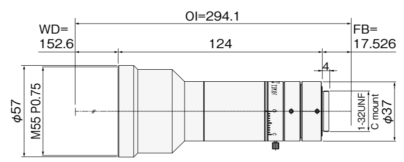
Design for FTV series, Telecentric Lens for 25 Mega Pixel

□= light color(R=RED、G=GREEN、B=BLUE、W=WHITE)

▶ The detail information is written Page 118-119

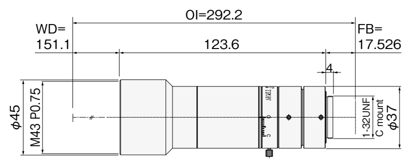
TELECENTRIC LENS

FTV05-150



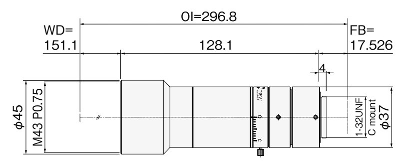
Magnification	0.5×
F No.	6.3
Object side NA	0.040
WD	152.6mm
OI	294.1mm
Depth of field	2mm
Resolution	8.4 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV07-150



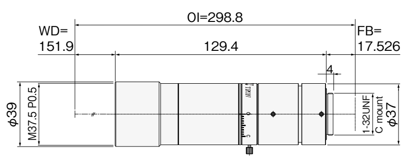
Magnification	0.7×
F No.	9.0
Object side NA	0.039
WD	151.1mm
OI	292.2mm
Depth of field	1.47mm
Resolution	8.6 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV08-150



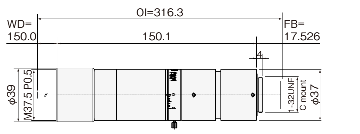
Magnification	0.8×
F No.	8.1
Object side NA	0.050
WD	151.1mm
OI	296.8mm
Depth of field	1.01mm
Resolution	6.8 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV10-150



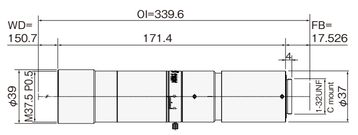
Magnification	1.0×
F No.	9.1
Object side NA	0.055
WD	151.9mm
OI	298.8mm
Depth of field	0.73mm
Resolution	6.1 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV15-150



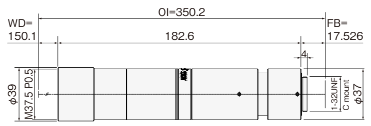
Magnification	1.5×
F No.	11.8
Object side NA	0.064
WD	150.7mm
OI	316.3mm
Depth of field	0.42mm
Resolution	5.3 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV20-150



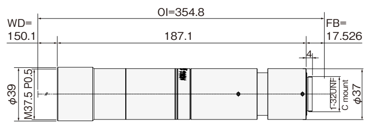
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	150.7mm
OI	339.6mm
Depth of field	0.27mm
Resolution	4.5 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV30-150



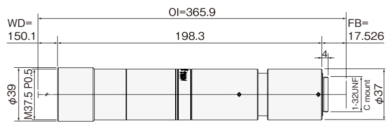
Magnification	3.0×
F No.	17.4
Object side NA	0.086
WD	150.1mm
OI	350.2mm
Depth of field	0.16mm
Resolution	3.9 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV40-150



Magnification	4.0×
F No.	22.0
Object side NA	0.091
WD	150.1mm
OI	354.8mm
Depth of field	0.11mm
Resolution	3.7 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

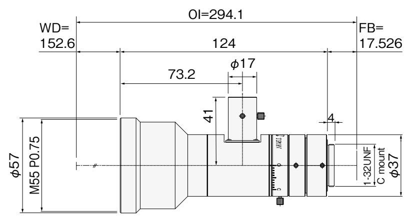
FTV60-150



Magnification	6.0×
F No.	33.0
Object side NA	0.091
WD	150.1mm
OI	365.9mm
Depth of field	0.07mm
Resolution	3.7 µm
TV distortion	0.01%
Maximum Compatible sensor	1.1"
Mount	C

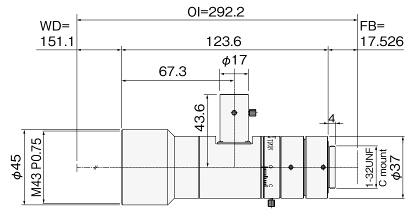
* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40 µm.

FTV05C-150



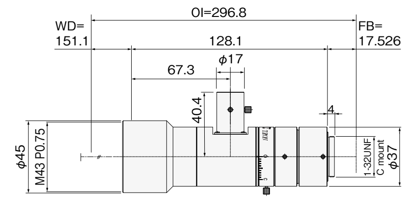
Magnification	0.5×
F No.	6.3
Object side NA	0.040
WD	152.6mm
OI	294.1mm
Depth of field	2mm
Resolution	8.4 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV07C-150



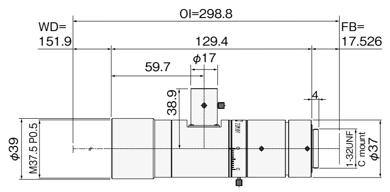
Magnification	0.7×
F No.	9.0
Object side NA	0.039
WD	151.1mm
OI	292.2mm
Depth of field	1.47mm
Resolution	8.6 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV08C-150



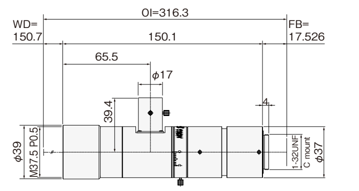
Magnification	0.8×
F No.	8.1
Object side NA	0.050
WD	151.1mm
OI	296.8mm
Depth of field	1.01mm
Resolution	6.8 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV10C-150



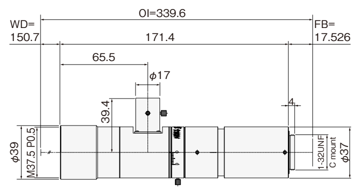
Magnification	1.0×
F No.	9.1
Object side NA	0.055
WD	151.9mm
OI	298.8mm
Depth of field	0.73mm
Resolution	6.1 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV15C-150



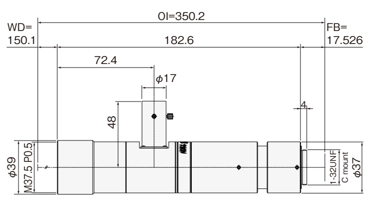
Magnification	1.5×
F No.	11.8
Object side NA	0.064
WD	150.7mm
OI	316.3mm
Depth of field	0.42mm
Resolution	5.3 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV20C-150



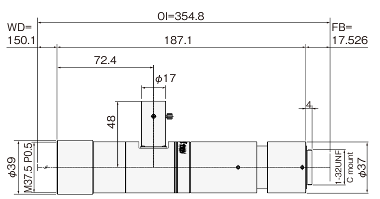
Magnification	2.0×
F No.	13.5
Object side NA	0.074
WD	150.7mm
OI	339.6mm
Depth of field	0.27mm
Resolution	4.5 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV30C-150



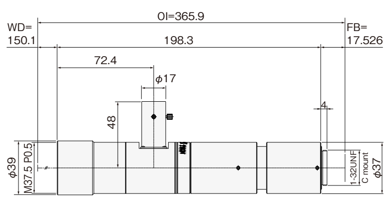
Magnification	3.0×
F No.	17.4
Object side NA	0.086
WD	150.1mm
OI	350.2mm
Depth of field	0.16mm
Resolution	3.9 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV40C-150



Magnification	4.0×
F No.	22.0
Object side NA	0.091
WD	150.1mm
OI	354.8mm
Depth of field	0.11mm
Resolution	3.7 µm
TV distortion	0.00%
Maximum Compatible sensor	1.1"
Mount	C

FTV60C-150



Magnification	6.0×
F No.	33.0
Object side NA	0.091
WD	150.1mm
OI	365.9mm
Depth of field	0.07mm
Resolution	3.7 µm
TV distortion	0.01%
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 calculated assuming permissible circle of confusion is 40 µm.

TELECENTRIC LENS

FTV Series

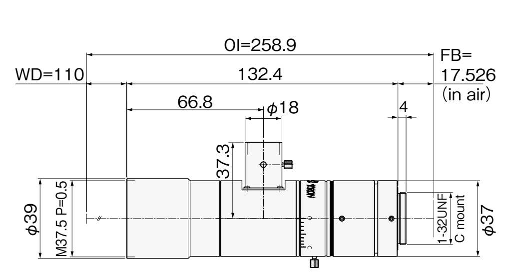
SWIR 1.1″

SWIR Telecentric Lens for 1.1”

Possible to capture differences and defects that cannot be seen in visible ray

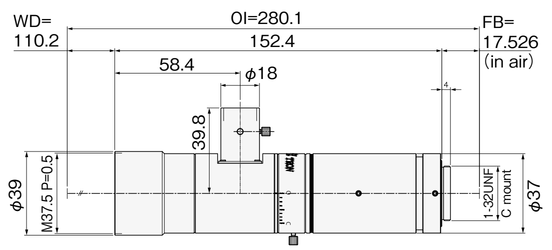
- Available for SONY IMX990, 1.3MP SWIR image sensor
- Available for SWIR image sensor 1”, InGaAs Sensor
- Special design to transmit SWIR 950nm-1800nm
- Possible to capture differences and defects that cannot be seen in visible ray
- 1.0x/2.0x lenses are adjustable iris, possible to adjust depth of field
- No coaxial type, FTV10-110SW and FTV20-110SW are available

FTV10C-110SW



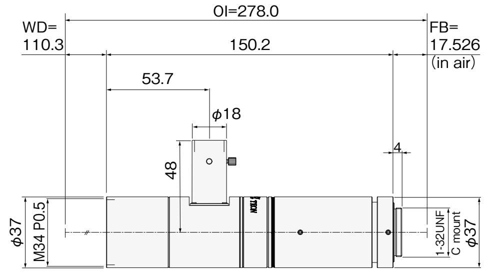
Magnification	1.0x	Depth of field	0.56mm
F No.	7.0	Resolution	10.3µm
Object side NA	0.071	TV distortion	0.02%
WD	110.0mm	Maximum Compatible sensor	1.1"
OI	258.9mm	Mount	C

FTV20C-110SW



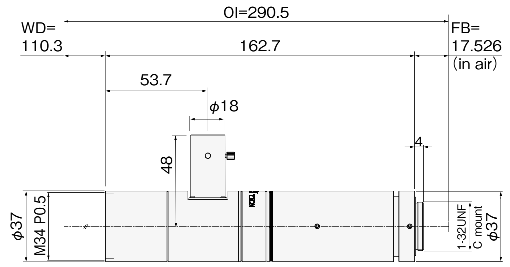
Magnification	2.0x	Depth of field	0.23mm
F No.	11.5	Resolution	8.4µm
Object side NA	0.087	TV distortion	0.03%
WD	110.2mm	Maximum Compatible sensor	1.1"
OI	280.1mm	Mount	C

FTV30C-110SW



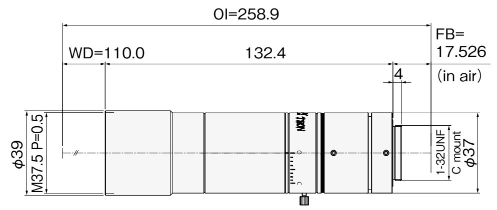
Magnification	3.0x	Depth of field	0.14mm
F No.	16.0	Resolution	7.8µm
Object side NA	0.094	TV distortion	0.02%
WD	110.3mm	Maximum Compatible sensor	1.1"
OI	278.0mm	Mount	C

FTV40C-110SW



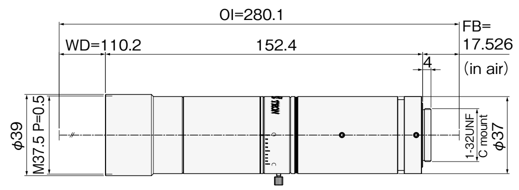
Magnification	4.0x	Depth of field	0.10mm
F No.	20.0	Resolution	7.3µm
Object side NA	0.100	TV distortion	0.02%
WD	110.3mm	Maximum Compatible sensor	1.1"
OI	290.5mm	Mount	C

FTV10-110SW



Magnification	1.0x	Depth of field	0.56mm
F No.	7.0	Resolution	10.3µm
Object side NA	0.071	TV distortion	0.02%
WD	110.0mm	Maximum Compatible sensor	1.1"
OI	258.9mm	Mount	C

FTV20-110SW



Magnification	2.0x	Depth of field	0.23mm
F No.	11.5	Resolution	8.4µm
Object side NA	0.087	TV distortion	0.03%
WD	110.2mm	Maximum Compatible sensor	1.1"
OI	280.1mm	Mount	C

* Indicated specifications are design values * Resolution indicates a theoretical resolution at wavelength of 1200nm
* Depth of field is calculated assuming permissible circle of confusion is 40µm

SWIR 150W Halogen Light Source

Model	MYHA-150VR
Wavelength	400~1700nm
Input Voltage	AC100V~240V
Light guide	Heat resisting temperature
Option	Output Control

Features

- Wave length:400nm~1700nm(Peak Wave length:1000nm)
- Irradiation in the NIR is supported by 150W halogen lamp
- Filter attachment / detachment mechanism
  Possible to select wavelength by bandpass filte
- Light guide for Spot / Ring / Line are available

▶ The detail information is written Page 110-111

LED Spotlight

Model	Wavelength
MSL22-1050SWH	1050nm
MSL22-1100SW	1100nm
MSL22-1450SW	1450nm
MSL22-1550SW	1550nm

Features

- Design for FTV-SW series
- 1050nm, 1100nm, 1450nm, and 1550nm are available·Irradiate wide range object with high brightness and high uniformity

▶ The detail information is written Page 118-119

VTL Series

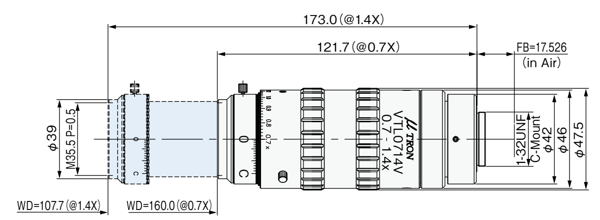
25MP 1.1"

25 Mega Pixel Vari Focal Telecentric Lens for 1.1"

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

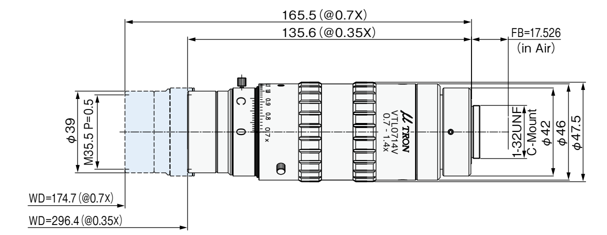
- Suitable for best quality in 25 Mega Pixel (2.5µm/Pixel)
- Super high resolution
- Adjustable the depth of field and the Contrast
- Magnification can be converted from 0.35x to 0.7x by using front converter

VTL0714V



Magnification	0.7x - 1.4x
WD	160mm - 108mm
Maximum Compatible sensor	1.1"
Mount	C

VTL0714V ＋ VTL05FCV



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

* Indicated specifications are design values. * Resolution is calculated based on MTF
* Depth of field is calculated assuming permissible circle of confusion is 40μm.

VTL Series

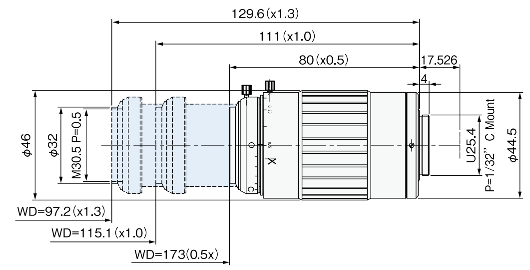
5MP 2/3"

5 Mega Pixel Vari Focal Telecentric Lens

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

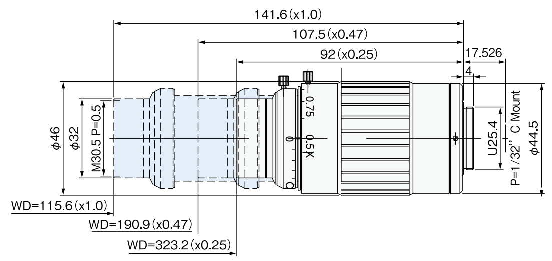
- Telecentric lens at the whole range of magnification
- Suitable for 5 Mega Pixel
- Magnification of VTL0513 can be converted from 0.25x - 2.6x by using front converter
- Reduce relative illumination
- TV distortion less than 0.01%
- VTL0513 is suitable for large format, up to 1.1" even though original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

VTL0513



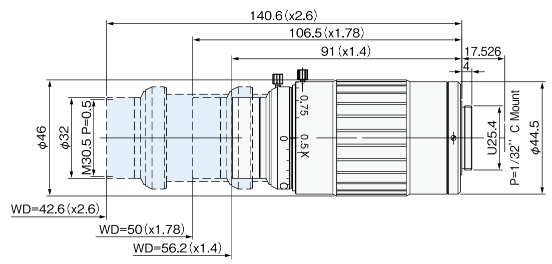
Magnification	0.5x - 1.3x
F No.	5.26 - 10
Object side NA	0.048 - 0.065
WD	173mm - 97mm
OI	271mm - 244mm
Depth of field	1.68mm - 0.47mm
Resolution	4.2μ - 2.9μ
TV distortion	0.01%
Maximum Compatible sensor	2/3"
Mount	C

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 is calculated based on MTF
* Depth of field is calculated assuming permissible circle of confusion is 40μm.

MGTL-V Series

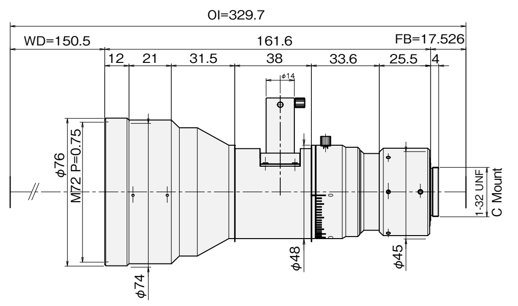
12-25MP 1.1”

12-25 Mega Pixel Telecentric Lens for 1.1”

Wide field of view 0.3x and 0.345x

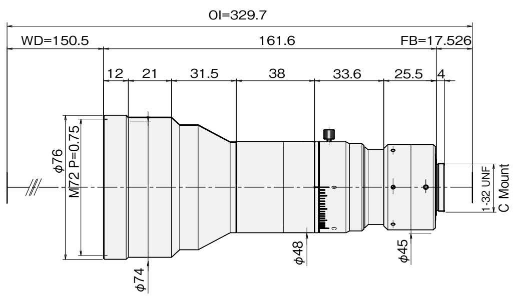
- MGTL03V and MGTL03VC are suitable for 12 Mega Pixel
- MGTL0345V is suitable for 25 Mega Pixel
- Long working distance, 150mm - 160mm with excellent brightness
- Variable iris, possible to adjust DOF
- Suitable for measurement and inspection, required for high accuracy

MGTL03VC



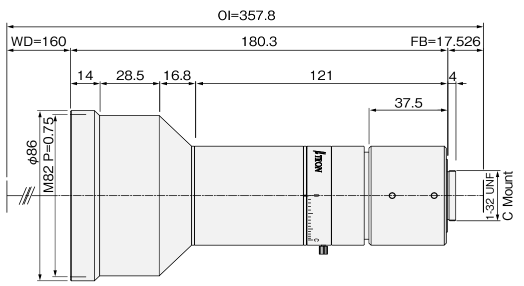
Magnification	0.3×	Depth of field	4.26mm
F No.	4.8	Resolution	10.8μ
Object side NA	0.031	TV distortion	0.00%
WD	150.5mm	Maximum Compatible sensor	1.1"
OI	329.7mm	Mount	C

MGTL03V



Magnification	0.3×	Depth of field	4.26mm
F No.	4.8	Resolution	10.8μ
Object side NA	0.031	TV distortion	0.00%
WD	150.5mm	Maximum Compatible sensor	1.1"
OI	329.7mm	Mount	C

MGTL0345V



Magnification	0.345×	Depth of field	3.2mm
F No.	4.8	Resolution	9.3μ
Object side NA	0.036	TV distortion	0.00%
WD	160mm	Maximum Compatible sensor	1.1"
OI	357.8mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40μm.

MGTL-V Series

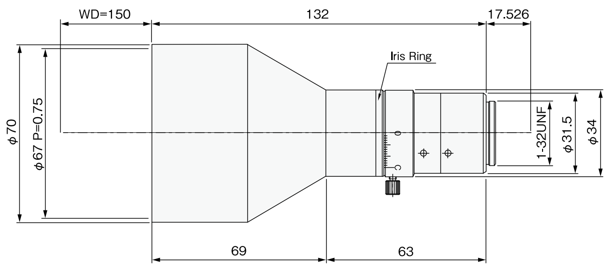
4-9MP 1”

4-9 Mega Pixel Telecentric lens for 1”

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

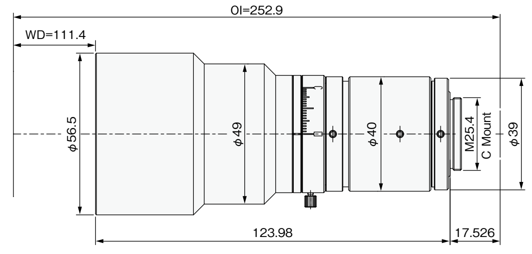
- 4 Mega Pixel – 9 Mega Pixel telecentric lens series for 1”
- 0.275x and 0.37x are available
- MGTL0275V is designed for long working distance, 150mm
- Excellent relative illumination
- Adjustable iris, possible to adjust depth of field

MGTL0275V



Magnification	0.275×	Depth of field	7.2mm
F No.	6.8	Resolution	16.8μ
Object side NA	0.02	TV distortion	0.01%
WD	150mm	Maximum Compatible sensor	1"
OI	299.5mm	Mount	C

MGTL037V



Magnification	0.37×	Depth of field	3.8mm
F No.	6.5	Resolution	12μ
Object side NA	0.028	TV distortion	0.01%
WD	111mm	Maximum Compatible sensor	1"
OI	252.9mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40μm.

TELECENTRIC LENS

MGTL-VM Series

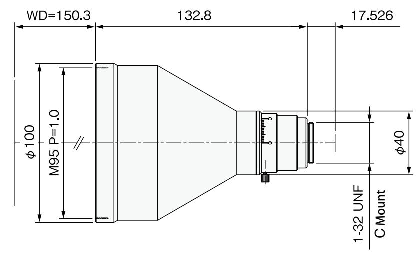
5MP 2/3″

Low Magnification Telecentric Lens for 5 Mega Pixel

Possible to capture wide field of view with high resolution

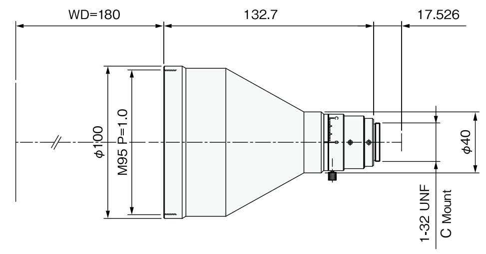
- Suitable for 3.45μm
- Line up : 0.14x, 0.17x, 0.19x and 0.22x
- Long working distance, WD150mm
- WD180mm type is available for 0.14x
- Compact design with low magnification
- Adjustable iris, possible to adjust depth of field

MGTL014VM



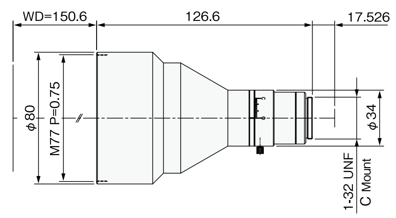
Magnification	0.14x	Depth of field	17.5mm
F No.	4.3	Resolution	20.5μm
Object side NA	0.016	TV distortion	0.01%
WD	150.3mm	Maximum Compatible sensor	2/3"
OI	300.6mm	Mount	C

MGTL014VM-180



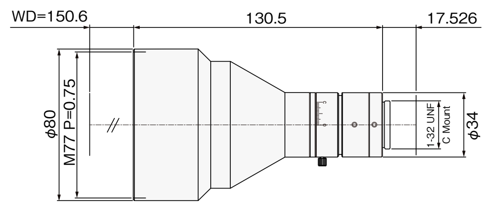
Magnification	0.14x	Depth of field	18mm
F No.	4.4	Resolution	21μm
Object side NA	0.016	TV distortion	-0.01%
WD	180mm	Maximum Compatible sensor	2/3"
OI	330.2mm	Mount	C

MGTL017VM



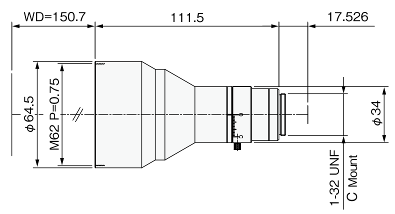
Magnification	0.17x	Depth of field	14.4mm
F No.	5.2	Resolution	20.5μm
Object side NA	0.016	TV distortion	0.00%
WD	150.6mm	Maximum Compatible sensor	2/3"
OI	294.7mm	Mount	C

MGTL019VM



Magnification	0.19x	Depth of field	12.6mm
F No.	5.7	Resolution	20.1μm
Object side NA	0.017	TV distortion	0.00%
WD	150.6mm	Maximum Compatible sensor	2/3"
OI	298.6mm	Mount	C

MGTL022VM



Magnification	0.22x	Depth of field	8.5mm
F No.	5.2	Resolution	15.8μm
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 calculated assuming permissible circle of confusion is 40μm.

MGTL-VM Series

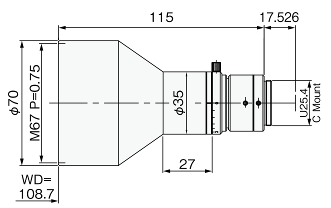
5MP 2/3"-1.1"

Telecentric Lens for 5 Mega Pixel

Suitable for the inspection in ultra high accuracy

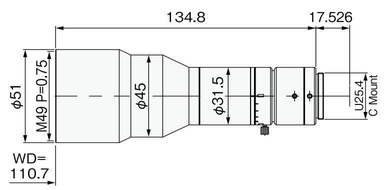
- Suitable for 3.45µm
- Excellent brightness, compared to Mega Pixel telecentric lenses
- Adjustable iris, possible to adjust depth of field
- Compact design
- Reduce hot spots of co-axial illumination
- MGTL10V and MGTL10VC are suitable for 1.1"

MGTL023H



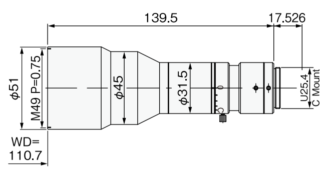
Magnification	0.23x
F No.	5.2
Object side NA	0.022
WD	109mm
OI	241mm
Depth of field	7.9mm
Resolution	8.7µ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

MGTL03VM



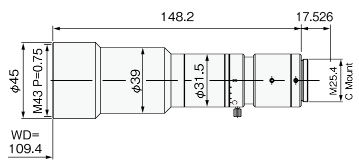
Magnification	0.3x
F No.	5.0
Object side NA	0.03
WD	111mm
OI	263mm
Depth of field	4.4mm
Resolution	6.6µ
TV distortion	-0.04%
Maximum Compatible sensor	2/3"
Mount	C

MGTL0345VM



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

MGTL04VM

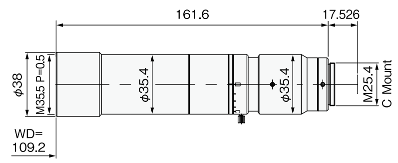


Magnification	0.4x
F No.	5.0
Object side NA	0.04
WD	109mm
OI	275mm
Depth of field	2.5mm
Resolution	4.9µ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

* Indicated specifications are design values. * Resolution is calculated based on MTF
* Depth of field is calculated assuming permissible circle of confusion is 40µm.

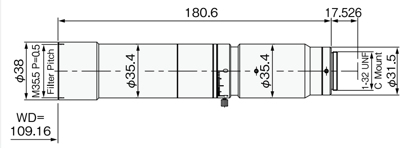
TELECENTRIC LENS

MGTL05VM



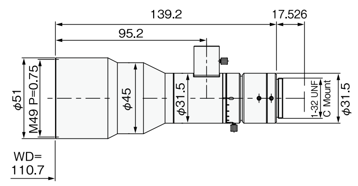
Magnification	0.5x
F No.	4.7
Object side NA	0.05
WD	109mm
OI	288mm
Depth of field	1.5mm
Resolution	3.8µ
TV distortion	-0.03%
Maximum Compatible sensor	2/3"
Mount	C

MGTL069VM



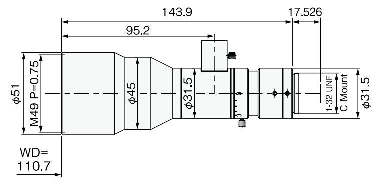
Magnification	0.69x
F No.	6.6
Object side NA	0.052
WD	109mm
OI	307mm
Depth of field	1.1mm
Resolution	3.9µ
TV distortion	-0.04%
Maximum Compatible sensor	2/3"
Mount	C

MGTL03VMC



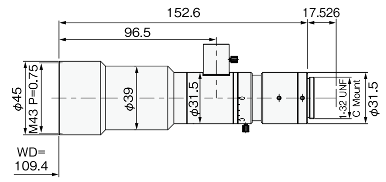
Magnification	0.3x
F No.	5.0
Object side NA	0.03
WD	111mm
OI	267mm
Depth of field	4.4mm
Resolution	6.6µ
TV distortion	-0.04%
Maximum Compatible sensor	2/3"
Mount	C

MGTL0345VMC



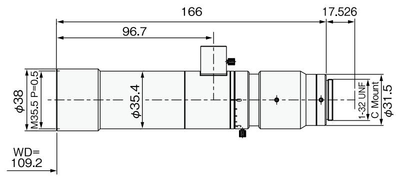
Magnification	0.345x
F No.	4.9
Object side NA	0.035
WD	111mm
OI	272mm
Depth of field	3.3mm
Resolution	5.5µ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

MGTL04VMC



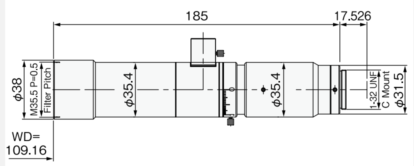
Magnification	0.4x
F No.	5.0
Object side NA	0.04
WD	109mm
OI	280mm
Depth of field	2.5mm
Resolution	4.9µ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

MGTL05VMC



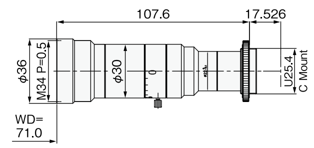
Magnification	0.5x
F No.	4.7
Object side NA	0.05
WD	109mm
OI	293mm
Depth of field	1.5mm
Resolution	3.8µ
TV distortion	-0.03%
Maximum Compatible sensor	2/3"
Mount	C

MGTL069VMC



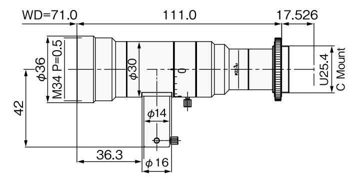
Magnification	0.69x
F No.	6.6
Object side NA	0.052
WD	109mm
OI	312mm
Depth of field	1.1mm
Resolution	3.9µ
TV distortion	-0.04%
Maximum Compatible sensor	2/3"
Mount	C

MGTL10V



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

* Indicated specifications are design values. * Resolution is calculated based on MTF
* Depth of field is calculated assuming permissible circle of confusion is 40µm.

MGTL Series

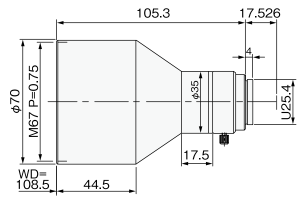
2MP 1/2"- 2/3"

2 Mega Pixel Telecentric Lens

High resolution, compatible with 2 Mega Pixel camera

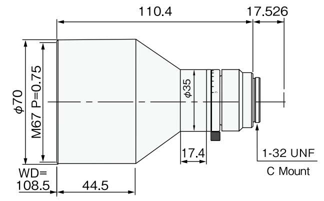
- Compact design, suitable for small device
- Adjustable iris, possible to adjust depth of field
- TV distortion less than 0.05%
- MGTL05-1.1 is suitable for 1.1"
- MGTL0275V-2 is suitable for 2/3"(φ12.8mm)

MGTL014



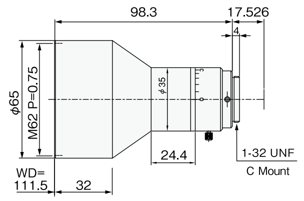
Magnification	0.14x	Depth of field	16.3mm
F No.	4.0	Resolution	19.7μ
Object side NA	0.017	TV distortion	0.02%
WD	108mm	Maximum Compatible sensor	1/2"
OI	231mm	Mount	C

MGTL019



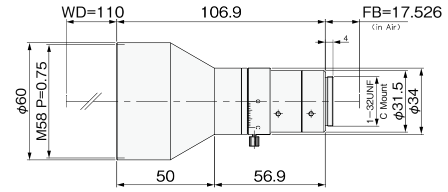
Magnification	0.19x	Depth of field	8.9mm
F No.	4.0	Resolution	14.0μ
Object side NA	0.024	TV distortion	0.01%
WD	108mm	Maximum Compatible sensor	2/3"
OI	236mm	Mount	C

MGTL023



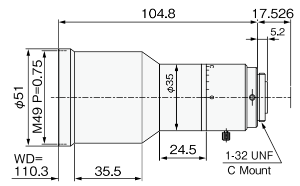
Magnification	0.23x	Depth of field	8.3mm
F No.	5.5	Resolution	16.0μ
Object side NA	0.021	TV distortion	0.01%
WD	111mm	Maximum Compatible sensor	2/3"
OI	227mm	Mount	C

MGTL0275-2



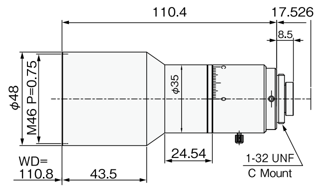
Magnification	0.275×	Depth of field	8.1mm
F No.	7.6	Resolution	18.6μ
Object side NA	0.018	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	2/3"
OI	234mm	Mount	C

MGTL03



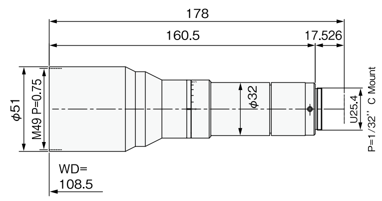
Magnification	0.3x	Depth of field	6.2mm
F No.	7.0	Resolution	16.0μ
Object side NA	0.021	TV distortion	0.05%
WD	110mm	Maximum Compatible sensor	2/3"
OI	233mm	Mount	C

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. * Depth of field is calculated assuming permissible circle of confusion is 40μm.

FT Series

2-5MP 2/3"

WD65 High NA Mega Pixel Telecentric Lens

Design for 2-5 Mega Pixel Compact and high durability

- Mega Pixel telecentric lens for 2/3"
- Suitable for 2 Mega Pixel - 5 Mega Pixel
- High contrast with co-axial illumination
- TV distortion less than 0.01%
- R type is improved contrast and relative illumination

MSL14 □ Series

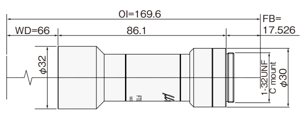
Compact size Coaxial spotlight

Design for FT series, Telecentric Lens for 2-5 Mega Pixel

□= light color(R=RED、G=GREEN、B=BLUE、W=WHITE)

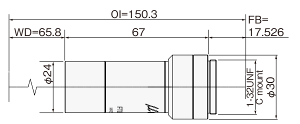
▶ The detail information is written Page 118-119

FT05-65R



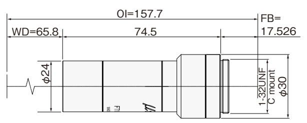
Magnification	0.5×
F No.	9.1
Object side NA	0.028
WD	66mm
OI	169.6mm
Depth of field	2.91mm
Resolution	12.2μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT08-65R



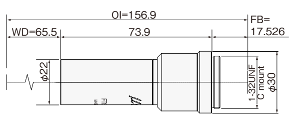
Magnification	0.8×
F No.	9.5
Object side NA	0.042
WD	65.8mm
OI	150.3mm
Depth of field	1.19mm
Resolution	8.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT10-65R



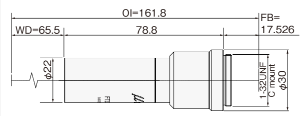
Magnification	1.0×
F No.	9.7
Object side NA	0.052
WD	65.8mm
OI	157.7mm
Depth of field	0.78mm
Resolution	6.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT15-65R



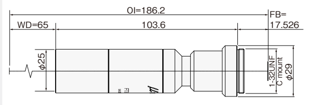
Magnification	1.5×
F No.	10.6
Object side NA	0.071
WD	65.5mm
OI	156.9mm
Depth of field	0.38mm
Resolution	4.7μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT20-65R



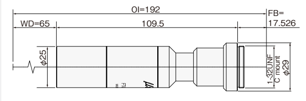
Magnification	2.0×
F No.	12.5
Object side NA	0.08
WD	65.5mm
OI	161.8mm
Depth of field	0.25mm
Resolution	4.2μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT30-65R



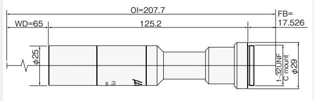
Magnification	3.0×
F No.	12.5
Object side NA	0.12
WD	65mm
OI	186.2mm
Depth of field	0.11mm
Resolution	2.8μ
TV distortion	-0.01%
Maximum Compatible sensor	2/3"
Mount	C

FT40-65R



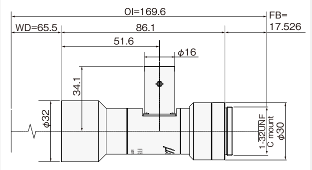
Magnification	4.0×
F No.	16
Object side NA	0.125
WD	65mm
OI	192mm
Depth of field	0.08mm
Resolution	2.7μ
TV distortion	-0.01%
Maximum Compatible sensor	2/3"
Mount	C

FT60-65R



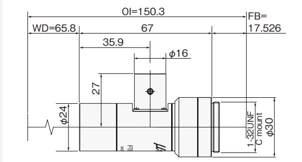
Magnification	6.0×
F No.	24
Object side NA	0.125
WD	65mm
OI	207.7mm
Depth of field	0.05mm
Resolution	2.7μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT05C-65R



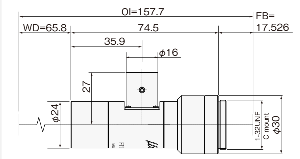
Magnification	0.5×
F No.	9.1
Object side NA	0.028
WD	65.5mm
OI	169.6mm
Depth of field	2.91mm
Resolution	12.2μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT08C-65R



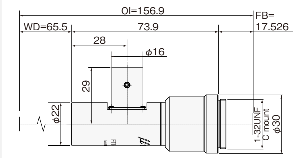
Magnification	0.8×
F No.	9.5
Object side NA	0.042
WD	65.8mm
OI	150.3mm
Depth of field	1.19mm
Resolution	8.0μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT10C-65R



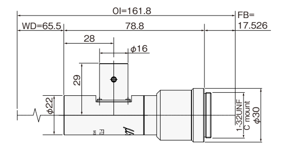
Magnification	1.0×
F No.	9.7
Object side NA	0.052
WD	65.8mm
OI	157.7mm
Depth of field	0.78mm
Resolution	6.5μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT15C-65R



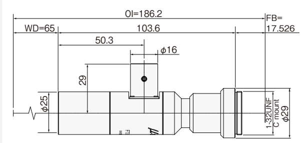
Magnification	1.5×
F No.	10.6
Object side NA	0.071
WD	65.5mm
OI	156.9mm
Depth of field	0.38mm
Resolution	4.7μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT20C-65R



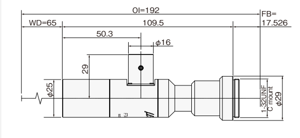
Magnification	2.0×
F No.	12.5
Object side NA	0.08
WD	65.5mm
OI	161.8mm
Depth of field	0.25mm
Resolution	4.2μ
TV distortion	0.00%
Maximum Compatible sensor	2/3"
Mount	C

FT30C-65R



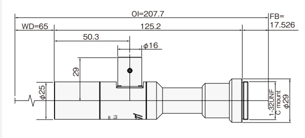
Magnification	3.0×
F No.	12.5
Object side NA	0.12
WD	65mm
OI	186.2mm
Depth of field	0.11mm
Resolution	2.8μ
TV distortion	-0.01%
Maximum Compatible sensor	2/3"
Mount	C

FT40C-65R



Magnification	4.0×
F No.	16
Object side NA	0.125
WD	65mm
OI	192mm
Depth of field	0.08mm
Resolution	2.7μ
TV distortion	-0.01%
Maximum Compatible sensor	2/3"
Mount	C

FT60C-65R



Magnification	6.0×
F No.	24
Object side NA	0.125
WD	65mm
OI	207.7mm
Depth of field	0.05mm
Resolution	2.7μ
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 calculated assuming permissible circle of confusion is 40μm.

FT Series

2-5MP　2/3"

WD110 High NA Mega Pixel Telecentric Lens

Design for 2-5 Mega Pixel Compact and high durability

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

MSL14 □ Series

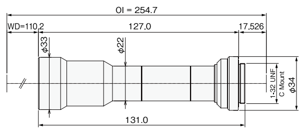
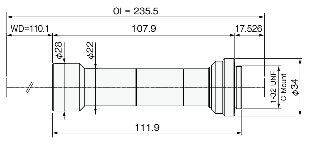
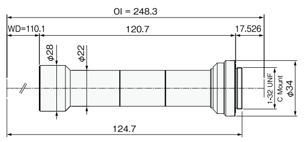
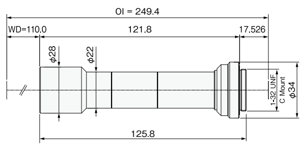
Compact size Coaxial spotlight

Design for FT series, Telecentric Lens for 2-5 Mega Pixel

□= light color (R=RED、G=GREEN、B=BLUE、W=WHITE)

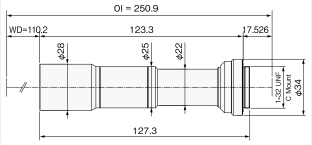
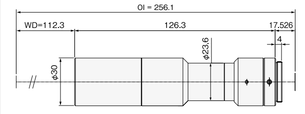
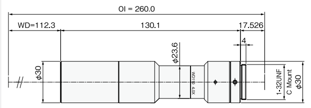
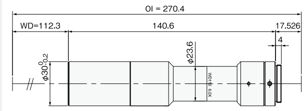
▶ The detail information is written Page 118-119

FT05-110 / FT08-110 / FT10-110 / FT15-110

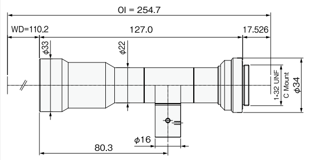
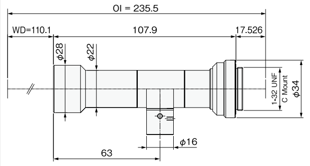
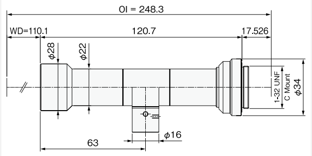
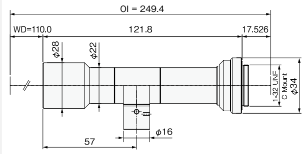
	FT05-110	FT08-110	FT10-110	FT15-110
Magnification	0.5×	0.8×	1.0×	1.5×
F No.	9.6	11.1	11.1	11.9
Object side NA	0.026	0.036	0.045	0.063
WD	110mm	110mm	110mm	110mm
OI	254.7mm	235.5mm	248.3mm	249.4mm
Depth of field	3.1mm	1.4mm	0.9mm	0.4mm
Resolution	12.9μ	9.3μ	7.5μ	5.3μ
TV distortion	0.00%	0.01%	0.00%	0.00%
Maximum Compatible sensor	2/3"	2/3"	2/3"	2/3"
Mount	C	C	C	C

FT20-110 / FT30-110R / FT40-110R / FT60-110R

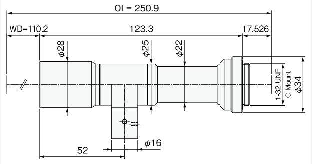
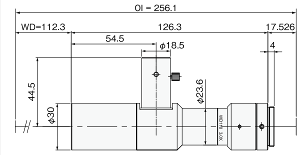
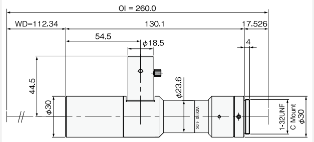
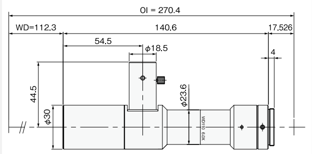
	FT20-110	FT30-110R	FT40-110R	FT60-110R
Magnification	2.0×	3.0×	4.0×	6.0×
F No.	13.5	17.2	22.0	33.0
Object side NA	0.074	0.087	0.091	0.091
WD	110mm	112mm	112mm	112mm
OI	250.9mm	256.1mm	260.0mm	270.4mm
Depth of field	0.3mm	0.15mm	0.11mm	0.07mm
Resolution	4.5μ	3.9μ	3.7μ	3.7μ
TV distortion	0.00%	0.00%	0.00%	0.00%
Maximum Compatible sensor	2/3"	2/3"	2/3"	2/3"
Mount	C	C	C	C

FT05C-110 / FT08C-110 / FT10C-110 / FT15C-110

	FT05C-110	FT08C-110	FT10C-110	FT15C-110
Magnification	0.5×	0.8×	1.0×	1.5×
F No.	9.6	11.1	11.1	11.9
Object side NA	0.026	0.036	0.045	0.063
WD	110mm	110mm	110mm	110mm
OI	254.7mm	235.5mm	248.3mm	249.4mm
Depth of field	3.1mm	1.4mm	0.9mm	0.4mm
Resolution	12.9μ	9.3μ	7.5μ	5.3μ
TV distortion	0.00%	0.01%	0.00%	0.00%
Maximum Compatible sensor	2/3"	2/3"	2/3"	2/3"
Mount	C	C	C	C

FT20C-110 / FT30C-110R / FT40C-110R / FT60C-110R

	FT20C-110	FT30C-110R	FT40C-110R	FT60C-110R
Magnification	2.0×	3.0×	4.0×	6.0×
F No.	13.5	17.2	22.0	33.0
Object side NA	0.074	0.087	0.091	0.091
WD	110mm	112mm	112mm	112mm
OI	250.9mm	256.1mm	260.0mm	270.4mm
Depth of field	0.3mm	0.15mm	0.11mm	0.07mm
Resolution	4.5μ	3.9μ	3.7μ	3.7μ
TV distortion	0.00%	0.00%	0.00%	0.00%
Maximum Compatible sensor	2/3"	2/3"	2/3"	2/3"
Mount	C	C	C	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40μm.

TL Series

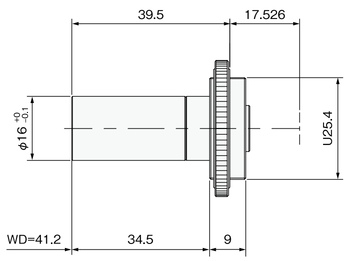
1/2"

WD40 Built-in type Telecentric Lens

Short WD: WD40mm

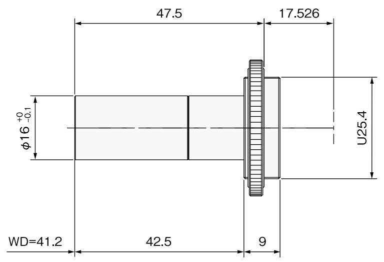
- Suitable for small device and limited space
- φ16mm telecentric lens
- Suitable for bonding, chip mounter, etc..

TL20-40



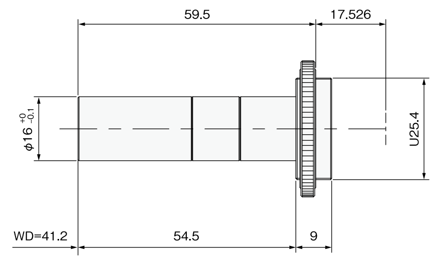
Magnification	2x	Depth of field	0.28mm
F No.	14.1	Resolution	4.7µ
Object side NA	0.071	TV distortion	0.13%
WD	41.2mm	Maximum Compatible sensor	1/2"
OI	98mm	Mount	C

TL40-40



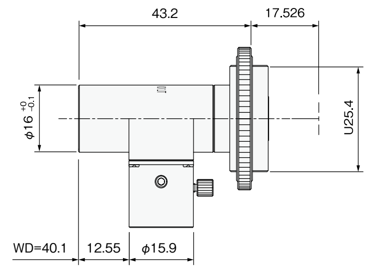
Magnification	4x	Depth of field	0.14mm
F No.	28.2	Resolution	4.7µ
Object side NA	0.071	TV distortion	-0.19%
WD	41.2mm	Maximum Compatible sensor	1/2"
OI	106mm	Mount	C

TL60-40



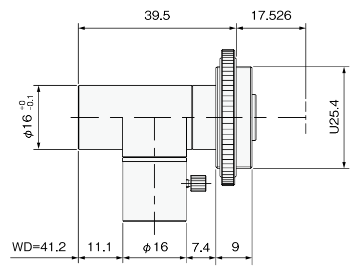
Magnification	6x	Depth of field	0.09mm
F No.	41.6	Resolution	4.7µm
Object side NA	0.072	TV distortion	-0.10%
WD	41.2mm	Maximum Compatible sensor	1/2"
OI	118mm	Mount	C

TL10C-40



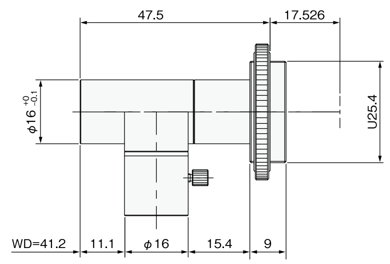
Magnification	1×	Depth of field	0.83mm
F No.	10.4	Resolution	7.0µm
Object side NA	0.048	TV distortion	0.00%
WD	40.1mm	Maximum Compatible sensor	1/2"
OI	100.8mm	Mount	C

TL20C-40



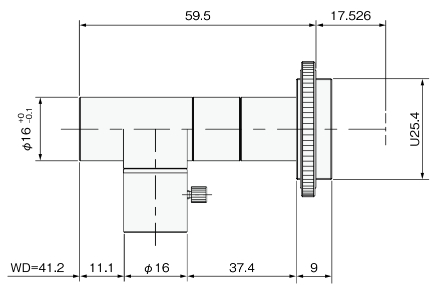
Magnification	2x	Depth of field	0.28mm
F No.	14.1	Resolution	4.7µm
Object side NA	0.071	TV distortion	0.13%
WD	41.2mm	Maximum Compatible sensor	1/2"
OI	98mm	Mount	C

TL40C-40



Magnification	4x	Depth of field	0.14mm
F No.	28.2	Resolution	4.7µm
Object side NA	0.071	TV distortion	-0.19%
WD	41.2mm	Maximum Compatible sensor	1/2"
OI	106mm	Mount	C

TL60C-40



Magnification	6x	Depth of field	0.09mm
F No.	41.6	Resolution	4.7µm
Object side NA	0.072	TV distortion	-0.10%
WD	41.2mm	Maximum Compatible sensor	1/2"
OI	118mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40µm.

TL Series

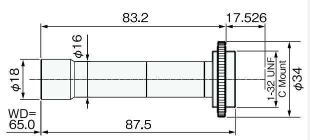
1/2"- 2/3"

WD65 Built-in type Telecentric Lens

Middle WD: WD65mm

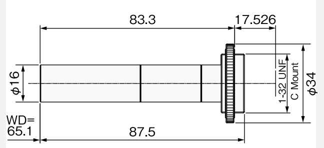
- Short OI and High NA
- φ16mm telecentric lens
- R type is improved contrast and relative illumination

TL08-65R



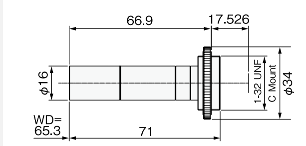
Magnification	0.8x
F No.	14.8
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.85mm
Resolution	12.3µ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8"
Mount	C

TL10-65R



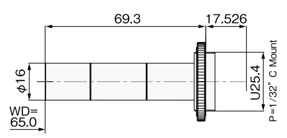
Magnification	1x
F No.	18.5
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.48mm
Resolution	12.4µ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8"
Mount	C

TL15-65R



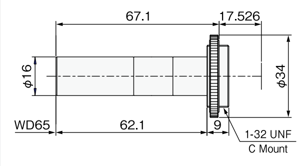
Magnification	1.5x
F No.	16.0
Object side NA	0.047
WD	65mm
OI	150mm
Depth of field	0.57mm
Resolution	7.22µ
TV distortion	0.00%
Maximum Compatible sensor	1/1.8"
Mount	C

TL20-65R



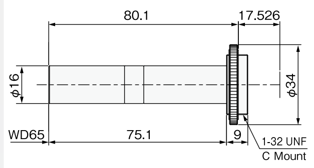
Magnification	2x
F No.	16.7
Object side NA	0.06
WD	65mm
OI	152mm
Depth of field	0.33mm
Resolution	5.6µ
TV distortion	-0.01%
Maximum Compatible sensor	1/2"
Mount	C

TL40-65



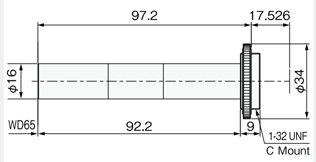
Magnification	4x
F No.	26.0
Object side NA	0.077
WD	65mm
OI	150mm
Depth of field	0.13mm
Resolution	4.36µm
TV distortion	0.30%
Maximum Compatible sensor	2/3"
Mount	C

TL60-65



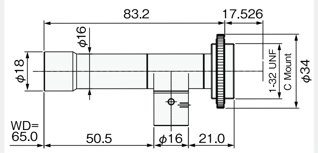
Magnification	6x
F No.	39.0
Object side NA	0.077
WD	65mm
OI	163mm
Depth of field	0.09mm
Resolution	4.36µm
TV distortion	0.33%
Maximum Compatible sensor	2/3"
Mount	C

TL80-65



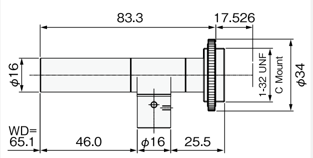
Magnification	8x
F No.	52.0
Object side NA	0.077
WD	65mm
OI	180mm
Depth of field	0.07mm
Resolution	4.36µm
TV distortion	0.20%
Maximum Compatible sensor	2/3"
Mount	C

TL08C-65R



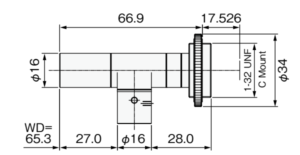
Magnification	0.8x
F No.	14.8
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.85mm
Resolution	12.3µm
TV distortion	0.00%
Maximum Compatible sensor	1/1.8"
Mount	C

TL10C-65R



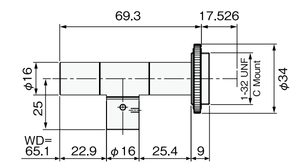
Magnification	1x
F No.	18.5
Object side NA	0.027
WD	65mm
OI	166mm
Depth of field	1.48mm
Resolution	12.4µm
TV distortion	0.00%
Maximum Compatible sensor	1/1.8"
Mount	C

TL15C-65R



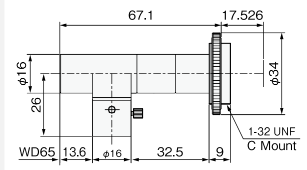
Magnification	1.5x
F No.	16.0
Object side NA	0.047
WD	65mm
OI	150mm
Depth of field	0.57mm
Resolution	7.22µm
TV distortion	0.00%
Maximum Compatible sensor	1/1.8"
Mount	C

TL20C-65R



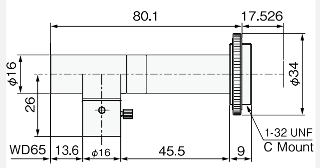
Magnification	2x
F No.	16.7
Object side NA	0.06
WD	65mm
OI	152mm
Depth of field	0.33mm
Resolution	5.6µm
TV distortion	-0.01%
Maximum Compatible sensor	1/2"
Mount	C

TL40C-65



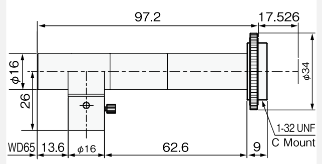
Magnification	4x
F No.	26.0
Object side NA	0.077
WD	65mm
OI	150mm
Depth of field	0.13mm
Resolution	4.36µm
TV distortion	0.30%
Maximum Compatible sensor	2/3"
Mount	C

TL60C-65



Magnification	6x
F No.	39.0
Object side NA	0.077
WD	65mm
OI	163mm
Depth of field	0.09mm
Resolution	4.36µm
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	4.36µm
TV distortion	0.20%
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 calculated assuming permissible circle of confusion is 40µm.

TL Series

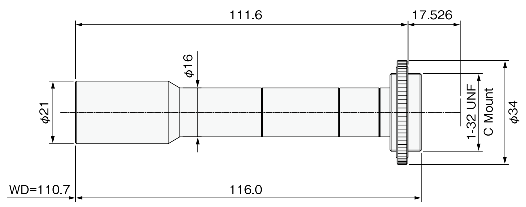
1/2"- 2/3"

WD110 Built-in type Telecentric Lens

Long WD: 110mm

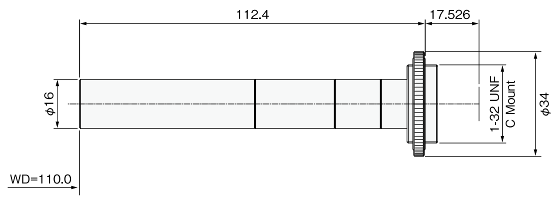
- Compact and suitable for customized optical systems
- φ16mm telecentric lens
- R type is improved contrast and relative illumination

TL08-110R



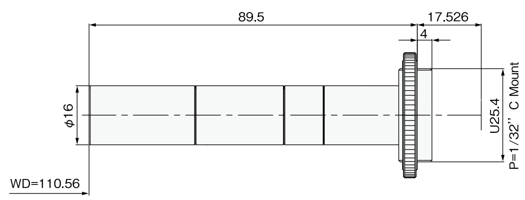
Magnification	0.8×	Depth of field	2.09mm
F No.	16.7	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	111mm	Maximum Compatible sensor	1/1.8"
OI	240mm	Mount	C

TL10-110R



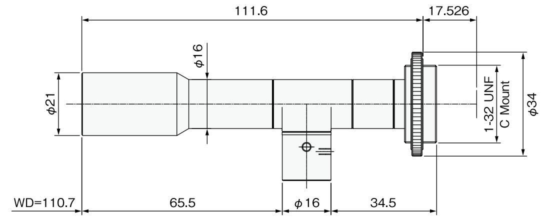
Magnification	1×	Depth of field	1.67mm
F No.	20.9	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8"
OI	240mm	Mount	C

TL20-110R



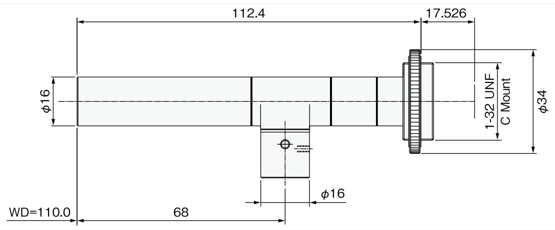
Magnification	2×	Depth of field	0.67mm
F No.	33.45	Resolution	11.2μ
Object side NA	0.03	TV distortion	-0.03%
WD	110mm	Maximum Compatible sensor	1/2"
OI	218mm	Mount	C

TL08C-110R



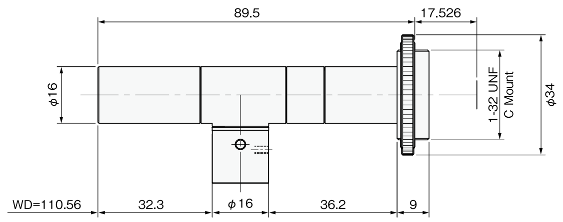
Magnification	0.8×	Depth of field	2.09mm
F No.	16.7	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	111mm	Maximum Compatible sensor	1/1.8"
OI	240mm	Mount	C

TL10C-110R



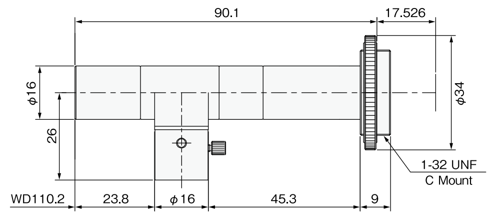
Magnification	1×	Depth of field	1.67mm
F No.	20.9	Resolution	14μ
Object side NA	0.024	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8"
OI	240mm	Mount	C

TL20C-110R



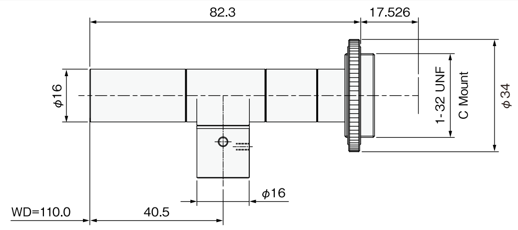
Magnification	2×	Depth of field	0.67mm
F No.	33.45	Resolution	11.2μ
Object side NA	0.03	TV distortion	-0.03%
WD	110mm	Maximum Compatible sensor	1/2"
OI	218mm	Mount	C

TL30C-110



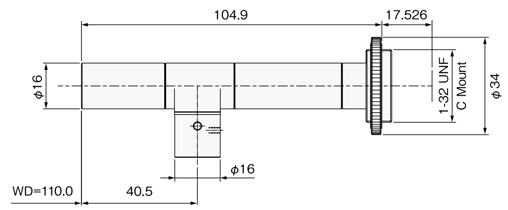
Magnification	3×	Depth of field	0.27mm
F No.	30.4	Resolution	6.8μ
Object side NA	0.049	TV distortion	0.06%
WD	110mm	Maximum Compatible sensor	2/3"
OI	218mm	Mount	C

TL40C-110R



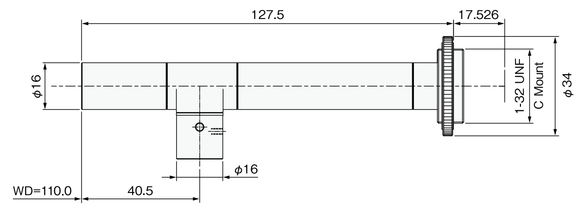
Magnification	4×	Depth of field	0.22mm
F No.	44.4	Resolution	7.5μ
Object side NA	0.045	TV distortion	0.00%
WD	110mm	Maximum Compatible sensor	1/1.8"
OI	210mm	Mount	C

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 calculated assuming permissible circle of confusion is 40μm.

TL Series

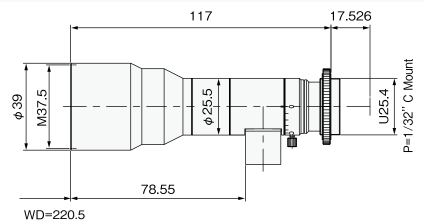
1/1.8″

WD220 Built-in type Telecentric Lens

Long WD: 220mm

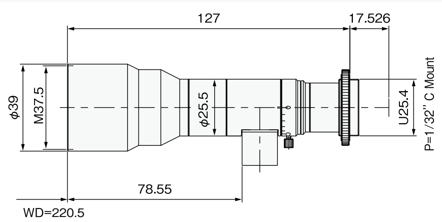
- High resolution and compact design
- Suitable for various applications, alignment, inspection, measurement, etc..
- Adjustable iris for 0.5x and 0.7x
- Compatible with 3 Mega Pixel of 1/1.8”

TL05C-220



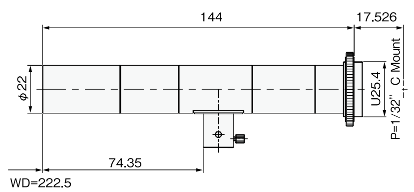
Magnification	0.5x	Depth of field	2.17mm
F No.	6.79	Resolution	9.1 μ
Object side NA	0.037	TV distortion	0.02%
WD	220.5mm	Maximum Compatible sensor	1/1.8"
OI	355mm	Mount	C

TL07C-220



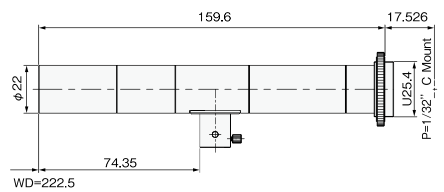
Magnification	0.7x	Depth of field	1.55mm
F No.	9.50	Resolution	9.1 μ
Object side NA	0.037	TV distortion	0.02%
WD	220.5mm	Maximum Compatible sensor	1/1.8"
OI	365mm	Mount	C

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	222.5mm	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	222.5mm	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 calculated assuming permissible circle of confusion is 40 μm.

TELECENTRIC LENS

TL Series

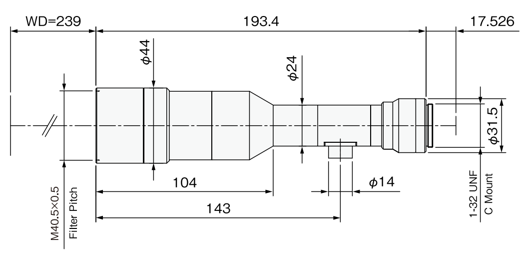
2/3″

WD240 High Magnification Telecentric Lens

Long WD: 240mm

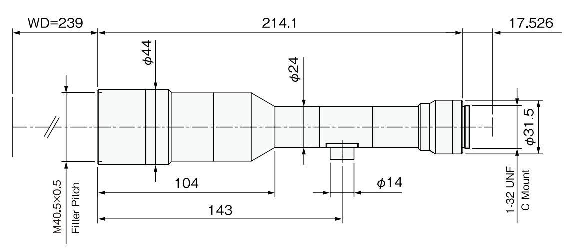
- Suitable for vacuum chamber, working environment in high temperature, etc.., required for long WD
- 4x and 6x are available
- All models are designed for co-axial illumination

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	449.9mm	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

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40 μm.

TL Series

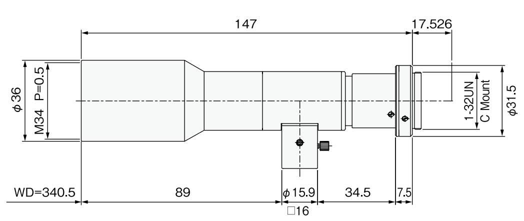
1/1.8"- 2/3"

WD300 Telecentric Lens

Long WD: 310mm and 340mm

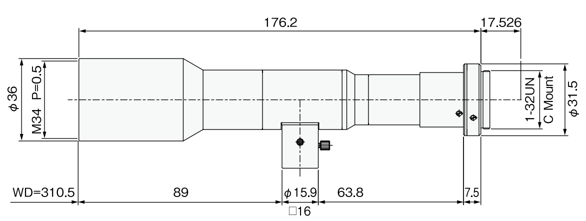
- Suitable for applications required for long WD
- Long WD, over 300mm
- TL10C-310 is compatible with 2/3”
- TV distortion is less than 0.00%

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	340.5mm	Maximum Compatible sensor	1/1.8"
OI	505mm	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	310.5mm	Maximum Compatible sensor	2/3"
OI	504.2mm	Mount	C

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40µm.

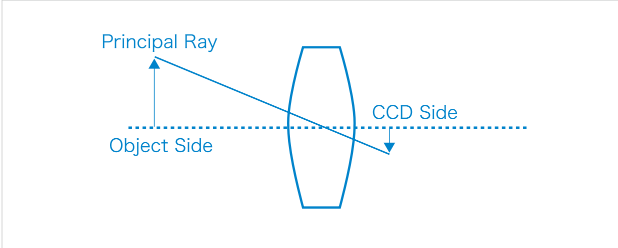
TELECENTRIC LENS

Telecentric Lens for Image Processing

The most suitable optical system for measurement in high accuracy

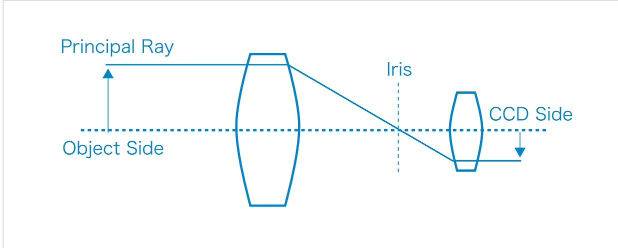
Telecentric optical system is an optical design that where the principal ray in parallel to the optical axis. It eliminates distortion problems by collimating the light entering the lens and suitable for imaging 3D objects. Co-axial illumination is suitable for recognizing object with high reflectance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

Non-telecentric lens



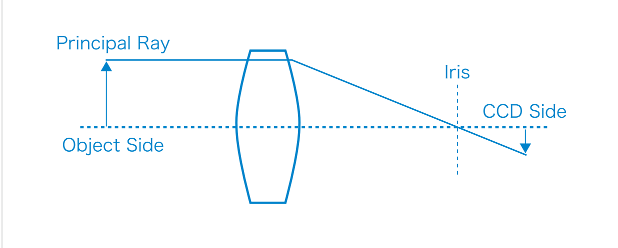
- Smaller size
- The number of lenses is fewer.
- Object size changes as the object goes up and down.

Double side telecentric lens



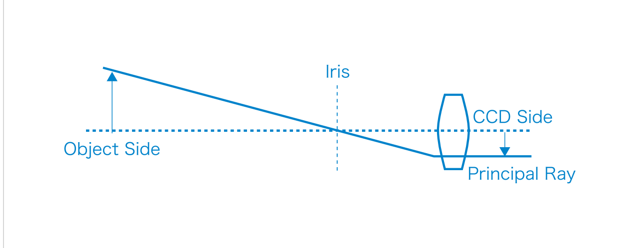
- Primary lays of object and image side are parallel to optical axis.
- Object size does not change when object goes up and down.
- Large size and high cost

Object side telecentric lens



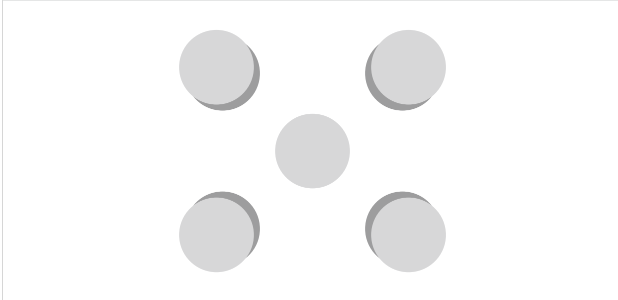
- Principal ray of object side is parallel to optical axis.
- Required for co-axial illumination
- Object size does not change when object goes up and down.
- Small size, compared to double side telecentric lens

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.

HMZ Series

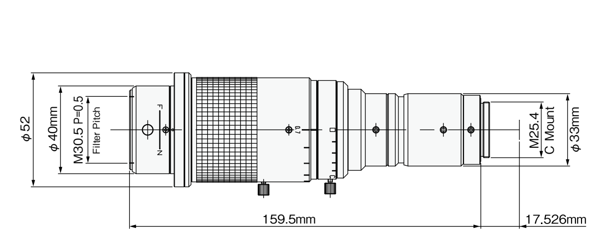
1/1.8"

High Resolution Macro Zoom Lens

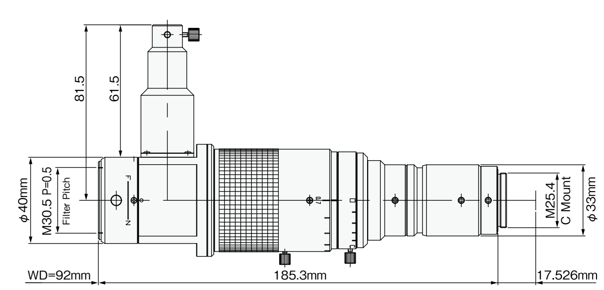
High resolution and compact design

- Compatible with 1/1.8" of Mega Pixel camera
- High resolution and compact design
- High contrast and low distortion
- Improve uniformity of brightness for co-axial illumination
- Magnification and working distance can be converted to 0.21x - 18x, WD37 - 329mm by using converters

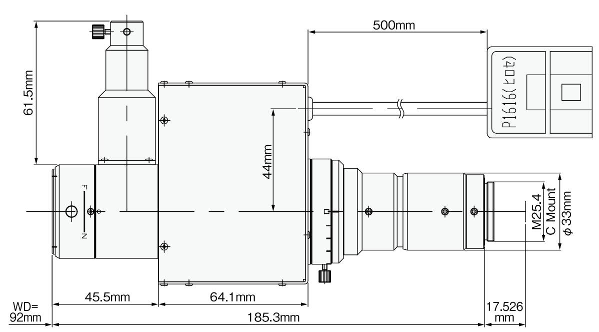
HMZ0745 (Manual Zoom)



HMZ0745C (Manual Zoom/Co-axial type)



HMZ0745C-SM (Motorized Zoom/Co-axial type)



Lens

Model	HMZ0745 / HMZ0745C / HMZ0745C-SM		
Magnification	0.7× - 4.5×	Depth of field	2mm - 0.08mm
WD	92mm	TV distortion	0.05% - 0.08%
Resolution	11.5μ - 2.87μ	Maximum Compatible sensor	1/1.8"
Object side NA	0.03 - 0.12		

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.

* Depth of field is calculated assuming permissible circle of confusion is 40μm.

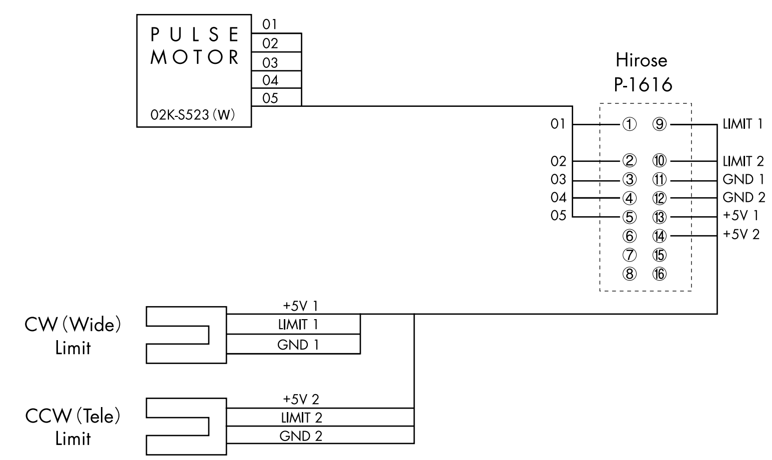
Front Converter

Model	Magnification	WD with converter
HMZ-FC03	0.3×	329mm
HMZ-FC05	0.5×	182mm
HMZ-FC067	0.67×	118mm
HMZ-FC20	2.0×	37mm

Rear Converter

Model	Magnification
HMZ-RC20	2.0×

(Wiring Diagram) HMZ0745C-SM



TLZ Series

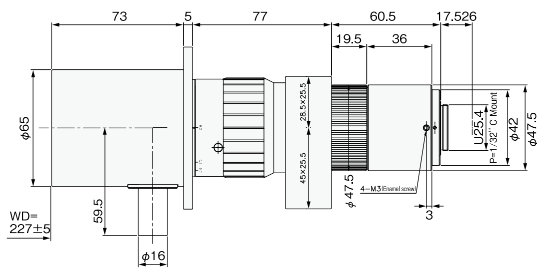
1/1.8″

Low Magnification Zoom Lens with Co-axial Illumination

Built-in co-axial illumination
Suitable for various applications, inspection of wafer, IC chip, etc...

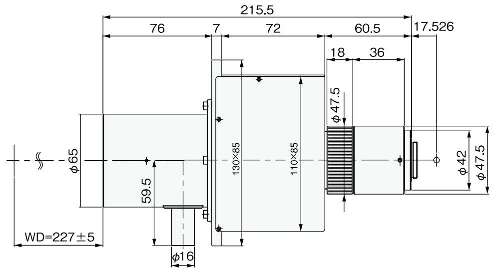
- 10x Zoom (0.2x - 2.0x)
- Compact design of 10x zoom ratio
- Reduce relative illumination
- High resolution at the whole magnification
- Motorized zoom type is available
- Long WD, 227mm

TLZ0220C (Manual Zoom)



Magnification	0.2x-2.0x	Depth of field	13.1mm - 0.45mm
WD	227mm	TV distortion	-0.16% - 0.16%
Resolution	22.4µ - 7.6µ	Maximum Compatible sensor	1/1.8"
Object side NA	0.015 - 0.044		

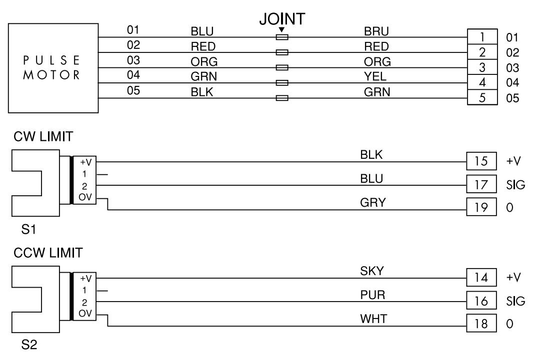
TLZ0220C-SM (Motorized Zoom)



Magnification	0.2x - 2.0x	Depth of field	13.1mm - 0.45mm
WD	227mm	TV distortion	-0.16% - 0.16%
Resolution	22.4µ - 7.6µ	Maximum Compatible sensor	1/1.8"
Object side NA	0.015 - 0.044		

* Indicated specifications are design values. * Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40µm.

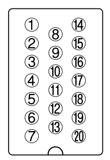
(Wiring Diagram) TLZ0220C-SM



1	01	8		14	S2−+V
2	02	9		15	S1−+V
3	03	10		16	S2−SIG
4	04	11		17	S1−SIG
5	05	12		18	S2−0V
6		13		19	S1−0V
7				20	

PIN ASSIGNMENT

CONNECTOR
MR-20RM (HONDA)



PIN LOCATION

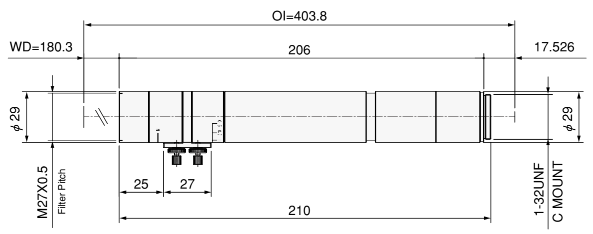
1/3″

8.0x Compact Macro Zoom Lens

Compact and wide zoom ratio, suitable for inspection of various objects

- Long WD, 180mm
- Focus function is available
- φ29mm, suitable for small and limited spaces

CMZ0540-2



Magnification	0.5x〜4.0x	Depth of field	3.3〜0.19mm
WD	180.3mm	TV distortion	0.02%
Resolution	14µ〜6.3µ	Maximum Compatible sensor	1/3"
Object side NA	0.024〜0.053		

* Indicated specifications are design values.
* Resolution indicates a theoretical resolution at a wavelength of 550nm.
* Depth of field is calculated assuming permissible circle of confusion is 40µm.

FIXED FOCAL LENS FOR C MOUNT

FIXED FOCAL LENS

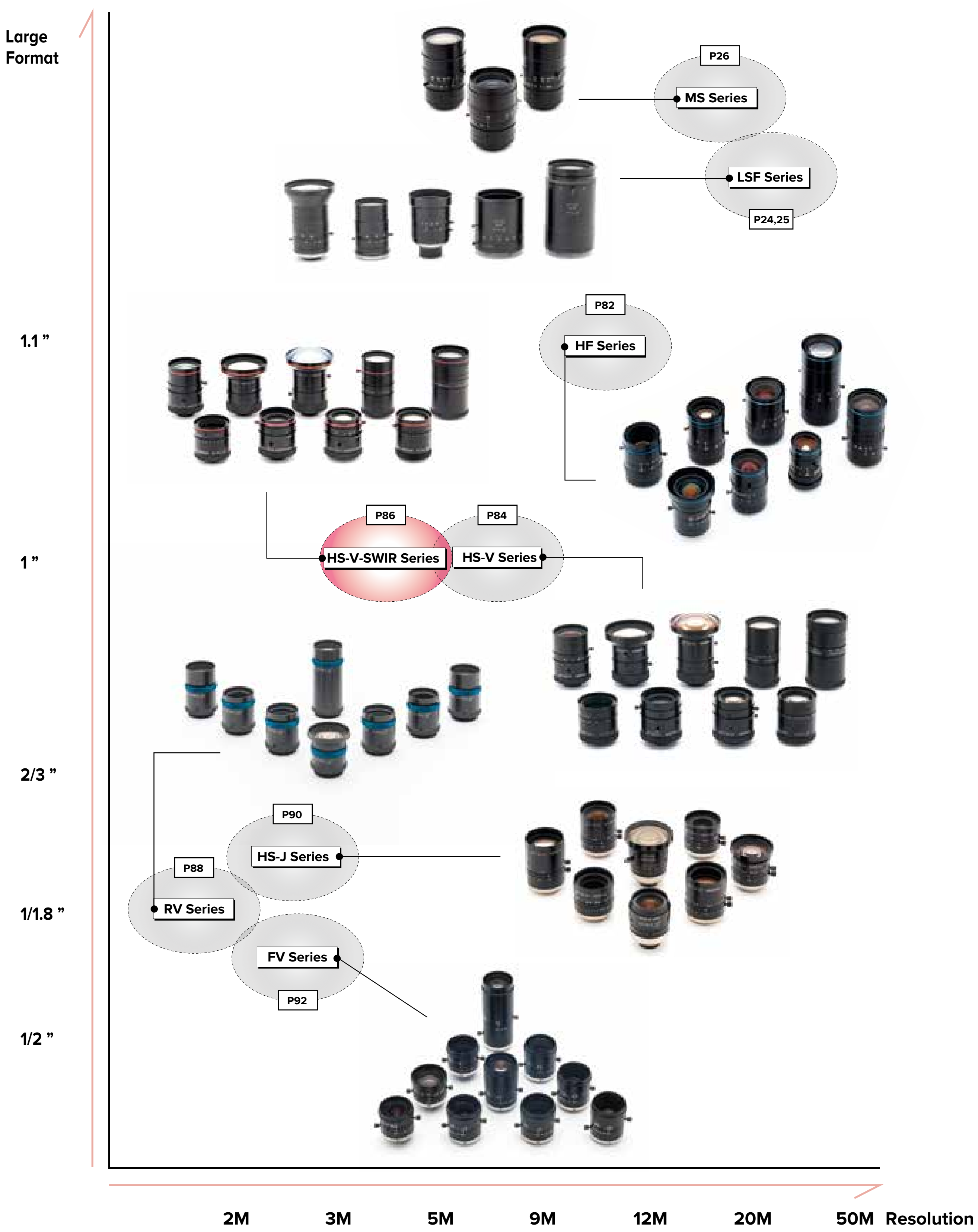
Sensor size Chart for Fixed Focal Lens

Series	Model No.	1/2	1/1.8	2/3	1	1.1	1.2	4/3	Page
4/3" 21-25 Mega Pixel MS-C Series	MS1828-C								P79
	MS2524-C								
	MS3520-C								
8 Mega Pixel HF-DN Series	HF1216V DN								P81
	HF1616V DN								
	HF2516V DN								
	HF3516V DN								
	HF5018V DN								
	HF7520V DN								
	VV1618HF DN								
5-12Mega Pixel HF Series	HF0528J-2								P82
	HF0818J-2								
	HF1214J-2								
	HF1218V								
	HF1618V-2								
	HF2514V-2								
	HF3514V-2								
	HF5018V-2								
	HF7518V-2								
4-12Mega Pixel HS-V Series	HS0619V								P85
	HS0818V								
	HS1214V								
	HS1614V								
	HS2514V								
	HS3516V								
	HS5016V								
	HS7520V								
	HS10028V								
SWIR HS-V-SW Series	HS0619V-SW								P87
	HS0818V-SW								
	HS1214V-SW								
	HS1614V-SW								
	HS2514V-SW								
	HS3516V-SW								
	HS5016V-SW								
	HS7520V-SW								
	HS10028V-SW								
Resistance against vibration RV Series	RV0420								P88
	RV0622								
	RV0814								
	RV1022								
	RV1214								
	RV1520								
	RV2020								
	RV2520								
	RV3020								
	RV3519								
	RV5025								
	RV7538								

Series	Model No.	1/2	1/1.8	2/3	1	1.1	1.2	4/3	Page
3Mega Pixel HS Series	HS0420H								P90
	HS0618H								
	HS0814J								
	HS1214J								
	HS1614J								
	HS2514J								
	HS3514J								
	HS5018J								
Low distortion FV Series	FV0420								P92
	FV0622								
	FV1022								
	FV1520								
	FV2020								
	FV2520								
	FV3020								
	FV3519								
	FV5025								
	FV7538								
MV Series	MV0316								P94
	MV0614								
	MV0813								
	MV1214								
	MV1614								
	MV2514								
	MV3519								
	MV5018								
	MV7527								
	MV10035								

FIXED FOCAL LENS

FIXED FOCAL LENS　LINE UP



MS-C Series

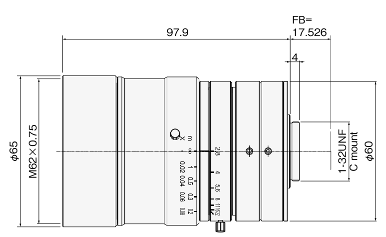
21-25MP　4/3”

Fixed Focal Lens for 4/3”

High resolution, low distortion lens for 4/3”, 21 and 25 Mega Pixel

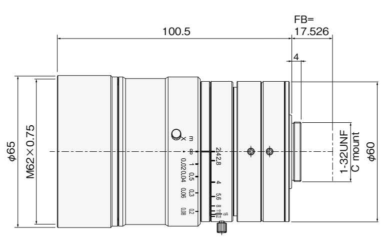
- Possible to capture wide view with c mount full size camera
- Excellent relative illumination
- Stable performance from macro to infinity by floating design

MS1828-C



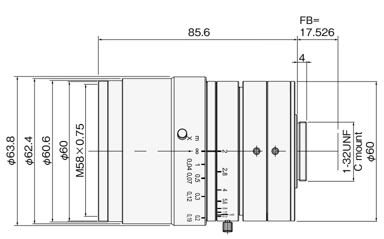
Focal length	18mm
∞F No.	2.8
Range of WD	97mm ~ ∞
Maximum Magnification	0.15x
TV distortion	0.52%
Maximum Compatible sensor	4/3"
Mount	C

MS2524-C



Focal length	25mm
∞F No.	2.4
Range of WD	118mm ~ ∞
Maximum Magnification	0.2x
TV distortion	-0.27%
Maximum Compatible sensor	4/3"
Mount	C

MS3520-C



Focal length	35mm
∞F No.	2.0
Range of WD	93mm ~ ∞
Maximum Magnification	0.39x
TV distortion	-0.11%
Maximum Compatible sensor	4/3"
Mount	C

* Indicated specifications are design values.
* TV distortion indicates a value for minimum working distance.

HF-V DN/VV Series

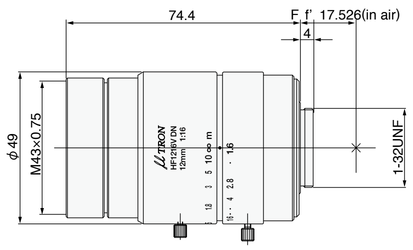
8MP | 1" | NIR

8 Mega Pixel Visible-NIR Chromatic aberration corrected lens

4K resolution

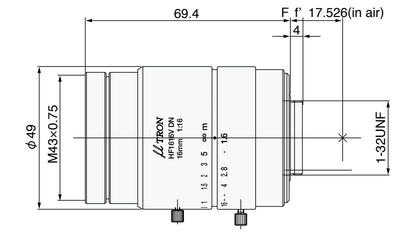
- f12mm, 16mm, 25mm, 35mm, 50mm, 75mm are available for Fixed Focal Lens
- f16-50mm is available for Varifocal Lens
- 400nm-950nm Focus Shift correction
- Realizes color reproduction in color images
- Super high resolution, Low distortion, and excellent uniformity of brightness
- Line up : Extension ring for close-up purpose

HF1216V DN



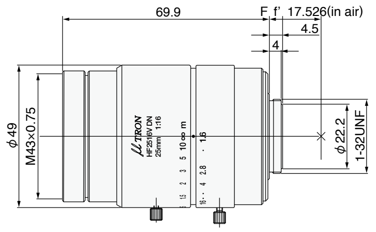
Focal length	12mm	Angle of view (H x V)	56.1°x 46.05°
∞F No.	1.6	Filter pitch	M43 P=0.75
Range of WD	1.8m - ∞	Maximum Compatible sensor	1"

HF1616V DN



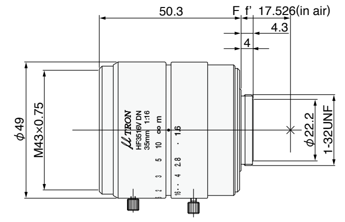
Focal length	16mm	Angle of view (H x V)	43.6°x 35.3°
∞F No.	1.6	Filter pitch	M43 P=0.75
Range of WD	0.8m - ∞	Maximum Compatible sensor	1"

HF2516V DN



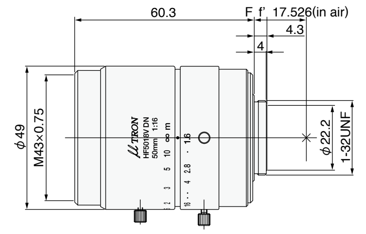
Focal length	25mm	Angle of view (H x V)	28.2°x 21.2°
∞F No.	1.6	Filter pitch	M43 P=0.75
Range of WD	1.0m - ∞	Maximum Compatible sensor	1"

HF3516V DN



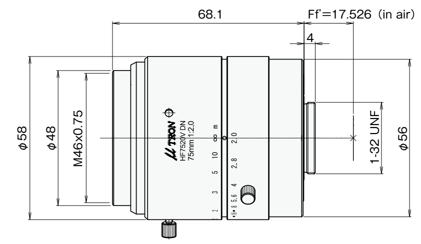
Focal length	35mm	Angle of view (H x V)	20.8°x 15.6°
∞F No.	1.6	Filter pitch	M43 P=0.75
Range of WD	1.5m - ∞	Maximum Compatible sensor	1"

HF5018V DN



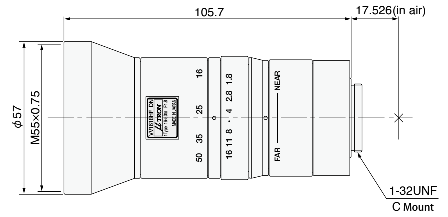
Focal length	50mm	Angle of view (H x V)	15.0°x 11.2°
∞F No.	1.8	Filter pitch	M43 P=0.75
Range of WD	1.5m - ∞	Maximum Compatible sensor	1"

HF7520V DN



Focal length	75mm	Angle of view (H x V)	10.0°x 7.5°
∞F No.	2.0	Filter pitch	M46 P=0.75
Range of WD	1.5m - ∞	Maximum Compatible sensor	1"

VV1618HF DN



Focal length	16～50mm	Angle of view (H x V)	Wide 44.4°x33.4°
∞F No.	1.8		Tele 14.9°x11.3°
Range of WD	2m - ∞	Filter pitch	M55 P=0.75
		Maximum Compatible sensor	1"

* Indicated specifications are design values.

HF Series

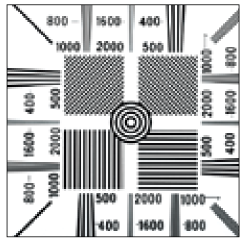
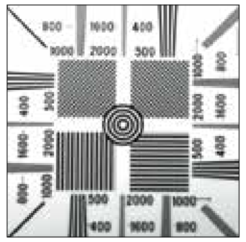
5-25MP 2/3"- 1.2"

High Resolution Fixed Focal Lens for 5 Mega Pixel - 25 Mega Pixel

Suitable for inspection and alignment , required for high accuracy

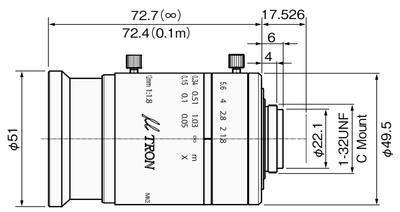
- f12mm, HF1218V is suitable for 25 Mega Pixel and 12 Mega Pixel
- f16mm - f75mm are compatible with 1.1"- 1.2"
- Suitable for different types of sensor
- Excellent performance at macro imaging, compared with conventional Mega Pixel Fixed Focal lens
- Stable performance at different working distance by floating design
- Large aperture
- Robust design, suitable for machine vision applications

Comparison of resolution

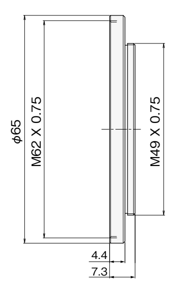
12 Mega Pixel Lens	Mega Pixel Lens
	

HF1218V

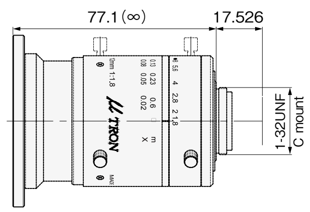
Suitable for 25MP(2.5μm/Pixel),12MP(3.45μm/Pixel)



HF12FA Filter frame (Option)



HF12FAMounting with Filter frame

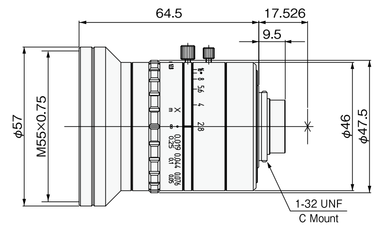


Focal length	12mm	TV distortion	-0.10%
∞F No.	1.8	Filter pitch	M62 P=0.75(OPTION)
Range of WD	100mm - ∞	Maximum Compatible sensor	1.1"
Maximum Magnification	0.1x		

* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

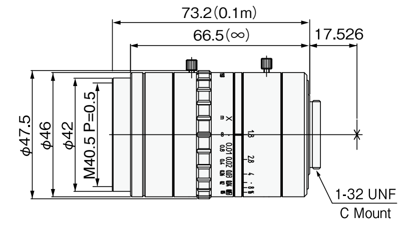
FIXED FOCAL LENS FOR C MOUNT

HF0528J-2



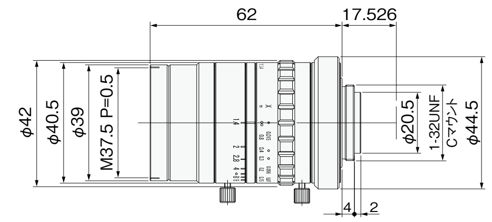
Focal length	5mm	TV distortion	0.29%
∞F No.	2.8	Filter pitch	M55 P=0.75
Range of WD	50mm - ∞	Maximum Compatible sensor	2/3"
Maximum Magnification	0.076x		

HF0818J-2



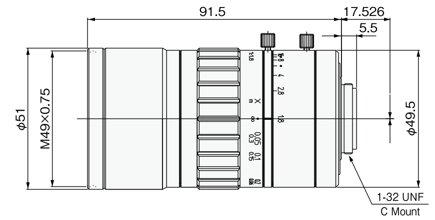
Focal length	8mm	TV distortion	0.31%
∞F No.	1.8	Filter pitch	M40.5 P=0.5
Range of WD	100mm - ∞	Maximum Compatible sensor	2/3"
Maximum Magnification	0.078x		

HF1214J-2



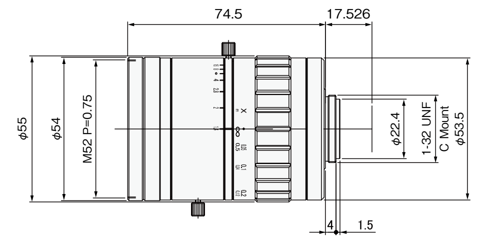
Focal length	12mm	TV distortion	-0.31%
∞F No.	1.4	Filter pitch	M37.5 P=0.5
Range of WD	100mm - ∞	Maximum Compatible sensor	2/3"
Maximum Magnification	0.1x		

HF1618V-2



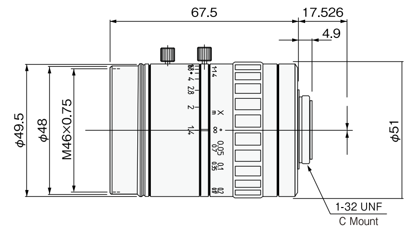
Focal length	16mm	TV distortion	-0.28%
∞F No.	1.8	Filter pitch	M49 P=0.75
Range of WD	33mm - ∞	Maximum Compatible sensor	1.1"
Maximum Magnification	0.3x		

HF2514V-2



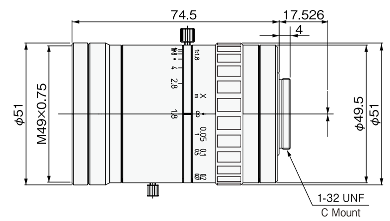
Focal length	25mm	TV distortion	-0.09%
∞F No.	1.4	Filter pitch	M52 P=0.75
Range of WD	80mm - ∞	Maximum Compatible sensor	1.1"
Maximum Magnification	0.3x		

HF3514V-2



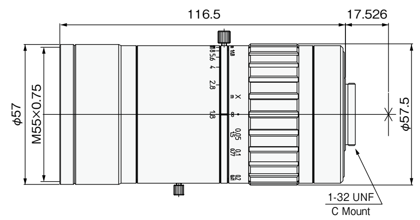
Focal length	35mm	TV distortion	0.027%
∞F No.	1.4	Filter pitch	M46 P=0.75
Range of WD	110mm - ∞	Maximum Compatible sensor	1.1"
Maximum Magnification	0.3x		

HF5018V-2



Focal length	50mm	TV distortion	-0.01%
∞F No.	1.8	Filter pitch	M49 P=0.75
Range of WD	192mm - ∞	Maximum Compatible sensor	1.2"
Maximum Magnification	0.3x		

HF7518V-2



Focal length	75mm	TV distortion	0.00%
∞F No.	1.8	Filter pitch	M55 P=0.75
Range of WD	290mm - ∞	Maximum Compatible sensor	1.2"
Maximum Magnification	0.3x		

* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

HS-V Series

4-12MP

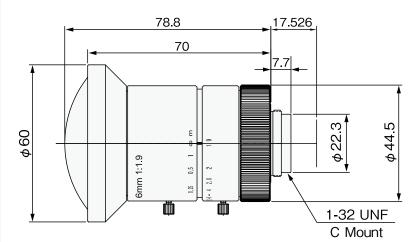
1"- 1.1"

High Resolution Fixed Focal Lens for 1”-1.1”

Suitable for 4 MP, 5MP, 9MP for 1”, 12MP for 1.1”

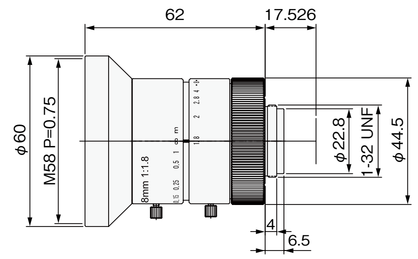
- Suitable for 1” and 1.1”(3.45µm/pixel)
- Compact design
- Stable performance at different working distance, from macro to infinity by floating design
- Robust design
- f35mm, 50mm, 75mm and 100mm are suitable for 1.1” (φ17.4mm)

HS0619V



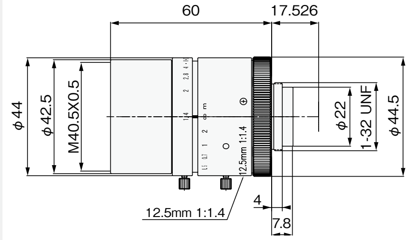
Focal length	6mm
∞F No.	1.9
Range of WD	100mm ~ ∞
TV distortion	0.83%
Angle of view (H×V)	94.7°×78.1°
Maximum Compatible sensor	1"
Mount	C

HS0818V



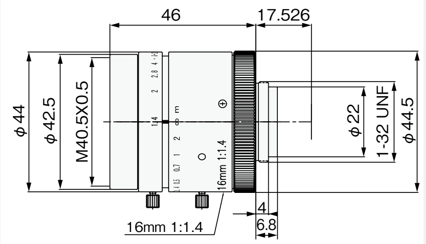
Focal length	8mm
∞F No.	1.8
Range of WD	100mm ~ ∞
TV distortion	-0.17%
Angle of view (H×V)	78.1°×62.1°
Filter pitch	M58 P=0.75
Maximum Compatible sensor	1"
Mount	C

HS1214V



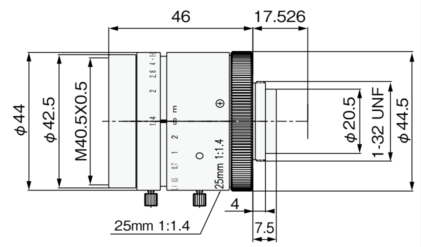
Focal length	12.5mm
∞F No.	1.4
Range of WD	300mm ~ ∞
TV distortion	-0.69%
Angle of view (H×V)	54.9°×42.2°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1"
Mount	C

HS1614V



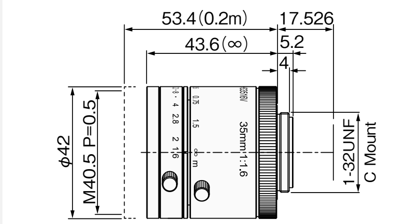
Focal length	16mm
∞F No.	1.4
Range of WD	300mm ~ ∞
TV distortion	-0.85%
Angle of view (H×V)	44.2°×33.5°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1"
Mount	C

HS2514V



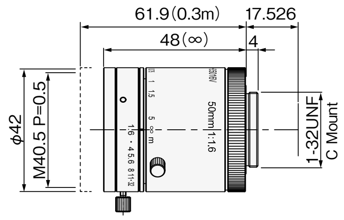
Focal length	25mm
∞F No.	1.4
Range of WD	300mm ~ ∞
TV distortion	-0.02%
Angle of view (H×V)	28.6°×21.6°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1"
Mount	C

HS3516V



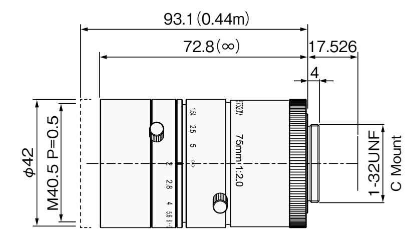
Focal length	35mm
∞F No.	1.6
Range of WD	200mm ~ ∞
TV distortion	0.12%
Angle of view (H×V)	22.1°x 16.7°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1.1"
Mount	C

HS5016V



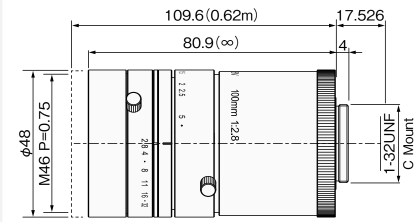
Focal length	50mm
∞F No.	1.6
Range of WD	300mm ~ ∞
TV distortion	0.14%
Angle of view (H×V)	16.1°x 12.1°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1.1"
Mount	C

HS7520V



Focal length	75mm
∞F No.	2.0
Range of WD	440mm ~ ∞
TV distortion	0.05%
Angle of view (H×V)	11.1°x 8.3°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1.1"
Mount	C

HS10028V



Focal length	100mm
∞F No.	2.8
Range of WD	620mm ~ ∞
TV distortion	0.09%
Angle of view (H×V)	8.4°x 6.3°
Filter pitch	M46 P=0.75
Maximum Compatible sensor	1.1"
Mount	C

* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

FIXED FOCAL LENS FOR C MOUNT

FIXED FOCAL LENS FOR C MOUNT

HS-V-SW Series

SWIR | 1"- 1.1"

SWIR Fixed Focal Lens for 1"-1.1"

Possible to capture differences and defects that cannot be seen in visible ray

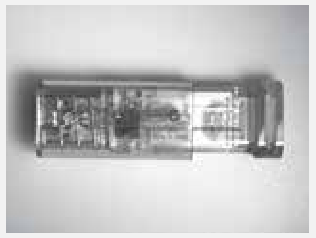
- Available for SWIR image sensor 1",1.1", InGaAs Sensor
- Special design to transmit SWIR 950 ～ 1800 nm

USB

Transmit USB memory stick

VISIBLE RAY

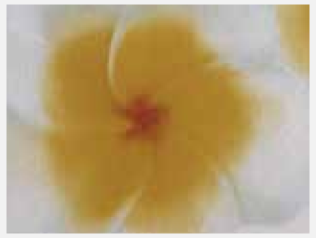
SWIR



PRINTING

Possible to defect the scratch

VISIBLE RAY



SWIR

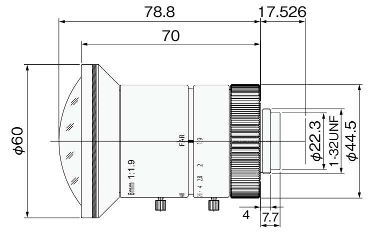
Wafer

Possible to defect the back side scratch

VISIBLE RAY

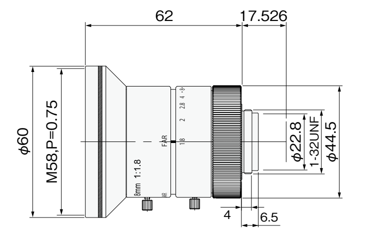
SWIR

HS0619V-SW



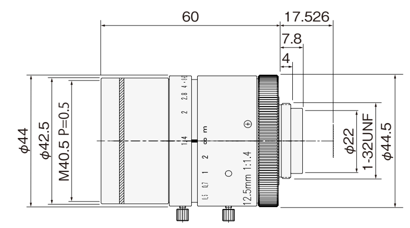
Focal length	6mm
∞F No.	1.9
Range of WD	100mm ～ ∞
TV distortion	0.14%
Angle of view (H×V)	94.1°×77.5°
Maximum Compatible sensor	1"
Mount	C

HS0818V-SW



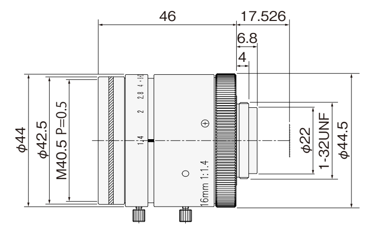
Focal length	8mm
∞F No.	1.8
Range of WD	100mm ～ ∞
TV distortion	-0.52%
Angle of view (H×V)	77°×61°
Filter pitch	M58 P=0.75
Maximum Compatible sensor	1"
Mount	C

HS1214V-SW



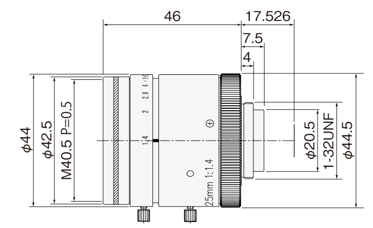
Focal length	12.5mm
∞F No.	1.4
Range of WD	300mm ～ ∞
TV distortion	-1.06%
Angle of view (H×V)	54.2°×41.5°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1"
Mount	C

HS1614V-SW



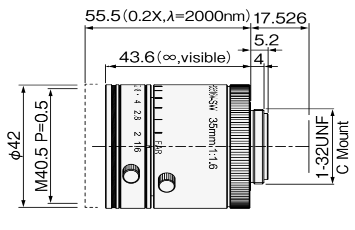
Focal length	16mm
∞F No.	1.4
Range of WD	300mm ～ ∞
TV distortion	-0.97%
Angle of view (H×V)	43.6°x 33.1°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1"
Mount	C

HS2514V-SW



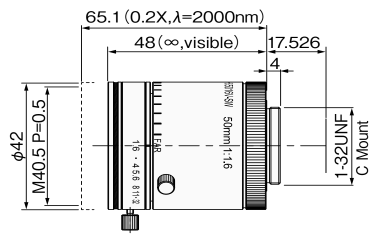
Focal length	25mm
∞F No.	1.4
Range of WD	300mm ～ ∞
TV distortion	-0.01%
Angle of view (H×V)	28.1°x 21.3°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1"
Mount	C

HS3516V-SW



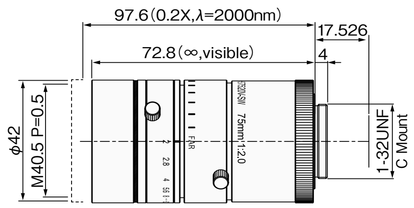
Focal length	35mm
∞F No.	1.6
Range of WD	200mm ～ ∞
TV distortion	0.09%
Angle of view (H×V)	21.5°x 16.3°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1.1"
Mount	C

HS5016V-SW



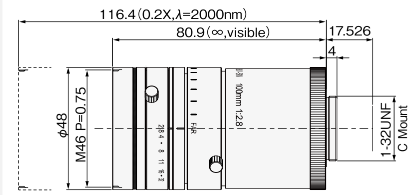
Focal length	50mm
∞F No.	1.6
Range of WD	300mm ～ ∞
TV distortion	0.10%
Angle of view (H×V)	15.8°x 11.9°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1.1"
Mount	C

HS7520V-SW



Focal length	75mm
∞F No.	2.0
Range of WD	440mm ～ ∞
TV distortion	0.05%
Angle of view (H×V)	10.8°x 8.1°
Filter pitch	M40.5 P=0.5
Maximum Compatible sensor	1.1"
Mount	C

HS10028V-SW



Focal length	100mm
∞F No.	2.8
Range of WD	620mm ～ ∞
TV distortion	0.09%
Angle of view (H×V)	8.2°x 6.1°
Filter pitch	M46 P=0.75
Maximum Compatible sensor	1.1"
Mount	C

* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

RV Series

3MP 1/2"- 2/3"

Resistance against vibration Lens for Robot Vision

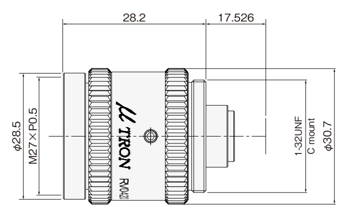
3 Mega Pixel, Low distortion

- Suitable for Resistance against vibration
- Focus : double nut and set screw
- Possible to select iris : 2(OPEN) / 4/ 5.6 / 8
- Compact design
- 12 kinds of focal length are available

Possible to select iris : Open / 4 / 5.6 / 8

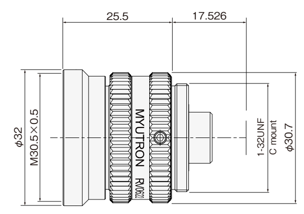
Example Model Name	F NO.
RV0420	F2 (OPEN)
RV0420－F4	F 4
RV0420－F5.6	F 5.6
RV0420－F8	F 8

RV0420



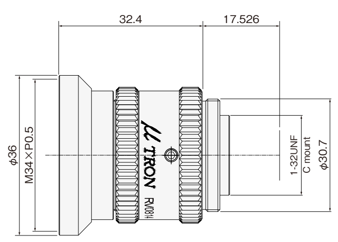
Application	Resistance against vibration Lens
Focal length	4mm
Closet magnification	0.038x
Operations distance	0.1m - ∞
Effective F No.	2 (OPEN)
TV distortion	0.91%
Angle of view (H x V)	75.24°x 59.96°
Maximum Compatible sensor	1/2"
Mount	C

RV0622



Application	Resistance against vibration Lens
Focal length	6.5mm
Closet magnification	0.055x
Operations distance	0.1m - ∞
Effective F No.	2.2 (OPEN)
TV distortion	-0.01%
Angle of view (H x V)	52.35°x 40.47°
Maximum Compatible sensor	1/2"
Mount	C

RV0814

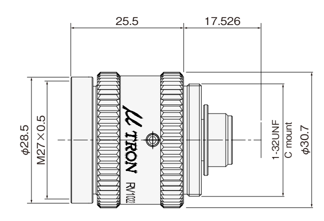


Application	Resistance against vibration Lens
Focal length	8mm
Closet magnification	0.074x
Operations distance	0.1m - ∞
Effective F No.	1.4 (OPEN)
TV distortion	0.83%
Angle of view (H x V)	56°x 44°
Maximum Compatible sensor	2/3"
Mount	C

* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

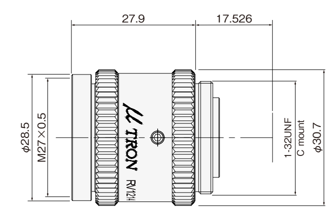
FIXED FOCAL LENS FOR C MOUNT

RV1022



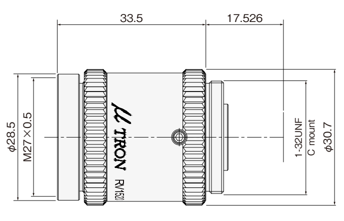
Application	Resistance against vibration Lens
Focal length	10mm
Closet magnification	0.1x
Operations distance	0.1m - ∞
Effective F No.	2.2 (OPEN)
TV distortion	-0.08%
Angle of view (H x V)	34.61°x 26.31°
Maximum Compatible sensor	1/2"
Mount	C

RV1214



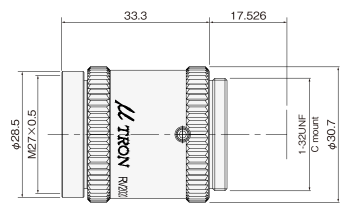
Application	Resistance against vibration Lens
Focal length	12mm
Closet magnification	0.08x
Operations distance	0.15m - ∞
Effective F No.	1.4 (OPEN)
TV distortion	-0.12%
Angle of view (H x V)	39°x 30°
Maximum Compatible sensor	2/3"
Mount	C

RV1520



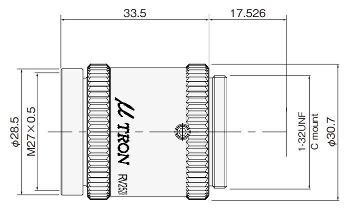
Application	Resistance against vibration Lens
Focal length	15mm
Closet magnification	0.3x
Operations distance	0.05m - ∞
Effective F No.	2 (OPEN)
TV distortion	-0.09%
Angle of view (H x V)	31.79°x 24.11°
Maximum Compatible sensor	2/3"
Mount	C

RV2020



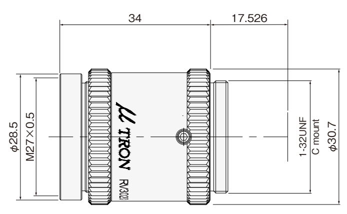
Application	Resistance against vibration Lens
Focal length	20mm
Closet magnification	0.25x
Operations distance	0.09m - 1m
Effective F No.	2 (OPEN)
TV distortion	-0.10%
Angle of view (H x V)	24.11°x 18.2°
Maximum Compatible sensor	2/3"
Mount	C

RV2520



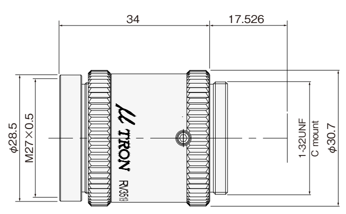
Application	Resistance against vibration Lens
Focal length	25mm
Closet magnification	0.2x
Operations distance	0.15m - 1m
Effective F No.	2 (OPEN)
TV distortion	-0.01%
Angle of view (H x V)	19.58°x 14.75°
Maximum Compatible sensor	2/3"
Mount	C

RV3020



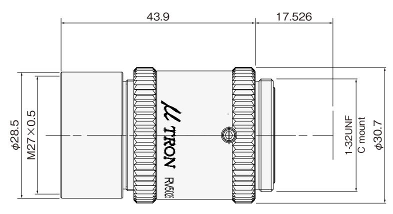
Application	Resistance against vibration Lens
Focal length	30mm
Closet magnification	0.16x
Operations distance	0.2m - 1m
Effective F No.	2 (OPEN)
TV distortion	-0.02%
Angle of view (H x V)	16.69°x 12.55°
Maximum Compatible sensor	2/3"
Mount	C

RV3519



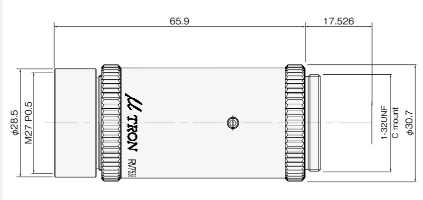
Application	Resistance against vibration Lens
Focal length	35mm
Closet magnification	0.13x
Operations distance	0.3m - 1m
Effective F No.	1.9 (OPEN)
TV distortion	-0.03%
Angle of view (H x V)	14.32°x 10.77°
Maximum Compatible sensor	2/3"
Mount	C

RV5025



Application	Resistance against vibration Lens
Focal length	50mm
Closet magnification	0.13x
Operations distance	0.4m - 1m
Effective F No.	2.5 (OPEN)
TV distortion	0.03%
Angle of view (H x V)	10.38°x 7.82°
Maximum Compatible sensor	2/3"
Mount	C

RV7538



Application	Resistance against vibration Lens
Focal length	75mm
Closet magnification	0.2x
Operations distance	0.4m - 1m
Effective F No.	3.8 (OPEN)
TV distortion	-0.01%
Angle of view (H x V)	6.81°x 5.11°
Maximum Compatible sensor	2/3"
Mount	C

* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

FIXED FOCAL LENS FOR C MOUNT

HS Series

3MP | 1/1.8"- 2/3"

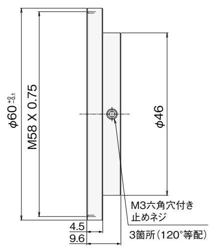
3 Mega Pixel Fixed Focal Lens

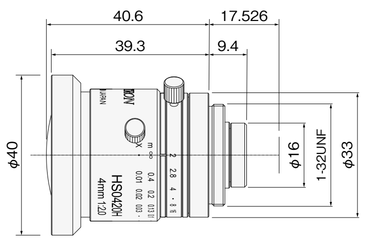
Excellent brightness, Low distortion, and suitable for various applications

- HS0420H and HS0618H are designed for low distortion
- Stable performance from macro to infinity (∞)
- Suitable for 3 Mega Pixel (1/1.8",2/3")
- High durability

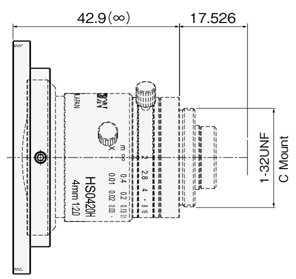
HS0420H

HS04FA Filter frame (Option)



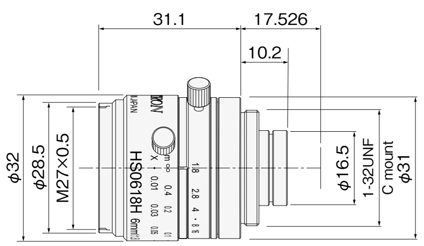


HS04FA Mounting with Filter frame



Focal length	4mm	Angle of view (H×V)	85°×68°
∞F No.	2.0	Filter pitch	M58 P=0.75 (OPTION)
Range of WD	100mm ～ ∞		
TV distortion	0.26%	Maximum Compatible sensor	1/1.8"

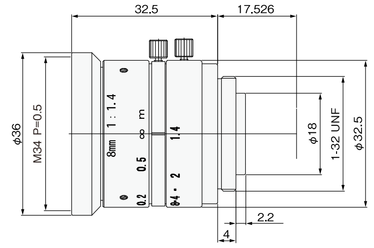
HS0618H



Focal length	6mm
∞F No.	1.8
Range of WD	100mm ～ ∞
TV distortion	-0.13%
Angle of view (H×V)	61°×47°
Filter pitch	M27 P=0.5
Maximum Compatible sensor	1/1.8"

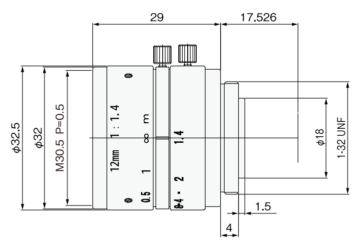
* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

HS0814J



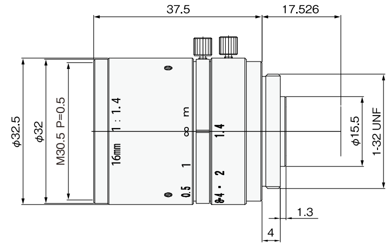
Focal length	8mm
∞F No.	1.4
Range of WD	100mm - ∞
TV distortion	0.83%
Angle of view (H×V)	56°×44°
Filter pitch	M34 P=0.5
Maximum Compatible sensor	2/3"

HS1214J



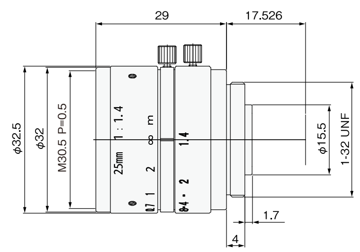
Focal length	12mm
∞F No.	1.4
Range of WD	150mm - ∞
TV distortion	-0.12%
Angle of view (H×V)	39°×30°
Filter pitch	M30.5 P=0.5
Maximum Compatible sensor	2/3"

HS1614J



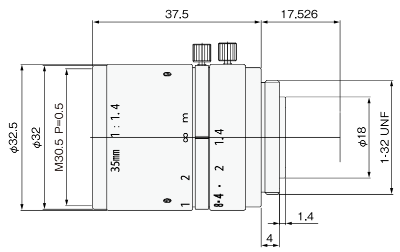
Focal length	16mm
∞F No.	1.4
Range of WD	200mm - ∞
TV distortion	-0.14%
Angle of view (H×V)	30°×23°
Filter pitch	M30.5 P=0.5
Maximum Compatible sensor	2/3"

HS2514J



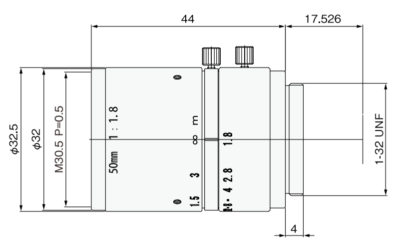
Focal length	25mm
∞F No.	1.4
Range of WD	300mm - ∞
TV distortion	-0.12%
Angle of view (H×V)	19°×15°
Filter pitch	M30.5 P=0.5
Maximum Compatible sensor	2/3"

HS3514J



Focal length	35mm
∞F No.	1.4
Range of WD	400mm - ∞
TV distortion	-0.06%
Angle of view (H×V)	14°×11°
Filter pitch	M30.5 P=0.5
Maximum Compatible sensor	2/3"

HS5018J



Focal length	50mm
∞F No.	1.8
Range of WD	500mm - ∞
TV distortion	0.07%
Angle of view (H×V)	10°×7.7°
Filter pitch	M30.5 P=0.5
Maximum Compatible sensor	2/3"

* Indicated specifications are design values. * TV distortion indicates a value for minimum working distance.
* Angle of view indicates a value for maximum compatible sensor.

FV Series

LOW DISTORTION | 3MP | 1/2"- 2/3"

3 Mega Pixel Low Distortion Fixed Focal Lens

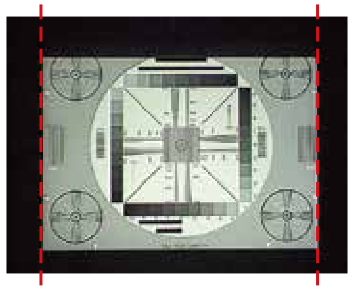
Design for low distortion

- Design for machine vision application, excellent performance at short WD, less than 500mm
- Reduce color aberration, compared with Conventional Fixed Focal Lens
- TV distortion less than 0.1% (except for f4mm)
- Possible to use for macro imaging without extension ring

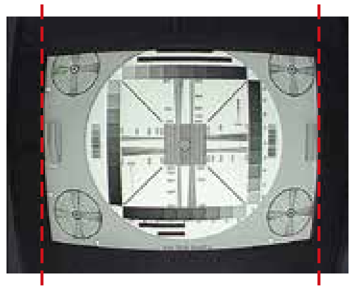
Comparison of Distortion

- FV0420 0.9%
  Conventional f4mm lens
  Approx. 18%

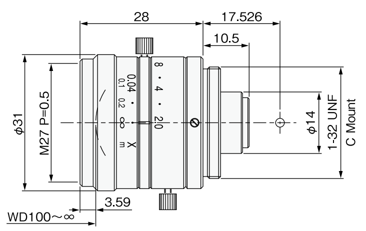
FV low distortion lens



Conventional Fixed Focal lens

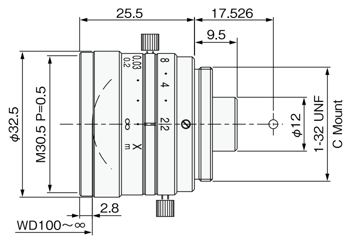


FV0420



Focal length	4mm	Angle of view(H×V)	75.14°×59.96°
∞F No.	2.0	Filter pitch	M27 P=0.5
Range of WD	0.1m - ∞	Maximum Compatible sensor	1/2"
TV distortion	0.91%		

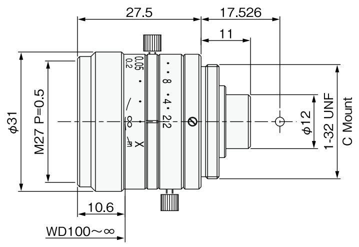
FV0622



Focal length	6.5mm	Angle of view(H×V)	52.35°×40.47°
∞F No.	2.2	Filter pitch	M30.5 P=0.5
Range of WD	0.1m - ∞	Maximum Compatible sensor	1/2"
TV distortion	-0.01%		

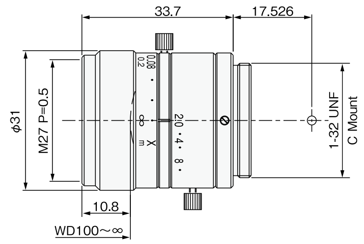
* Indicated specifications are design values. * Angle of view indicates a value for maximum compatible sensor.
* TV distortion indicates a value for the minimum working distance.

FV1022



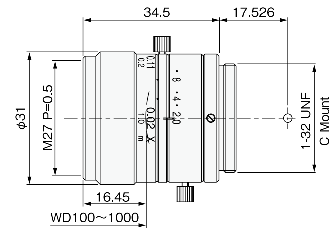
Focal length	10mm	Angle of view(H×V)	34.61°×26.31°
∞F No.	2.2	Filter pitch	M27 P=0.5
Range of WD	0.1m - ∞	Maximum Compatible sensor	1/2"
TV distortion	-0.08%		

FV1520



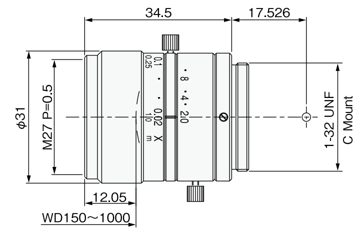
Focal length	15mm	Angle of view(H×V)	31.79°×24.11°
∞F No.	2.0	Filter pitch	M27 P=0.5
Range of WD	0.1m - ∞	Maximum Compatible sensor	2/3"
TV distortion	-0.09%		

FV2020



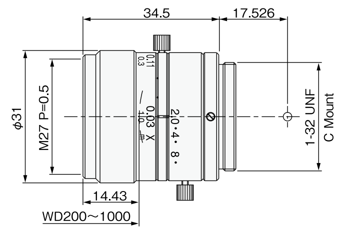
Focal length	20mm	Angle of view(H×V)	24.11°×18.2°
∞F No.	2.0	Filter pitch	M27 P=0.5
Range of WD	0.1m - 1m	Maximum Compatible sensor	2/3"
TV distortion	-0.10%		

FV2520



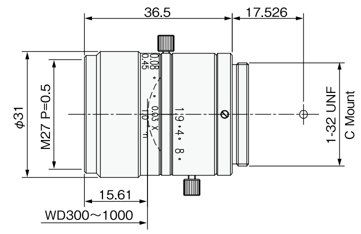
Focal length	25mm	Angle of view(H×V)	19.58°×14.75°
∞F No.	2.0	Filter pitch	M27 P=0.5
Range of WD	0.15m - 1m	Maximum Compatible sensor	2/3"
TV distortion	-0.01%		

FV3020



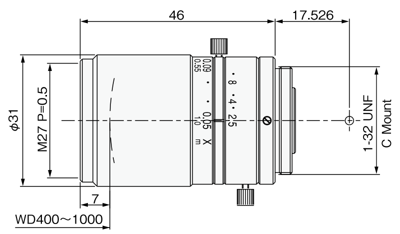
Focal length	30mm	Angle of view(H×V)	16.69°×12.55°
∞F No.	2.0	Filter pitch	M27 P=0.5
Range of WD	0.2m - 1m	Maximum Compatible sensor	2/3"
TV distortion	-0.02%		

FV3519



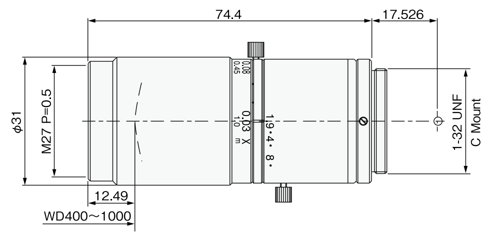
Focal length	35mm	Angle of view(H×V)	14.32°×10.77°
∞F No.	1.9	Filter pitch	M27 P=0.5
Range of WD	0.3m - 1m	Maximum Compatible sensor	2/3"
TV distortion	-0.03%		

FV5025



Focal length	50mm	Angle of view(H×V)	6.5°×4.9°
∞F No.	2.5	Filter pitch	M27 P=0.5
Range of WD	0.4m - 1m	Maximum Compatible sensor	2/3"
TV distortion	0.03%		

FV7538



Focal length	75mm	Angle of view(H×V)	6.81°×5.11°
∞F No.	3.8	Filter pitch	M27 P=0.5
Range of WD	0.4m - 1m	Maximum Compatible sensor	2/3"
TV distortion	-0.01%		

* Indicated specifications are design values. * Angle of view indicates a value for maximum compatible sensor.
* TV distortion indicates a value for the minimum working distance.

MV Series

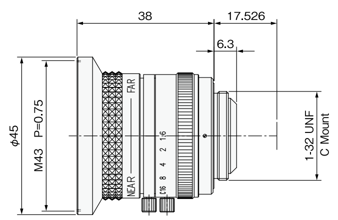
1/2"- 2/3"

VGA Fixed Focal Lens

Wide range of focal length is available Suitable for various applications

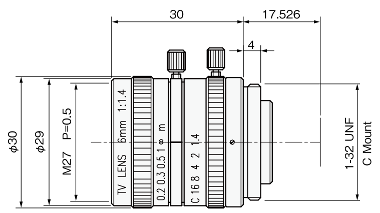
- Focal length f3.5mm - f100mm, 10 models are available
- Available for focus and iris lock screws
- Suitable for various applications

MV0316



Focal length	3.5mm	Angle of view(H×V)	84.9°×68.9°
∞F No.	1.6	Filter pitch	M43 P=0.75
Range of WD	0.1m - ∞	Maximum Compatible sensor	1/2"

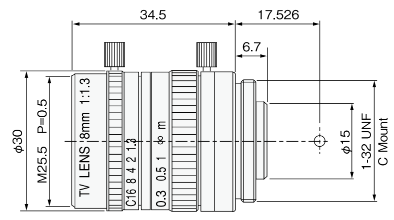
MV0614



Focal length	6.0mm	Angle of view(H×V)	54.6°×42.3°
∞F No.	1.4	Filter pitch	M27 P=0.5
Range of WD	0.2m - ∞	Maximum Compatible sensor	1/2"

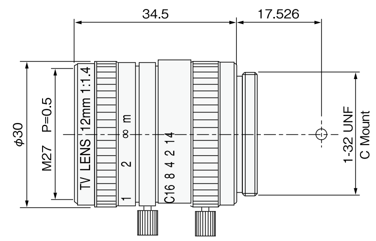
* Indicated specifications are design values.   * Angle of view indicates a value for maximum compatible sensor.

MV0813



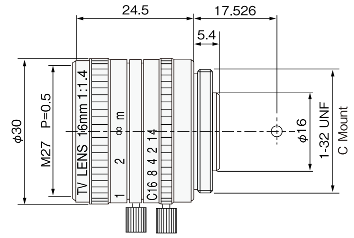
Focal length	8.0mm	Angle of view(H×V)	57.8°×45°
∞F No.	1.3	Filter pitch	M25.5 P=0.5
Range of WD	0.2m - ∞	Maximum Compatible sensor	2/3"

MV1214



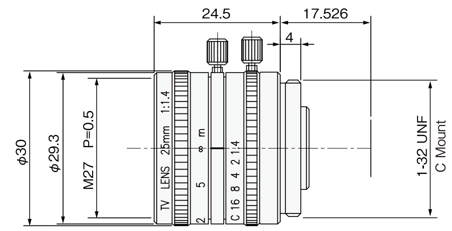
Focal length	12mm	Angle of view(H×V)	29°×21.9°
∞F No.	1.4	Filter pitch	M27 P=0.5
Range of WD	0.3m - ∞	Maximum Compatible sensor	1/2"

MV1614



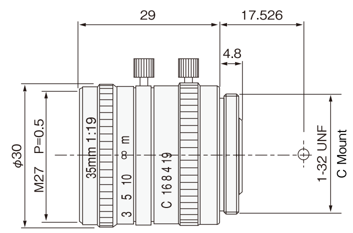
Focal length	16mm	Angle of view(H×V)	30.4°×23°
∞F No.	1.4	Filter pitch	M27 P=0.5
Range of WD	0.4m - ∞	Maximum Compatible sensor	2/3"

MV2514



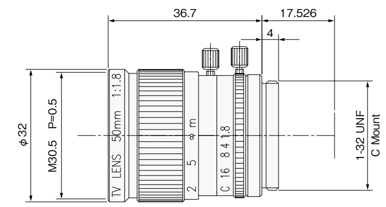
Focal length	25mm	Angle of view(H×V)	28.5°×21.6°
∞F No.	1.4	Filter pitch	M27 P=0.5
Range of WD	0.5m - ∞	Maximum Compatible sensor	2/3"

MV3519



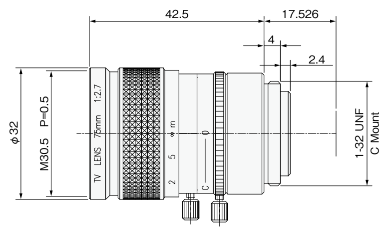
Focal length	35mm	Angle of view(H×V)	14.4°×10.8°
∞F No.	1.9	Filter pitch	M27 P=0.5
Range of WD	0.5m - ∞	Maximum Compatible sensor	2/3"

MV5018



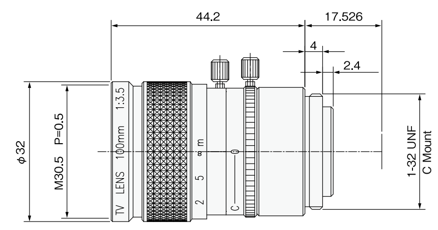
Focal length	50mm	Angle of view(H×V)	10.5°×7.9°
∞F No.	1.8	Filter pitch	M30.5 P=0.5
Range of WD	1m - ∞	Maximum Compatible sensor	2/3"

MV7527



Focal length	75mm	Angle of view(H×V)	6.5°×4.9°
∞F No.	2.7	Filter pitch	M30.5 P=0.5
Range of WD	1m - ∞	Maximum Compatible sensor	2/3"

MV10035



Focal length	100mm	Angle of view(H×V)	5.1°×3.8°
∞F No.	3.5	Filter pitch	M30.5 P=0.5
Range of WD	1m - ∞	Maximum Compatible sensor	2/3"

* Indicated specifications are design values.   * Angle of view indicates a value for maximum compatible sensor.

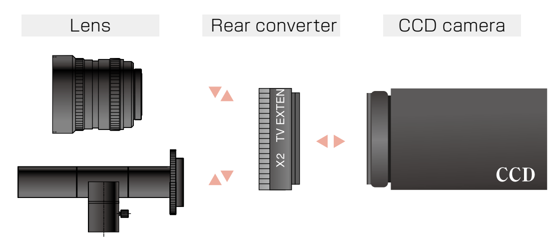
ACCESSORIES

Rear Converter

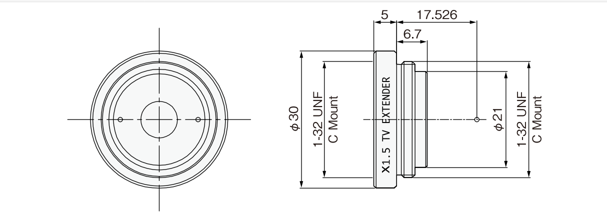
Rear converter for C mount

- Easy to convert magnification without changing the working distance
  * Using rear converter is deteriorated resolution and F No.

Configuration

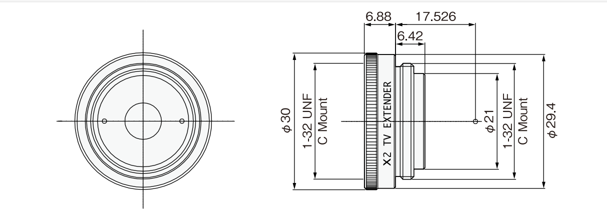


RC15



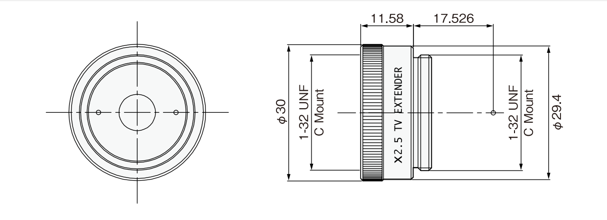
Magnification 1.5x

RC20



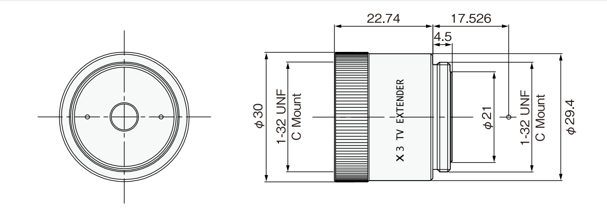
Magnification 2.0x

RC25



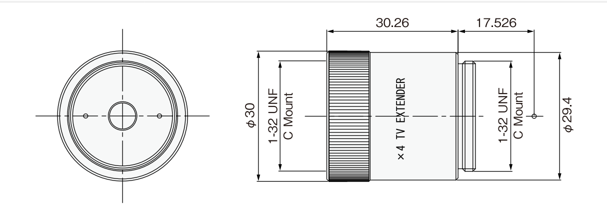
Magnification 2.5x

RC30



Magnification 3.0x

RC40



Magnification 4.0x

Extension Ring

Fixed Focal lens can be changed into macro lens with extension rings

- Attach to the end of a lens to change magnification and WD

Model	Specification
SR-02	0.2mm
SR-05	0.5mm
SR-1	1mm
SR-2	2mm
SR-5	5mm
SR-10	10mm
SR-15	15mm
SR-20	20mm
SR-30	30mm
SR-40	40mm
SR-50	50mm
SR-100	100mm
SR-SET	0.5mm、1mm、2mm、5mm、10mm、20mm、40mm

Magnification, WD and FOV Chart for Extension Ring

Fixed Focal Lens（MV Series）

Extension Ring (mm)	MV0316 FOV (V x H) 1/2 CCD	MV0316 FOV (V x H) 1/3 CCD	MV0316 WD (mm)	MV0316 magnification	MV0614 FOV (V x H) 1/2 CCD	MV0614 FOV (V x H) 1/3 CCD	MV0614 WD (mm)	MV0614 magnification	MV0813 FOV (V x H) 1/2 CCD	MV0813 FOV (V x H) 1/3 CCD	MV0813 WD (mm)	MV0813 magnification
0	147×196	110×147	100	0.03	165×221	124×165	200	0.03	96×128	72×96	148	0.05
0.5	28×37	21×28	10	0.17	44×58	33×44	43	0.11	43×57	32×43	59	0.11
	35×46	26×35	14	0.14	60×79	45×60	63	0.08	77×102	57×77	115	0.06
1					25×34	19×25	19	0.19	27×37	21×27	34	0.18
					30×40	22×30	25	0.16	38×51	29×38	52	0.13
1.5									20×27	15×20	22	0.24
									26×34	19×26	31	0.19
2												
5												
10												

Extension Ring (mm)	MV1214 FOV (V x H) 1/2 CCD	MV1214 FOV (V x H) 1/3 CCD	MV1214 WD (mm)	MV1214 magnification	MV1614 FOV (V x H) 1/2 CCD	MV1614 FOV (V x H) 1/3 CCD	MV1614 WD (mm)	MV1614 magnification
0	103×137	77×103	248	0.05	109×145	82×109	358	0.04
0.5	55×73	41×55	125	0.09	64×86	48×64	206	0.07
	119×159	89×119	289	0.04	156×208	117×156	515	0.03
1	38×50	28×38	80	0.13	45×61	34×45	143	0.11
	59×79	45×59	136	0.08	78×104	58×78	252	0.06
1.5	29×38	21×29	57	0.17	35×47	26×35	108	0.14
	40×53	30×40	85	0.12	52×69	39×52	164	0.09
2	23×31	17×23	42	0.21	29×38	22×29	86	0.17
	30×40	22×30	59	0.16	39×52	29×39	120	0.12
5					14×18	10×14	35	0.35
					16×21	12×16	42	0.31
10					7.3×9.7	5.4×7.3	14	0.66
					7.8×10	5.8×7.8	15	0.62

Extension Ring (mm)	MV2514 FOV (V x H) 1/2 CCD	MV2514 FOV (V x H) 1/3 CCD	MV2514 WD (mm)	MV2514 magnification	MV3519 FOV (V x H) 1/2 CCD	MV3519 FOV (V x H) 1/3 CCD	MV3519 WD (mm)	MV3519 magnification	MV5018 FOV (V x H) 1/2 CCD	MV5018 FOV (V x H) 1/3 CCD	MV5018 WD (mm)	MV5018 magnification
0	87×115	65×87	458	0.06	66×87	49×66	500	0.07	90×120	68×90	943	0.05
0.5	64×85	48×64	338	0.08	55×73	41×55	422	0.09				
	242×322	181×242	1270	0.02	335×447	251×335	2459	0.01				
1	50×67	38×50	269	0.1	47×63	35×47	366	0.1				
	121×161	91×121	637	0.04	168×223	126×168	1240	0.03				
1.5	42×56	31×42	223	0.12	41×55	31×41	324	0.12	57×76	43×57	610	0.08
	81×107	60×81	425	0.06	112×149	84×112	834	0.04	154×205	115×154	1577	0.03
2	36×47	27×36	191	0.13	37×49	28×37	291	0.13	51×67	38×51	548	0.1
	60×81	45×60	320	0.08	84×112	63×84	631	0.06	115×154	86×115	1193	0.04
5	19×25	14×19	103	0.25	22×30	17×22	185	0.22	31×41	23×31	347	0.16
	24×32	18×24	130	0.2	34×45	25×34	265	0.14	46×61	35×46	503	0.1
10	11×14	8.0×11	60	0.45	13×18	10×13	121	0.36	18×25	14×18	226	0.26
	12×16	9.1×12	66	0.4	17×22	13×17	143	0.29	23×31	17×23	273	0.21
15	7.4×9.8	5.5×7.4	43	0.65	9.5×13	7.2×9.5	93	0.5	13×18	10×13	174	0.37
	8.1×11	6.0×8.1	45	0.6	11×15	8.4×11	103	0.43	15×21	12×15	196	0.31
20	5.6×7.5	4.2×5.6	34	0.85	7.4×9.9	5.6×7.4	78	0.65	10×14	7.7×10	145	0.47
	6.0×8.1	4.5×6.0	35	0.79	8.4×11	6.3×8.4	82	0.57	12×15	8.6×12	158	0.42
25					6.1×8.1	4.6×6.1	68	0.79	8.4×11	6.3×8.4	126	0.57
					6.7×8.9	5.0×6.7	70	0.72	9.2×12	6.9×9.2	134	0.52
30									7.1×9.4	5.3×7.1	113	0.68
									7.7×10	5.8×7.7	119	0.63
35									6.1×8.2	4.6×6.1	104	0.78
									6.6×8.8	4.9×6.6	108	0.73
40									5.4×7.2	4.1×5.4	97	0.89
									5.8×7.7	4.3×5.8	100	0.83
45												
50												

Extension Ring (mm)	MV7527 FOV (V x H) 1/2 CCD	MV7527 FOV (V x H) 1/3 CCD	MV7527 WD (mm)	MV7527 magnification	MV10035 FOV (V x H) 1/2 CCD	MV10035 FOV (V x H) 1/3 CCD	MV10035 WD (mm)	MV10035 magnification
0	60×80	45×60	1000	0.08	46×62	35×46	1000	0.1
0.5								
1								
1.5								
2	43×57	32×43	776	0.11				
	184×246	138×184	3189	0.03				
5	30×40	23×30	607	0.16	27×37	21×27	724	0.18
	74×98	55×74	1422	0.07	95×127	71×95	2413	0.05
10	20×27	15×20	475	0.24	19×26	15×19	609	0.25
	37×49	28×37	833	0.13	48×63	36×48	1432	0.1
15	15×20	11×15	408	0.32	15×20	11×15	546	0.32
	25×33	18×25	636	0.2	32×42	24×32	1105	0.15
20	12×16	9×12	369	0.4	12×16	9×12	505	0.39
	18×25	14×18	538	0.26	24×32	18×24	941	0.2
25	10×14	7.6×10	342	0.47	10×14	8×10	478	0.46
	15×20	11×15	479	0.33	19×25	14×19	843	0.25
30	8.7×12	6.5×8.7	323	0.55	9.0×12	6.7×9.0	458	0.54
	12×16	9.2×12	440	0.39	16×21	12×16	778	0.3
35	7.6×10	5.7×7.6	309	0.63	7.9×11	5.9×7.9	443	0.61
	11×14	7.9×11	412	0.46	14×18	10×14	731	0.35
40	6.7×9.0	5.1×6.7	297	0.71	7.1×9.4	5.3×7.1	430	0.68
	9.2×12	6.9×9.2	391	0.52	12×16	8.9×12	696	0.4
45	6.1×8.1	4.6×6.1	289	0.79	6.4×8.5	4.8×6.4	421	0.75
	8.2×11	6.1×8.2	375	0.59	11×14	7.9×11	669	0.45
50	5.5×7.4	4.1×5.5	281	0.87	5.8×7.8	4.4×5.8	412	0.82
	7.4×9.8	5.5×7.4	361	0.65	9.5×13	7.1×9.5	647	0.5

ACCESSORIES

Magnification, WD and FOV Chart for Extension Ring
Mega Pixel Low Distortion Fixed Focal Lens (FV Series)

Extension Ring (mm)	FV0420				FV0622				FV1022				FV1520			
	FOV (V x H)		WD (mm)	magnification	FOV (V x H)		WD (mm)	magnification	FOV (V x H)		WD (mm)	magnification	FOV (V x H)		WD (mm)	magnification
	1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD		
0	126×168	95×126	97	0.038	86×114	64×86	97	0.056	49×65	37×49	91	0.098	33×44	24×33	92	0.147
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0.5	30×41	23×30	14	0.158	36×48	27×36	30	0.132	33×44	25×33	56	0.146	27×36	20×27	73	0.179
	40×53	30×40	23	0.120	62×83	47×62	65	0.077	98×131	73×98	196	0.049	150×200	113×150	462	0.032
1	17×23	13×17	3	0.279	23×31	17×23	12	0.209	25×33	18×25	38	0.195	23×30	17×23	60	0.212
	20×27	15×20	6	0.240	31×42	23×31	23	0.154	49×66	37×49	90	0.097	74×98	55×74	223	0.065
1.5					17×22	13×17	4	0.286	20×26	15×20	28	0.244	20×26	15×20	50	0.244
					21×28	16×21	9	0.230	33×44	25×33	55	0.146	49×66	37×49	144	0.097
2									16×22	12×16	21	0.292	17×23	13×17	43	0.276
									25×33	18×25	38	0.195	37×50	28×37	104	0.129
5									8.2×11	6.2×8.2	3	0.585	10×14	7.7×10	20	0.470
									9.9×13	7.4×9.9	6	0.487	15×20	11×15	32	0.324
10													6.0×8.1	4.5×6.0	6	0.794
													7.4×9.9	5.6×7.4	8	0.647

Extension Ring (mm)	FV2020				FV2520				FV3020				FV3519			
	FOV (V x H)		WD (mm)	magnification	FOV (V x H)		WD (mm)	magnification	FOV (V x H)		WD (mm)	magnification	FOV (V x H)		WD (mm)	magnification
	1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD		
0	22×29	17×22	88	0.217	27×35	20×27	142	0.181	29×39	22×29	190	0.164	37×49	27×37	288	0.131
	229×305	171×229	984	0.021	185×246	138×185	988	0.026	155×206	116×155	986	0.031	133×178	100×133	985	0.036
0.5	20×27	15×20	79	0.241	24×32	18×24	128	0.200	27×35	20×27	173	0.181	33×44	25×33	262	0.145
	107×142	80×107	447	0.045	107×142	80×107	559	0.045	102×136	77×102	639	0.047	96×128	72×96	711	0.050
1	18×24	14×18	71	0.265	22×29	16×22	117	0.220	24×32	18×24	159	0.198	30×40	23×30	241	0.159
	70×93	52×70	287	0.069	74×98	55×74	390	0.065	75×100	56×75	473	0.064	74×98	55×74	558	0.065
1.5	17×22	12×17	64	0.290	20×27	15×20	107	0.240	22×30	17×22	148	0.214	28×37	21×28	222	0.174
	51×68	38×51	209	0.094	56×75	42×56	299	0.085	59×79	44×59	376	0.081	61×81	46×61	461	0.079
2	15×20	11×15	59	0.314	19×25	14×19	99	0.259	21×28	16×21	137	0.231	26×34	19×26	207	0.188
	41×54	31×41	164	0.118	46×62	35×46	242	0.104	49×66	37×49	312	0.097	52×69	39×52	393	0.093
5	10×14	7.8×10	38	0.459	13×17	9.5×13	69	0.377	15×19	11×15	98	0.331	18×23	13×18	149	0.273
	18×24	14×18	67	0.263	22×29	16.2×22	112	0.222	24×32	18×24	156	0.197	27×36	20×27	213	0.179
10	6.8×9.1	5.1×6.8	22	0.702	8.4×11	6.3×8.4	45	0.573	9.6×13	7.2×9.6	68	0.498	12×15	9×12	105	0.416
	9.5×13	7.1×9.5	30	0.506	11×15	8.6×11	58	0.418	13×18	9.9×13	86	0.364	15×20	11×15	126	0.322
15	5.1×6.8	3.8×5.1	15	0.945	6.2×8.3	4.7×6.2	34	0.769	7.2×9.6	5.4×7.2	53	0.664	8.6×11	6.4×8.6	83	0.559
	6.4×8.5	4.8×6.4	17	0.749	7.8×10	5.9×7.8	39	0.614	9.0×12	6.8×9.0	60	0.531	10×14	7.7×10	93	0.465
20					5.0×6.6	3.7×5.0	27	0.965	5.8×7.7	4.3×5.8	44	0.831	6.8×9.1	5.1×6.8	71	0.702
					5.9×7.9	4.4×5.9	28	0.810	6.9×9.2	5.2×6.9	47	0.697	7.9×11	5.9×7.9	75	0.607
25													5.7×7.6	4.3×5.7	62	0.845
													6.4×8.5	4.8×6.4	64	0.750

Extension Ring (mm)	FV5025				FV7538			
	FOV (V x H)		WD (mm)	magnification	FOV (V x H)		WD (mm)	magnification
	1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD		
0	37×50	28×37	397	0.129	24×31	18×24	398	0.204
	96×128	72×96	993	0.050	62×83	47×62	988	0.077
0.5	35×46	26×35	370	0.139	23×30	17×23	386	0.211
	80×107	60×80	826	0.060	57×76	43×57	910	0.084
1	32×43	24×32	345	0.150	22×29	17×22	375	0.218
	69×91	51×69	707	0.070	53×71	40×53	844	0.090
1.5	30×40	23×30	324	0.160	21×28	16×21	364	0.225
	59×79	44×59	619	0.081	49×66	37×49	787	0.097
2	28×38	21×28	306	0.170	21×28	16×21	356	0.231
	53×70	40×53	551	0.091	46×62	35×46	738	0.104
5	21×28	16×21	230	0.232	18×24	13×18	307	0.272
	31×42	24×31	335	0.153	33×44	25×33	538	0.144
10	14×19	11×14	166	0.335	14×19	11×14	253	0.340
	19×25	14×19	207	0.256	23×30	17×23	375	0.212
15	11×15	8.2×11	132	0.438	12×16	8.8×12	217	0.407
	13×18	10×13	153	0.359	17×23	13×17	290	0.280
20	8.9×12	6.6×8.9	111	0.542	10×13	7.6×10	191	0.475
	10×14	7.8×10	122	0.462	14×18	10×14	239	0.347
25	7.4×9.9	5.6×7.4	97	0.645	8.9×12	6.6×8.9	172	0.542
	8.5×11	6.4×8.5	103	0.566	12×15	8.7×12	204	0.415
30	6.4×8.6	4.8×6.4	86	0.748	7.9×10	5.9×7.9	157	0.610
	7.2×9.6	5.4×7.2	90	0.669	10×13	7.5×10	179	0.482
35	5.6×7.5	4.2×5.6	78	0.851	7.1×9.5	5.3×7.1	145	0.677
	6.2×8.3	4.7×6.2	80	0.772	8.7×12	6.5×8.7	160	0.550
40	5.0×6.7	3.8×5.0	72	0.954	6.4×8.6	4.8×6.4	135	0.745
	5.5×7.3	4.1×5.5	73	0.875	7.8×10	5.8×7.8	146	0.618
45					5.9×7.9	4.4×5.9	126	0.813
					7.0×9.3	5.3×7.0	134	0.685
50					5.5×7.3	4.1×5.5	119	0.880
					6.4×8.5	4.8×6.4	124	0.753

WD and FOV Chart for Extension Ring
3 Mega Pixel Fixed Focal Lens (HS-J Series)

Extension Ring (mm)	HS0814J				HS1214J				HS1614J			
	FOV (V x H)		WD (mm)	Magnification	FOV (V x H)		WD (mm)	Magnification	FOV (V x H)		WD (mm)	Magnification
	1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD		
0	65×86	49×65	90	0.074	61×81	46×61	145	0.079	60 x 80	45 x 60	197	0.08
	600×800	450×600	989	0.008	400×533	300×400	994	0.012	300 x 400	225 x 300	996	0.016
0.5	36×47	27×36	40	0.135	40×54	30×40	92	0.119	44 x 58	33 x 44	141	0.11
	70×93	52×70	98	0.069	91×121	68×91	223	0.053	102 x 136	77 x 102	343	0.047
1	24×33	18×24	21	0.196	30×40	23×30	65	0.16	34 x 45	26 x 34	108	0.141
	37×49	28×37	42	0.13	52×69	39×52	120	0.093	62 x 83	47 x 62	204	0.077
1.5	19×25	14×19	11	0.256	24×32	18×24	50	0.2	28 x 37	21 x 28	87	0.171
	25×34	19×25	21	0.19	36×48	27×36	80	0.133	45 x 60	34 x 45	144	0.107
2	15×20	11×15	5	0.317	20×27	15×20	39	0.24	24 x 32	18 x 24	73	0.201
	19×25	14×19	11	0.251	28×37	21×28	58	0.173	35 x 46	26 x 35	110	0.138
5					10×13	7.5×10	13	0.482	13 x 17	9.4 x 13	34	0.383
					12×15	8.7×12	17	0.415	15 x 20	11 x 15	42	0.32
10					5.4×7.2	4.1×5.4	2	0.885	7 x 9.3	5.2 x 7	15	0.686
					5.9×7.8	4.4×5.9	2	0.818	7.7 x 10	5.8 x 7.7	16	0.623

Extension Ring (mm)	HS2514J				HS3514J				HS5018J			
	FOV (V x H)		WD (mm)	Magnification	FOV (V x H)		WD (mm)	Magnification	FOV (V x H)		WD (mm)	Magnification
	1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD			1/2 CCD	1/3 CCD		
0	55 x 74	41 x 55	291	0.087	47 x 63	35 x 47	337	0.102	43 x 58	32 x 43	438	0.111
	185 x 246	138 x 185	988	0.026	98 x 131	73 x 98	701	0.049	80 x 107	60 x 80	813	0.06
0.5	45 x 60	34 x 45	236	0.107	41 x 55	31 x 41	295	0.116	40 x 53	30 x 40	402	0.121
	107 x 142	80 x 107	560	0.045	75 x 100	56 x 75	542	0.064	69 x 91	51 x 69	693	0.07
1	38 x 51	29 x 38	200	0.126	37 x 49	28 x 37	263	0.13	37 x 49	27 x 37	371	0.131
	74 x 98	55 x 74	390	0.065	62 x 82	46 x 62	441	0.078	60 x 80	45 x 60	604	0.08
1.5	33 x 44	25 x 33	172	0.146	33 x 44	25 x 33	235	0.145	34 x 45	26 x 34	345	0.141
	57 x 76	43 x 57	298	0.084	52 x 70	39 x 52	371	0.092	53 x 70	40 x 53	536	0.091
2	29 x 39	22 x 29	151	0.166	21 x 28	16 x 21	145	0.231	24 x 32	18 x 24	239	0.203
	46 x 62	35 x 46	241	0.104	27 x 36	20 x 27	188	0.178	32 x 42	24 x 32	317	0.152
5	17 x 23	13 x 17	87	0.283	13 x 17	10 x 13	87	0.374	16 x 21	12 x 16	159	0.305
	22 x 29	16 x 22	111	0.221	15 x 20	11 x 15	101	0.321	19 x 25	14 x 19	188	0.254
10	10 x 13	7.5 x 10	50	0.479	9.3 x 12	7 x 9.3	62	0.517	12 x 16	9 x 12	118	0.408
	12 x 15	8.6 x 12	57	0.417	10 x 14	7.8 x 10	67	0.464	13 x 18	10 x 13	133	0.357
15	7.1 x 9.5	5.3 x 7.1	35	0.674	7.3 x 10	5.5 x 7.3	47	0.66	9 x 13	7.1 x 9.4	95	0.51
	7.8 x 10	5.9 x 7.8	37	0.613	7.9 x 11	5.9 x 7.9	50	0.607	10 x 14	7.8 x 10	103	0.459
20	5.5 x 7.4	4.1 x 5.5	26	0.87	6 x 8	4.5 x 6	37	0.803	7.8 x 10.4	5.9 x 7.8	78	0.613
	5.9 x 7.9	4.5 x 5.9	27	0.808	6.4 x 8.5	4.8 x 6.4	39	0.75	8.5 x 11.4	6.4 x 8.5	83	0.562
30									6.7 x 9	5 x 6.7	67	0.715
									7.2 x 9.6	5.4 x 7.2	70	0.664
35									5.9 x 7.8	4.4 x 5.9	59	0.818
									6.3 x 8.3	4.7 x 6.3	60	0.767

Filter

Attach to the tip of lenses and use for adjustment of wavelength and brightness

*Please contact us for different filters, not listed on the catalog.

UV Cut Filter (Protection cover filter)

Model	Filter	Screw Pitch
UV255	UV–CUT	M25.5 P=0.5
UV270	UV–CUT	M27.0 P=0.5
UV305	UV–CUT	M30.5 P=0.5

IR Cut Filter

Model	Filter	Screw Pitch
IR255	IR–CUT	M25.5 P=0.5
IR270	IR–CUT	M27.0 P=0.5
IR305	IR–CUT	M30.5 P=0.5

ND Filter

Model	Filter	Screw Pitch
ND2270	ND2 (50%)	M27.0 P=0.5
ND2305	ND2 (50%)	M30.5 P=0.5
ND2405	ND2 (50%)	M40.5 P=0.5
ND4225	ND4 (25%)	M22.5 P=0.5
ND4255	ND4(25%)	M25.5 P=0.5
ND4270	ND4(25%)	M27.0 P=0.5
ND4305	ND4(25%)	M30.5 P=0.5
ND4405	ND4(25%)	M40.5 P=0.5
ND8270	ND8(12.5%)	M27.0 P=0.5
ND8305	ND8(12.5%)	M30.5 P=0.5

Polarized Filter

Model	Filter	Screw Pitch
PL255R-M1.7	Rotation type	M25.5 P=0.5
PL270R-M1.7		M27.0 P=0.5
PL305R-M1.7		M30.5 P=0.5
PL340R-M1.7		M34.0 P=0.5
PL355R-M1.7		M35.5 P=0.5
PL375R-M1.7		M37.5 P=0.5
PL405R-M1.7		M40.5 P=0.5
PL430R-M1.7		M43.0 P=0.75
PL460R-M1.7		M46.0 P=0.75
PL490R-M1.7		M49.0 P=0.75
PL520R-M1.7		M52.0 P=0.75
PL550R-M1.7		M55.0 P=0.75
PL580R-M1.7		M58.0 P=0.75
PL620R-M1.7		M62.0 P=0.75
PL670R-M1.7		M67.0 P=0.75
PL720R-M1.7		M72.0 P=0.75
PL770R-M1.7		M77.0 P=0.75
PL820R-M1.7		M82.0 P=0.75
PL950R	No Rotation type	M95.0 P=1.0

Color Fiter

Model	Filter	Screw Pitch	Model	Filter	Screw Pitch
B255	Blue	M25.5 P=0.5	Y255	Yellow	M25.5 P=0.5
B270	Blue	M27.0 P=0.5	Y270	Yellow	M27.0 P=0.5
B305	Blue	M30.5 P=0.5	Y305	Yellow	M30.5 P=0.5
G255	Green	M25.5 P=0.5	R255	Red	M25.5 P=0.5
G270	Green	M27.0 P=0.5	R270	Red	M27.0 P=0.5
G305	Green	M30.5 P=0.5	R305	Red	M30.5 P=0.5

CHART

Screw Pitch	Model Name			
	LINE / LARGE AREA SENSOR LENS	TELECENTRIC LENS	MACRO ZOOM LENS	FIXED FOCAL LENS
M25.5 P=0.5				MV0813
M27.0 P=0.5			CMZ0540-2	RV0420,RV1022,RV1214,RV1520,RV2020,RV2520,RV3020,RV3519,RV5025,RV7538,HS0618H,FV0420,FV1022,FV1520,FV2020,FV2520,FV3020,FV3519,FV5025,FV7538,MV1214,MV1614,MV2514,MV3519
M30.5 P=0.5		VTL0513	HMZ0745, HMZ0745C	RV0622,HS1214J,HS1614J,HS2514J,HS3514J,HS5018J,MV0316,FV0622,MV5018,MV7527,MV10035
M34 P=0.75		FTV30-110,FTV30C-110,FTV40-110,FTV40C-110,FTV60-110,FTV60C-110,FTV30C-110SW,FTV40C-110SW,MGTL10V,MGTL10VC,TL07C-340,TL10C-310,		RV0814,HS0814J
M35.5 P=0.5		VTL0714V, MGTL05VM, MGTL05VMC, MGTL069VM, MGTL069VMC		
M37.5 P=0.5	LS05, LS07, LS10, LS15	FTV15-110,FTV15C-110,FTV10-110,FTV10C-110,FTV20-110,FTV20C-110,FTV10-150,FTV10C-150,FTV15-150,FTV15C-150,FTV20-150,FTV20C-150,FTV30-150,FTV30C-150,FTV40-150,FTV40C-150,FTV60-150,FTV60C-150,FTV10-110SW,FTV10C-110SW FTV20-110SW,FTV20C-110SW TL05C-220,TL07C-220		HF1214J-2
M40.5 P=0.5		TL40C-240,TL60C-240		HF0818J-2,HS1214V,HS1614V,HS2514V,HS3516V,HS5016V,HS7520V
M43 P=0.75		FTV07-150,FTV07C-150,FTV08-150,FTV08C-150,MGTL04VM,MGTL04VMC		MV0316,HF1216V DN,HF1616V DN,HF2516V DN,HF3516V DN,HF5018V DN
M46 P=0.75	XLS03, XLS05, XLS075, XLS10, XLS14, XLS20	FTV07-110,FTV07C-110,FTV08-110,FTV08C-110,MGTL04		HF3514V-2,HS10028V,HF7520V DN
M49 P=0.75	FV3526L	MGTL03VM, MGTL03VMC, MGTL0345VM, MGTL0345VMC, MGTL03,MGTL05-1.1		HF1618V-2, HF5018V-2
M52 P=0.75	LSF3528	LSTL078TW,FTV05-110,FTV05C-110		HF2514V-2
M55 P=0.75		LSTL15H,LSTL20H,FTV05-150,FTV05C-150		HF0528J-2,HF7518V-2,VV1618HF DN
M58 P=0.75	SP10,SP20,XLS01,XLS02,WF5045,MS3520,HB5014,SP05,SP07,SP14,UL035,UL05,UL07,UL10	MGTL0275-2		HS0818V,HS0420H(Option),MS3520-C
M62 P=0.75	MS1828,MS2524,LSP350,FV5026L,FV5026W,LSF10528	MGTL022VM,MGTL023		HF1218V(Option),MS1828-C,MS2524-C
M67 P=0.75	LSF5028	LSTL10H,MGTL0275V,MGTL023H,MGTL014,MGTL019		
M72 P=0.75	LSF20035,VIR5028	MGTL03VC,MGTL03V		
M77 P=0.75	LSF2528,FV8528W,VIR8035	MGTL017VM,MGTL019VM		
M82 P=0.75	FV8528L	LSTL055TW,MGTL0345V		
M95 P=1.0		MGTL014VM,MGTL014VM-180		

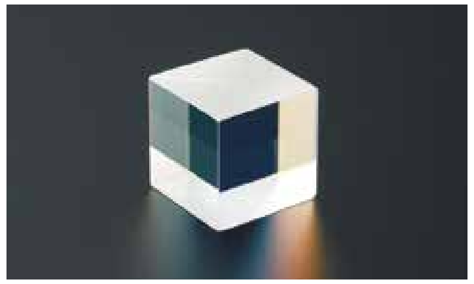
* Customization is available for over M100

Optical Lens Parts

Unpolarized Beam Splitter

Wavelength	400nm-700nm
Coating	Slope: Dielectric multilayer coating Side: AR multi-coated
Spectral ratio	T : R = 50 : 50
Surface tolerance	λ／4
Angle	±3'
Size tolerance	+0.1／-0.3mm
Material	BK-7

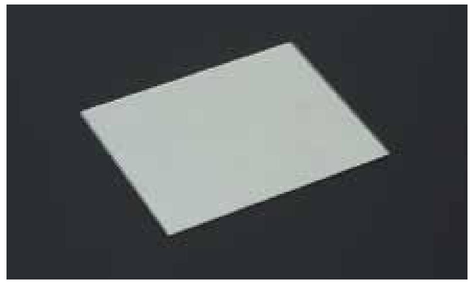
Model	Dimension(mm)
BS-10	10×10×10
BS-15	15×15×15
BS-20	20×20×20
BS-25	25×25×25



Polarized beam splitter

Wavelength	450nm-650nm
Coating	Slope: Dielectric multilayer coating Side: AR multi-coated
Spectral ratio	Tp > 95 Rs > 95
Surface tolerance	λ／4
Angle	±3'
Size tolerance	+0.1／-0.3mm
Material	BK-7

Model	Dimension(mm)
BSP-03	3×3×3
BSP-05	5×5×5
BSP-08	8×8×8
BSP-10	10×10×10



Half mirror

Coating	Surface: Dielectric multilayer coating Rear surface : AR multi-coated
Spectral ratio	T : R = 50 : 50
Surface tolerance	λ - 3λ
Parallelism	Within 1'
Angle of incidence	45°
Material	Crown

Model	Dimension(mm)	Thickness(mm)
HM-30-1	30×30	1
HM-50-1	50×50	1
HM-100-1	100×100	1
HM-30-2	30×30	2
HM-50-2	50×50	2
HM-100-2	100×100	2

Aluminized surface mirror

Coating	Aluminum + SiO2
Surface tolerance	λ
Size tolerance	+0／-0.2mm
Material	Crown

Model	Dimension(mm)	Thickness(mm)
AM-5	5×5	1
AM-10	10×10	1
AM-30	30×30	2
AM-50	50×50	3
AM-100	100×100	3

Right angle prism

Coating	Slope: Aluminum coated Vertical plane: AR multi-coated
Surface tolerance	λ／2
Angle	±3'
Size tolerance	+0／-0.2mm
Material	BK-7

Model	Dimension(mm)
TP-5	5×5×5
TP-10	10×10×10
TP-15	15×15×15
TP-20	20×20×20
TP-25	25×25×25
TP-30	30×30×30
TP-40	40×40×40
TP-50	50×50×50

Penta prism

Coating	Two sided: AR multi-coated Two sided: black coated aluminum
Surface tolerance	λ／2
Angle	±3'
Size tolerance	±0.2mm
Material	BK-7

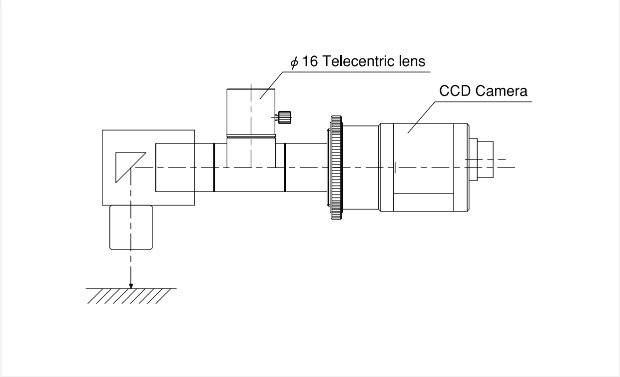
Model	Dimension(mm)
PP-5	5×5×5
PP-10	10×10×10
PP-15	15×15×15
PP-20	20×20×20
PP-25	25×25×25
PP-30	30×30×30

Prism Adapter

Prism adapters for telecentric lenses

Bend the optical axis at 90° and suitable for mark recognition

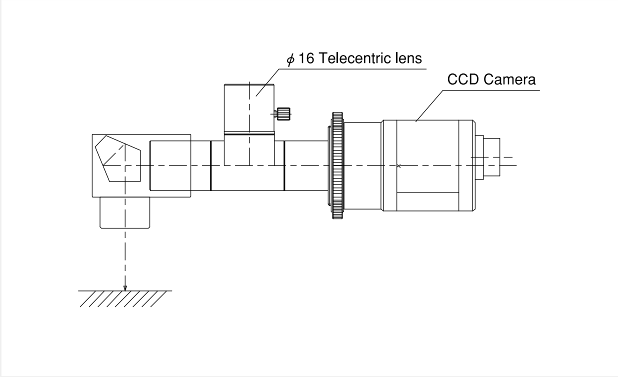
90° slide-looking rectangular mirror type



Optical axis can be bent 90°degrees. Effective when there is no space above the object. Monitored image is a mirror image.

Model	Compatible model
TL-PM16-1	ϕ16 Telecentric Series
TL-PM22-1	WD220 Telecentric ϕ22
TL-PM39-1	WD220 Telecentric ϕ39

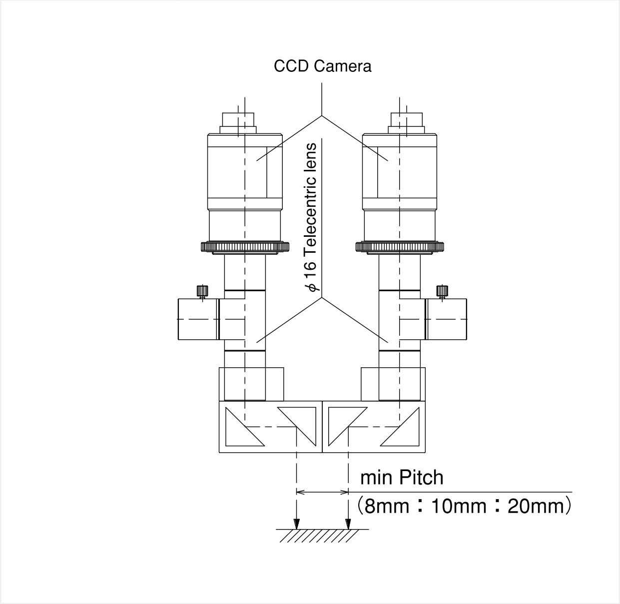
90° slide-looking pentaprism type



Optical axis can be bent 90°degrees. Effective when there is no space above the object. Monitored image is an electing image.

Model	Compatible model
TL-PP16-1	ϕ16 Telecentric Series
TL-PP22-1	WD220 Telecentric ϕ22
TL-PP39-1	WD220 Telecentric ϕ39

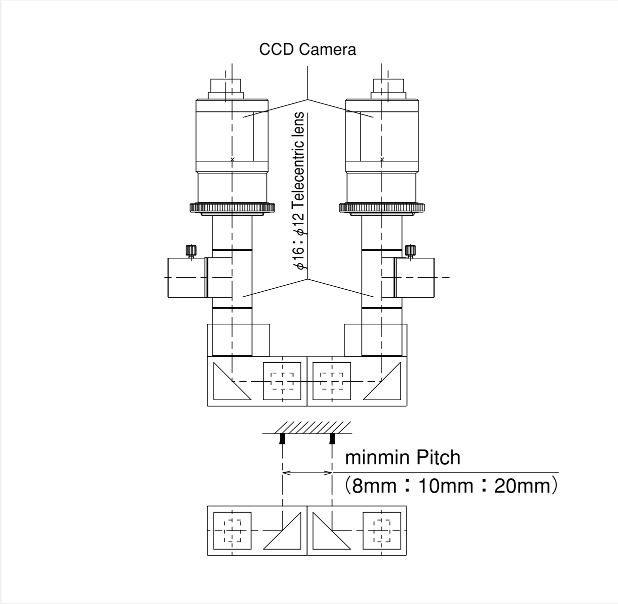
Optical axis pitch conversion type



Narrow pitch marks between two points can be recognized.

Model	Compatible model
TL-PT16-1	ϕ16 Telecentric (Pitch 8mm/One side 4mm)
TL-PT16-2	ϕ16 Telecentric (Pitch 10mm/One side 5mm)
TL-PT16-3	ϕ16 Telecentric (Pitch 20mm/One side 10mm)

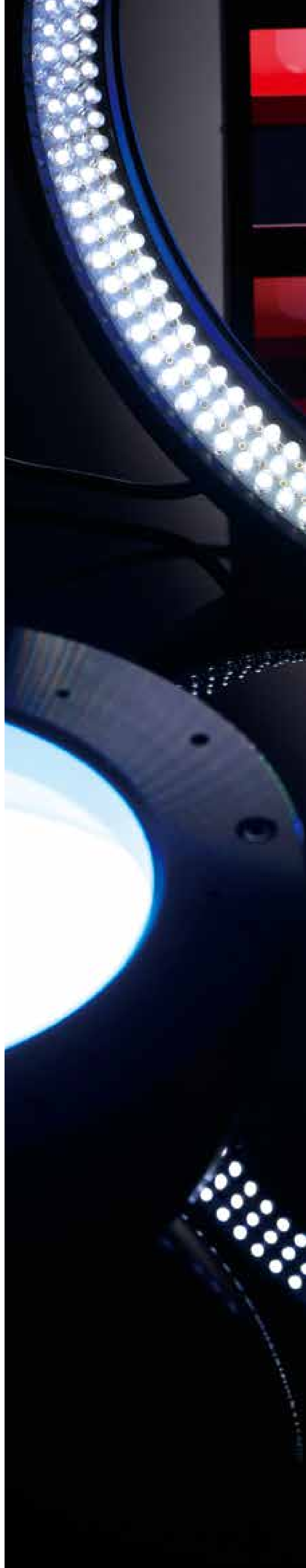
Optical axis pitch 90° conversion type



Narrow pitch marks between two points can be recognized.
Effective when there is no space above the object.

Model	Compatible model
TL-PTV16-1	ϕ16 Telecentric (Pitch 8mm/One side 4mm)
TL-PTV16-2	ϕ16 Telecentric (Pitch 10mm/One side 5mm)
TL-PTV16-3	ϕ16 Telecentric (Pitch 20mm/One side 10mm)

LIGHTING
SERIES



LED PROJECTOR

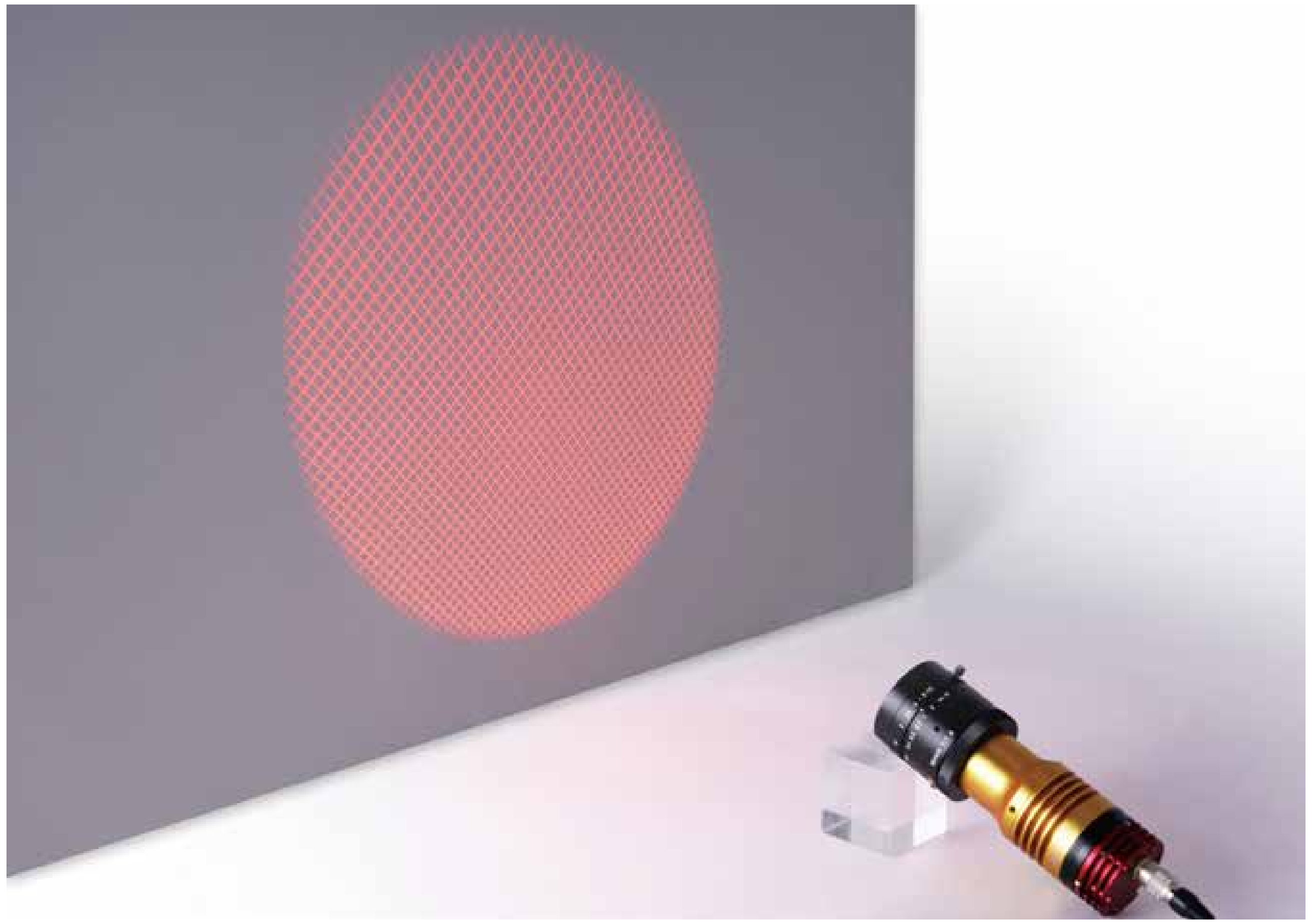
PR Series

LED PROJECTOR

LED PROJECTOR for pattern projector, 3D Image recognition

- LED PROJECTOR for pattern projector, 3D Image recognition
- Possible to select the projection size, distance with lens
- Possible to image by many high precision mask

Model	Color	Voltage	Input Current	Chart effective area	Mount
PR2W-W1	White	6±0.5V	Maximum 700mA	ϕ16mm	C
PR2W-R1	Red				
PR2W-G1	Green				
PR2W-B1	Blue				



Irradiation Image of using Led Projector

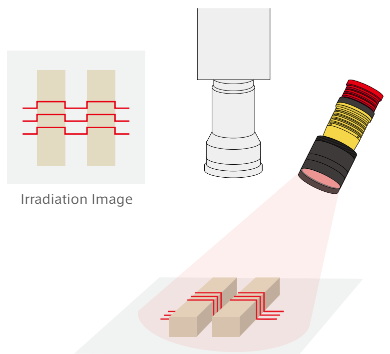
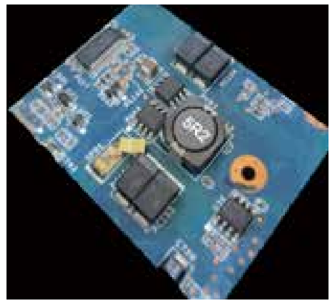


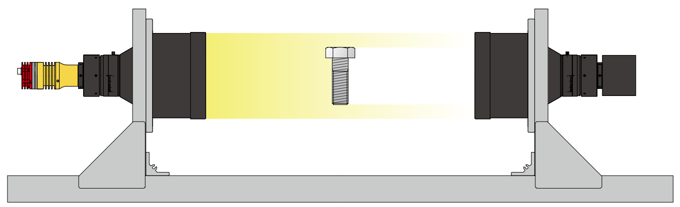
Image:Pattern Projection

Image:3D



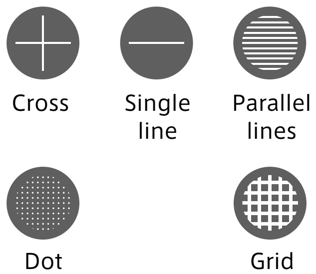
*3D image requires software processing

Irradiation Image of using Telecentric Parallel illumination

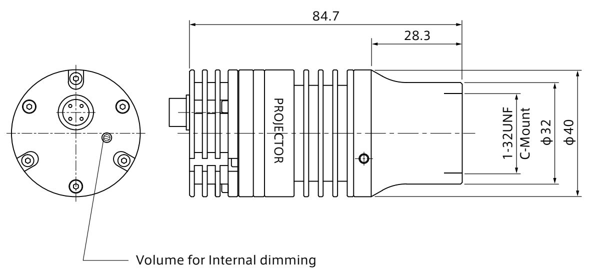


Measurement Object:Bolt

Example of Pattern Chart

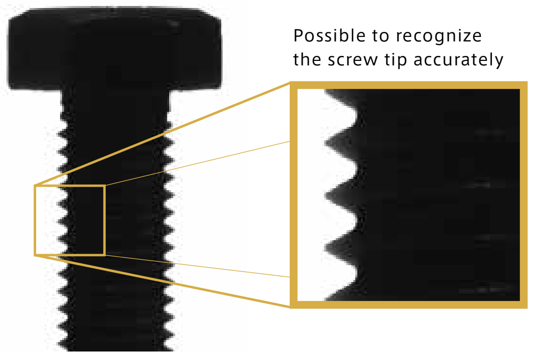


Drawing

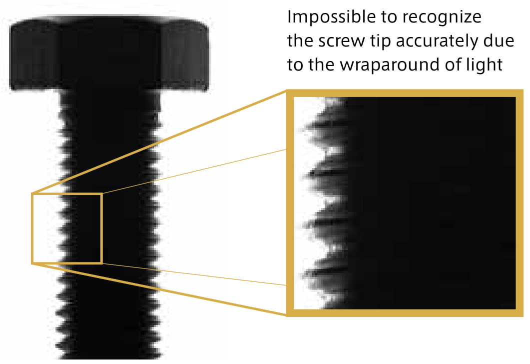


※カスタムチャート対応可能です。ご相談下さい。

Projector + Telecentric Lens



Square Dome Light



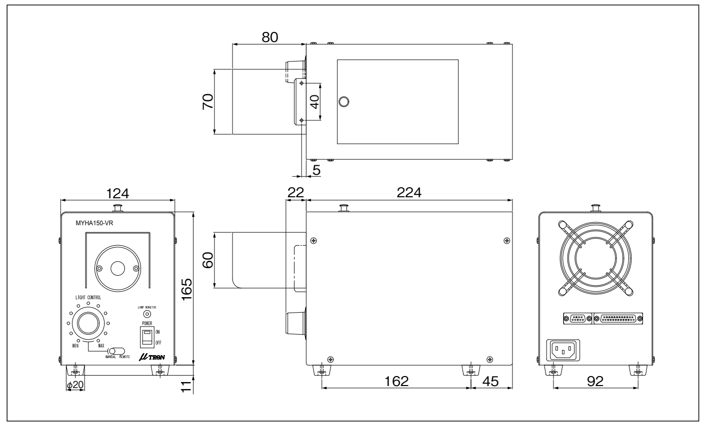
MYHA150-VR HALOGEN

SWIR 150W Halogen Light Source

Irradiates NIR over wide band
Possible to capture differences and defects
that cannot be seen in visible ray

- Wave length : 400nm ～ 1700nm（Peak Wave length : 1000nm）
- Irradiation in the NIR is supported by 150W halogen lamp
- Filter attachment / detachment mechanism
- Possible to select wavelength by bandpass filter
- Light guide for Spot / Ring / Line are available

Model	MYHA150-VR
Wavelength	400～1700nm
Peak Wavelength	1000nm
Input Voltage	AC100V～240V
Lamp	15V150W
Light guide	Heat resisting temperature
Option	Output Control



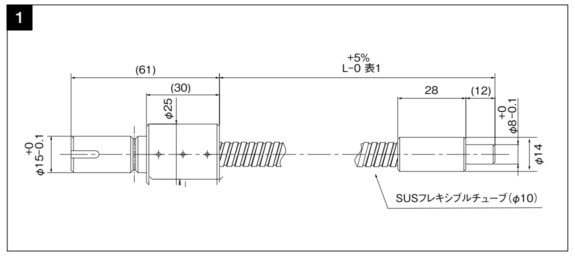
Option

Heat resistant Light Guide for Spot type

Model	Dimension
SLG1-（L）-HR	1

＊(L) : Possible to select 1000mm ／ 1500mm ／ 2000mm ／ 3000mm

1



Heat resistant Light Guide for Ring type

Model	Size	Dimension
RLG32-（L）-HR	Inner：φ32mm／Outer：φ50mm t＝30mm	2
RLG45-（L）-HR	Inner：φ45mm／Outer：φ70mm t＝26mm	3
RLG55-（L）-HR	Inner：φ55mm／Outer：φ80mm t＝26mm	4
RLG65-（L）-HR	Inner：φ65mm／Outer：φ85mm t＝26mm	5
RLG75-（L）-HR	Inner：φ75mm／Outer：φ100mm t＝26mm	6

＊(L)：Possible to select 1000mm ／ 1500mm ／ 2000mm ／ 3000mm

Heat resistant Light Guide for Surface emitting type

Model	Size	Dimension
FLG30-（L）-HR	Surface size：□30mm t＝10mm	7
FLG60-（L）-HR	Surface size：□60mm t＝10mm	8
FLG100-（L）-HR	Surface size：□100mm t＝15mm	9

＊(L)：Possible to select 1000mm ／ 1500mm ／ 2000mm ／ 3000mm

Heat resistant Light Guide for Line type

Model	Size	Dimension
LLG50-（L）-HR	Surface size：50mm t＝12mm	10
LLG100-（L）-HR	Surface size：100mm t＝15mm	11
LLG150-（L）-HR	Surface size：150mm t＝18mm	12
LLG200-（L）-HR	Surface size：200mm t＝20mm	13

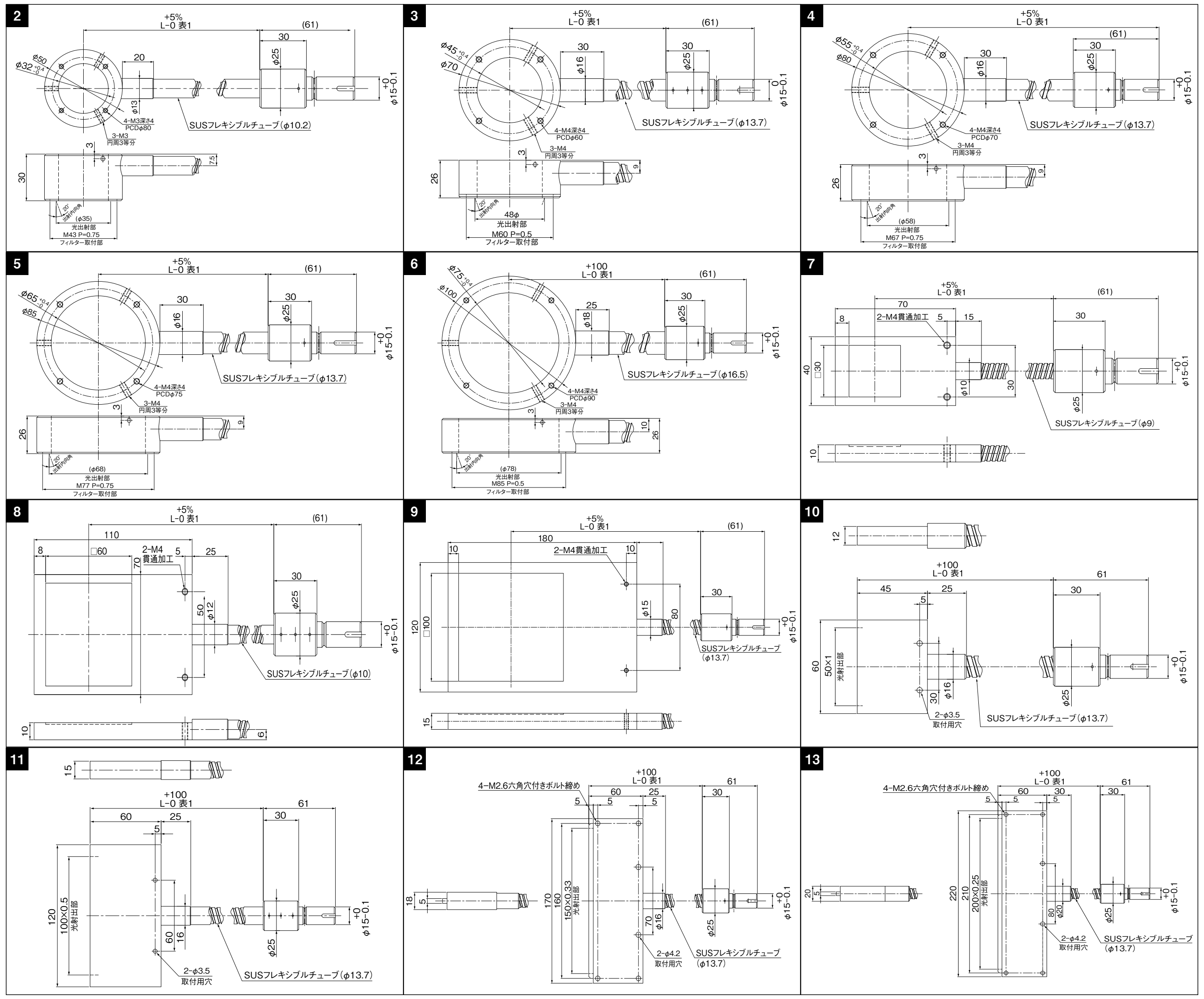
＊(L)：Possible to select 1000mm ／ 1500mm ／ 2000mm ／ 3000mm

Heat resistant Bandpass Filter / Visible Ray cut Filter

Model	Wavelength	Model	Wavelength
BDF800-HR	800nm	BDF1200-HR	1200nm
BDF900-HR	900nm	BDF1300-HR	1300nm
BDF1000-HR	1000nm	BDF1400-HR	1400nm
BDF1100-HR	1100nm		

Model	Wavelength
VCF700-HR	700nm
VCF750-HR	750nm
VCF-800HR	800nm

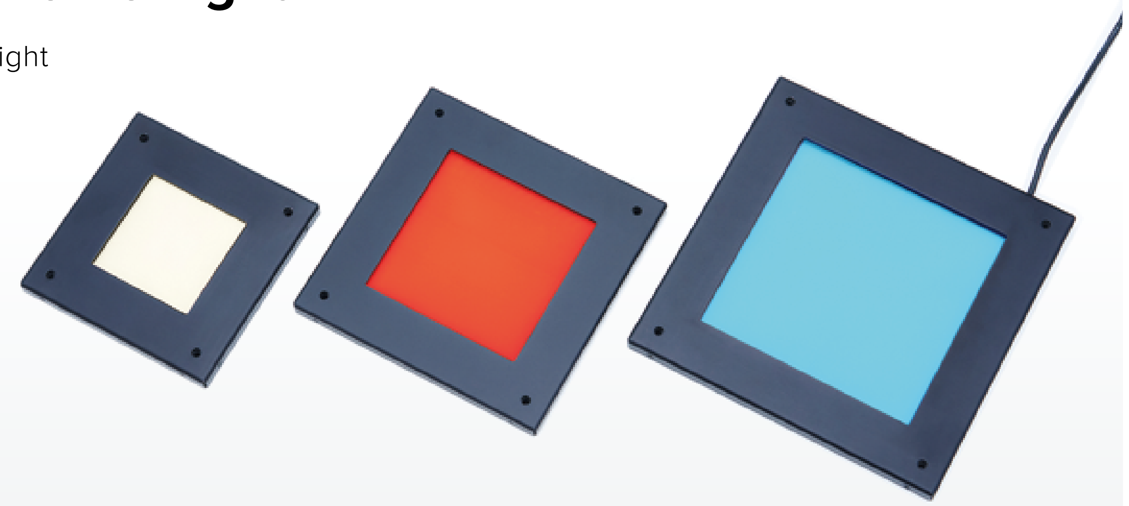
＊400nm-1550nm are availabe



MFD series Dome Light

Flat Square Dome Light

Dome light for Lightweight

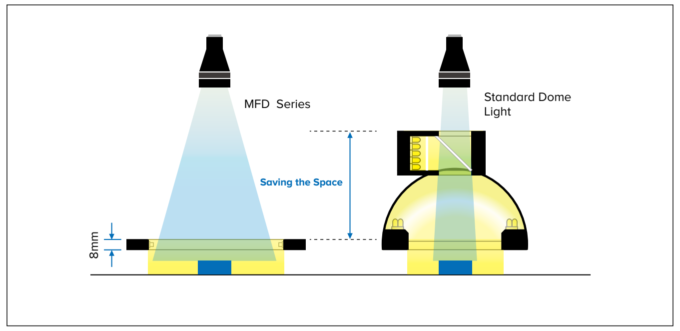


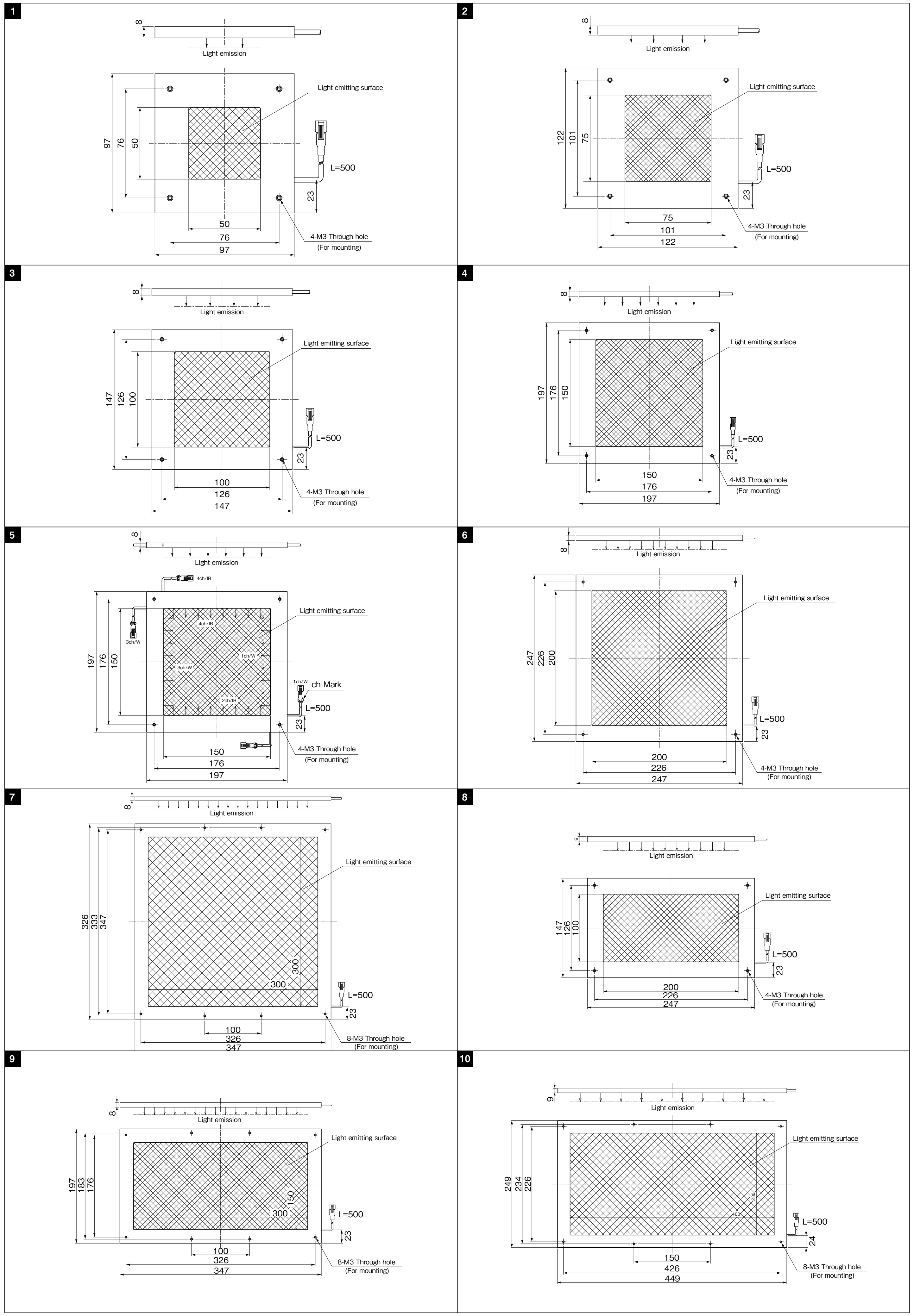
- Thin 8-mm Dome Lighting
- Possible to irradiate wide range
- Possible to capture images at close distance
- Line up, White, Red, Green, Blue, and IR
- Possible to switch from visible light to infrared light by one IR lighting

Model	Color					Input Voltage	Dimensions (W/D/H)	Dimension
MFD50	W	R	B	G		DC12V	97mm/97mm/8mm	1
MFD50IR					IR			
MFD75	W	R	B	G			122mm/122mm/8mm	2
MFD75IR					IR			
MFD100	W	R	B	G			147mm/147mm/8mm	3
MFD100IR					IR			
MFD150	W	R	B	G			197mm/197mm/8mm	4
MFD150IR					IR			5
MFD200				G			247mm/247mm/8mm	6
MFD200IR					IR			
MFD100_H	W	R	B	G		DC24V	147mm/147mm/8mm	3
MFD100IRH					IR			
MFD150_H	W	R	B	G			197mm/197mm/8mm	4
MFD150IRH					IR			5
MFD200_H	W	R	B	G			247mm/247mm/8mm	6
MFD200IRH					IR			
MFD300_H	W	R	B	G			347mm/347mm/8mm	7
MFD300IRH					IR			
MFD200/100	W	R	B	G	IR		247mm/147mm/8mm	8
MFD300/150_H	W	R	B	G	IR		347mm/197mm/8mm	9
MFD400/200_H	W	R	B	G			449mm/249mm/9mm	10

● IR =850nm

Example image compared with standard Dome Light





MDBB-LSRH Series Line Light

1 million lx very bright lighting product line

Natural air-cooled, industrys' highest class
Use PC to adjust light strength each 100mm.

Special Optical Design

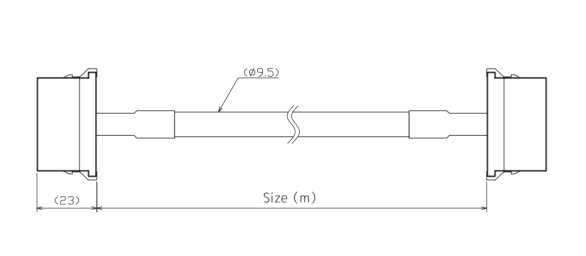
Natural air cooled

Power LED

- Achieves natural air-cooled 1 million lx (WD 50mm).
- Can use special power app to control by PC individually each 100mm.
- Our product line emits light from 100 to 3000 mm, in 100mm units.
- Models ending in -S can be used very uniformly.

Model	Color	Power Consumption (W)	Channels	Dimension
MDBB-LSRH100W	W	30	1CH	1
MDBB-LSRH200W	W	60	2CH	
MDBB-LSRH300W	W	90	3CH	
MDBB-LSRH400W	W	120	4CH	
MDBB-LSRH500W	W	150	5CH	
MDBB-LSRH600W	W	180	6CH	
MDBB-LSRH700W	W	210	7CH	
MDBB-LSRH800W	W	240	8CH	
MDBB-LSRH900W	W	270	9CH	
MDBB-LSRH1000W	W	300	10CH	
MDBB-LSRH1100W	W	330	11CH	2
MDBB-LSRH1200W	W	360	12CH	
MDBB-LSRH1300W	W	390	13CH	
MDBB-LSRH1400W	W	420	14CH	
MDBB-LSRH1500W	W	450	15CH	
MDBB-LSRH1600W	W	480	16CH	
MDBB-LSRH1700W	W	510	17CH	
MDBB-LSRH1800W	W	540	18CH	
MDBB-LSRH1900W	W	570	19CH	
MDBB-LSRH2000W	W	600	20CH	
MDBB-LSRH2100W	W	630	21CH	3
MDBB-LSRH2200W	W	660	22CH	
MDBB-LSRH2300W	W	690	23CH	
MDBB-LSRH2400W	W	720	24CH	
MDBB-LSRH2500W	W	750	25CH	
MDBB-LSRH2600W	W	780	26CH	
MDBB-LSRH2700W	W	810	27CH	
MDBB-LSRH2800W	W	840	28CH	
MDBB-LSRH2900W	W	870	29CH	
MDBB-LSRH3000W	W	900	30CH	

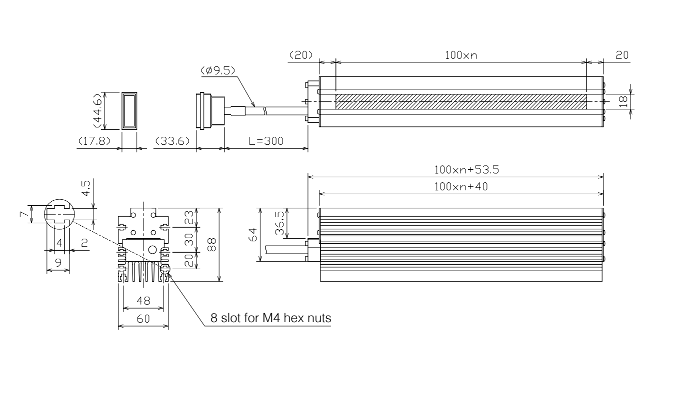
MDBB-LSRH Dedicated extension cable



Model	Size(m)
M-CB-S1-HDN	1
M-CB-S2-HDN	2
M-CB-S3-HDN	3
M-CB-S4-HDN	5
M-CB-S5-HDN	7
M-CB-S6-HDN	10

● Condenser lens MLBB-□ and diffusion plate MKBB-LSR□ (optional) can be attached. Replace the □ with its size, in 100mm units. Product line from 100 to 1800 mm.Please tell us whether you want a condenser lens or diffusion plate attached. Diffusion plates are 30%, 60%, 80% or 90%.

1



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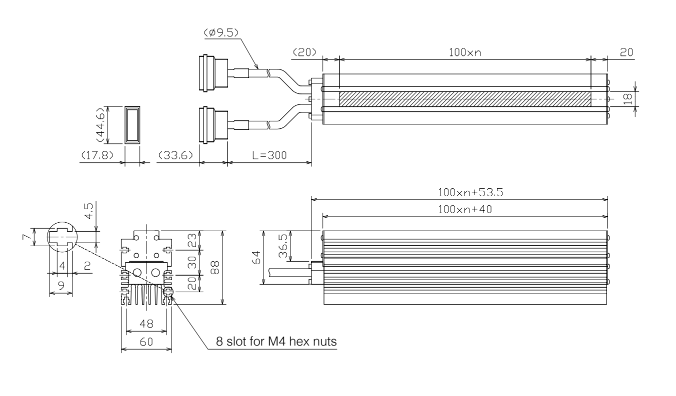

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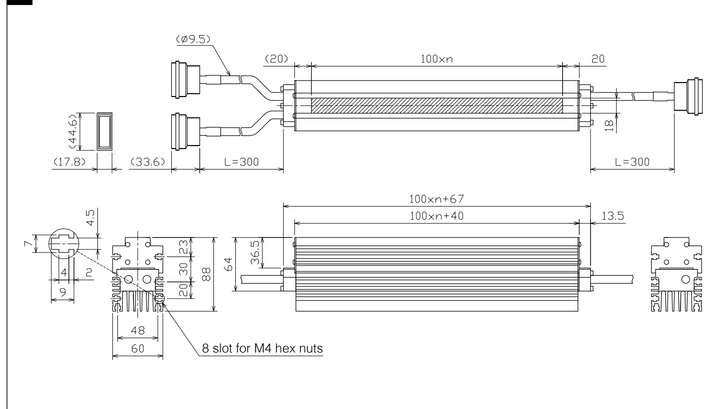


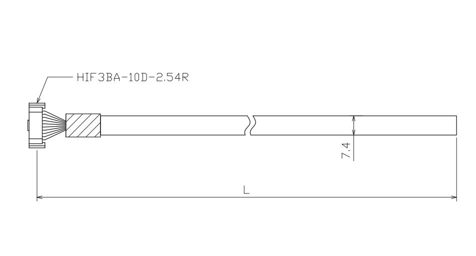
Powel Supply application

Power Supply for MDBB-LSRH

CE MARK TYPE

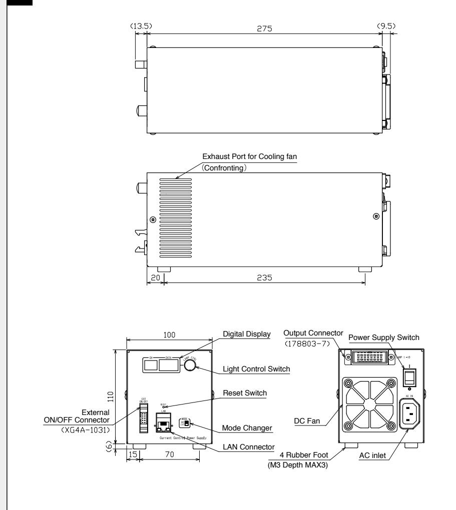
Model	MMC-300M10-TP	MMC-600M20-TP	MMC-1000M30-TP
Input Voltage	AC100～240V		
Operating frequency	50/60Hz		
Capacity	30W/CH		
Channels	10CH	20CH	30CH
Dimming method	Method to vary output current		
External control	LAN ON/OFF		
Size	100～1000	1100～2000	2100～3000
Dimension	1	2	3

External control cable



Model	Size(m)
MC-MIL-10-1	1
MC-MIL-10-2	2
MC-MIL-10-3	3
MC-MIL-10-5	5
MC-MIL-10-10	10

1



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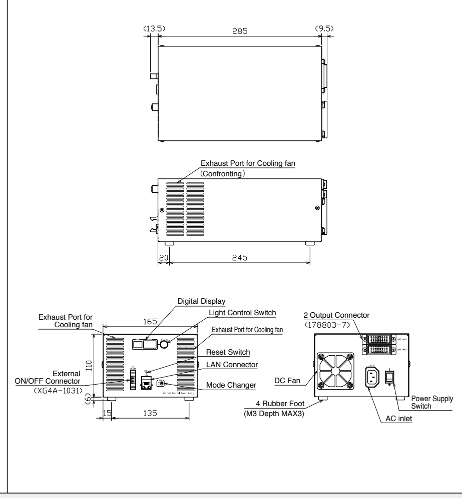

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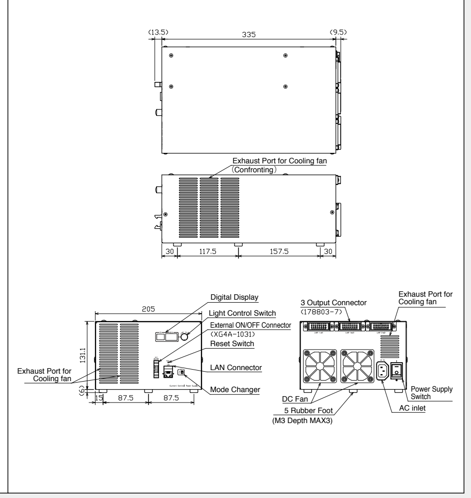


MDBB-LSRA Series Line Light

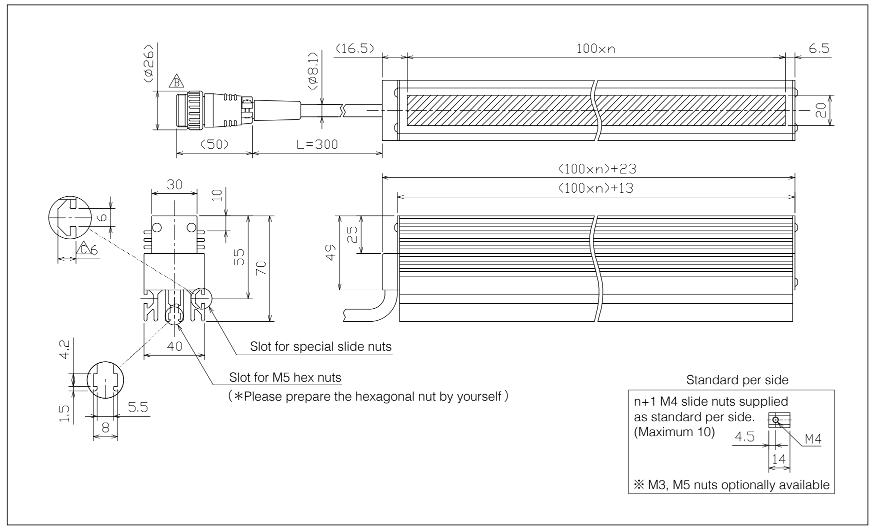
600,000 lx bright lighting product line

Great variety of sizes
Extendable from 100mm to max 3000mm

- Special Optical Design
- Natural air cooled
- DC24V
- Power LED

・ Models ending in -S can be used very uniformly.

Model	Color	Power Consumption (W)	Dimension
MDBB-LSRA100□	W	20	n=1
	B		
MDBB-LSRA200□	W	40	n=2
	B		
MDBB-LSRA300□	W	60	n=3
	B		
MDBB-LSRA400□	W	80	n=4
	B		
MDBB-LSRA600□	W	120	n=6
	B		
MDBB-LSRA1000□	W	200	n=10
	B		



- W = White, B = Blue, in □ .
- Input voltage is DC24V.
- Condenser lens MLBB-□ and diffusion plate MKBB-LSR □ (optional) can be attached. Replace the □ with its size, in 100mm units. Product line from 100 to 1800 mm.Please tell us whether you want a condenser lens or diffusion plate attached. Diffusion plates are 30%, 60%, 80% or 90%.

Powel Supply application

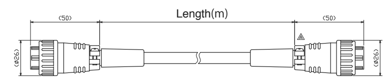
High function Voltage Light Control Power Supply

10bit | LAN | CE MARK TYPE

Voltage light control power supply capable of 1,000 - level light control

- As it is capable of varying output voltage, this series is suitable for Line Scan Camera and High Speed Camera
- This series is capable of supporting large 24 V DC lights with power consumption of 300 W and makes it possible to select an optimal light control range by setting a low-voltage output limit.
- It is possible to switch between LAN and parallel communication for external light control.

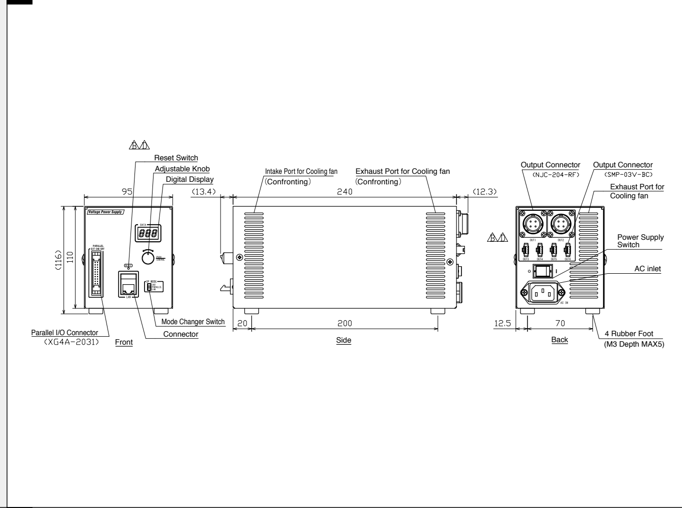
Dedicated extension cable



Model	Size(m)
M-CB-S1R-MCB	1
M-CB-S2R-MCB	2
M-CB-S3R-MCB	3
M-CB-S5R-MCB	5
M-CB-S10R-MCB	10

Model	MWDV-300S-24	MWDV-600M2-24	MWDV-300M1-24
Input Voltage	AC100～240V		
Operating frequency	50/60Hz		
Rated output	DC24V		
Capacity	300W	Total 600W (300W/CH)	300W
Channels	Single split - channel output connectors (metal connectors ×2 +SM connectors ×4)	2CH 4 connectors ×2 +SM connectors ×4)	1CH 4 connectors / CH (metal connectors ×2 +SM connectors ×2)
Dimming method	Method to vary output current		
External control	External ON/OFF External light control (10 bit parallel communication / LAN communication)	External ON/OFF External light control (10 bit parallel communication / LAN communication)	
Dimension	1	2	3

1



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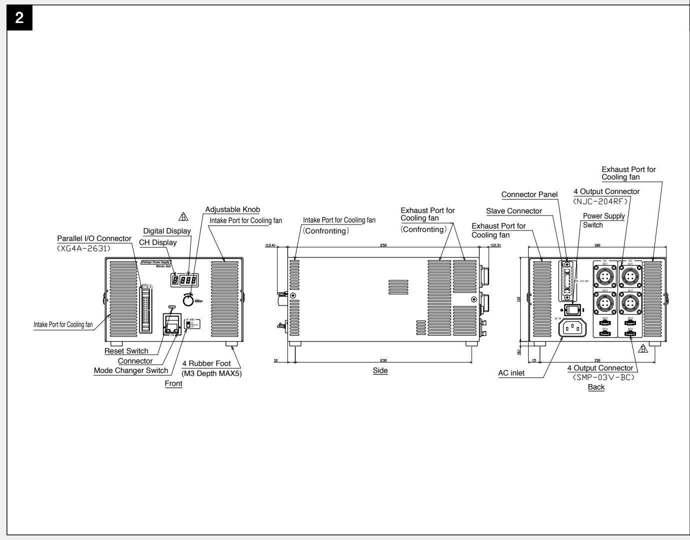

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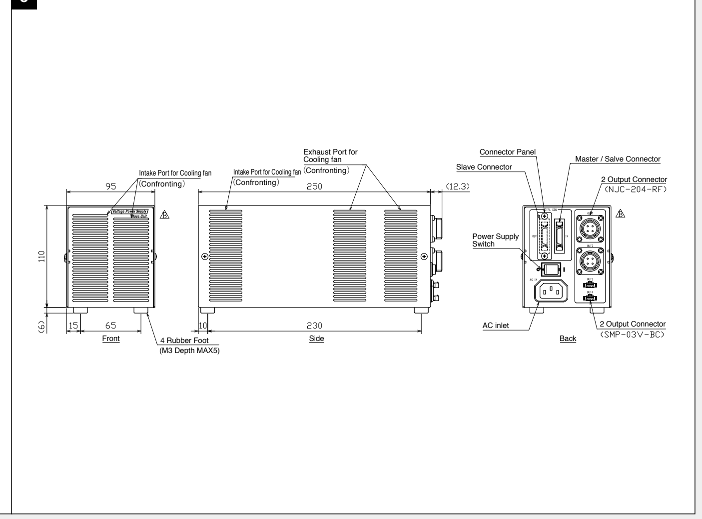


＊For details on the external control cable, refer to MC-MIL-series on page113.

MSL Series **Coaxial Light**

LED coaxial spotlight for SWIR and Visible

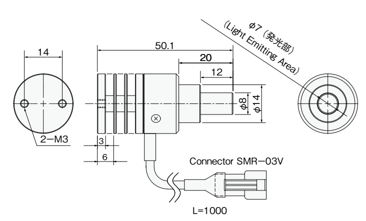
Special design for Myutron Telecentric Lens series

SWIR : 1050nm, 1100nm, 1450nm and 1550nm are available

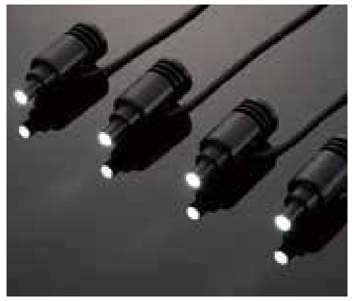
Visible : Ultra-high brightness and Compact size are available

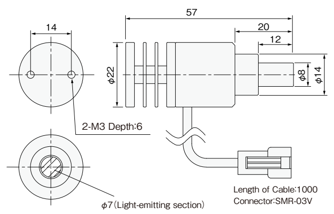
Power LED

Ultra-high brightness for SWIR Coaxial spotlight

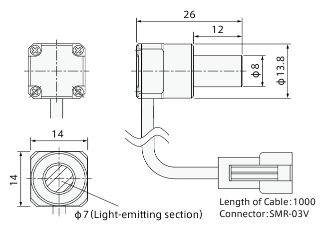
Model	Wave length	Input Current	Dimension
MSL22-1050SWH	1050nm	600mA	
MSL22-1100SW	1100nm	800mA	
MSL22-1450SW	1450nm		
MSL22-1550SW	1550nm		
Controller			
MPP48W-C2（PWM Controller）＋MRB-1 , MRB-3（Resistance Box）			
Recommended Lens			
SWIR Telecentric Lens for 1.1"（P42）			

Ultra-high brightness coaxial spotlight



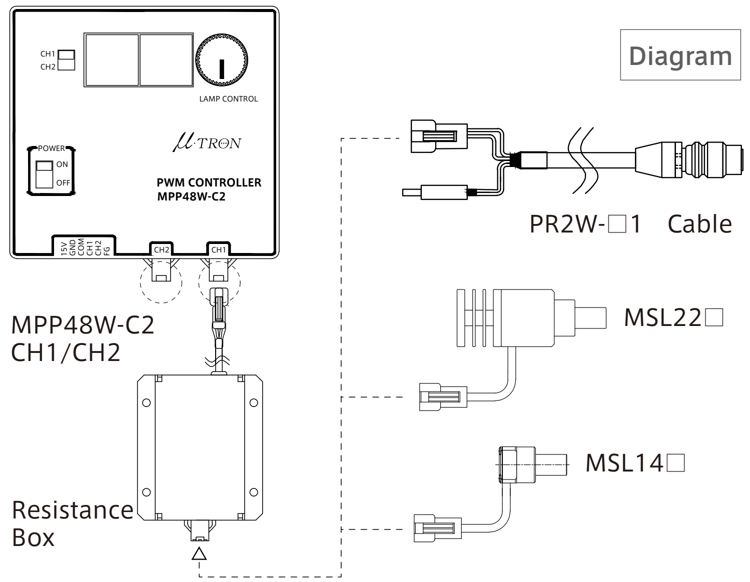
Model	Color	Input Current	Dimension
MSL22W	W	700mA	
MSL22R	R		
MSL22G	G		
MSL22B	B		
Controller			
MPP48W-C2（PWM Controller）＋MRB-1（Resistance Box）			
Recommended Lens			
WD110 25 Mega Pixel Telecentric Lens for 1.1"（P36） WD150 25 Mega Pixel Telecentric Lens for 1.1"（P39）			

Compact size Coaxial spotlight

Model	Color	Input Current	Dimension
MSL14W	W	250mA	
MSL14R	R		
MSL14G	G		
MSL14B	B		
Controller			
MPP48W-C2（PWM Controller）＋MRB-2（Resistance Box）			
Recommended Lens			
WD65 High NA Mega Pixel Telecentric Lens（P54） WD110 High NA Mega Pixel Telecentric Lens（P56）			

● R= Red, W = White, B = Blue, G = Green, in □． Use a resistance box to enable connection to power supplies other than MLC.

・ LEDs have individual differences in peak wavelengths, so their hues can vary, even if the same model product.



Model		MPP48W-C2
Light-emitting method		Steady Light-emitting
Power drive system		Constant voltage method
Input Voltage		DC15V±10% Maximum approx.4A
Overcurrent protection function		2.5A/Per 1CH Over 4A/Total 2CH→ Stop
Current Control method		Voltage 12V, 30W/Per 1CH Total 2CH → Less than 48W
Output Control method		approx.118KHz PWM
Gradation		8000 Gradations
Channel		2CH
AC adaptor		AC-AD1
Resistance box	For MSL22	MRB-1
	For MSL14	MRB-2
	For MSL22-1050SWH	MRB-3

Option		
Cable	1m	MCB-1
	2m	MCB-2
	3m	MCB-3
	4m	MCB-4
	5m	MCB-5
	7m	MCB-7
	10m	MCB-10

MV & MHV Series Coaxial Light

Ultra-high brightness coaxial spot lighting

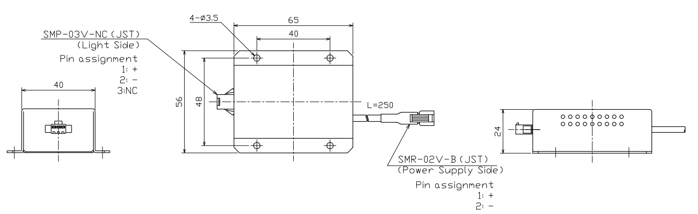
Telecentric light source
Ideal for mirror work such as a wafers
We also have UV & IR types
MHVE-21A is the industrys'highest class of brightness

Power LED

Model	Color	Power Consumption (W)	Applicable Power Supply	Dimension
MV-14A□	R	1.0	DC12V Type	1
	W			
	G			
	B			
MV-30A□	R	2.0		2
	W			
	G			
	B			
MHV-20A□	R	-	MLC-350M2-VI	3
	W			
	G			
	B			
MHVE-21A□	R	-	MLC-700M2-VI	4
	W			
	G			
	B			
MHV-20UV-405	UV	-	MLC-350M2-VI	5
MHVE-21AUV-365	UV	-	MLC-700M2-VI	6
MHVE-21AIR-850	IR	-	MLC-700M2-VI	7
MHVE-21AIR-940	IR	-	MLC-700M2-VI	

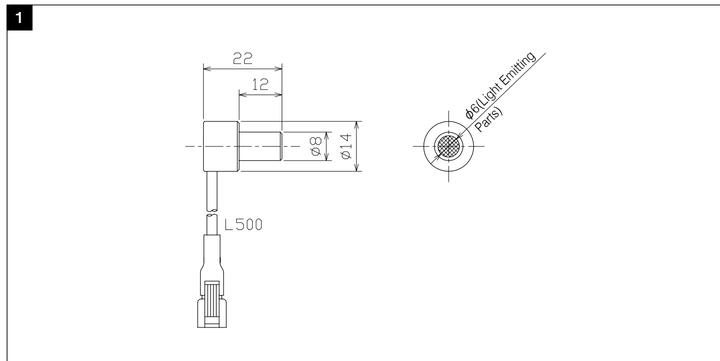
Resistance Box / MRBOX（Required when using 12V DC output power supply）

MRBOX-24R/MRBOX3W-15R/MRBOX3W-12R



Model	Applicable lighting	Power Consumption (W)
MRBOX-24R	MHV-20	4.5
MRBOX3W-15R	MHVE21A (R only)	9.0
MRBOX3W-12R	MHVB-22	9.0
	MFVE21A (Except R)	

● R= Red, W = White, B = Blue, G = Green, in □ .
・ Use a resistance box to enable connection to power supplies other than MLC.
・ LEDs have individual differences in peak wavelengths, so their hues can vary, even if the same model product.

1


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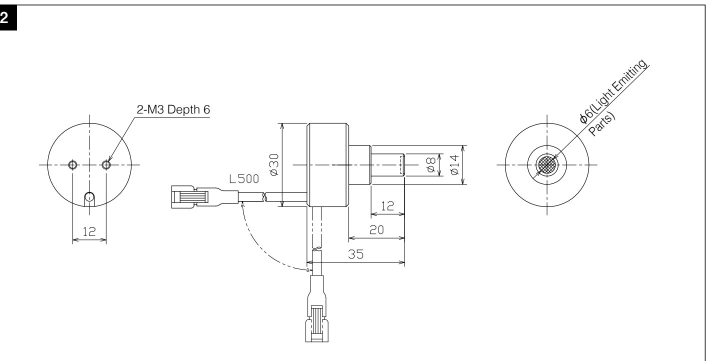

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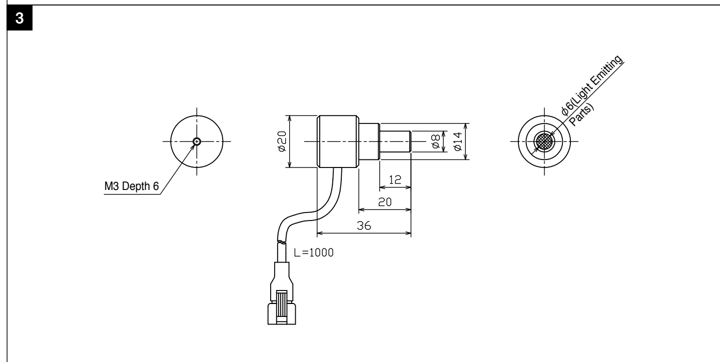

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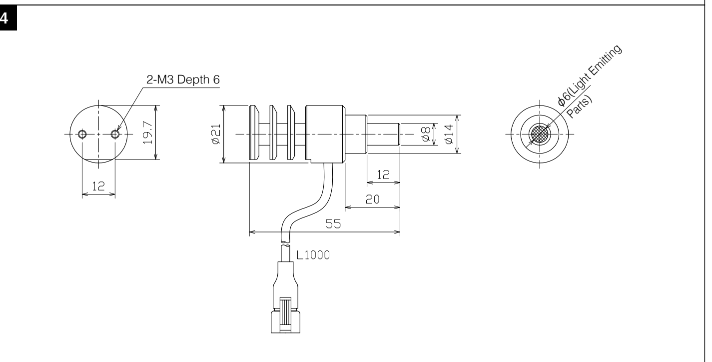

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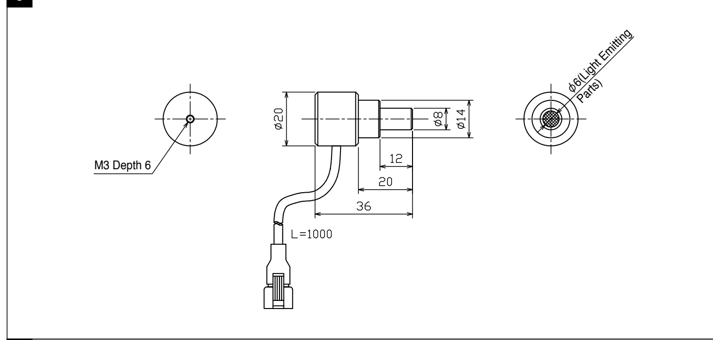

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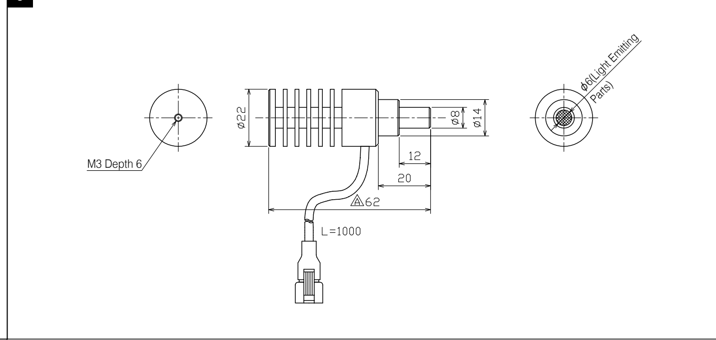

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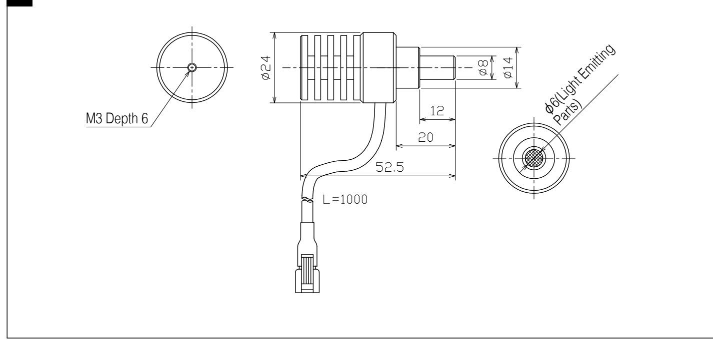
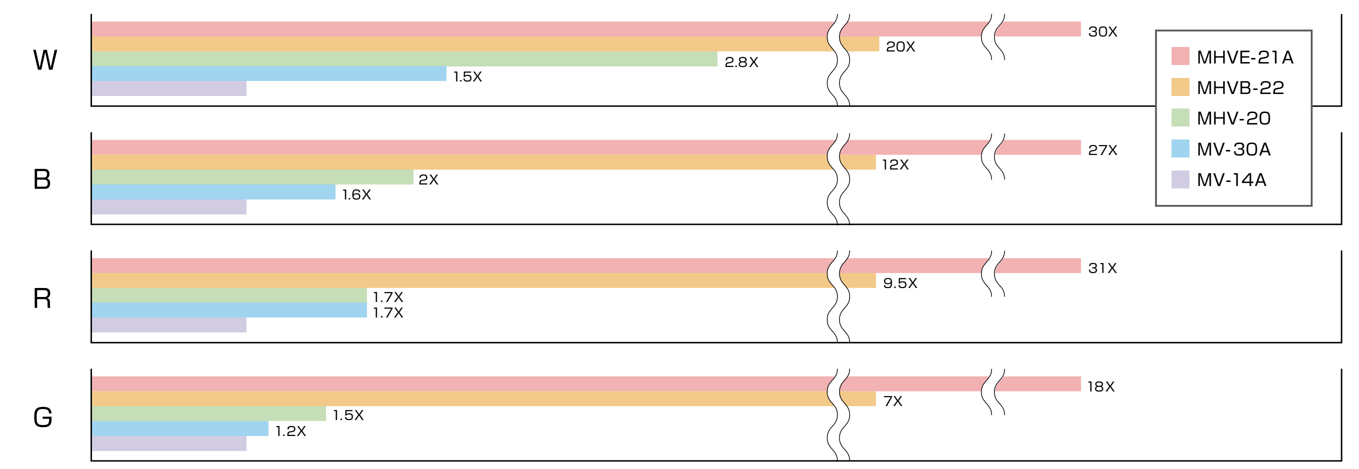


Luminance Comparison（Reference Values）Relative brightness（MV-14A standard）



MRV Series Ring Light

Multi-angle ring lighting

From low angles to high angles

Applicable to wide range of uses

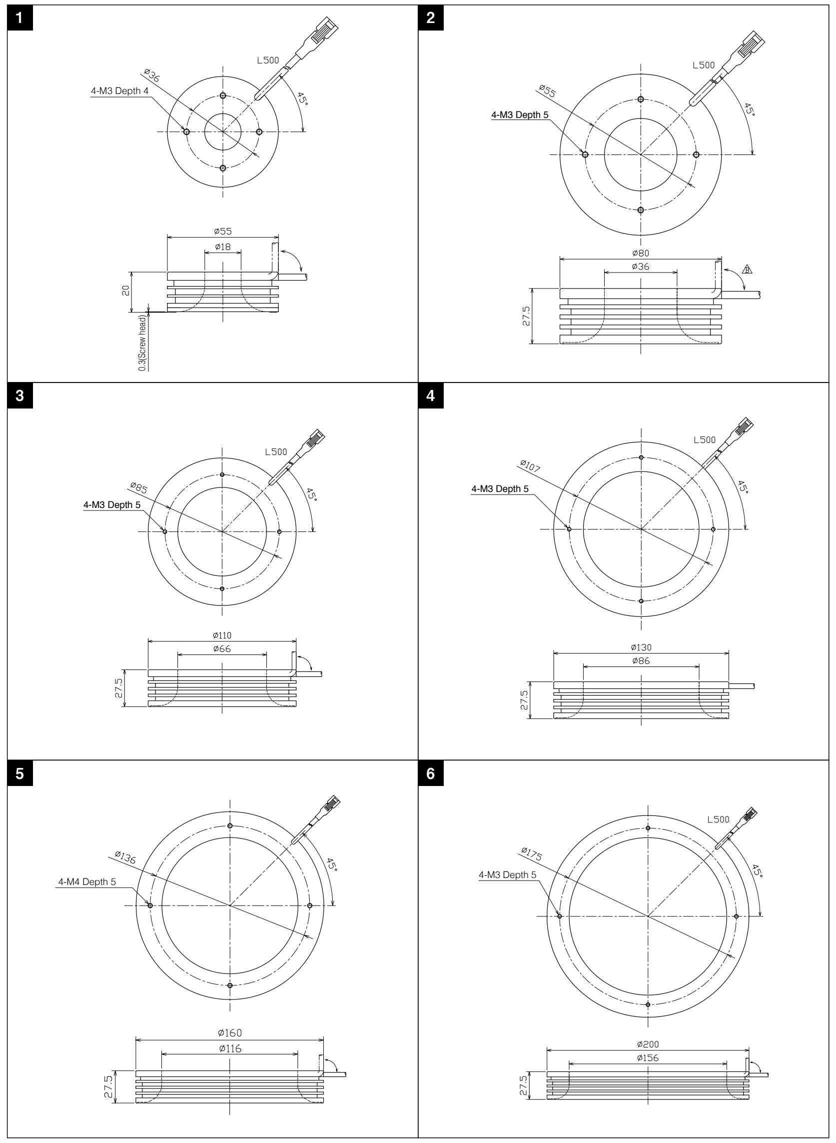
24 V DC Models Available

Power LED

Model	Color	Power Consumption (W)	SAG*	Dimension
MRV55□	R	5	D3	1
	W	6	B8	
	DB	5.5	A6	
MRV80□	R	10	AC	2
	W	11	A0	
	DB	10	8F	
MRV110□	R	15	AF	3
	W	17	A4	
	DB	15	92	
MRV130□	R	18	A9	4
	W	20	90	
	DB	18	8C	
MRV160□	R	23	AC	5
	W	25	A2	
	DB	23	91	
MRV200□	R	29	A6	6
	W	30	A6	
	DB	29	95	

- R= Red, W = White, DB = Blue, in □ .
- Input voltage is DC12V, but we can also make DC24V products.

* SAG is the maximum voltage setting for a SAG power supply. See details P.136.



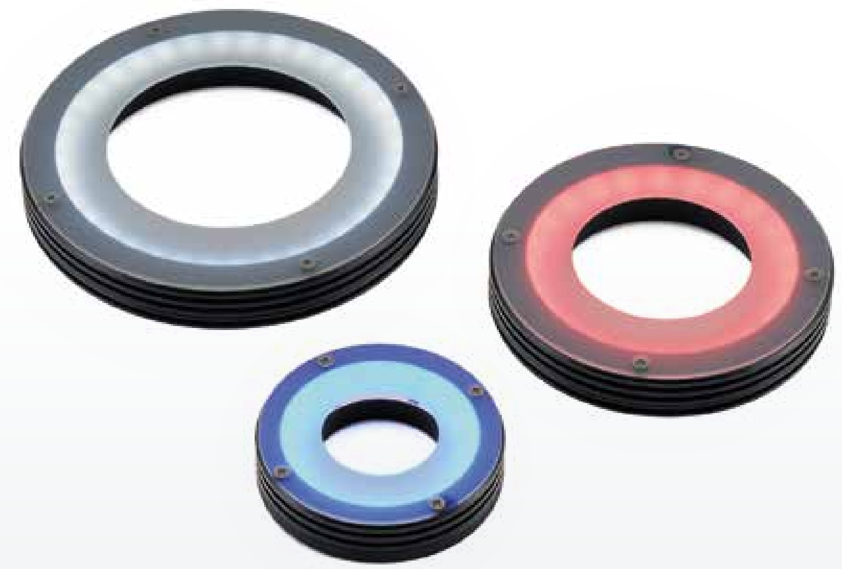
MHRA Series Ring Light

High Power Flat Ring Light

φ66 to φ353

7 types in product line

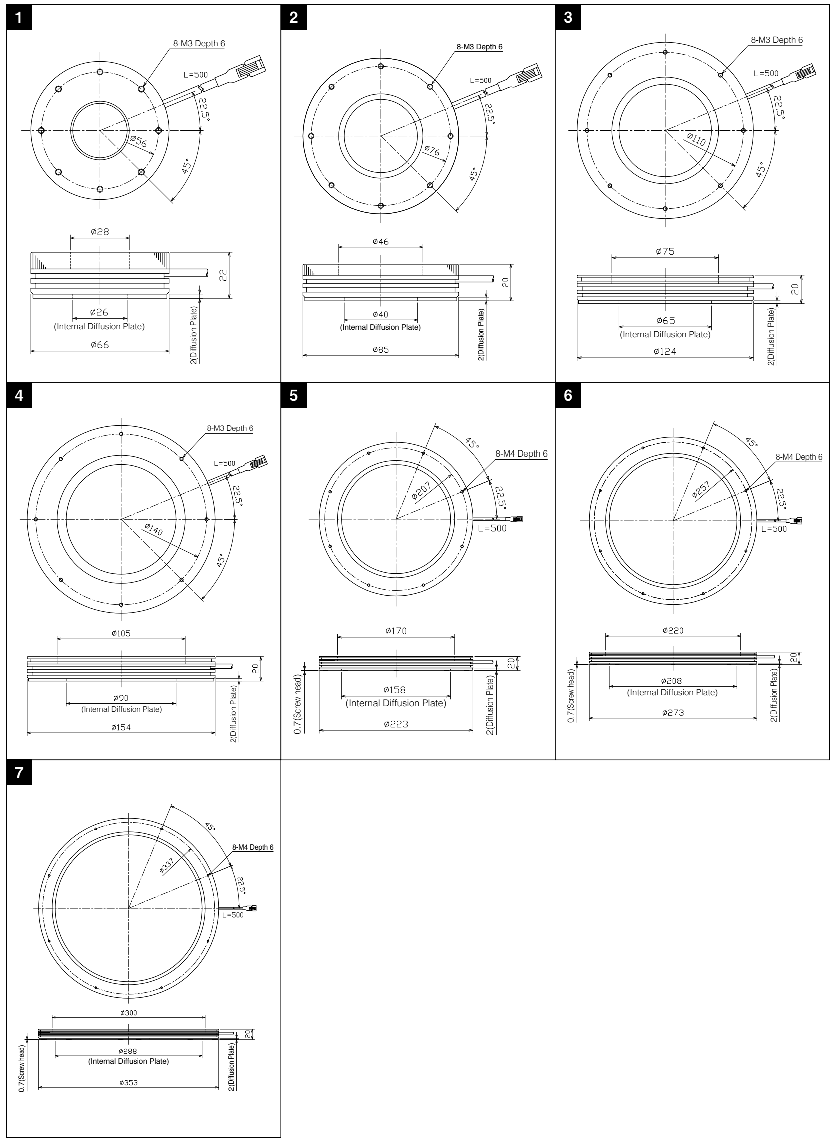
Power LED



Model	Color	Power Consumption (W)	Input Voltage (V)	SAG*	Dimension
MHRA-60□S	R	6.5	12	FF	1
	AW				
	B				
MHRA-80□S	R	9		FF	2
	AW				
	B				
MHRA-120□S	R	13.5		FF	3
	AW				
	B				
MHRA-150□S	R	18		FF	4
	AW				
	B				
MHRA-220□S	R	28.5		FF	5
	AW			BC	
	B				
MHRA-270□HVS	R	34	24	-	6
	AW				
	B				
MHRA-350□HVS	R	44		-	7
	AW				
	B				

- R= Red, AW = White, B = Blue, in □ .
- Diffusion plate is removable. Can add a polarization plate (optional).
- MHRA-270 □ HVS and higher models are DC24V spec.

* SAG is the maximum voltage setting for a SAG power supply. See details P.136.



MDR Series Ring Light

Direct Ring Light

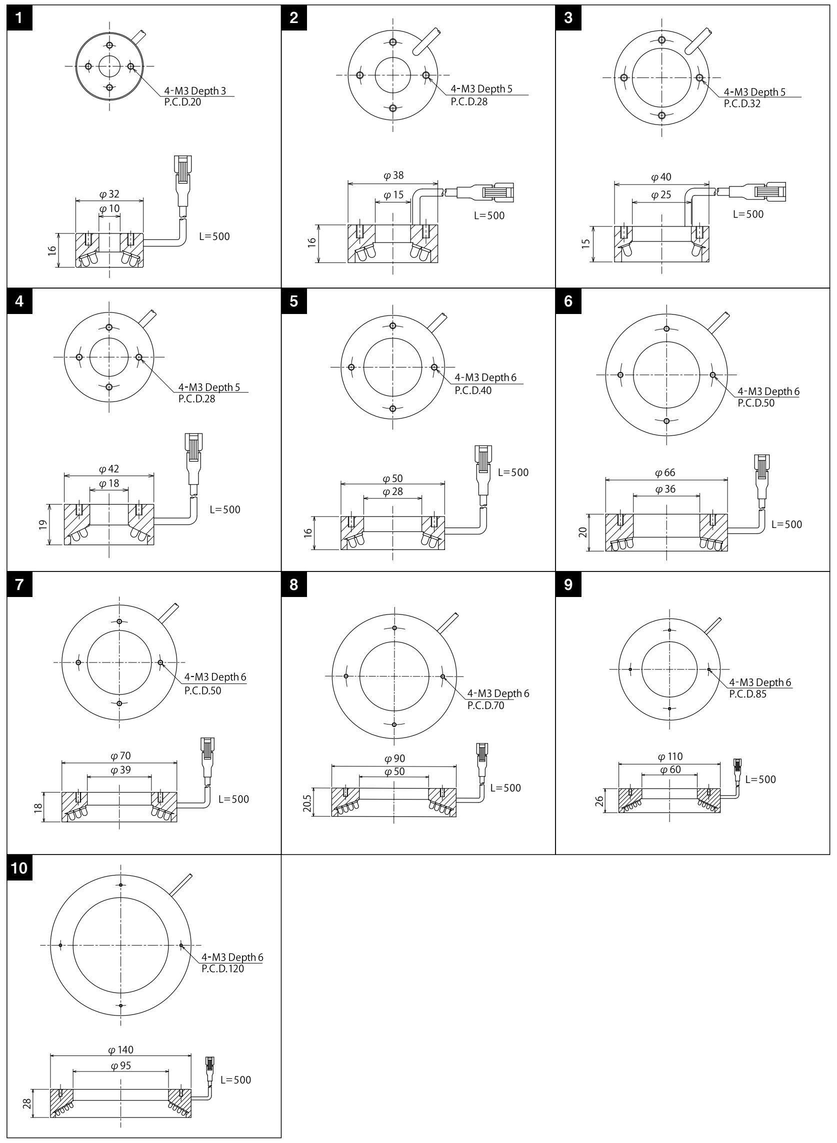
General purpose ring LED applicable in a wide ange of uses

24 V DC Models Available

Model	Color	Power Consumption (W)	WD	SAG✱	Dimension
MDR-32/10DR	DR	1.6	20-35	6E	1
MDR-32/10□	DW B G	1.8	20-35	FF	
MDR-38/15DR	R	1.8	20-35	6E	2
MDR-38/15□	DW B G	2.2	20-35	FF	
MDR-40/25DR	DR	1.2	25-45	6E	3
MDR-40/25□	DW B G	1.5	25-45	FF	
MDR-42/18DR	DR	2.2	25-45	6E	4
MDR-42/18□	DW B G	2.6	25-45	FF	
MDR-50/28DR	DR	3	30-50	6E	5
MDR-50/28□	DW B G	2.7	30-50	FF	
MDR-66/36DR	DR	4.3	40-70	70	6
MDR-66/36□	DW B G	5.4	40-70	FF	
MDR-70/39DR	DR	4.9	20-60	71	7
MDR-70/39□	DW B G	5.8	20-60	FF	
MDR-90/50DR	DR	7.1	40-90	73	8
MDR-90/50□	DW B G	6.5	40-90	FF	
MDR-110/60DR	DR	9.6	35-90	75	9
MDR-110/60□	DW B G	9.6	35-90	FF	
MDR-140/95DR	DR	13.9	50-110	78	10
MDR-140/95□	DW B G	10.8	50-110	FF	

- DR = Red, DW = White, B = Blue, G= Green, in □ .
- Can attach a diffusion plate and polarization plate (optional).
- Input voltage is DC12V, but we can also make DC24V products.
- We can also make other sizes.
- DC24V models have HV at end of the model number.

✱ SAG is the maximum voltage setting for a SAG power supply. See details P.136.



MDR-LA Series Ring Light

Low Angle Direct Light

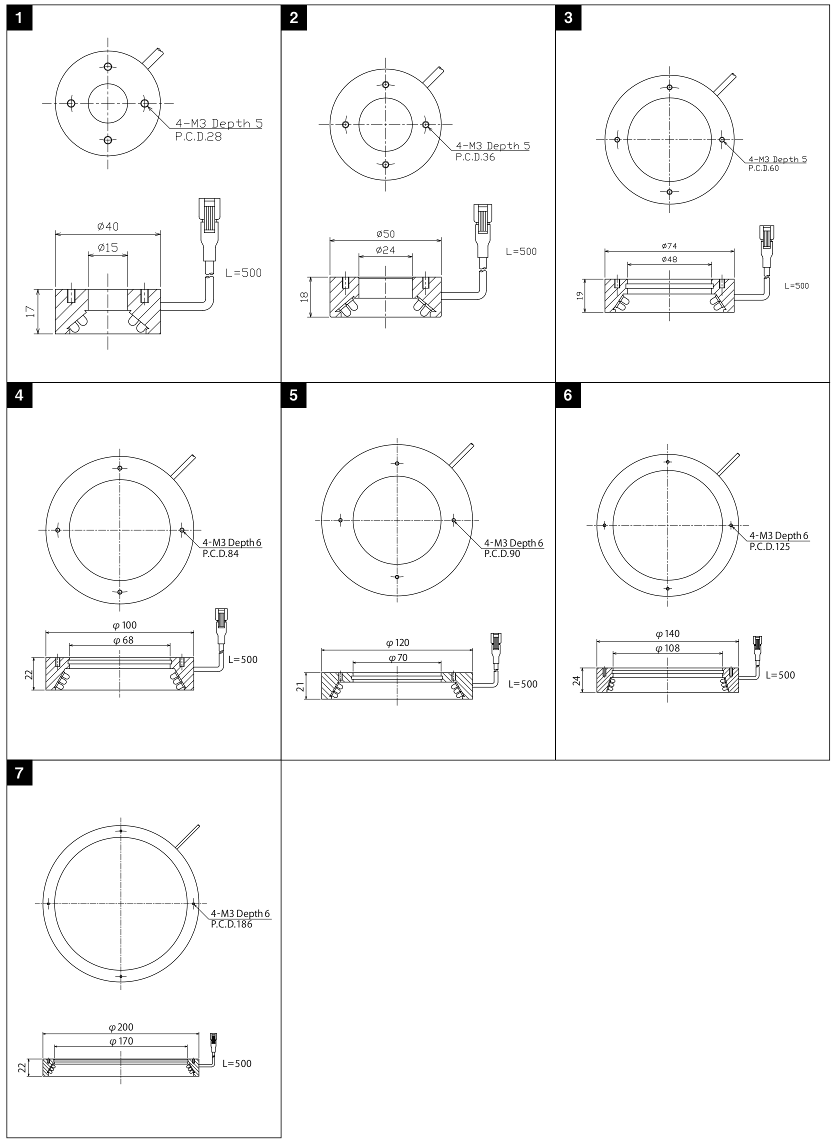
Great for detecting minute scratches and edges

24 V DC Models Available

Model	Color	Power Consumption(W)	WD	SAG✱	Dimension
MDR-LA40/15DR-2	DR	2.1	5-10	D9	1
MDR-LA40/15□-2	DW B G	2.2	5-10	FF	
MDR-LA50/24DR-2-C01	DR	2.7	10-20	D1	2
MDR-LA50/24□-2-C01	DW B G	2.9	10-20	FF	
MDR-LA74/48DR	DR	5.4	15-30	C8	3
MDR-LA74/48□	DW B G	5.4	15-30	FF	
MDR-LA100/68DR-3	DR	7	20-40	FF	4
MDR-LA100/68□-3	DW B G	5.4	20-40	FF	
MDR-LA120/70DR-3	DR	10.5	20-40	F3	5
MDR-LA120/70□-3	DW B G	6.9	20-40	FF	
MDR-LA140/108DR-3	DR	11.9	15-40	F4	6
MDR-LA140/108□-3	DW B G	8	15-40	FF	
MDR-LA200/170DR-3	DR	18.4	40-45	F0	7
MDR-LA200/170□-3	DW B G	18.9	40-45	FF	

- DR = Red, DW = White, B = Blue, G= Green, in □ .
- Can attach a diffusion plate and polarization plate (optional). ✱ Excludes LA40/15.
- Input voltage is DC12V, but we can also make DC24V products.
- We can also make other sizes.
- DC24V models have HV at end of the model number.

✱ SAG is the maximum voltage setting for a SAG power supply. See details P.136.



MDHM Series Transparent lighting

Very bright chip LED surface-emitting lighting

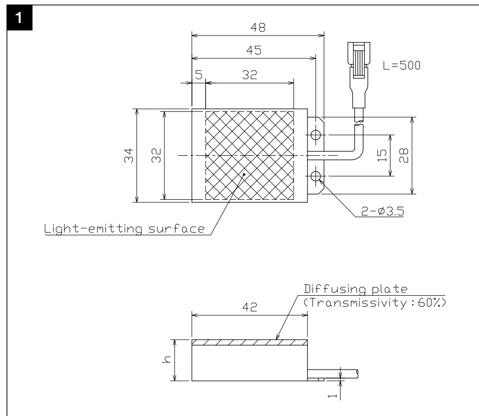
Very bright & uniform thin flat surface-emitting lighting.
We can make these in sizes that are multiples of 30mm square.

24 V DC Models Available

Model	Color		Power Consumption (W)	SAG＊	Dimension	Model	Color		Power Consumption (W)	SAG＊	Dimension
MDHM-32/32HRT	R		1.5	74	1	MDHM-62/92HRT	R		8.7	76	6
MDHM-32/32DWT	DW		1.8	FF		MDHM-62/92DWT	DW		10.8	FF	
MDHM-32/32□T	B	G	1.8	DC		MDHM-62/92□T	B	G	10.8	E8	
MDHM-32/62HRT	R		2.9	75	2	MDHM-62/122HRT	R		11.6	77	7
MDHM-32/62DWT	DW		3.6	FF		MDHM-62/122DWT	DW		14.4	FF	
MDHM-32/62□T	B	G	3.6	DD		MDHM-62/122□T	B	G	14.4	E0	
MDHM-32/92HRT	R		4.4	75	3	MDHM-92/92HRT	R		13	78	8
MDHM-32/92DWT	DW		5.4	FF		MDHM-92/92DWT	DW		16.2	FF	9
MDHM-32/92□T	B	G	5.4	E0		MDHM-92/92□T	B	G	16.2	E6	
MDHM-32/122HRT	R		5.8	76	4	MDHM-92/122HRT	R		17.3	79	10
MDHM-32/122DWT	DW		7.2	FF		MDHM-92/122DWT	DW		21.6	FF	11
MDHM-32/122□T	B	G	7.2	E3		MDHM-92/122□T	B	G	21.6	ED	
MDHM-62/62HRT	R		5.8	76	5	MDHM-122/122HRT	R		23.1	7B	12
MDHM-62/62DWT	DW		7.2	FF		MDHM-122/122DWT	DW		28.8	FF	13
MDHM-62/62□T	B	G	7.2	E3		MDHM-122/122□T	B	G	28.8	F3	

- B = Blue, G= Green, in □ .
- Input voltage is DC12V, but we can also make DC24V products.
- DC24V models have HV at end of the model number.

＊ SAG is the maximum voltage setting for a SAG power supply. See details P.136.

1


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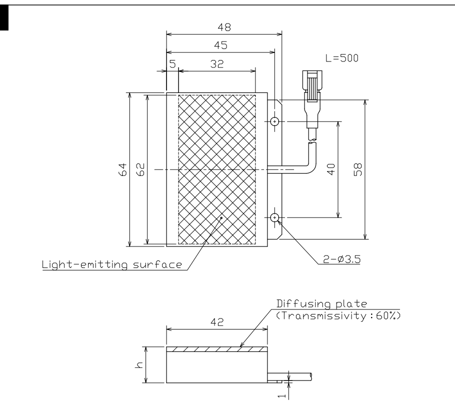

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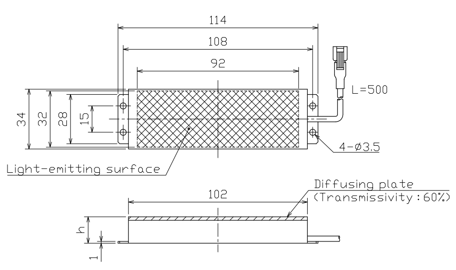

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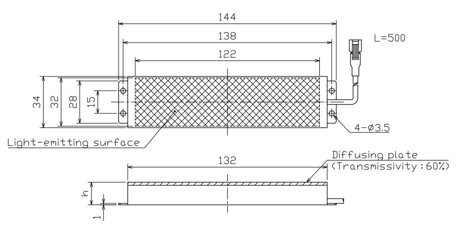

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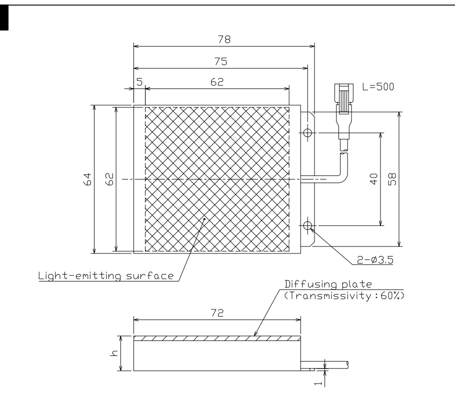

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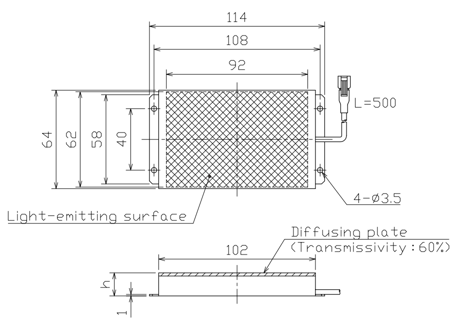

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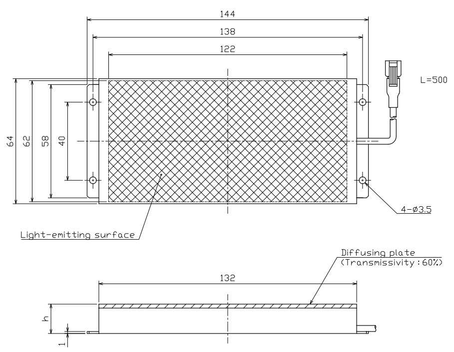

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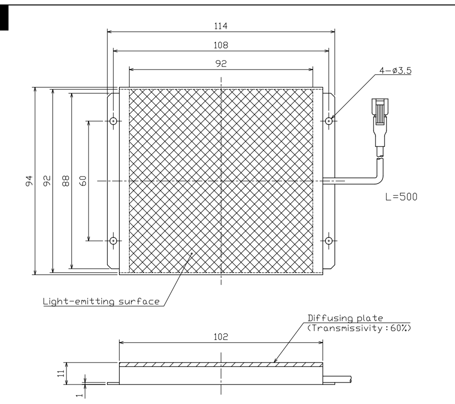

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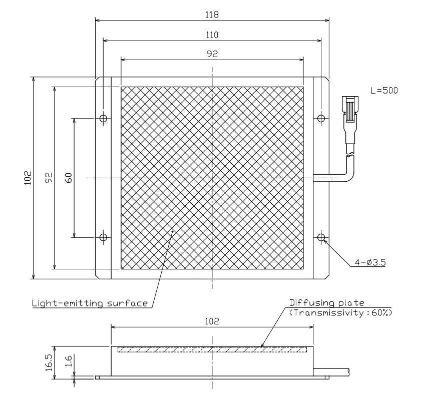

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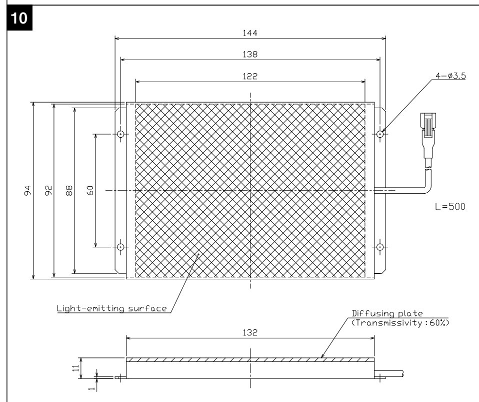

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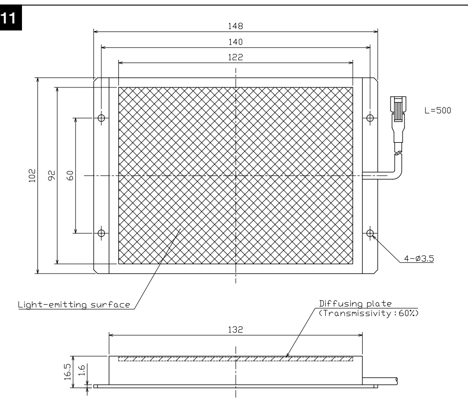

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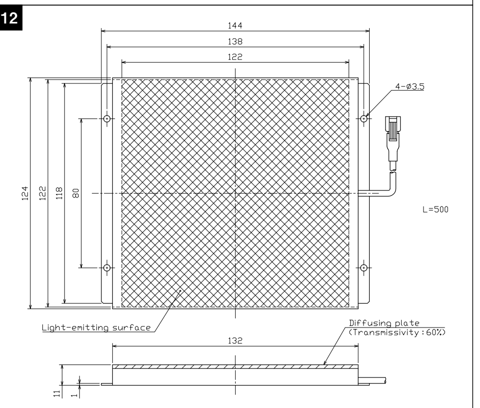

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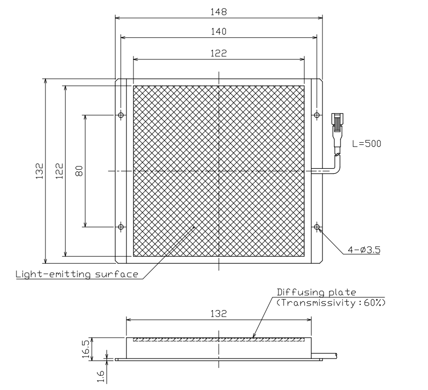
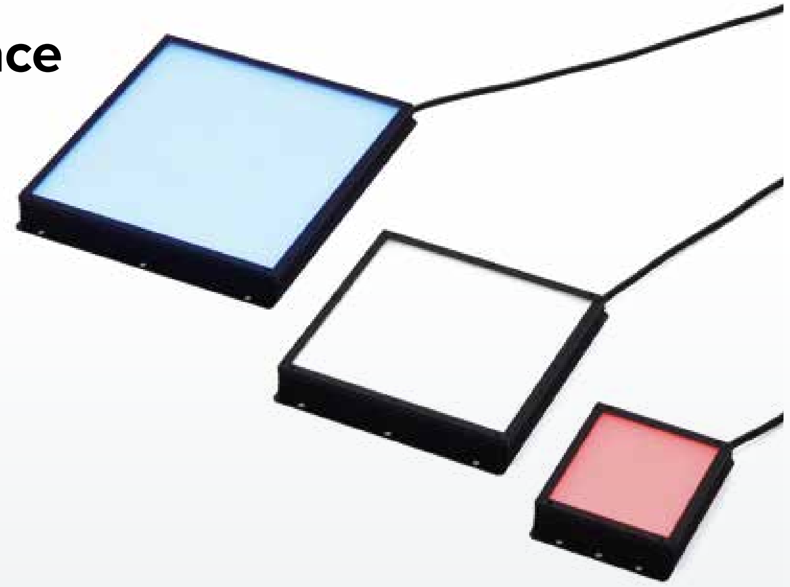


＊The height of 1-7. Red 11mm, White, Blue, Green 15 mm.

MSF Series Transparent lighting

Very bright chip LED surface illumination lighting

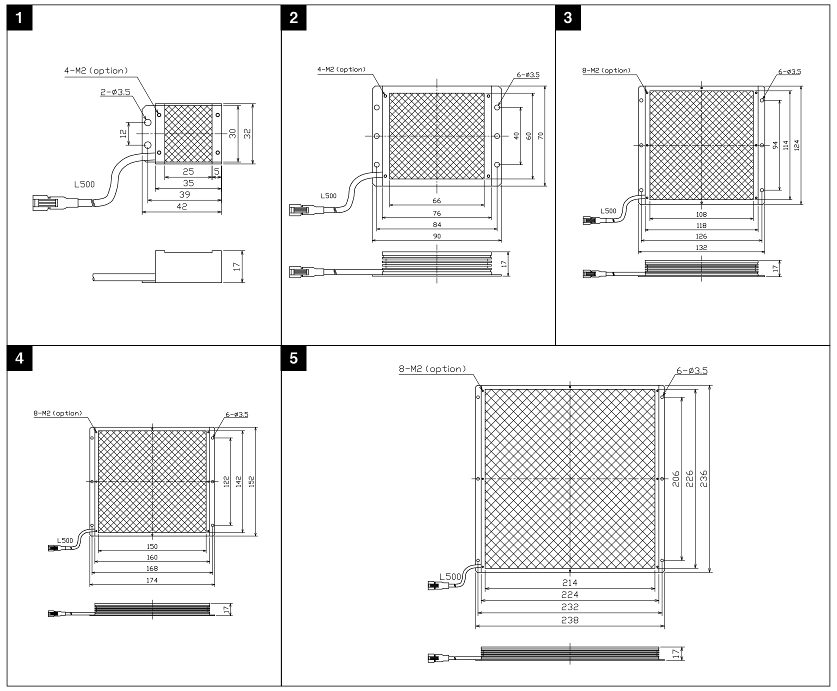
High output, light weight chip type transparent lighting
IR:850mm is also in our product line.



24 V DC Models Available

Model	Color	Power Consumption(W)	Input Voltage (V)	SAG✱	Dimension
MSF-25/30□	R	2	12	9A	1
	W			F9	
	B			98	
	IR			E3	
MSF- 66/60□	R	7.5		F5	2
	W			FF	
	B			B3	
	IR			FF	
MSF-108/114□	R	14.7		FF	3
	W				
	B				
	IR				
MSF -150/142□	R	24		FF	4
	W			CF	
	B			D0	
	IR			E5	
MSF-214/226□	R	47	24	-	5
	W				
	B				
	IR				

- R = Red, W = White, B = Blue, IR = Infrared, in □ .
- Can attach a polarization plate and light control (optional).
- SAG is the maximum voltage setting for a SAG power supply. See details P. 136.
- IR=850nm.



MCP Series Coaxial Light

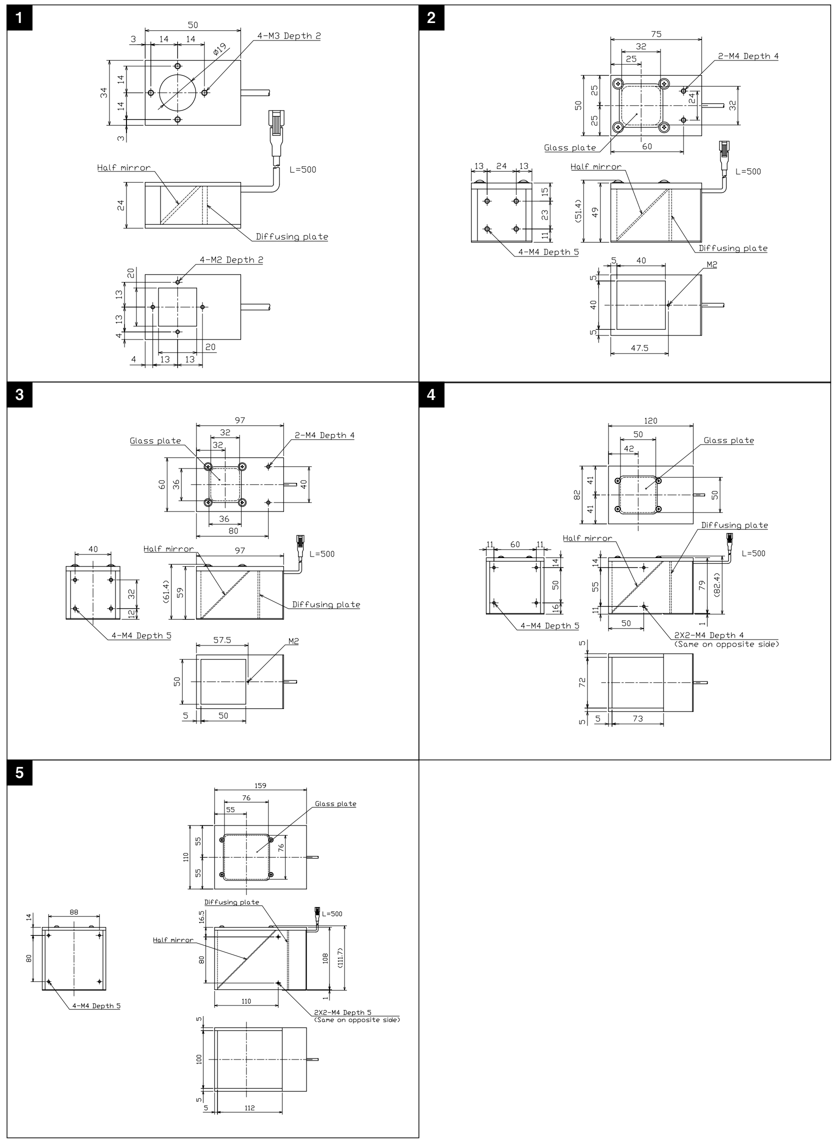
Pseudo coaxial epi-illumination

Achieves coaxial incident on a lens that is not telecentric.
Uniformly gets a positive reflection in a wide field of view.

24 V DC Models Available

Model	Color			Power Consumption (W)	SAG✱	Dimension
MCP20□	R	W	B	4.2	FF	1
	IR			T.B.D	T.B.D	
MCP40□	R			10.5	98	2
	W				AA	
	B				C7	
	IR			T.B.D	T.B.D	
MCP50□	R			14	A7	3
	W				B9	
	B				A7	
	IR			T.B.D	T.B.D	
MCP70□	R			24	B9	4
	W				D9	
	B				B9	
	IR			T.B.D	T.B.D	
MCP100□H	R	W	B	32	-	5

- R=Red, W = White, B = Blue, in □ .
- Input voltage is DC12V, MCP100 □ is for DC24V
- SAG is the maximum voltage setting for a SAG power supply. See details P. 136.
- IR=850nm.



LIGHTING

MDBA-LE Series Bar Light

High Power Bar Light

Achieves illumination in wide field of vision at long distances.

5 colors: white, red, blue, green, infrared, and ultraviolet are available

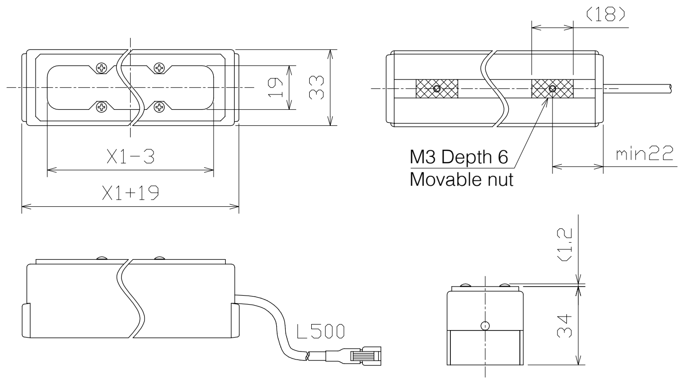
Power LED

reasonable price

Model	Color					Power Consumption (W)	Input Voltage (V)
MDBA-LE75□-A■	AR	AW	AB	IR	UV	4.5	12
MDBA-LE150□-A■	AR	AW	AB	IR	UV	9.0	
MDBA-LE225□-A■	AR	AW	AB	IR	UV	13.5	
MDBA-LE300□-A■	AR	AW	AB	IR	UV	18.0	
MDBA-LE375□-A■	AR	AW	AB	IR	UV	22.5	
MDBA-LE450□-A■	AR	AW	AB	IR	UV	27.0	
MDBA-LE600□-A■HV	AR	AW	AB	IR	UV	36.0	24
MDBA-LE750□-A■HV	AR	AW	AB	IR	UV	45.0	
MDBA-LE900□-A■HV	AR	AW	AB	IR	UV	54.0	
MDBA-LE1050□-A■HV	AR	AW	AB	IR	UV	63.0	
MDBA-LE1200□-A■HV	AR	AW	AB	IR	UV	72.0	

- S = wide angle light distribution type, L = narrow-angle light distribution type, in □ of the model number.
- Color is in ■ of model number (AR = Red, AW = White, AB = Blue, IR-850 = Infrared, UV-400 = Ultraviolet).
- The standard diffusion plate included is 90%. 80% or 60% can be attached as options.
- Can also attach a polarization plate.

＊ SAG is the maximum voltage setting for a SAG power supply. See details P.136.

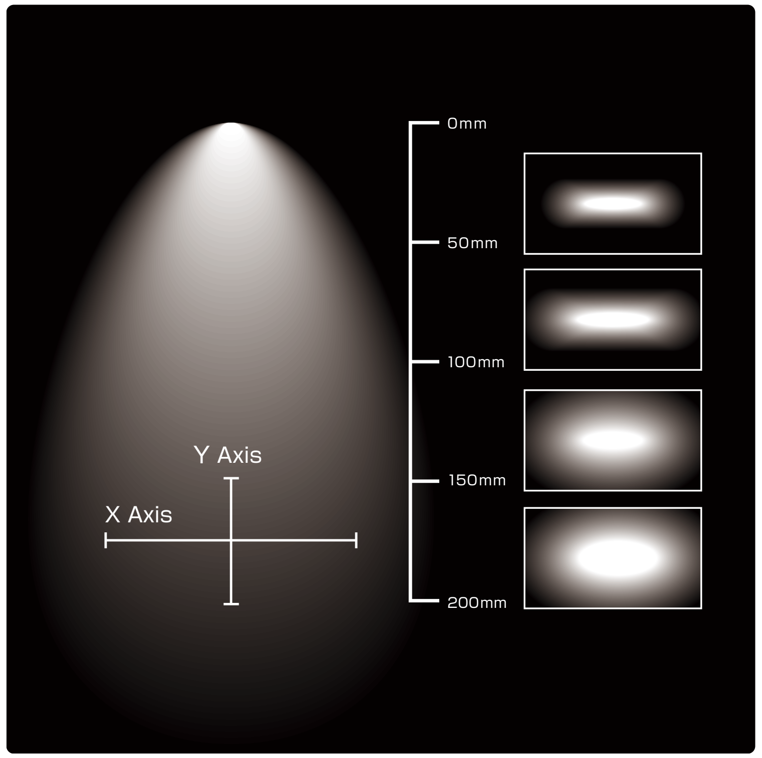


＊X1=Right Emitting Parts (75-450)

SAG Settings Values

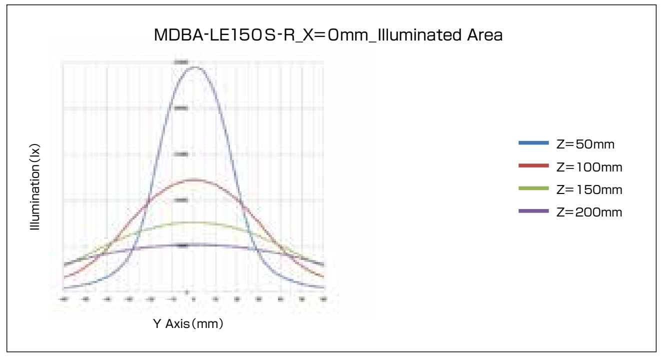
Model	AR	AW	AB	IR	UV
MDBA-LE75□-A■	C7	F3	90	CB	7F
MDBA-LE150□-A■	C9	FA	92	CD	80
MDBA-LE225□-A■	CA	FF	94	CE	82
MDBA-LE300□-A■	CC	FF	95	D0	83
MDBA-LE375□-A■	CD	FC	97	D1	85
MDBA-LE450□-A■	CF	E0	98	D3	87

S type wide distribution model – illuminates a wide area at close distances (Reference Values)

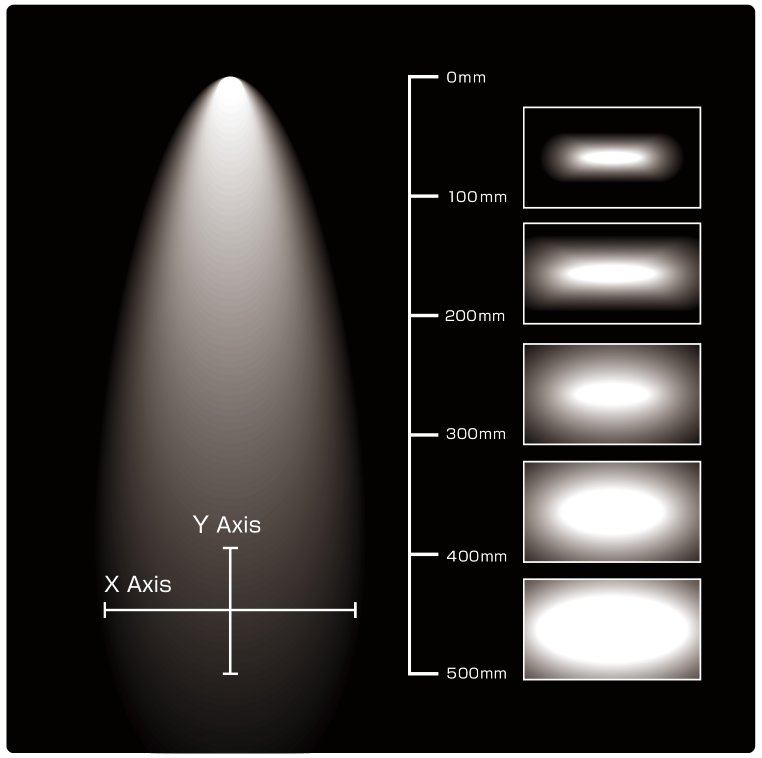


X Axis Graph

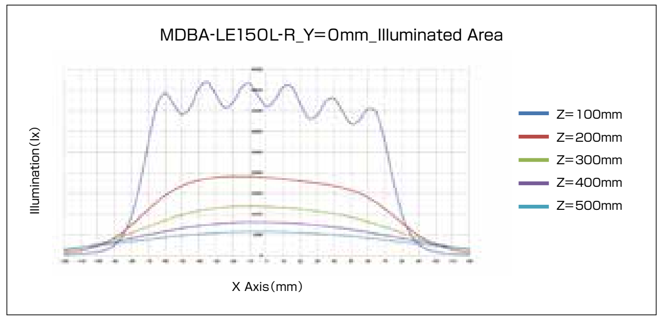
Y Axis Graph



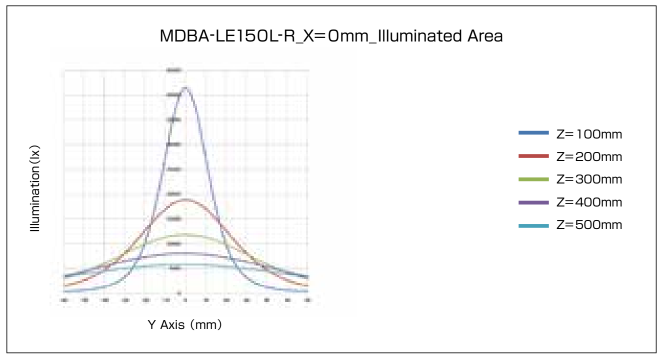
L type narrow distribution model – provides bright illumination at long distances (Reference Values)



X Axis Graph



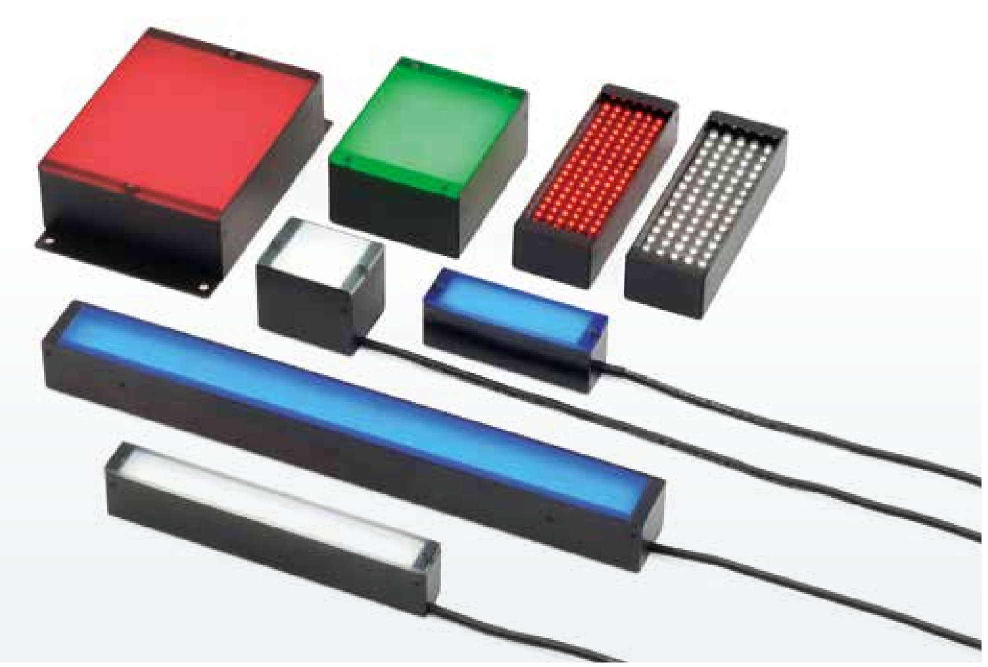
Y Axis Graph



MDBA-C Series Bar Light

Bar Light

Wide range of uses, as oblique lighting and backlight for various work

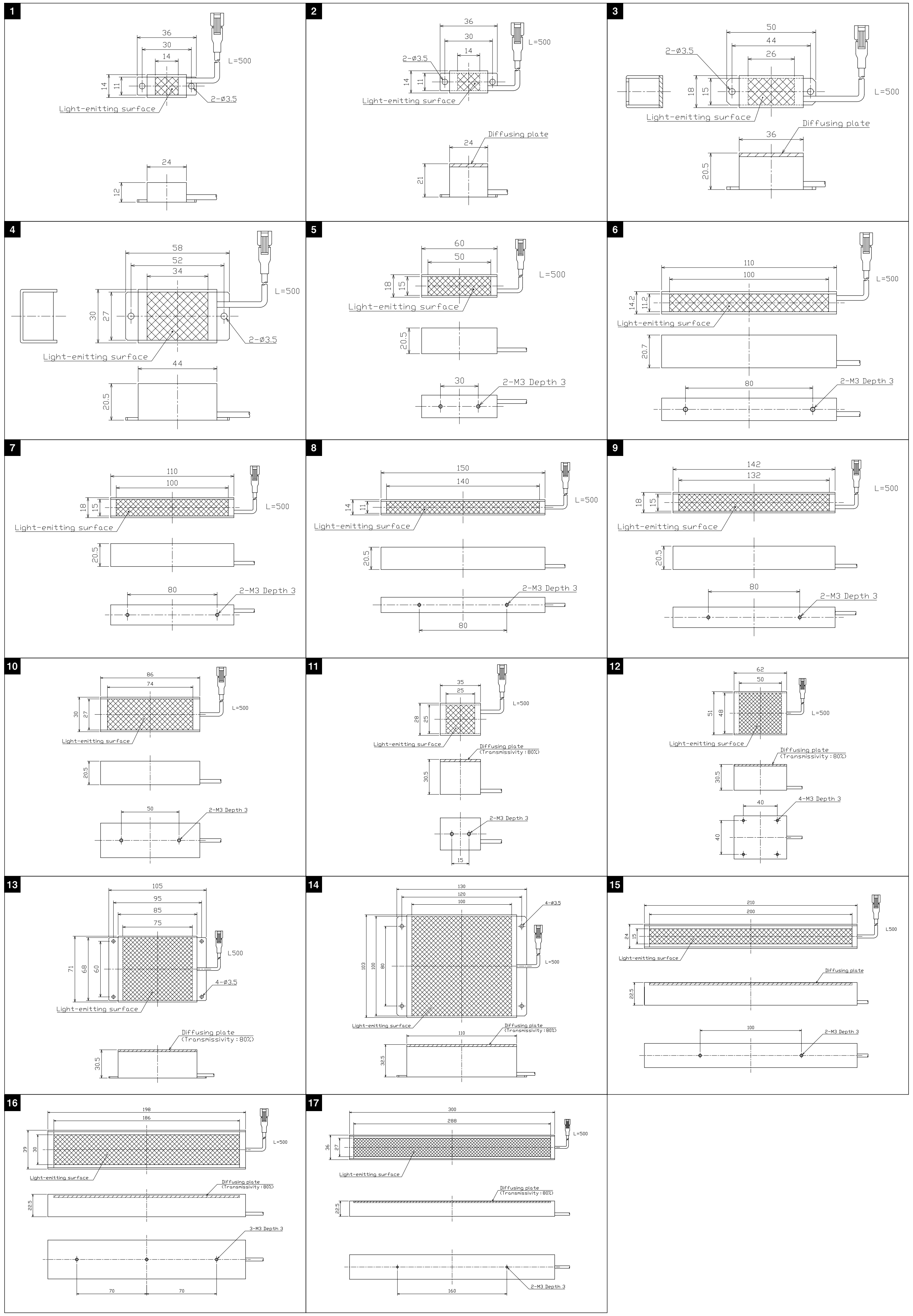


24 V DC Models Available

Model	Color	Power Consumption (W)	SAG*	Dimension	Model	Color	Power Consumption (W)	SAG*	Dimension
MDBA-C11/14DR	DR	0.3	C5	1	MDBA-C72/24DR	DR	5.4	C8	10
MDBA-C11/14□	DW B G	0.4	FF		MDBA-C72/24□	DW B G	4.4	FF	
MDBA-C11/14DRS-H21	DR	0.3	C5	2	MDBA-C25/25DRS	DR	1.8	C6	11
MDBA-C11/14□S-H21	DW B G	0.4	FF		MDBA-C25/25□S	DW B G	2.2	FF	
MDBA-C15/26DRS	DR	0.6	C5	3	MDBA-C50/50DRS	DR	6.4	EF	12
MDBA-C15/26□S	DW B G	1.1	FF		MDBA-C50/50□S	DW B G	5.4	FF	
MDBA-C27/34DR	DR	2.4	C6	4	MDBA-C70/75DRS	DR	10.2	CC	13
MDBA-C27/34□	DW B G	2.9	FF		MDBA-C70/75□S	DW B G	10.1	FF	
MDBA-C50/15DR	DR	1.8	C6	5	MDBA-C100/100DRS	DR	20.4	D3	14
MDBA-C50/15□	DW B G	2.2	FF		MDBA-C100/100□S	DW B G	20.6	FF	
MDBA-C100/11DR	DR	2.4	C6	6	MDBA-C15/200DRS	DR	8.4	CA	15
MDBA-C100/11□	DW B G	2.9	FF		MDBA-C15/200□S	DW B G	8.9	FF	
MDBA-C100/15DR	DR	4.2	6F	7	MDBA-C185/30DRS	DR	13.2	CE	16
MDBA-C100/15□	DW B G	4.4	FF		MDBA-C185/30□S	DW B G	13.0	FF	
MDBA-C140/11DR	DR	4.2	C8	8	MDBA-C300/24DRS	DR	20.2	CE	17
MDBA-C140/11□	DW B G	4.4	FF		MDBA-C300/24□S	DW B G	25.6	DC	
MDBA-C132/15DR	DR	5.4	C8	9					
MDBA-C132/15□	DW B G	5.8	FF						

- DW = White, B = Blue, G = Green in □ .
- Input voltage is DC12V, but we can also make DC24V products.
- We can also make other sizes.

* SAG is the maximum voltage setting for a SAG power supply. See details P. 136.



MDDA-KH Series Dome Light

High Power Dome Light

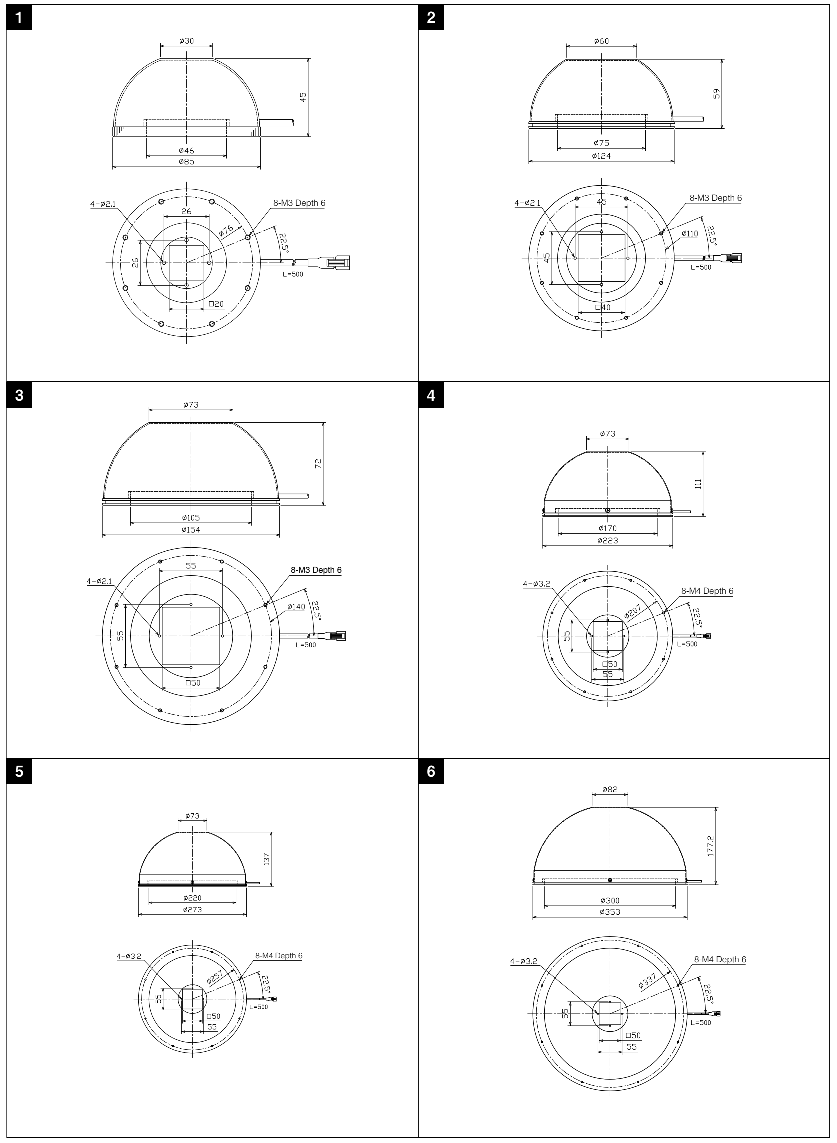
Illuminates objects with glossy surfaces or curved shapes, without irregularities

6 types in product line, from φ85 to φ353

Power LED

Model	Color	Power Consumption (W)	Input Voltage (V)	SAG*	Dimension
MDDA-KH80□	R	9	12	FF	1
	AW				
	B				
MDDA-KH120□	R	13.5		FF	2
	AW				
	B				
MDDA-KH150□	R	18		FF	3
	AW				
	B				
MDDA-KH220□	R	28.5		FF	4
	AW			C3	
	B			BC	
MDDA-KH270□HV	R	34	24	-	5
	AW				
	B				
MDDA-KH350□HV	R	44		-	6
	AW				
	B				

- R = Red, AW = White, B = Blue in □.
- MDDA-KH270 □ HV and higher models are DC24V.
- The AW series has a color temperature about 500K lower than conventional W. But this can vary by type and size.
- SAG is the maximum voltage setting for a SAG power supply. See details P.136.



UV Series UV LED

Ultraviolet lighting

Long type and short type radiation distances in product line.
High output UV LED included

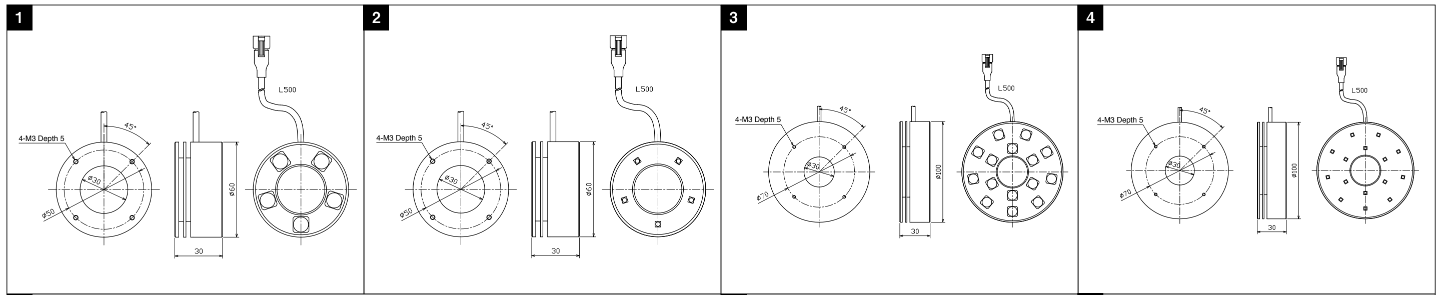
24 V DC Models Available

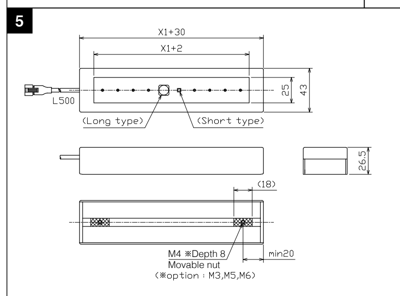
Model	Color	Power Consumption (W)	Input Voltage (V)	Wavelength (mm)	Dimension
MDHR-60L-UV-(X2)	UV	8	24	365 (375) 385 (395) (405)	1
MDHR-60S-UV-(X2)	UV				2
MDHR-100L-UV-(X2)	UV	15.4			3
MDHR-100S-UV-(X2)	UV				4
MDBA-CH(X1)L-UV-(X2)	UV	7.5 x N			5
MDBA-CH(X1)S-UV-(X2)	UV				

Model	Color	Power Consumption (W)	Input Voltage (V)	SAG*	Wavelength (mm)	Dimension
MDR-50/28UV-405NR	UV	2.9	12	6A	405	6
MDR-LA74/48UV-405NR	UV	5.4		6E		7
MDBA-C50/15UV-405NR	UV	2.9		61		8
MHV-20AUV-405	UV	-	350mA	-	400	9
MHVE-21AUV-365	UV	-	700mA	-	365	10
MFV-C40-405NR	UV	4.1	12	A7	405	11

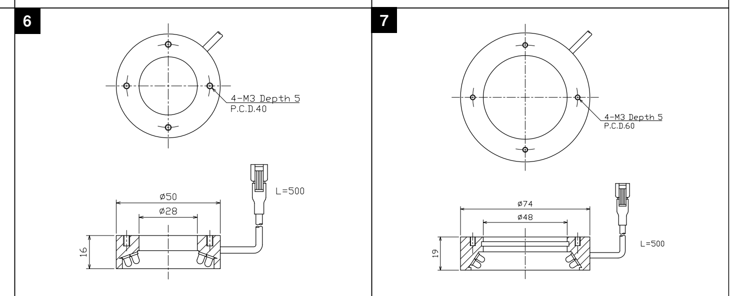
- Ask us about other shapes.
- Input voltage is DC12V, but we can also make DC24V products.
- The meaning of X1 and X2, please refer to Dimension 5.

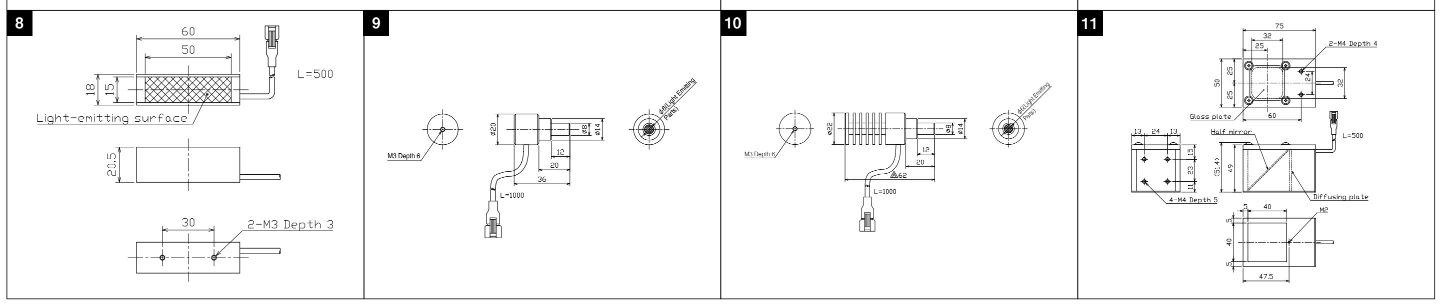
* SAG is the maximum voltage setting for a SAG power supply. See details P.136.





N	X1	X2 Wavelength
1	75	365
2	150	(375)
3	225	385
4	300	(395)
5	375	(405)
6	450	
7	525	
8	600	





IR Series IR LED

Infrared illumination

Ideal for permeation testing: liquids, packages, etc.

850nm and others (780/810/890/940mm) also in product line

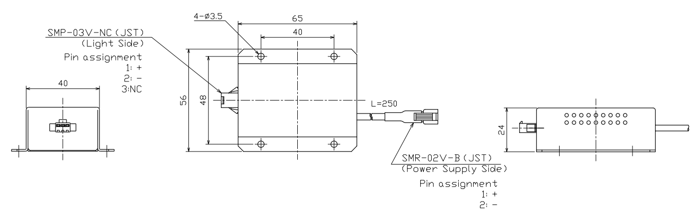
24 V DC Models Available

Model	Color	Power Consumption (W)	SAG✱	Dimension
MMAR-80IR-850	IR	7	BC	1
MDR-50/28AIR-850	IR	2.2	FF	2
MDR-90/50AIR-850	IR	4.4	FF	3
MHV-20AIR-850/940	IR	-	-	4
MHVE-21AIR-850/940	IR	-	-	
MFV-C40AIR-850	IR	2	FF	5
MDBA-C50/15AIR-850	IR	1.5	DC	6
MDBA-C72/24IR-850	IR	2.8	FF	7
MDBA-C132/15AIR-850	IR	3.9	FF	8

- We can also make shapes that are same as for visible light illumination, in addition to the above.
- Input voltage is DC12V, but we can also make DC24V products.
- SAG is the maximum voltage setting for a SAG power supply. See details P.136.

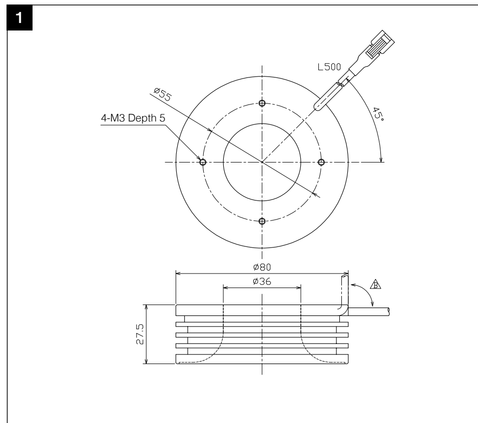
Resistance Box / MRBOX（Input voltage is 12 V DC.）

MRBOX3W-15R



Model	Applicable lighting	Power Consumption (W)
MRBOX3W-15R	MHVB-24IR-850	9.0
	MHVB-24IR-940	

1



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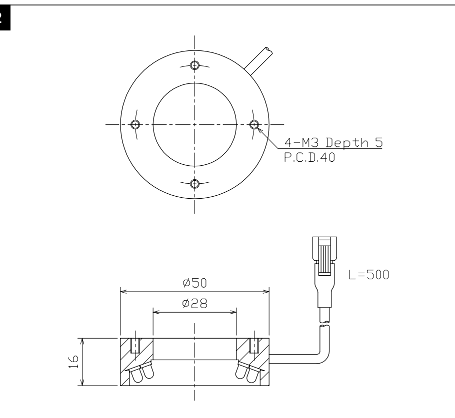

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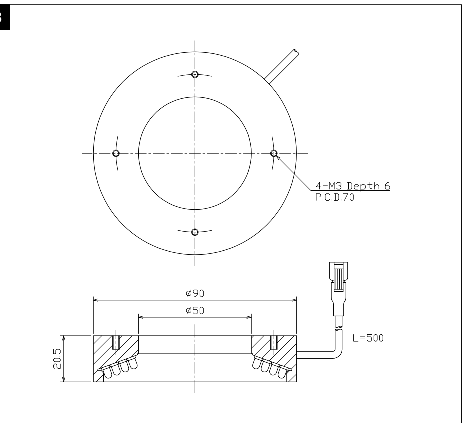

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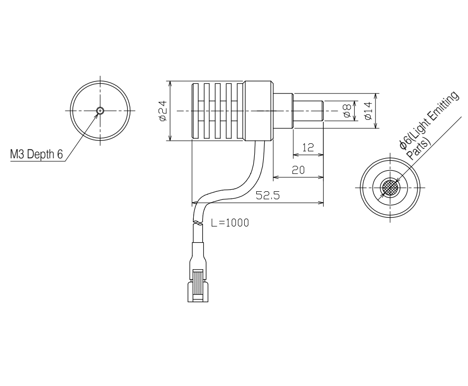

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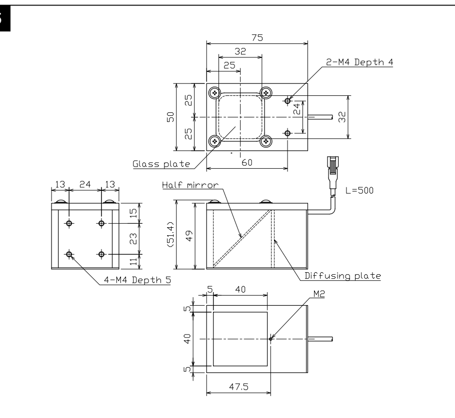

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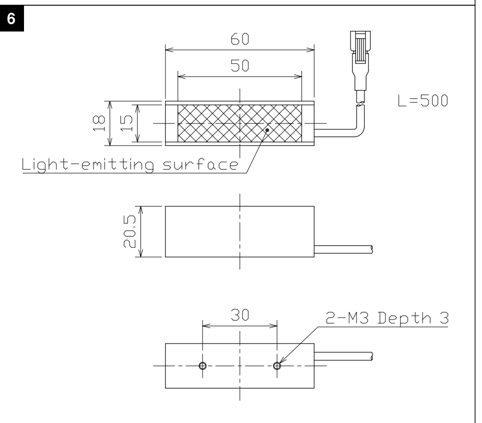

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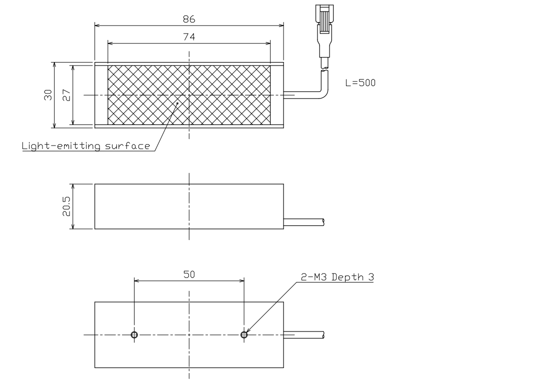

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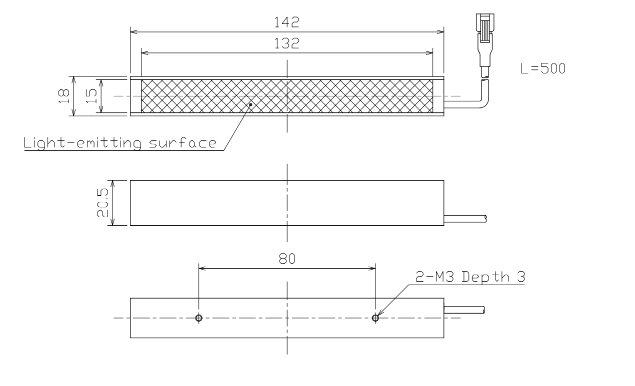


MGDC Series Digital power supply

Digital pulse dimmer power supply

Multi-function power supply with
freely selectable interface

Total Diverse Line up of 63 Models

Model	Input Voltage (V)	Output voltage	Capacity (W)	Channels	Mass (g)	Dimension
MGDC-30M2-*****	AC100-240V	DC12V	30	2CH	700	1
MGDC-30M4-*****				4CH	1000	2
MGDC-30M8-*****				8CH		
MGDC-50M2-*****			50	2CH	1200	3
MGDC-50M4-*****				4CH		
MGDC-50M8-*****				8CH		
MGDC-100M2-*****			100	2CH	1300	4
MGDC-100M4-*****				4CH		
MGDC-100M8-*****				8CH		
MGDC-30M2-24-*****		DC24V	30	2CH	700	1
MGDC-30M4-24-*****				4CH	1000	2
MGDC-30M8-24-*****				8CH		
MGDC-50M2-24-*****			50	2CH	1200	3
MGDC-50M4-24-*****				4CH		
MGDC-50M8-24-*****				8CH		
MGDC-100M2-24-*****			100	2CH	1300	4
MGDC-100M4-24-*****				4CH		
MGDC-100M8-24-*****				8CH		
MGDC-50M2-24-*****-T	DC24V		46	2CH	700	5
MGDC-150M4-24-*****-T			144	4CH	1000	6
MGDC-150M8-24-*****-T				8CH		

CE MARK TYPE

Common Specifications

Dimmer method	Approx. 125kHz PWM control
External control	External ON/OFF, external dimmer
Protective function	Overcurrent protection, fan abnormal

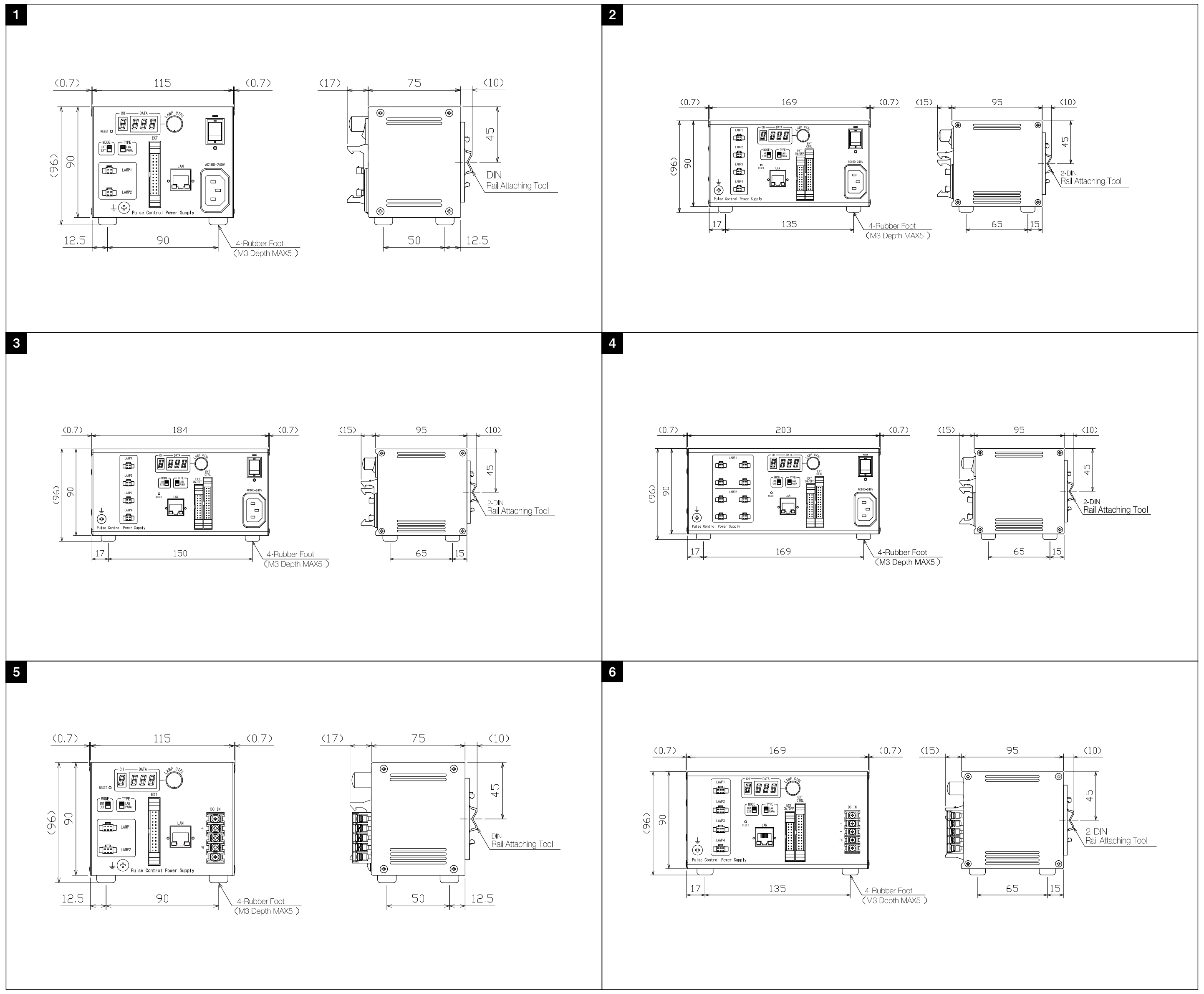
Communication Specifications (LAN)

Communication protocol	TCP/IP
Compliance	IEEE802.3(10BASE-T)、IEEE802.3u(100BASE-TX)
Transmission speed	10Mbps(10BASE-T)、100Mbps(100BASE-TX)
Connection ports	4 ports
Functions	Auto MDI/MDIX、Auto Negotiation

Communication Specifications (RS-232C/RS-485)

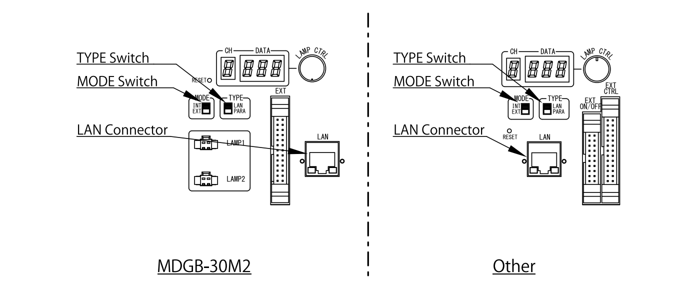
Communication protocols	RS-232C / RS-485
Baud rate	19200bps
Data	8bit
Parity bit	Even parity
Stop bit	1bit

- ***** in model number is for the external control type code.
  - TP/PI: LAN communication / 8 bit parallel communication switch type
  - S2/PI: RS-232C communication / 8 bit parallel communication switch type
  - S4/VI: RS-485 communication / Analog 0-5V switch type
- Depending on number of channels, dimensions and number of lighting connectors will vary.
- DC24V output specification has different dimensions and connector shape.
- For the external control cable, refer to P.129.

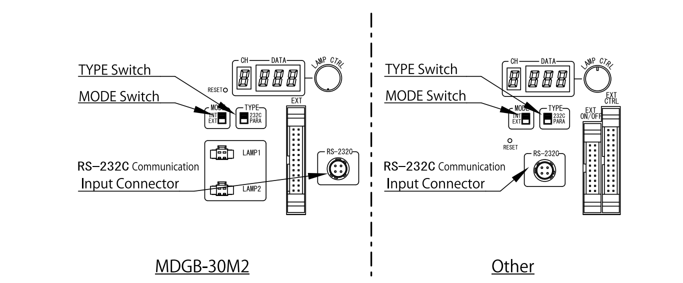


The layout of control part on the front panel

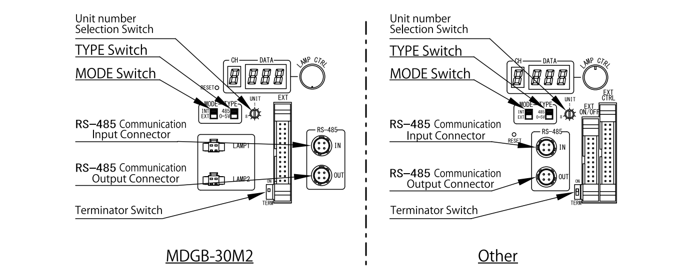
TP/PI Specification (LAN Communication ／ 8bit Parallel Communication)



S2/PI Specification (RS-232C Communication ／ 8bitParallel Communication)



S4/VI Specification (RS-485C Communication ／ Analog 0-5V)

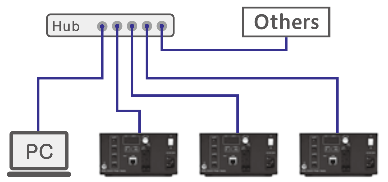


Fully External control Facility

Some type of external controls are available for your network environment the lineup of LAN communication / 8 bit parallel communication " switch ", " RS-232C communication / 8 bit parallel communication " switch, and " RS-485 communication / Analog 0-5 V " switch.

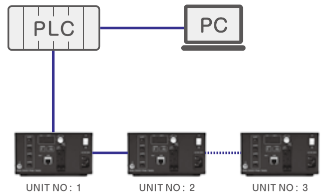
LAN communication (TP)

With an Ethernet communication, one computer is enabled to manage the devises on the network. An individual managing several MDGB series can be done by setting the IP address.



RS-485 Communication (S4)

By setting the unit No. of each power supply, up to 8 units can be individually controlled. It is also possible to manage up to 64 units in a lump by connecting an 8 channel power supply.



8 bit Parallel Communication (PI)

Parallel communication makes switching of setting values high speed.

RS-232C communications (S2)

With the RS-232C communication, it is easy to build an external control environment even in an environment susceptible to the noise.

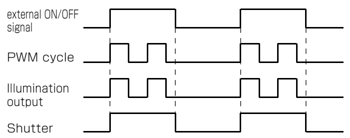
Analog 0-5V (VI)

It can be controlled with the analog signal of 0-5V. Because light control can be done only by varying the voltage, it is easy to build an external control environment.

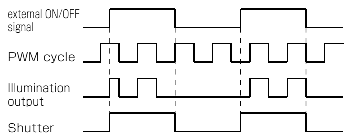
Fully synchronizes the lighting output and external ON/OFF signal

The conventional products had a lighting function due to an asynchronism in the external ON/OFF signal and inner PWM cycle. However, the PWM cycle of these products synchronizes with the external ON/OFF signal so it has no lighting fluctuation.

MDGB

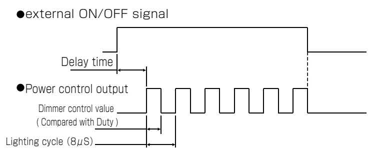
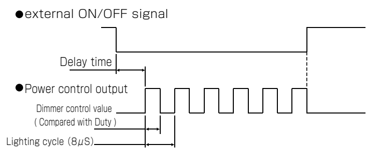
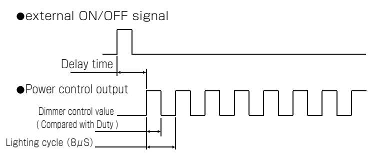
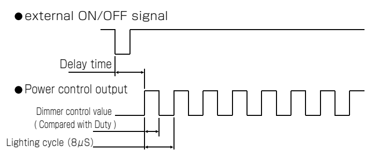
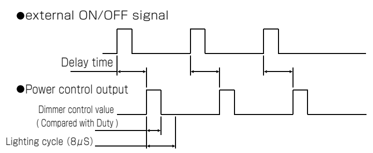
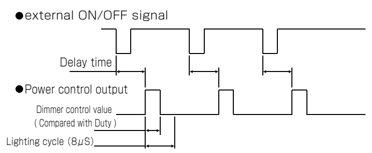


Previous Model



Various External ON/OFF Functions

Regarding the external ON/OFF mode, the " High Mode" which the lighting turns off with the signal and the "Low Mode" which the lighting turns on with one trigger, and "Single type" which turns the light on for one cycle with one trigger.

External ON/OFF Mode / External ON/OFF Type	High Mode	Low Mode
Normal Type		
Repeat Type Until either operation below is set by one external light signal, it keeps lighting on. a.Switching external ON/OFF type. b.Power off		
Single Type By one external light signal, it sets one cycle lighting on.		

MLC Series Constant-current power supply

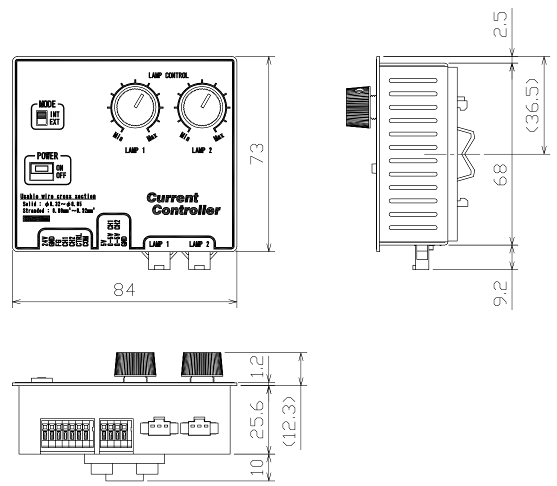
Small constant current controller

Constant-current power supply with external 0 to 5V control function.
Can be connected to MHV, MHVE and MBF series

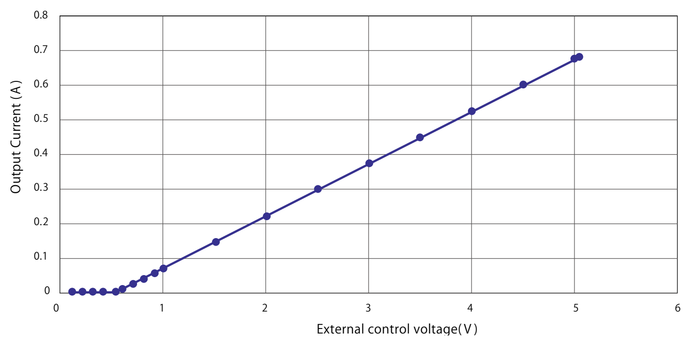
Model	MLC-700M2-VI	MLC-350M2-VI
Input Voltage (V)	DC24V±10%	
Input current	0.3A	0.15A
Operating frequency	-	
Rated output	700mA/CH	350mA/CH
Channels	2CH	
Dimming method	Method to vary output current	
External control	0-5V input, external On/Off	
Can be connected to lighting	MHVE・MBF-LX	MHV・MBF (UV-400)

＊ Available for MHA-IL (option).refer to P.106.

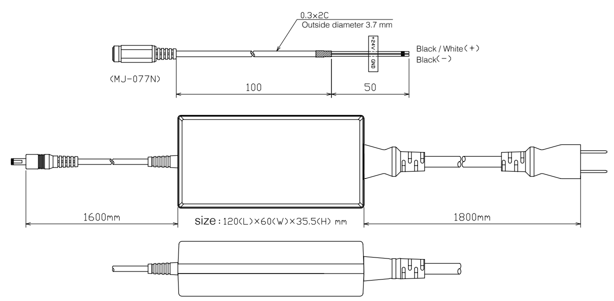
CE MARK TYPE



External 0 to 5 V light control output linearity



MC-ADJK-0.15 (OPTION)



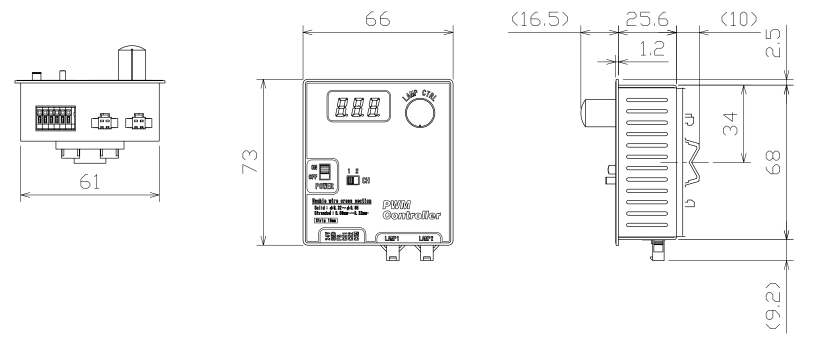
AC adapter（AC100V→DC24V）

MLP Series Digital power supply

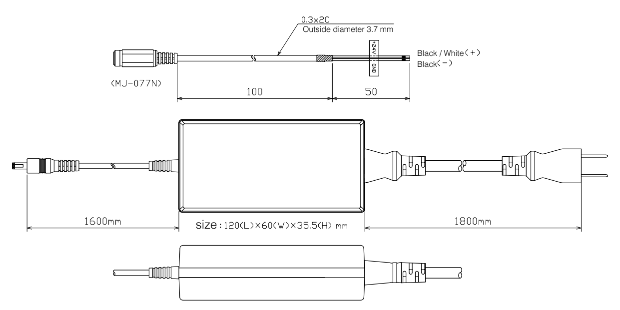
1000 gradations digital controller

Compact size digital power supply

Model	MLP-30M2	MLP-60M2-24
Input Voltage (V)	DC24V±10%	
Input current	1.5A（Max）	3.0A（Max）
Output voltage	DC12V	DC24V
Channels	2CH	
Capacity	30W (2 channels total)	60W (2 channels total)
Dimming method	Approximate 80kHz PWM control (1000 gradations)	
Response speed	OFF→ON: Within 70μS, ON→OFF: Within 20μS	

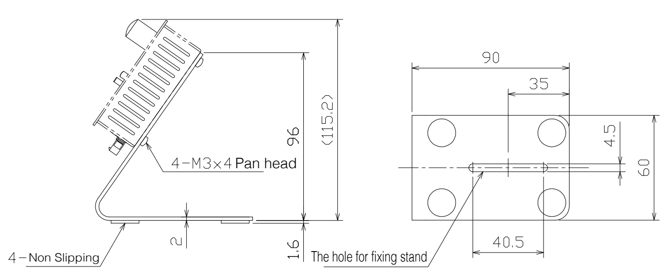


MC-ADJK-0.15 (OPTION)



AC adapter（AC100V→DC24V）

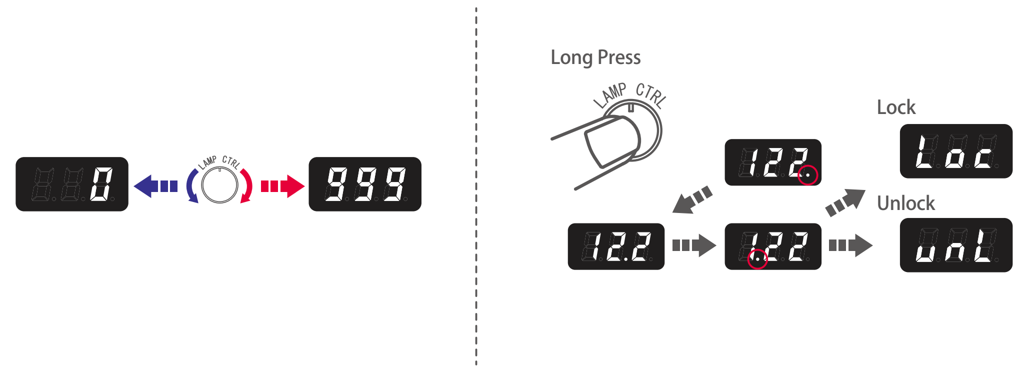
MHA-IL (OPTION)



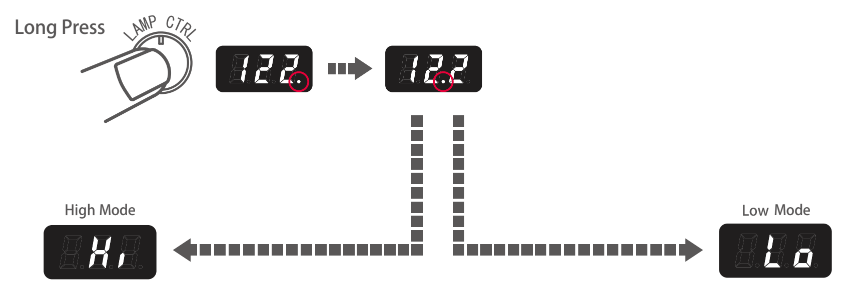
Stand

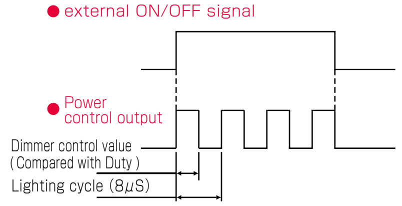
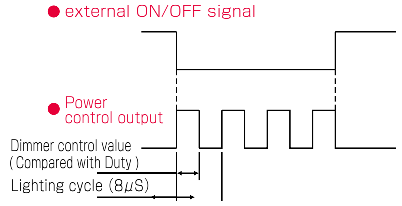
Easy to check the set value with the good visibility display.

1000 level digital controller with good visibility display. Since the variable speed of the light control is changed according to the speed of rotating the dimmer switch, the dimming value will be quickly set.
Further, by pressing and holding the dimmer switch, you can lock each channel.



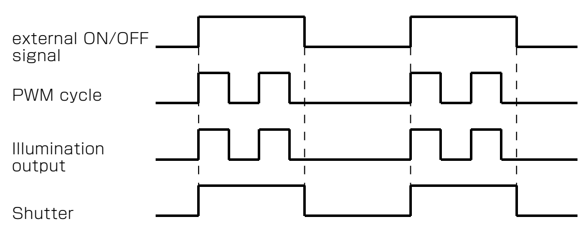
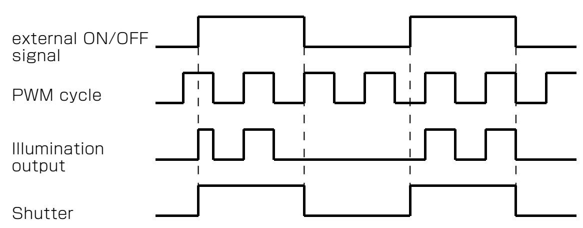
The external ON/OFF signal and inverting function of lighting output



High Mode	Low Mode
	

Fully synchronizes the lighting output and external ON/OFF signal

The conventional products had a lighting function due to an asynchronism in the external ON/OFF signal and inner PWM cycle. However, the PWM cycle of these products synchronizes with the external ON/OFF signal so it has no lighting fluctuation.

MLP	Previous Model
	

MJS Series Strobe power supply

Small multi-channel strobe power supply for LAN

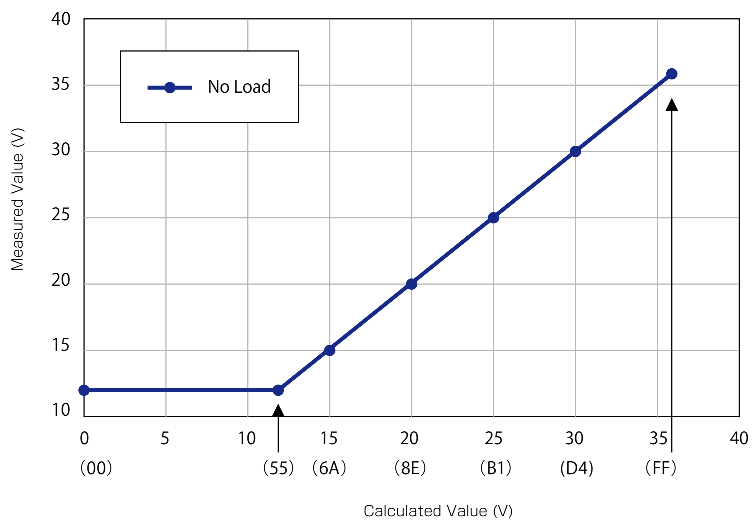
30W capacity, 2 to 6 channels,
enables strobe light.

- Momentarily sends current that is larger than normal. Can be used for up four times normal current or higher.
- More compact than conventional SAG power supplies.
- Adjustable in 256 gradients, from 12V to the SAG value set.
- 4 connection ports. Can control from 4 PCs.
- Multi-channel has same chassis size.

Model	Channels	Connection lighting capacity (power consumption)	Dimension
MJS-30M2-TP	2CH	15W x 2: Total 30W	1
MJS-30M3-TP	3CH	15W x 3: Total 30W	2
MJS-30M4-TP	4CH	10W x 2, 5W x 2: Total 30W	3
MJS-30M6-TP	6CH	5W x 6: Total 30W	4

Input Voltage (V)	AC 100 to 240V
Operating frequency	50/60Hz
Output voltage	DC12 to 36V (256 gradient variable output voltage)
Pulse width setting	10μsec to 990μsec
Trigger signal	Synchronous lighting function (internal/external switching)
Trigger response speed	Approximately 1μS
Internal lighting	50Hz fixed
External dimming function	LAN communication
Variable delay	0 to 5,000μS range in 1μS intervals (external control mode only)
Other	Interlock function, Overcurrent protection function

Voltage Characteristic



(The value in parenthesis is the value of digital switch.)

Light Control

Light control method

Strobe luminescence by external trigger signal The duty ratio of luminescence frequency should be 1/20 or less.

＊Please use our LED lightings within the maximum SAG setting value specified in the catalogue.

Light Control Method

DC12-36V (For the relationship between the digital switch hexadecimal values and voltage, see Page 108)

＊ Digital switch controls DC12V - 36V at 256 steps.

Range of 00→55 outputs DC12V constantly.

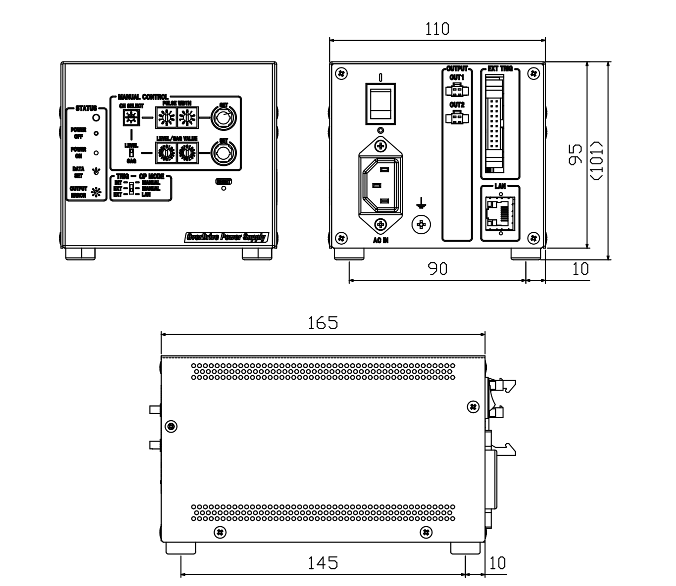
Please refer to the catalogue of SAG setting value and be sure not to apply excess current to LED.

Range of Voltage

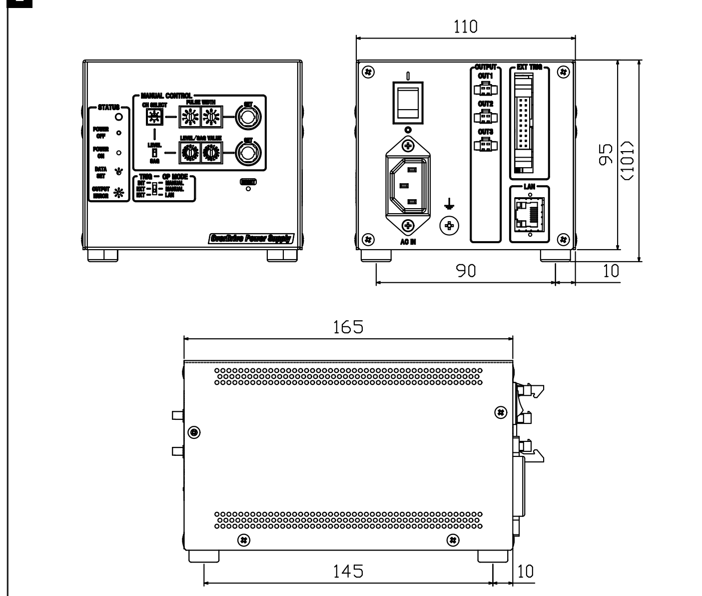
① Luminescence time is adjusted by pulth width.
(Approx. 10 μ SEC - 1mSEC)
(Switch INTI/EXT by PLS Select)
EXT:Adjust by pulth width of external trigger
INT:Control light by volume setting of pulth width
(Variable range: 10 μ s - 990 μ s)

② Luminescence intensity is adjusted by variable voltage of VOLTAGE SELECT.

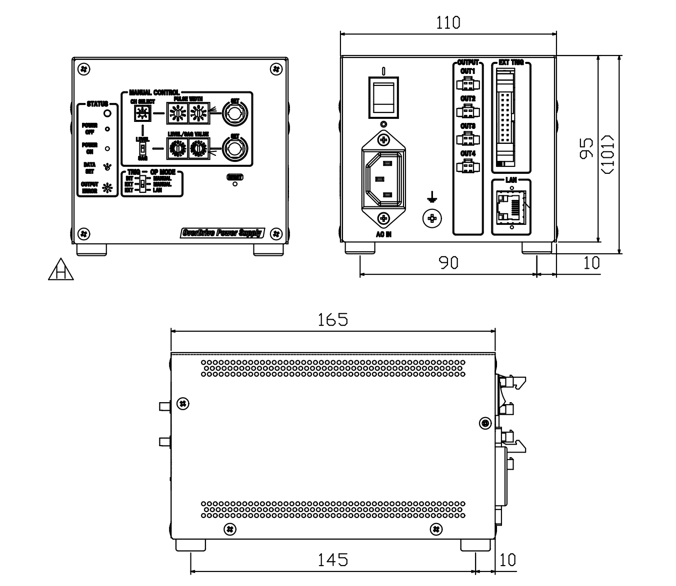
1



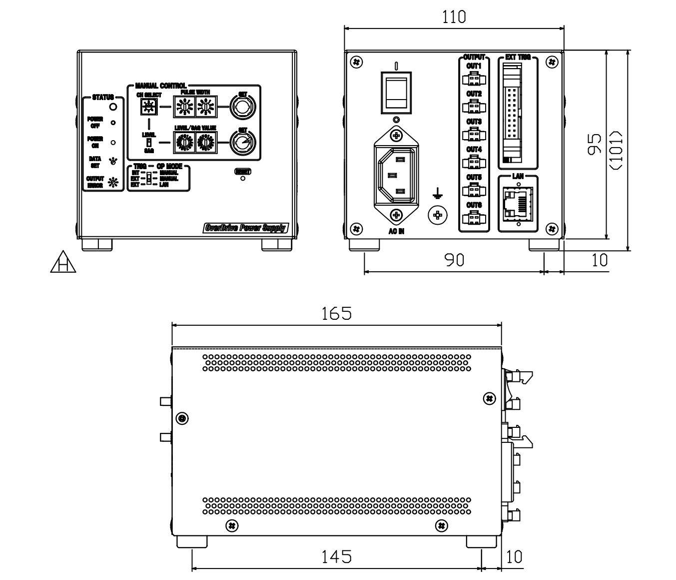
2



3



4



Options

Diffusion plate for ring lighting ／ MKR & MKR-F

- Diffusion plate for ring lighting. Attach to diffuse light and reduce reflection from work.
- Can control transmittance (diffusion index). Standard 80% transmittance. We also have 90%, 60% or 30% transmittance in same thickness and price. Special order sizes also possible.
- Easy to attach and detach later with screws.

Model	Applicable lighting	Model	Applicable lighting
MKR-32/10-80	MDR-32/10	MKR-66/32-80	MDR-66/36
MKR-38/15-80	MDR-38/15	MKR-70/39-80	MDR-70/39
MKR-38/12-80	MDR-38/15	MKR-70/35-80	MDR-70/39
MKR-40/25-80	MDR-40/25	MKR-90/50-80	MDR-90/50
MKR-40/21-80	MDR-40/25	MKR-90/46-80	MDR-90/50
MKR-42/18-80	MDR-42/18	MKR-110/60-80	MDR-110/60
MKR-50/28-80	MDR-50/28	MKR-110/56-80	MDR-110/60
MKR-50/24-80	MDR-50/28	MKR-140/95-80	MDR-140/95
MKR-66/36-80	MDR-66/36	MKR-140/91-80	MDR-140/95

＊The above models have 80% transmittance. 90% transmittance has -90 at the end of the model number. -60 for 60%, -30 for 30%.

Diffusion plate for bar lighting ／ MKBA

- Diffusion plate for bar lighting. Attach to diffuse light and reduce reflection from work.
- Can control transmittance (diffusion index). Standard 80% transmittance. We also have 90%, 60% or 30% transmittance in same thickness and price. Special order sizes also possible.
- Bar light manufacturing methods vary depending on whether there is a diffusion plate, so please tell us whether you want a diffusion plate when you order a light.

Model	Applicable lighting	Model	Applicable lighting	Model	Applicable lighting
MKBA-11/14-80	MDBA-C11/14	MKBA-100/15-80	MDBA-C100/15	MKBA-100/100-80	MDBA-C100/100
MKBA-15/26-80	MDBA-C15/26	MKBA-140/11-80	MDBA-C140/11	MKBA-15/200-80	MDBA-C15/200
MKBA-25/25-80	MDBA-C25/25	MKBA-132/15-80	MDBA-C132/15	MKBA-185/30-80	MDBA-C185/30
MKBA-50/15-80	MDBA-C50/15	MKBA-72/24-80	MDBA-C72/24	MKBA-300/24-80	MDBA-C300/24
MKBA-27/34-80	MDBA-C27/34	MKBA-50/50-80	MDBA-C50/50		
MKBA-100/11-80	MDBA-C100/11	MKBA-70/75-80	MDBA-C70/75		

＊The above models have 80% transmittance. 90% transmittance has -90 at the end of the model number. -60 for 60%, -30 for 30%.

Polarization plate (PL plate) ／ MKBA-PL & MKR-PL & MKR-F PL

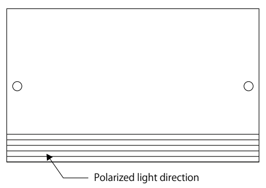
- You can eliminate glare and surface reflection from work by installing a PL plate or PL filter on light or camera lens.
- Can screw on, like the diffusion plate.
- For the bar lighting polarization plate, the polarizer's direction determines whether it is A type or B type.
- There is risk of deformation and discoloration due to heat, depending on your environment. Do heat dissipation countermeasures, and use within a range that does not exceed the heat resistance temperature (74°C).
  The original effect will no longer be obtained, so check by periodic inspections.

For ring lighting ／ MKR-PL, MKR-PL, MKR-F PL

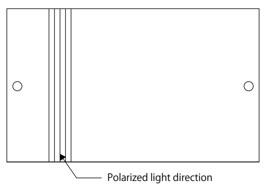
Model	Applicable lighting	Model	Applicable lighting	Model	Applicable lighting
MKR-32/10-PL	MDR-32/10	MKR-140/91-PL	MDR-140/95	MKR-66/32-PL	MDR-66/36
MKR-38/15-PL	MDR-38/15	MKHR-60-PL	MDR-66/36	MKR-70/39-PL	MDR-70/39
MKR-38/12-PL	MDR-38/15	MKHR-80-PL	MDR-70/39	MKR-70/35-PL	MDR-70/39
MKR-40/25-PL	MDR-40/25	MKHR-120-PL	MDR-70/39	MKR-90/50-PL	MDR-90/50
MKR-40/21-PL	MDR-40/25	MKHR-150-PL	MDR-90/50	MKR-90/46-PL	MDR-90/50
MKR-50/28-PL	MDR-50/28	MKHR-220-PL	MDR-90/50	MKR-110/60-PL	MDR-110/60
MKR-50/24-PL	MDR-50/28	MKHR-270-PL	MDR-110/60	MKR-110/56-PL	MDR-110/60
MKR-66/36-PL	MDR-66/36	MKHR-350-PL	MDR-110/60	MKR-140/95-PL	MDR-140/95

Polarized light direction

A type



B type



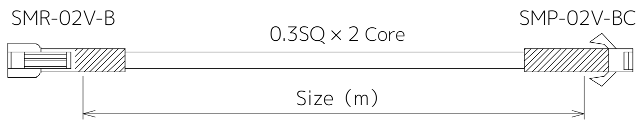
For bar lighting ／ MKBA-PL

Model		Applicable lighting
MKBA-11/14-A-PL	MKBA-11/14-B-PL	MDBA-C11/14
MKBA-15/26-A-PL	MKBA-15/26-B-PL	MDBA-C15/26
MKBA-25/25-A-PL	MKBA-25/25-B-PL	MDBA-C25/25
MKBA-50/15-A-PL	MKBA-50/15-B-PL	MDBA-C50/15
MKBA-27/34-A-PL	MKBA-27/34-B-PL	MDBA-C27/34
MKBA-100/11-A-PL	MKBA-100/11-B-PL	MDBA-C100/11
MKBA-100/15-A-PL	MKBA-100/15-B-PL	MDBA-C100/15
MKBA-132/15-A-PL	MKBA-132/15-B-PL	MDBA-C132/15
Model		Applicable lighting
MKBA-72/24-A-PL	MKBA-72/24-B-PL	MDBA-C72/24
MKBA-50/50-A-PL	MKBA-50/50-B-PL	MDBA-C50/50
MKBA-70/75-A-PL	MKBA-70/75-B-PL	MDBA-C70/75
MKBA-100/100-A-PL	MKBA-100/100-B-PL	MDBA-C100/100
MKBA-15/200-A-PL	MKBA-15/200-B-PL	MDBA-C15/200
MKBA-185/30-A-PL	MKBA-185/30-B-PL	MDBA-C185/30
MKBA-300/24-A-PL	MKBA-300/24-B-PL	MDBA-C300/24
Model		Applicable lighting
MKBA-LE75-A-PL	MKBA-LE75-B-PL	MKBA-LE75□-■
MKBA-LE150-A-PL	MKBA-LE150-B-PL	MKBA-LE150□-■
MKBA-LE225-A-PL	MKBA-LE225-B-PL	MKBA-LE225□-■
MKBA-LE300-A-PL	MKBA-LE300-B-PL	MKBA-LE300□-■
MKBA-LE375-A-PL	MKBA-LE375-B-PL	MKBA-LE375□-■
-	MKBA-LE450-B-PL	MKBA-LE450□-■

LIGHTING OPTION

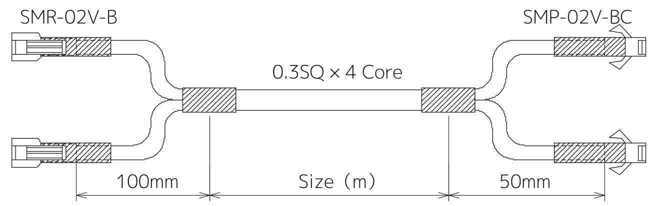
Extension cable for LED lighting

1ch Cable



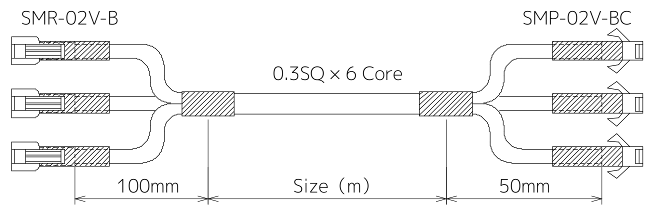
Model	Size (m)
M-CB-S1	1
M-CB-S2	2
M-CB-S3	3
M-CB-S4	4
M-CB-S5	5
M-CB-S10	10

2ch Cable



Model	Size (m)
M-CB-D1	1
M-CB-D2	2
M-CB-D3	3
M-CB-D4	4
M-CB-D5	5
M-CB-D10	10

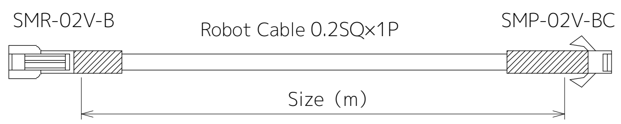
3ch Cable



Model	Size (m)
M-CB-T1	1
M-CB-T2	2
M-CB-T3	3
M-CB-T4	4
M-CB-T5	5
M-CB-T10	10

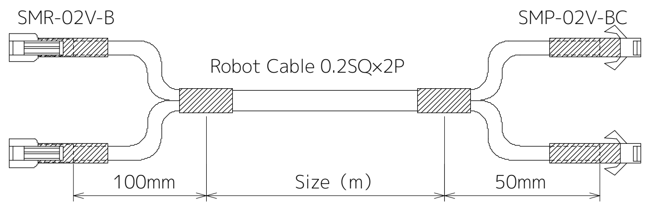
Extension robot cable for LED lighting

1ch Robot Cable



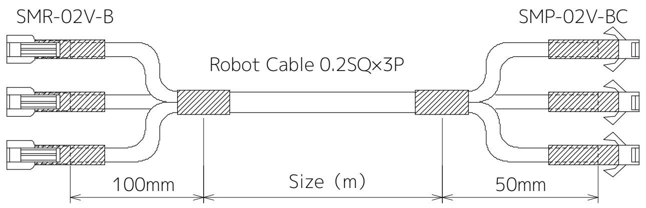
Model	Size (m)
M-CB-S1R-C02	1
M-CB-S2R-C02	2
M-CB-S3R-C02	3
M-CB-S4R-C02	4
M-CB-S5R-C02	5
M-CB-S10R-C02	10

2ch Robot Cable



Model	Size (m)
M-CB-D1R-C02	1
M-CB-D2R-C02	2
M-CB-D3R-C02	3
M-CB-D4R-C02	4
M-CB-D5R-C02	5
M-CB-D10R-C02	10

3ch Robot Cable

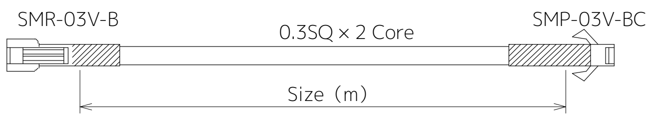


Model	Size (m)
M-CB-T1R-C02	1
M-CB-T2R-C02	2
M-CB-T3R-C02	3
M-CB-T4R-C02	4
M-CB-T5R-C02	5
M-CB-T10R-C02	10

LIGHTING OPTION

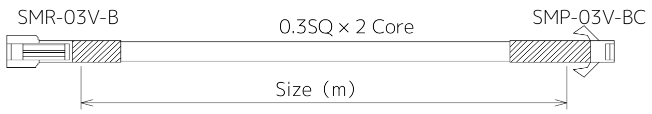
Extension cable for very bright coaxial & spot lighting MHV, & MHVE

For MHV



Model	Size (m)
M-CB-S1-HV	1
M-CB-S2-HV	2
M-CB-S3-HV	3
M-CB-S4-HV	4
M-CB-S5-HV	5

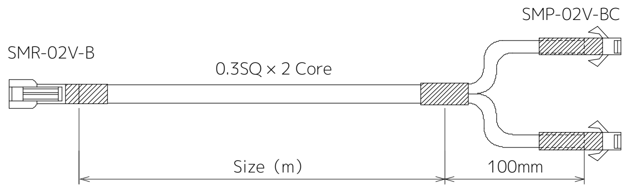
For MHVE



Model	Size (m)
M-CB-S1-HV3W	1
M-CB-S2-HV3W	2
M-CB-S3-HV3W	3
M-CB-S4-HV3W	4
M-CB-S5-HV3W	5

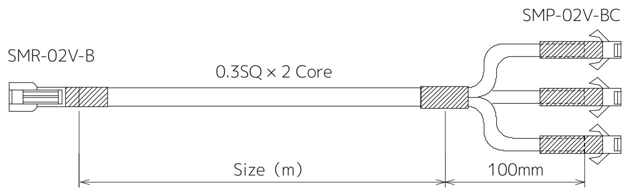
Extension branch cable for LED lighting

Two branches Cable



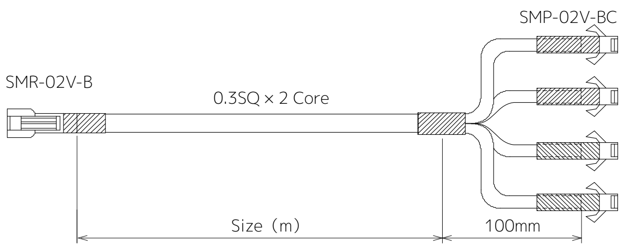
Model	Size (m)
M-2M-1-100	1
M-2M-2-100	2
M-2M-3-100	3
M-2M-4-100	4
M-2M-5-100	5
M-2M-10-100	10

Three branches Cable



Model	Size (m)
M-3M-1-100	1
M-3M-2-100	2
M-3M-3-100	3
M-3M-4-100	4
M-3M-5-100	5
M-3M-10-100	10

Four branches Cable



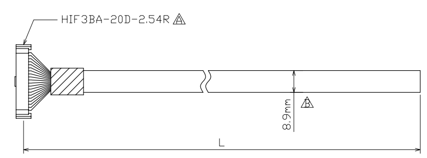
Model	Size (m)
M-4M-1-100	1
M-4M-2-100	2
M-4M-3-100	3
M-4M-4-100	4
M-4M-5-100	5
M-4M-10-100	10

External control cable

ON/OFF cable, Dimmer cable ／MC-MIL-20 series

Compatible power supplies (external ON/OFF): MWDV-300S-24 / MDGB series (except MDGB-30M2) / MJS series
(external dimmer): MWDV-300S-24

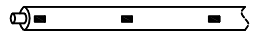
Pin No.	MDGB（4CH）	MDGB（8CH）	MWDV-300S-24
1	EXT 0~24V IN	EXT 0~24V IN	EXTCOM
2	EXT 0~24V IN	EXT 0~24V IN	NC
3	EXT ON/OFF CH1	EXT ON/OFF CH1	B0（LSB）
4	EXT ON/OFF CH2	EXT ON/OFF CH2	B1
5	EXT ON/OFF CH3	EXT ON/OFF CH3	B2
6	EXT ON/OFF CH4	EXT ON/OFF CH4	B3
7	RESERVED	EXT ON/OFF CH5	B4
8	RESERVED	EXT ON/OFF CH6	B5
9	RESERVED	EXT ON/OFF CH7	B6
10	RESERVED	EXT ON/OFF CH8	B7
11	Error Reset	Error Reset	B8
12	STATUS CH1	STATUS CH1	B9（MSB）
13	STATUS CH2	STATUS CH2	ON/OFF信号入力
14	STATUS CH3	STATUS CH3	NC
15	STATUS CH4	STATUS CH4	Status
16	RESERVED	STATUS CH5	COM
17	RESERVED	STATUS CH6	NC
18	RESERVED	STATUS CH7	NC
19	RESERVED	STATUS CH8	NC
20	STATUS COM	STATUS COM	NC



Model	Size (m)
MC-MIL-20-1	1
MC-MIL-20-2	2
MC-MIL-20-3	3
MC-MIL-20-5	5
MC-MIL-20-10	10

Pin No.	Cable Color	Dot Mark	Dot Color	Pin No.	Cable Color	Dot Mark	Dot Color
1	Orange	▬	Black	1	Orange	▬▬	Black
2	Orange	▬	Red	2	Orange	▬▬	Red
3	Yellow	▬	Black	3	Yellow	▬▬	Black
4	Yellow	▬	Red	4	Yellow	▬▬	Red
5	Light green	▬	Black	5	Light green	▬▬	Black
6	Light green	▬	Red	6	Light green	▬▬	Red
7	Gray	▬	Black	7	Gray	▬▬	Black
8	Gray	▬	Red	8	Gray	▬▬	Red
9	White	▬	Black	9	White	▬▬	Black
10	White	▬	Red	10	White	▬▬	Red

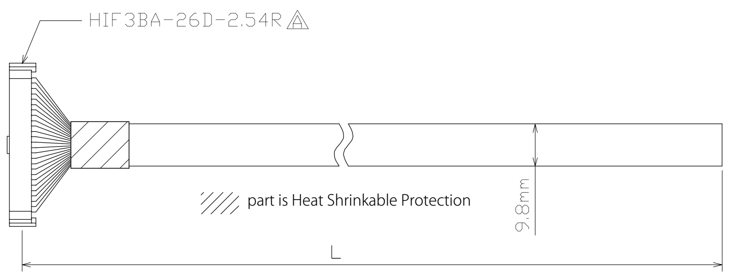
Core Wire image



Core Wire image

Dimmer cable (for VI/PI) ／MC-MIL-26 series

Compatible power supplies (external ON/OFF): MWDV-600M2-24 / MDGB-30M2
(external dimmer): MWDV-600M2-24 / MDGB series



Model	Size (m)
MC-MIL-26-1	1
MC-MIL-26-2	2
MC-MIL-26-3	3
MC-MIL-26-5	5
MC-MIL-26-10	10

Pin No.	Cable Color	Dot Mark	Dot Color	Pin No.	Cable Color	Dot Mark	Dot Color	Pin No.	Cable Color	Dot Mark	Dot Color
1	Orange	▬	Black	11	Orange	▬▬	Black	21	Orange	▬▬▬	Black
2	Orange	▬	Red	12	Orange	▬▬	Red	22	Orange	▬▬▬	Red
3	Yellow	▬	Black	13	Yellow	▬▬	Black	23	Yellow	▬▬▬	Black
4	Yellow	▬	Red	14	Yellow	▬▬	Red	24	Yellow	▬▬▬	Red
5	Light green	▬	Black	15	Light green	▬▬	Black	25	Light green	▬▬▬	Black
6	Light green	▬	Red	16	Light green	▬▬	Red	26	Light green	▬▬▬	Red
7	Gray	▬	Black	17	Gray	▬▬	Black				
8	Gray	▬	Red	18	Gray	▬▬	Red				
9	White	▬	Black	19	White	▬▬	Black				
10	White	▬	Red	20	White	▬▬	Red				

Core Wire image

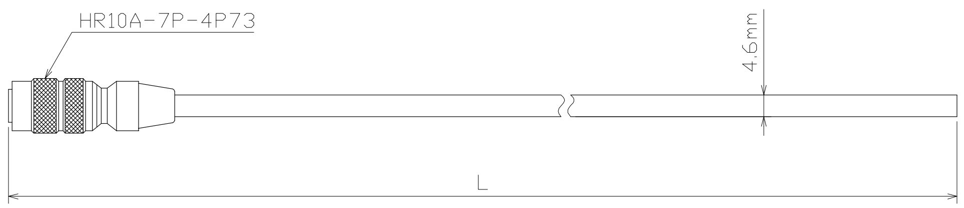
Core Wire image

Core Wire image

External control cable

Dimmer cable (for S2/S4) ／ MC-MCS2 series

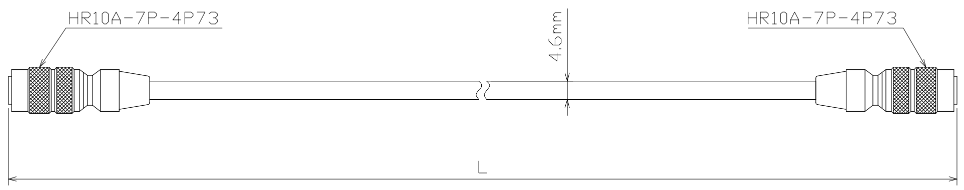
Compatible power supplies: MDGB series (-S2/PI, -S4/VI)



Model	Size (m)
MC-MCS2-1	1
MC-MCS2-2	2
MC-MCS2-3	3
MC-MCS2-5	5
MC-MCS2-10	10

Communication transition cable (for S4) ／ MC-MCS4 series

Compatible power supplies: MDGB series (-S2/PI, -S4/VI)



Model	Size (m)
MC-MCS4-1	1
MC-MCS4-2	2
MC-MCS4-3	3
MC-MCS4-5	5
MC-MCS4-10	10

LED lighting for image processing

Long life and low power consumption

Features

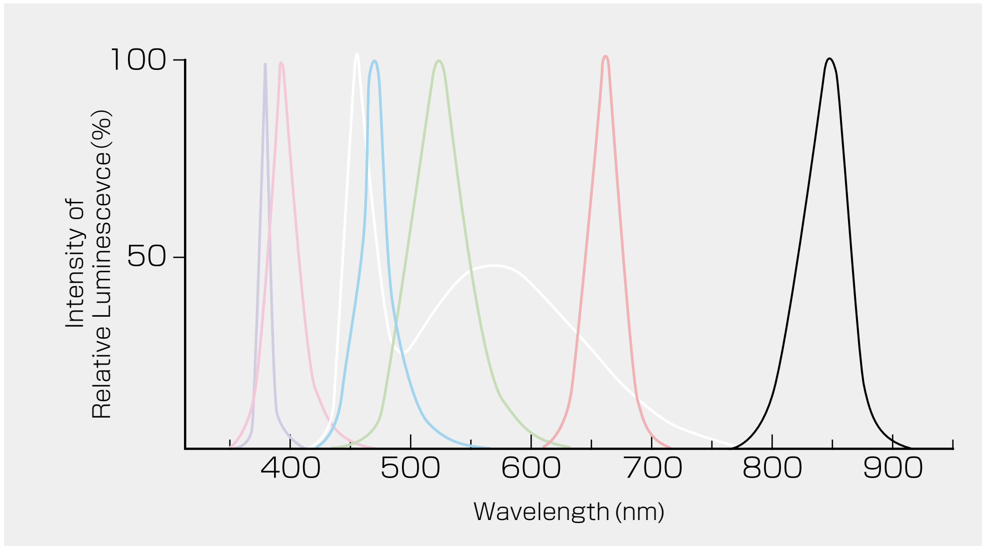
- ✓ Low power consumption
- ✓ Ten times longer life compare to halogen lamp and fluorescent light
- ✓ Greater flexibility in dimensions
- ✓ Suitable for narrow space or small device
- ✓ Excellent switch characteristics
- ✓ UV and IR lighting are also available

Comparison of characteristic of wave length

	Max. Wavelength	Main Uses of Inspection	Dispersion Rate
White	-	Color treating, etc	-
Ultraviolet	375nm	Inspection for fine scratches, etc.	Approx. 9times
	405nm		Approx. 8times
Blue	470nm	Inspection for scratches, etc.	Approx. 4times
Green	525nm	Visual Inspection, etc	Approx. 2.5times
Red	660nm	Use for backlight, etc	1
Infrared	850nm	Penetrating illumination	Approx. 0.4times

- As the wavelength is shorter, dispersion rate is increased, and it is suitable for surface inspection of fine scratch.
- If the object and LED are same color, it lowers the contrast.

Wavelength graph



CUSTOMIZATION

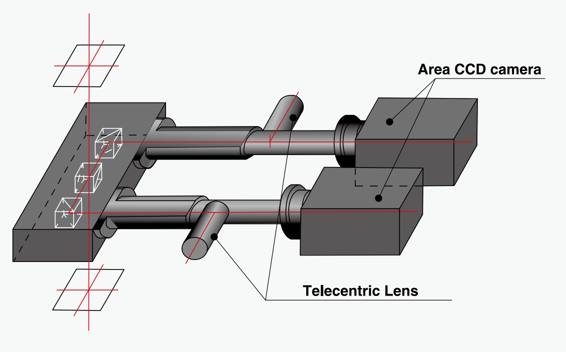
Customization

Customization Optical System

We can customize for your request. Semi-customized, fully customized, and OEM.

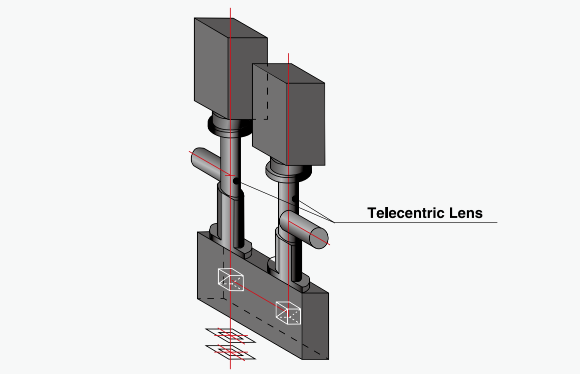
Production example

Top and bottom double field / Two magnification



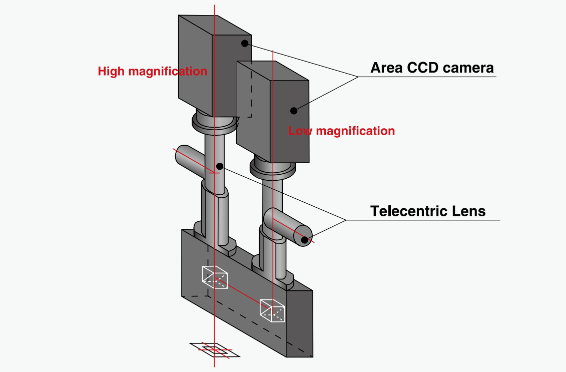
● Optical system to stick together two objects that are matching each other

Twin lens two focuses system



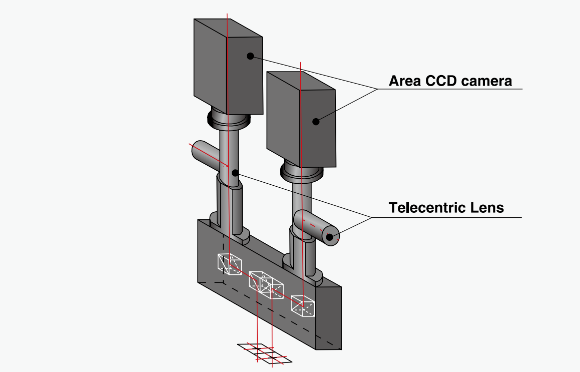
● Optical system to check at two focuses and two different magnification

Twin lens,two magnification system



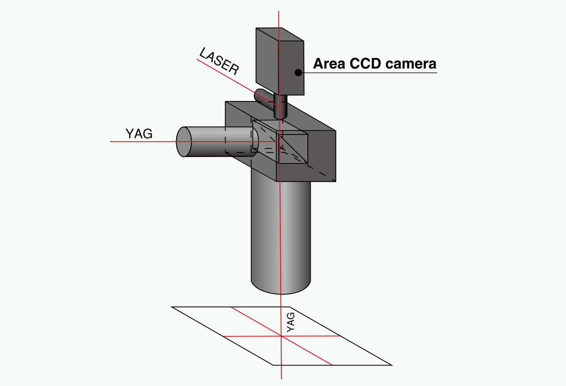
● Optical system to check an object at two different magnification

Optical system for inspection between two points

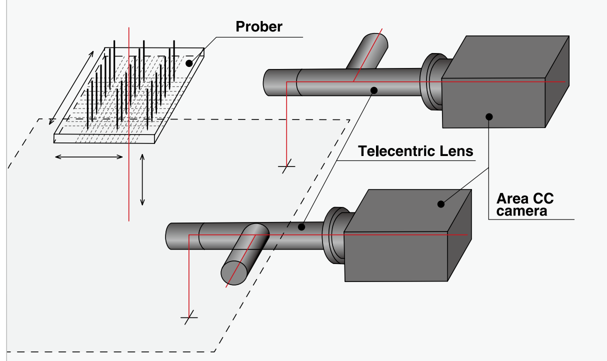


● Optical system to check narrow pitch marks between two points

YAG laser optical system



Prober alignment



CUSTOMIZATION

Work Flow

When you request the Customization products, please consult with the sales staff. We will discuss the specification each other, and then start to design by our engineer. After confirming the designed drawing, specification, Demo, and mass production will be started.

- Consult
- Design
- Demo Production
- Shipment
- Test
- Mass Production
- Shipment

Design / Development

Customization

Propose optical design for a special request
Customize lens mount and mechanical design

Optical unit

Propose optical system, including a lens, camera and illumination as a unit

SUPPORT

CUSTOMER SUPPORT

We will support both before and after sales service to each customers. We deal with any products except the catalogue products. Also, the custom and the semicustom production are available.
This Home page is written in not only, Japanese, but also English, Chinese and Korean.
We have the staff who can speak each foreign language. Kindly contact with us for each inquiry.

Before sales service

Demo products is available at free of charge.

Download of the specifications and the drawings
You can download it from sign-in form page.
If you have more inquiries, please feel free to contact with us.

Consultation
The sales staff in charge will consult with you to choose the most suitable products.

After sales service

Download of the specifications and the drawings
You can download it from sign-in form page.
If you have more inquiries, please feel free to contact with us.

Tel +81-3-5612-1884
E-mail opt@myutron.com

MATERIAL

Glossary

Resolution(μm)

Resolution indicates the ability to recognize two points that are close together.
Resolution values in this catalogue are theoretical resolution at 550nm.
Resolution = 0.61 x λ / NA

Resolving power(line/mm)

Resolving power indicates the number of black and white lines distinguished within 1mm in an image through a black and white grid-like chart lens. It is expressed by line/mm.
For example, 100 line/mm means that black and white pitch 1/100mm(10μ) can be distinguished. The width of both the black and white lines is 1/200mm(5μ).

Horizontal TV resolution

The total number of black and white horizontal stripes on a TV monitor screen.
It is expressed in TV lines. For resolving power, a pair of black and white lines is counted as one line.
However, for TV lines, one pair is counted as 2 TV lines. For example, if 470 horizontal TV lines of 1/2 CCD (H = 6.4mm) is used, required resolving power is 1mm/(6.4mm/(470/2)) = 36.72/mm.

Aperture efficiency/Relative illumination (%)

Aperture efficiency indicates the brightness difference between the optical axis of the image formation plane and its surrounding area when an evenly bright object is captured with a lens. It is expressed by percent(%) assuming that the center brightness is 100. It is one of a lens's optical characteristics.

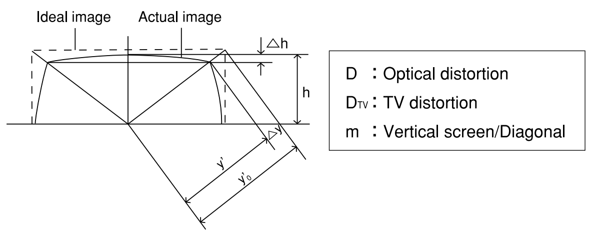
Shading

Shading is the brightness difference between TV monitor's center and its edges when an evenly bright object is captured with a lens. Shading indicates comprehensive performance of a lens and TV camera.

Chromatic aberration

In lenses' optional systems, positions where images are formed and image magnification differ according to light's wavelength. Rays with different wavelengths have different colors. This is called chromatic aberration. Aberration on the optical axis is called chromatic aberration on the axis and magnification difference is called magnification chromatic aberration.

Distortion



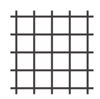
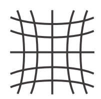
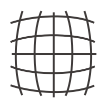
Optical distortion
Lens's aberration where a straight object outside of the optical axis appears curved.

$$D=\frac{y'-y'_0}{y'_0}\times100\%$$

Positive distortion of a straight line is called pincushion distortion. Negative distortion is called barrel distortion.

TV distortion
Image distortion on a TV monitor. The closer to zero, the better the performance.

$$D_{TV}=\frac{\triangle h}{2h}\times100\%$$

Object	Pincushion distortion	Barrel distortion
		

F Number (F No)

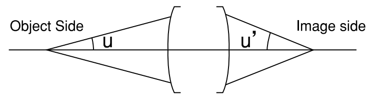
The brightness of a lens at infinity. It is calculated by dividing the focal length by the diameter of entrance pupil (D) (effective aperture)).
F No. = f/D

Effective F No

The brightness of a lens at a certain magnification.
Effective F No. = (1 + M) x F No.

NA

The higher the NA, the greater the resolution and brightness are. When the half angle that an image makes on exit pupil is u' and refractive index is n', n' xsin u' is called image side numberical aperture, NA'.
NA in this catalogue indicates object side numerical aperture.



NA＝n × sin u
NA'＝n' × sin u'

NA=M/2xF, NA'=1/2xF.
Relation of NA and NA' is NA=NA' x Optical magnfification or NA'=NA/optical magnficiattion.

MTF

It provides a graph analyzing a lens' ability to resolve sharp details in very fine sets of parallel lines, and a lens' contrast or ability to provide a sharp transfer between light and dark areas in sets of thicker parallel lines.

Depth of field

Images through lenses theoretically form as points. Acceptable blur on an acceptably clear image is called the permissible circle of confusion.Depth is the distance between the nearest and farthest points that appear in acceptably sharp focus when an object is shifted back and force from the best focal point. Depth range of the object side is called depth of field.
Depth of field = 2(Permissible circle of confusion x Effective F No/Magnification^2)

Depth of focus

Depth is the distance between the nearest and farthest points that appear in acceptably sharp forcus when a CCD is shifted back and force from the best focal point. Depth range of the image side is called depth of focus.

Angle of view

The angle formed by imaginary lines connecting the lens second principal point with both ends of the image diagonal. Angle of view is directly associated with lens focal length. As the focal length is longer, the angle of view is narrower.
Angle of view = 2xtan^{-1D}（Image size）／2ｆ（Focal length）

WD

Distance from the object to the front lens.

OI

Distance from the object to the image sensor.

Focal length

Focal length is the distance from the optical system's principle point to the focal point. Distance from the vertex of the last lens to the back focal point is called back length. Distance from the vertex of the first lens to the front focal point is called front focal length.

Image size

The diameter of the sharp image circle formed by a lens. Area sensor is expressed by inch, and diameter of image circle is equal to diagonal of sensor. Image circle of diameter for line sensor is equal to the maximum sensor size. It is expressed by pixel size x resolution.

Optical Data

How to calculate optical magnification

Most of lenses in this catalogue are designed for finite distance. Image format (sensor size) divided by object size equal to optical magnification. It is the most important to select a lens.

Image Format

Area Sensor / Large Area Sensor

Examples of area sensor and large area sensor.
Different size of sensor will be expected to be available for various applications.

Area Sensor

Image Size (inch)	1/3	1/2.5	1/2	1/1.8	2/3 (5MP)	1 (5MP)	1 (20MP)	1.1 (12MP)	1.1 (25MP)	4/3
Vertical (mm)	3.6	4.27	4.8	5.35	7.1	10.2	8.81	10.35	12.8	13
Horizontal (mm)	4.8	5.7	6.4	7.14	8.47	12.8	13.19	14.13	12.8	17.3
Diagonal (mm)	6	7.12	8	8.93	11	16.4	15.86	17.5	18.1	23.5

Large Area Sensor

Resolution (Mega Pixel)	19.6MP	20MP	25MP	31MP	51MP	61MP	65MP	71MP	101MP	120MP	151MP
Resolution (H x V)	4416 x 4428	5120 x 3840	5120 x 5120	6464 x 4852	8424 x 6032	9588 x 6380	9344 x 7000	10000 x 7096	11648 x 8742	13264 x 9176	14192 x 10640
Pixel size (μm)	3.45	6.4	4.5	3.45	4.6	3.76	3.2	3.1	3.76	2.2	3.76
Vertical (mm)	15.24	24.6	23.04	22.3	38.75	35.98	29.9	31	43.8	29.18	53.36
Horizontal (mm)	15.28	32.8	23.04	16.74	27.75	23.99	22.4	22	32.87	20.19	40.01
Diagonal (mm)	21.6	41	32.6	27.9	47.7	43.2	37.4	38	54.8	35.5	66.7

Line Sensor

Length of line sensor is formed, depended on pixel size and resolution. As the sensor size is larger, design and manufacture of a lens for line sensor are more difficult and complicated.

Resolution (pixel)	1024	1024	2048	2048	4096	7450	8192	16384	12288	16384	23360
Pixel size (μm)	10	14	10	14	7	4.7	7	3.5	5	5	3.5
Sensor Size (mm)	10.24	14.34	20.48	28.67	28.67	35	57.34	57.34	61.44	81.92	81.76

Formula of optical magnification

Field of View (FOV)

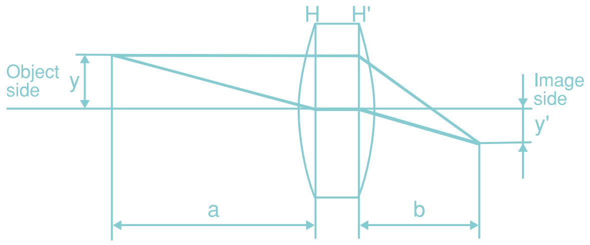
The actual size of a viewed object that can be taken when a lens is mounted to a camera.
Ex). Magnification: 0.5x Image format: 1/2

Vertical FOV = 4.8 ÷ 0.5 = 9.6mm Horizontal FOV = 6.4 ÷ 0.5 = 12.8mm

Magnification

Magnification (M) = Image format/FOV

$$M = y'/y = b/a$$

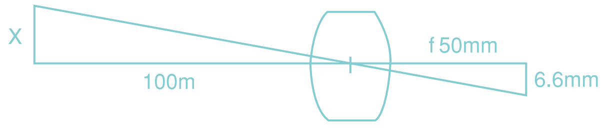


How to calculate focal length and photographic range

Formula of photographic range

$$X = \frac{\text{(Distance from lens to object)} \times \text{(Image size)}}{\text{Focal length}}$$

Ex. Object distance: 100m Focal length: 50mm CCD: 2/3

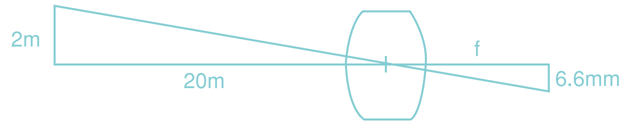


$$X = \frac{100{,}000 \times 6.6}{50} = 13{,}200 \text{ (mm)}$$ Height: 13.2m

Formula of Focal length

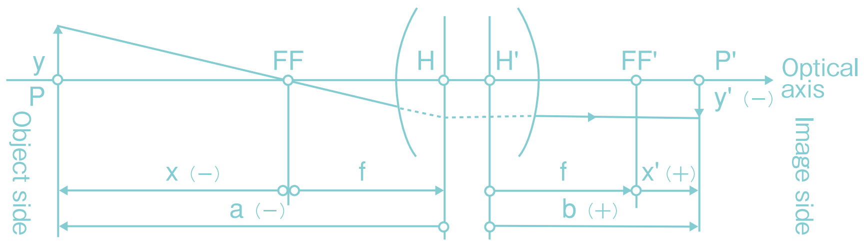
$$f = \frac{\text{(Distance from lens to object)} \times \text{(Image size)}}{\text{Height}}$$

Ex. Object distance: 20m Height: 2m CCD: 2/3



$$f = \frac{20{,}000 \times 6.6}{2{,}000} = 66 \text{ (mm)}$$ Focal length: 66mm

Formula of conjugation relationship



f : Focal length
FF : Front side focal point
FF' : Rear side focal point
H : Front side principal point
H' : Rear side principal point
P : Object point
P' : Image point
a : Distance from front side point to object point
b : Distance from rear side principal point to image point
x : Distance from front side principal point to object point
x' : Distance from rear side focal point to image side point
M : Magnification

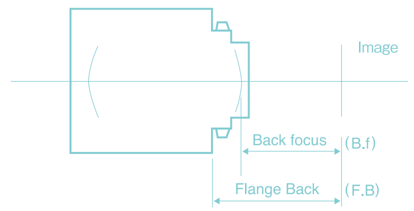
Basics formula	Horizontal magnification	Object point distance	Image point distance
$-\frac{1}{a}+\frac{1}{b}=\frac{1}{f}$	$M=\frac{y'}{y}=\frac{b}{a}$	$-a=(1-\frac{1}{M})\times f$	$b=(1-M)\times f$

F No./NA Formula

Relationship of object side NA and image side NA (NA')	Relationship of F No. and Effective F no.(Fe)	Relationship of NA and Effective F No.
$NA'=\frac{NA}{M}$	$Fe=(1+M)F$	$NA'=\frac{1}{2Fe}$ $NA'=\frac{1}{2(1+M)F}$ $NA=\frac{M}{2Fe}$ $NA=\frac{M}{2(1+M)F}$

Camera mount and Flange Back

- Back focus : Distance from the vertex of the last lens to the image plane
- Flange Back : Distance from the surface of lens mount to the image plane



Name	Flange Back	Screw size
C Mount	17.526mm	25.4mm 32tpi thread
F Mount	46.5mm	Bayonet

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