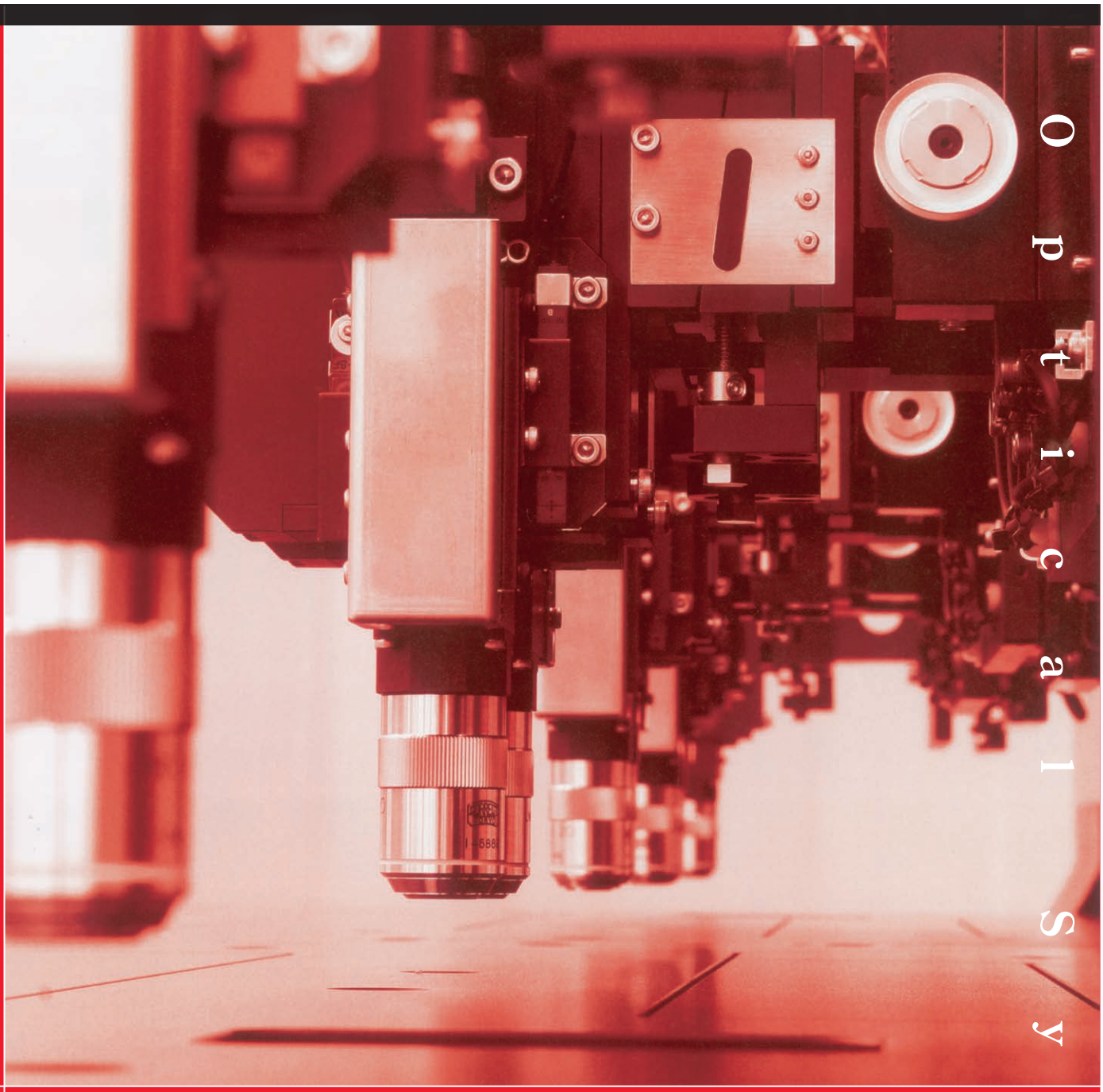


Optical System

Optical System

This section presents optical lens assemblies for alignment systems, measurement and shape recognition. Combining these lens assemblies in various ways will provide a unique solution to any optical problem.

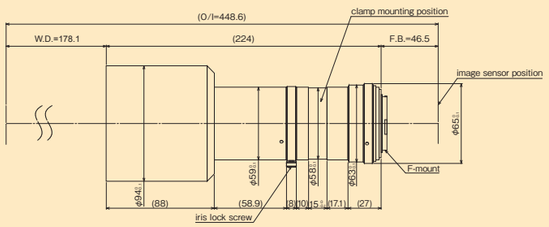
Image Circle 33mm High resolution Telecentric lens

SVL-TC33 series

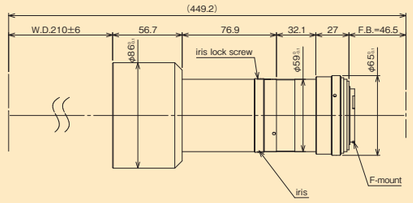
Straight type

Both side telecentric lens for super high resolution 25M pixel camera. It helps to improve performance and tact-up of various inspection equipment. Possible to offer Coaxial illumination port type. Please contact us.

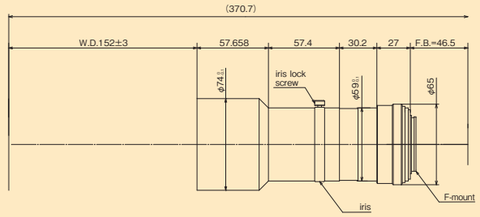
SVL-0.45X-TC33



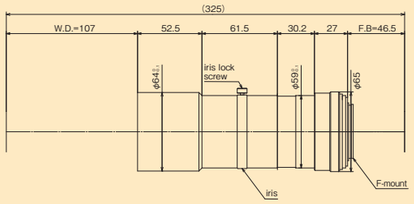
SVL-0.55X-TC33



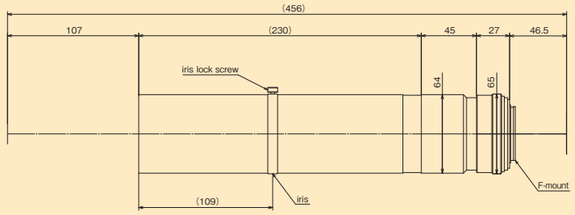
SVL-0.75X-TC33



SVL-1X-TC33



SVL-2X-TC33



■ Specification

Model #	SVL-0.45X-TC33	SVL-0.55X-TC33	SVL-0.75X-TC33	SVL-1X-TC33	SVL-2X-TC33
Magnification	0.45X	0.55X	0.75X	1X	2X
Working distance	178mm	210mm	152mm	107mm	107mm
Focal depth	2.96mm	1.79mm	1.02mm	0.57mm	0.14mm
Distortion (Aperture full open)	0.01% or less	0.01% or less	0.01% or less	0.01% or less	0.01% or less
Resolution LP/mm	89LP/mm	119LP/mm	154LP/mm	208LP/mm	416LP/mm
Resolution power	11.2μm	8.4μm	6.5μm	4.8μm	2.4μm
N.A. (Aperture full open)	0.03	0.04	0.052	0.07	0.14
F number (Aperture full open)	7.5	6.8	7.2	7.1	7.2
Camera mount	F-MOUNT (M42 P=1.0 Mount)				
Image circle	ϕ33mm				
Weight	Approx 1.5kg	Approx 1.6kg	Approx 1.5kg		

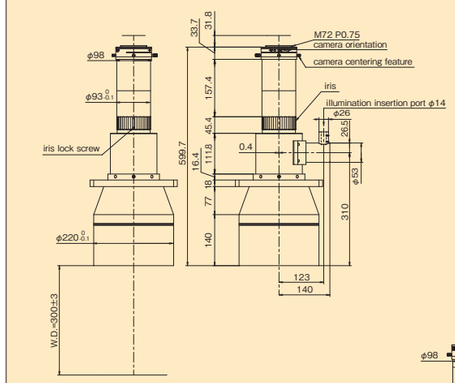
Telecentric Lens for Line Sensor Camera

SVL series

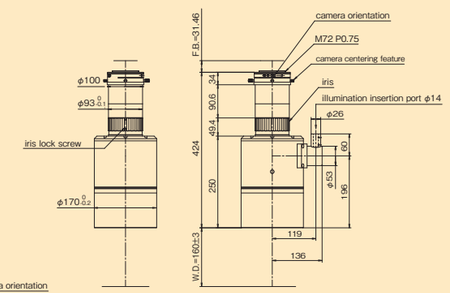
Coaxial type/Straight type

Telecentric lens for line sensor camera.
64mm maximum sensor size.
Ideal for capturing the image of glass substrate, the patterns on mirror.
Choose from a variety of camera mount options.

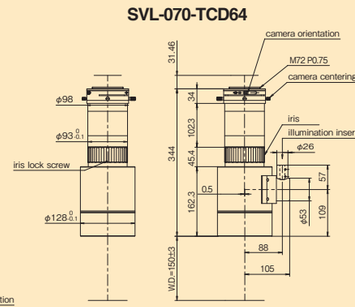
Coaxial SVL-035-TCD64



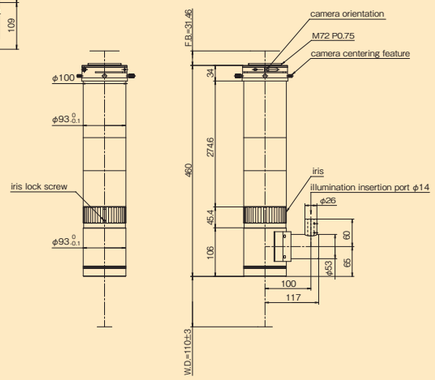
SVL-050-TCD64



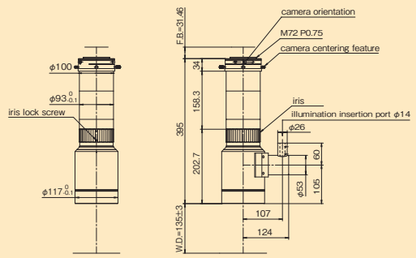
SVL-070-TCD64



SVL-200-TCD64



SVL-100-TCD64



■ Specification

Model #		SVL-035-TCD64	SVL-050-TCD64	SVL-070-TCD64	SVL-100-TCD64	SVL-200-TCD64
	Coaxial					
	Straight	—	SVL-050-TC64	SVL-070-TC64	SVL-100-TC64	SVL-200-TC64
Magnification		0.35X	0.5X	0.7X	1X	2X
Working distance		300mm	160mm	150mm	135mm	110mm
Focal depth		5.2mm	1.76mm	914μm	456μm	160μm
Distortion		0.06% or less	0.2% or less	0.1% or less	0.1% or less	0.02% or less
Resolution LP/mm		58LP/mm	126LP/mm	169LP/mm	220LP/mm	340LP/mm
Resolution power		17.2μm	7.9μm	5.9μm	4.5μm	2.9μm
N.A		0.022	0.045	0.062	0.087	0.124
F number		8	5.5	5.6	5.7	8
Camera mount		72mm P=0.75				
Maximum device		64mm				
Weight	Coaxial	Approx 17kg	Approx 9.3kg	Approx 7.3kg	Approx 5.3kg	Approx 5.1kg
	Straight	—	Approx 8.9kg	Approx 6.9kg	Approx 4.9kg	Approx 4.7kg

Telecentric Lens for 5 Megapixel Camera

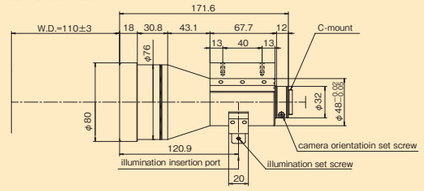
FXL series

Coaxial type/Straight type

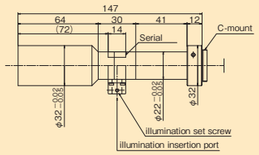
Telecentric lens compatible with 5M pixel camera. Ideal for capturing image in wide field, and high-resolution alignment.
Over 100mm WD enables inspection both with incident lighting and coaxial lighting.

Coaxial

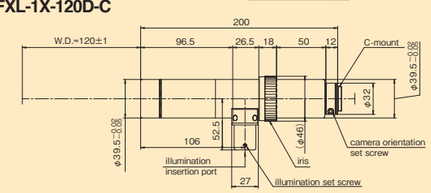
FXL-0.19X-110D-CESF



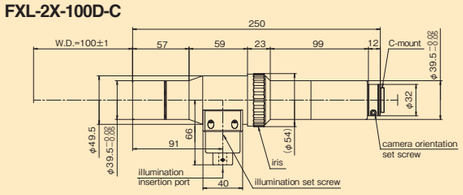
FXL-0.47X-130D-C



FXL-1X-120D-C

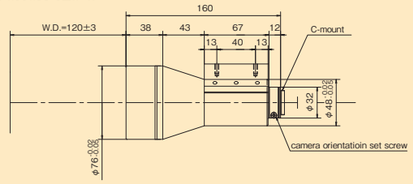


FXL-2X-100D-C

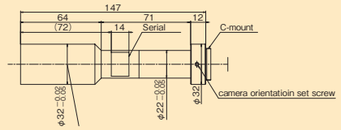


Straight

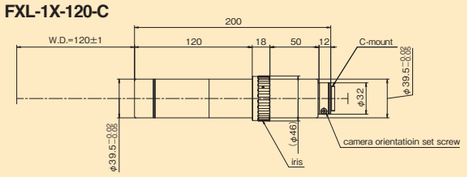
FXL-0.19X-120-C



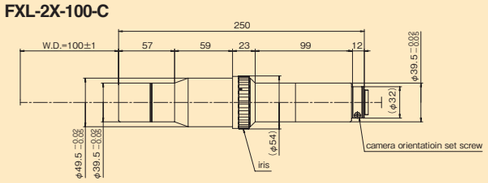
FXL-0.47X-130-C



FXL-1X-120-C



FXL-2X-100-C



■ Specification

Model #		FXL-0.19X-110D-CESF	FXL-0.47X-130D-C	FXL-1X-120D-C	FXL-2X-100D-C
	Straight	FXL-0.19X-120-C	FXL-0.47X-130-C	FXL-1X-120-C	FXL-2X-100-C
Magnification		0.19X	0.47X	1X	2X
Working distance		Coaxial:110mm Straight:120mm	130mm	120mm	100mm
Focal depth		13.3mm	2.9mm	560μm	160μm
Distortion		0.02% or less	0.01% or less	0.05% or less	0.05% or less
Resolution LP/mm		48LP/mm	69LP/mm	192LP/mm	340LP/mm
Resolution power		21μm	14.4μm	5.2μm	2.9μm
N.A.		0.017	0.028	0.072	0.13
F number		6	8.1	7	8
Camera mount		C-MOUNT			
Equivalent sensor		Under 2/3 inch camera	Under 1/1.8 inch camera	Under 2/3 inch camera	
Weight	Coaxial	580g	158g	410g	540g
	Straight	480g	150g	360g	490g

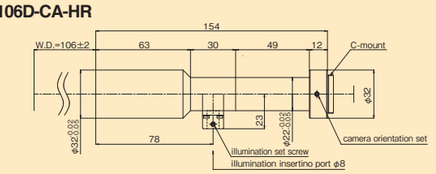
Telecentric Lens for 2 Megapixel Camera

FXL HR series

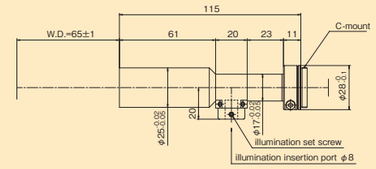
Coaxial type / Straight type

Telecentric lens for 2 megapixel camera. Designed for high-resolution alignment and size measurement. Some models are compatible with 5 megapixel camera. Choose from coaxial type and straight type.

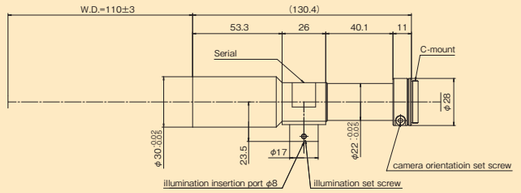
FVL-0.5X-106D-CA-HR



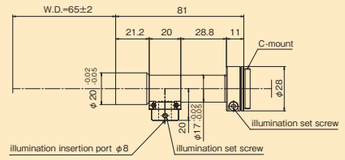
FVL-1X-65D-CA-HR



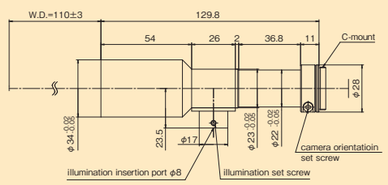
FVL-1.5X-110D-CA-HR



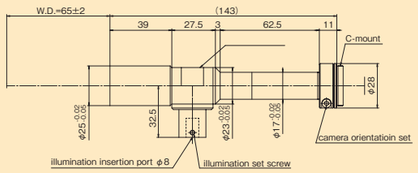
FVL-2X-65D-CA-HR



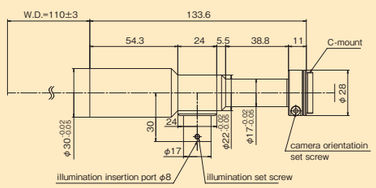
FVL-2X-110D-CA-HR



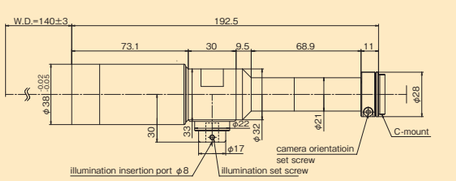
FVL-4X-65D-CA-HR



FVL-4X-110D-CA-HR



FVL-4X-140D-CA-HR



■ Specification

Model #		FVL-0.5X-106D-CA-HR	FVL-1X-65D-CA-HR	FVL-1.5X-110D-CA-HR	FVL-2X-65D-CA-HR	FVL-2X-110D-CA-HR	FVL-4X-65D-CA-HR	FVL-4X-110D-CA-HR	FVL-4X-140D-CA-HR
	Straight	FVL-0.5X-106-CA-HR	FVL-1X-65-CA-HR	FVL-1.5X-110-CA-HR	FVL-2X-65-CA-HR	FVL-2X-110-CA-HR	FVL-4X-65-CA-HR	FVL-4X-110-CA-HR	FVL-4X-140-CA-HR
Magnification		0.5X	1X	1.5X	2X	2X	4X	4X	4X
Working distance		106mm	65mm	110mm	65mm	110mm	65mm	110mm	140mm
Focal depth		2.8mm	808μm	423μm	270μm	240μm	80μm	100μm	106μm
Distortion		Less than 0.05%	Less than 0.1%	Less than 0.01%	Less than 0.01%	Less than 0.01%	Less than 0.02%	Less than 0.025%	Less than 0.015%
Resolution LP/mm		80LP/mm	147LP/mm	188LP/mm	222LP/mm	222LP/mm	333LP/mm	256LP/mm	250LP/mm
Resolution power		12.0μm	6.8μm	5.3μm	4.5μm	3.9μm	2.7μm	3.5μm	3.5μm
N.A.		0.028	0.049	0.063	0.075	0.085	0.125	0.096	0.096
F number		8.8	10.1	11.9	13.3	11.8	15.8	21	21.2
Camera mount			C-MOUNT						
Equivalent sensor		Under 1/1.8 inch camera	Under 2/3 inch camera						
Weight	Coaxial	140g	82g	158g	56g	106g	106g	110g	220g
	Straight	133g	76g	150g	50g	100g	100g	102g	210g

Note: Resolution power is calculated as theoretical resolution based on NA of wavelength of 550nm.
Note: Focal depth is calculated as maximum circle of confusion is φ40μm.

C-mount Type

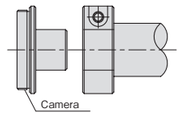
FVL65mm series

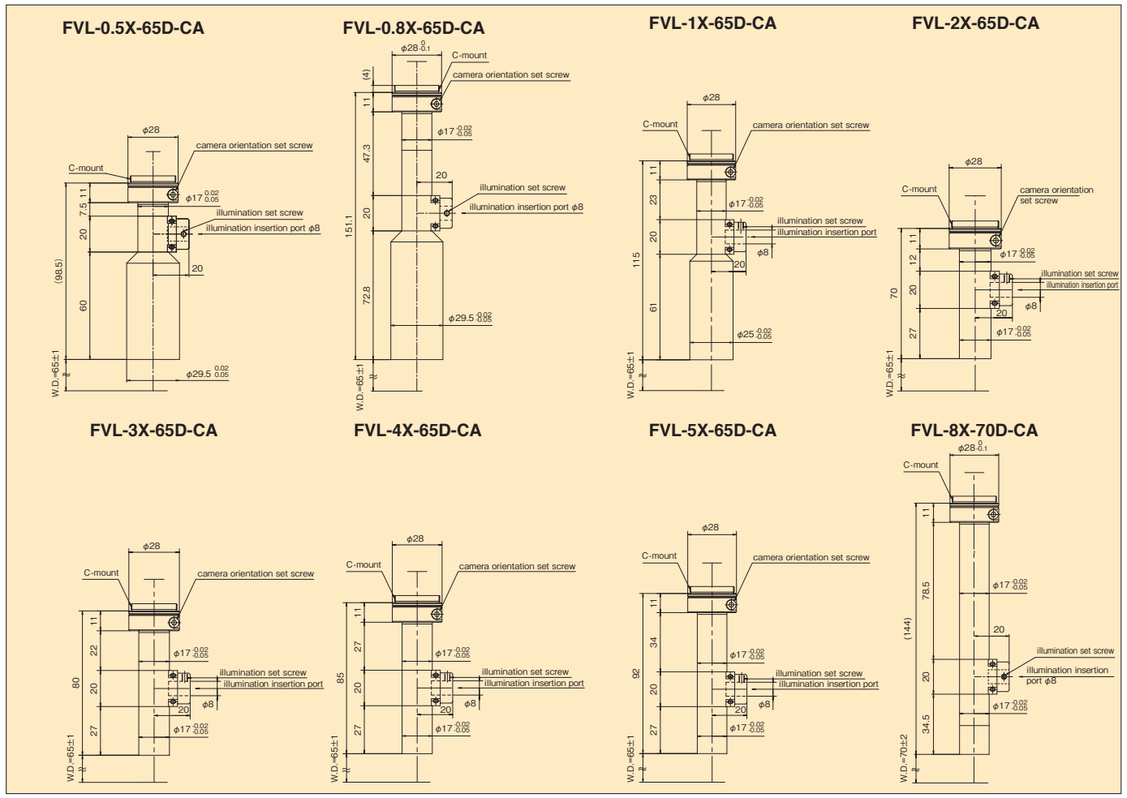
Coaxial illumination tube / Straight tube

WD=65mm Telecentric bonder lens. High-resolution, low distortion lens that is suitable for image processing systems. The lens uses a new C-mount adapter that allows total adjustment of camera orientation. Choose from a variety of illumination port styles and magnifications.

Split clamp C-mount type

Split clamp tightening method is adopted for easier camera orientation setting.





■ Specification

Model #		FVL-0.5×-65D-CA	FVL-0.8×-65D-CA	FVL-1×-65D-CA	FVL-2×-65D-CA	FVL-3×-65D-CA	FVL-4×-65D-CA	FVL-5×-65D-CA	FVL-8×-70D-CA
	Straight	FVL-0.5×-65-CA	FVL-0.8×-65-CA	FVL-1×-65-CA	FVL-2×-65-CA	FVL-3×-65-CA	FVL-4×-65-CA	FVL-5×-65-CA	–
Magnification		0.5X	0.8X	1X	2X	3X	4X	5X	8X
Working distance		65mm							70mm
Focal depth		1.7mm	1.3mm	920μm	326μm	197μm	131μm	97μm	60μm
Distortion		Less than 0.02%	Less than 0.2%	Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.4%
Resolution LP/mm		125LP/mm	120LP/mm	120LP/mm	178LP/mm	208LP/mm	238LP/mm	238LP/mm	244LP/mm
Resolution power		8.0μm	8.3μm	8.3μm	5.6μm	4.8μm	4.2μm	4.2μm	4.1μm
N.A.		0.046	0.04	0.04	0.06	0.07	0.08	0.08	0.081
F number		5.4	10.1	11.5	16.3	22.2	26.2	30.2	48.2
Camera mount		C-MOUNT							
Equivalent sensor		Under 1/2 inch camera	Under 2/3 inch camera						
Weight	Coaxial	100g	112g	82g	48g	50g	54g	58g	100g
	Straight	94g	106g	76g	42g	44g	48g	52g	–

C-mount Type

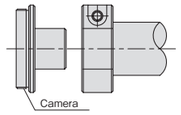
FVL120mm series

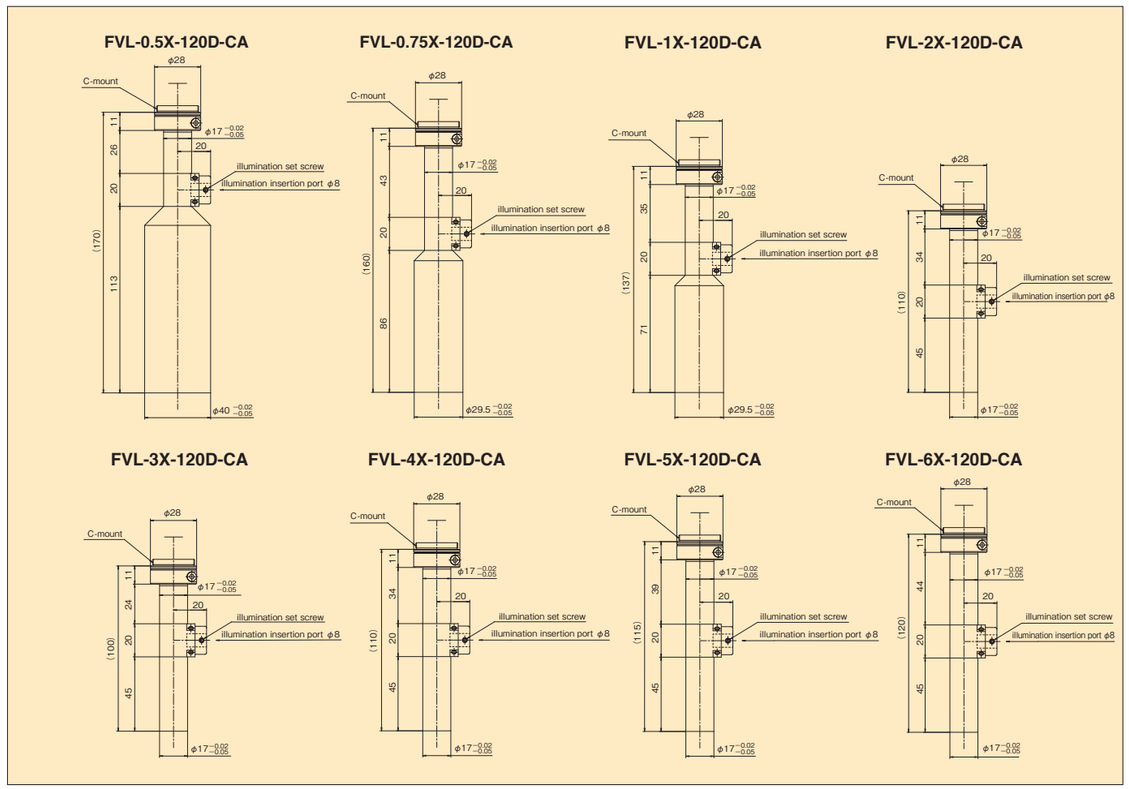
Coaxial illumination tube / Straight tube

WD=120mm Telecentric bonder lens. High-resolution, low-distortion lens that is suitable for image processing systems. The lens uses a new C-mount adapter that allows total adjustment of camera orientation. Choose from a variety of illumination port styles and magnifications.

Split clamp C-mount type

Split clamp tightening method is adopted for easier camera orientation setting.





■ Specification

Model #		FVL-0.5X-120D-CA	FVL-0.75X-120D-CA	FVL-1X-120D-CA	FVL-2X-120D-CA	FVL-3X-120D-CA	FVL-4X-120D-CA	FVL-5X-120D-CA	FVL-6X-120D-CA
	Straight	FVL-0.5X-120-CA	FVL-0.75X-120-CA	FVL-1X-120-CA	FVL-2X-120-CA	FVL-3X-120-CA	FVL-4X-120-CA	FVL-5X-120-CA	FVL-6X-120-CA
Magnification		0.5X	0.75X	1X	2X	3X	4X	5X	6X
Working distance		120mm							
Focal depth		3.0mm	1.9mm	1.3mm	650μm	323μm	220μm	168μm	138μm
Distortion		Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.1%	Less than 0.1%
Resolution LP/mm		80LP/mm	85LP/mm	91LP/mm	107LP/mm	120LP/mm	128LP/mm	135LP/mm	142LP/mm
Resolution power		12.5μm	11.8μm	11.0μm	9.3μm	8.3μm	7.8μm	7.4μm	7.0μm
N.A.		0.027	0.028	0.030	0.036	0.040	0.043	0.045	0.048
F number		9.3	13.3	16.7	32.5	36.3	43.9	52.4	62.2
Camera mount		C-MOUNT							
Equivalent sensor		Under 2/3 inch camera							
Weight	Coaxial	198g	124g	105g	66g	58g	66g	67g	75g
	Straight	192g	118g	99g	60g	52g	60g	61g	70g

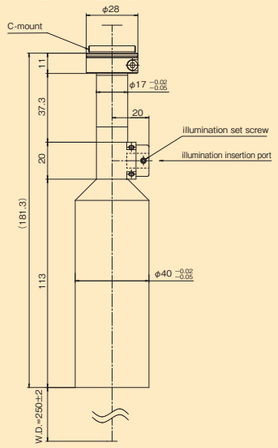
C-mount Type

FVL Custom series

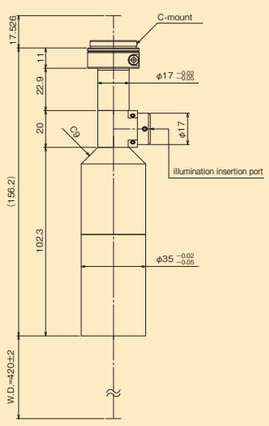
Coaxial type

Various lengths of WD models other than Standard WD(65mm, 120mm) are available. We accept custom design from 1pc. Please contact us.

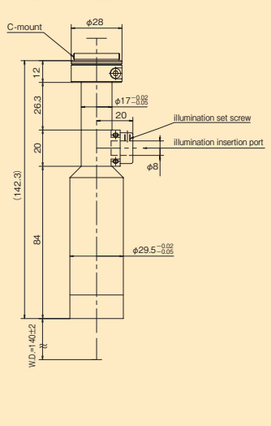
FVL-0.5X-250D-C



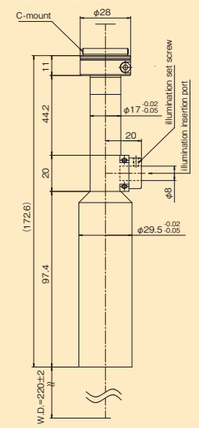
FVL-0.5X-420D-C



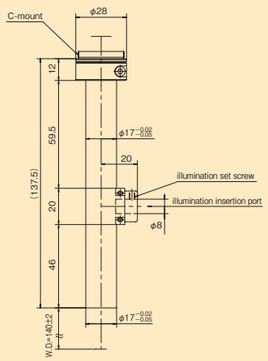
FVL-1X-140D-CA



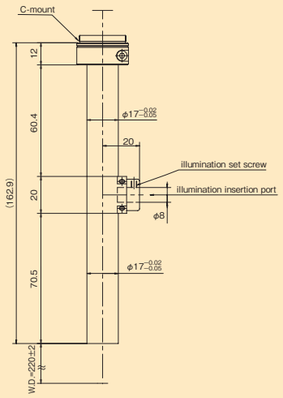
FVL-1X-220D-C



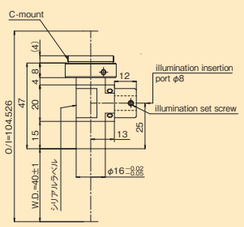
FVL-2X-140D-C



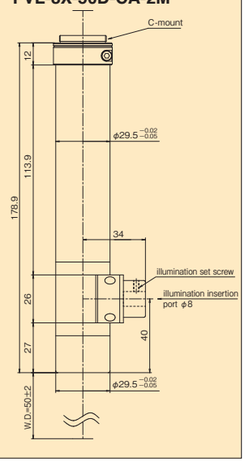
FVL-2X-220D-CA



FVL-1X-40D-CA



FVL-8X-50D-CA-2M



Specification

Model#	FVL-0.5X-250D-C	FVL-0.5X-420D-C	FVL-1X-140D-CA	FVL-1X-220D-C	FVL-2X-140D-C	FVL-2X-220D-CA	FVL-1X-40D-CA	FVL-8X-50D-CA-2M
Magnification	0.5X	0.5X	1X	1X	2X	2X	1X	8X
Working distance	250mm	420mm	140mm	220mm	140mm	220mm	40mm	50mm
Focal depth	3.6mm	5.9mm	1.3mm	1mm	642μm	1.1mm	864μm	50μm
Distortion	0.3% or less	0.2% or less	0.2% or less	0.5% or less	0.2% or less	0.2% or less	0.08% or less	0.2% or less
Resolution LP/mm	58LP/mm	40LP/mm	91LP/mm	119LP/mm	95LP/mm	56LP/mm	128LP/mm	277LP/mm
Resolution power	17μm	25μm	11.0μm	8.4μm	10.5μm	17.7μm	7.8μm	3.6μm
N.A.	0.0223	0.014	0.03	0.04	0.032	0.019	0.046	0.111
F number	11.2	18.5	16.6	12.5	32.1	53.6	10.8	39.74
Camera mount	C-mount							
Equivalent sensor	under 1/2 inch camera		under 2/3 inch camera		under 1/2 inch camera	under 2/3 inch camera		

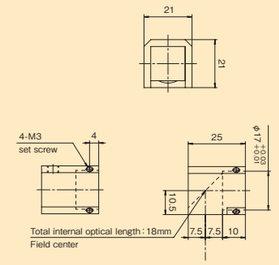
PRISM MOUNT series

Right angle prism mount (90°Up/Down, 90°Side view)

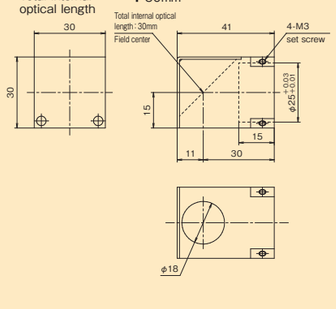
Dual right angle prism mount

Right Angle and Dual right angle prism mounts are available for all Telecentric/Non Telecentric lenses with different diameters.

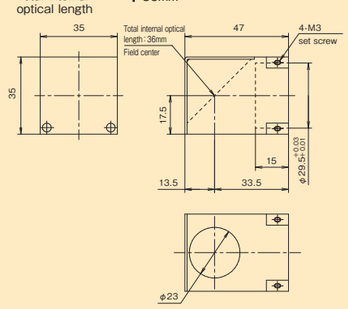
MPM-2 | For φ17 lens tube
Total internal optical length | 18mm



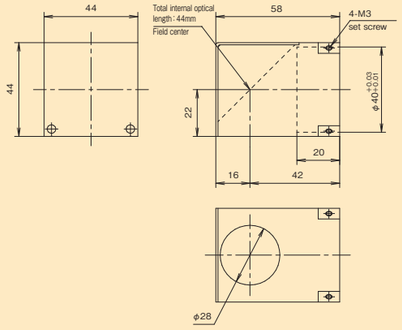
PM-2-φ25 | For φ25 lens tube
Total internal optical length | 30mm



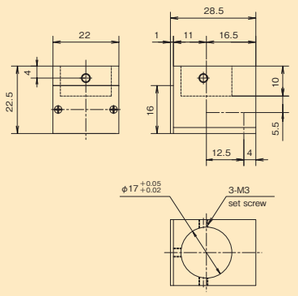
PM-2-φ29.5 | For φ29.5 lens tube
Total internal optical length | 36mm



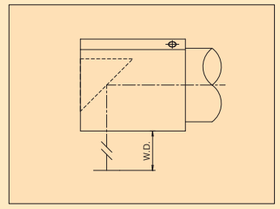
PM-2-φ40 | For φ40 lens tube
Total internal optical length | 44mm



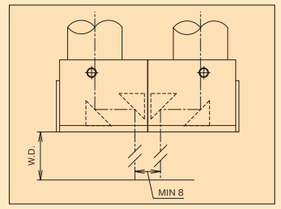
MPM-5 | For φ17 lens tube
Total internal optical length | 26mm



Right angle prism mount



Dual right angle prism mount



Specification

Model	MPM-2 (Working Distance w/ Lens Tube)
FVL65mm series	47mm
FVL120mm series	102mm

Model	PM-2-φ25 (Working Distance w/ Lens Tube)
FVL65mm series	35mm

Model	PM-2-φ29.5 (Working Distance w/ Lens Tube)
FVL65mm series	29mm
FVL120mm series	84mm

Model	PM-2-φ40 (Working Distance w/ Lens Tube)
FVL120mm series	76mm

Model	MPM-5 (Working Distance w/ Lens Tube)
FVL65mm series	39mm
FVL120mm series	94mm

CCTV LENS

STV series

Low cost CCTV Lens suitable for various angle of view. Various product lineup according to the camera to be combined.

Fixed focus lens for Mega pixel camera (1 inch - 1.1 inch)

1 - 1.1 inch camera compatible fixed focus lens.

Model #	STV-6-MP-1inch	STV-8-MP-1inch	STV-12.5M-1inch	STV-16-MP-1.1inch	STV-25-MP-1.1inch	STV-35-MP-1.1inch
Equivalent sensor	1	1	1	1.1	1.1	1.1
Focal length	6	8	12.5	16	25	35
F No.	F1.8~16	F1.4~16	F1.4~22	F1.4~26	F1.4~16	F1.4~16
Min. working distance	0.1m	0.1m	0.3m	0.3m	0.3m	0.3m
Camera mount	C-mount					
Iris control	Manual					

Fixed focus lens for 5 Mega pixel camera

5 mega pixel (1pixel = 3.45micron) camera compatible fixed focus lens.

Model #	STV-8M-5MP	STV-12M-5MP	STV-16M-5MP	STV-25M-5MP	STV-35M-5MP
Equivalent sensor	2/3	2/3	2/3	2/3	2/3
Focal length	8	12	16	25	35
F No.	F2.8~22	F1.8~22	F1.4~22	F1.4~22	F1.4~22
Min. working distance	0.1m	0.15m	0.2m	0.2m	0.25m
Camera mount	C-mount				
Iris control	Manual				

Fixed focus lens for 3 Mega pixel camera

3 mega pixel (1pixel = 4.5 micron) camera compatible fixed focus lens.

Model #	STV-8-3MP	STV-12-3MP2	STV-16-3MP2	STV-25-3MP	STV-35-3MP2
Equivalent sensor	2/3	2/3	2/3	2/3	2/3
Focal length	8	12	16	25	35
F No.	F1.4~Close	F1.8~Close	F1.4~22	F1.4~22	F1.4~22
Min. working distance	0.1m	0.2m	0.2m	0.2m	0.25m
Camera mount	C-mount				
Iris control	Manual				

φ29mm fixed focus lens for Mega pixel camera

Mega pixel camera compatible fixed focus lens.

Model #	STV-6VH	STV-16-EHF	STV-25M	STV-35M	STV-50M
Equivalent sensor	1/2	1/1.8	2/3	2/3	2/3
Focal length	6	16	25	35	50
F No.	F1.4~16	F1.4~16	F1.4~16	F2.0~22	F2.8~22
Min. working distance	0.2m	0.3m	0.25m	0.25m	0.5m
Camera mount	C-mount				
Iris control	Manual				

Fixed focus lens for machine vision

300K-500K pixel camera compatible fixed focus lens.

Model #	STV-3.5V-2	STV-6V-2	STV-12V-2	STV-35H	STV-7.5V-2	STV-8V-2	STV-16V-2	STV-50V	STV-25V-2	STV-G50	STV-G75
Equivalent sensor	1/2	1/2	1/2	1/2	2/3	2/3	2/3	2/3	1	1	1
Focal length	3.5	6	12	35	7.5	8	16	50	25	50	75
F No.	F1.6~C	F1.4~C	F1.4~C	F1.2~C	F1.4~C	F1.3~C	F1.4~C	F1.8~C	F1.4~C	F1.8~C	F1.8~C
Min. working distance	0.1m	0.2m	0.3m	1.0m	0.2m	0.2m	0.4m	0.7m	0.5m	0.7m	0.8m
Camera mount	C-mount										
Iris control	Manual										

Note : We have adapter ring as an accessory. (Thickness: 0.5mm / 1mm / 5mm / 10mm / 20mm)
This ring is for macro shooting. Please contact us.

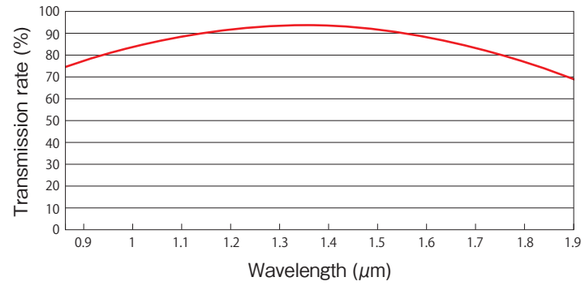
Lens for InGaAs Camera (900 - 1700nm)

InGaAs Camera (900 - 1700nm) compatible fixed focus lens.
Special coating is applied to each megapixel camera compatible lens.

Model #	STV-8M-IR	STV-12M-IR	STV-16M-IR	STV-25M-IR	STV-35M-IR
Equivalent sensor	2/3	2/3	2/3	2/3	2/3
Focal length	8	12	16	25	35
F No.	F2.6~22	F1.8~22	F1.4~22	F1.4~22	F1.4~22
Min. working distance	0.2m	0.25m	0.2m	0.2m	0.25m
Camera mount	C-mount				
Iris control	Manual				

Model #	STV -6-MPIR-1inch	STV -8-MPIR-1inch	STV -12.5-MPIR-1inch	STV -16-MPIR-1.1inch	STV -25-MPIR-1.1inch	STV -35-MPIR-1.1inch
Equivalent sensor	1	1	1	1.1	1.1	1.1
Focal length	6	8	12.5	16	25	35
F No.	F1.8~16	F1.4~16	F1.4~16	F1.4~16	F1.4~16	F1.4~16
Min. working distance	0.1m	0.1m	0.3m	0.3m	0.3m	0.3m
Camera mount	C-mount					
Iris control	Manual					

Reference: Lens transmission rate for InGaAs camera



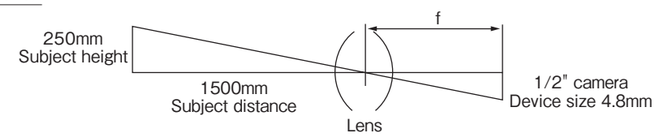
Math Formula for Lenses

①Focal Length

$$\text{Focal length : } f = \frac{(\text{Subject distance}) \times (\text{Camera sensor size})}{(\text{Subject height})}$$

(Example)

$$\text{Focal length} = \frac{1500 \times 4.8}{250} = 28.8\text{mm}$$

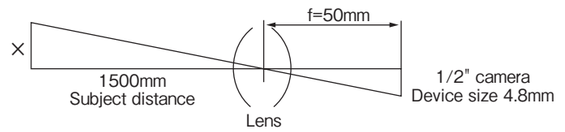


②Field of View

$$\text{Field of view} = \frac{(\text{Subject distance}) \times (\text{Camera sensor size})}{(\text{Lens focal point distance f})}$$

(Example)

$$\text{Field of view} = \frac{1500 \times 4.8}{50} = 144\text{mm}$$

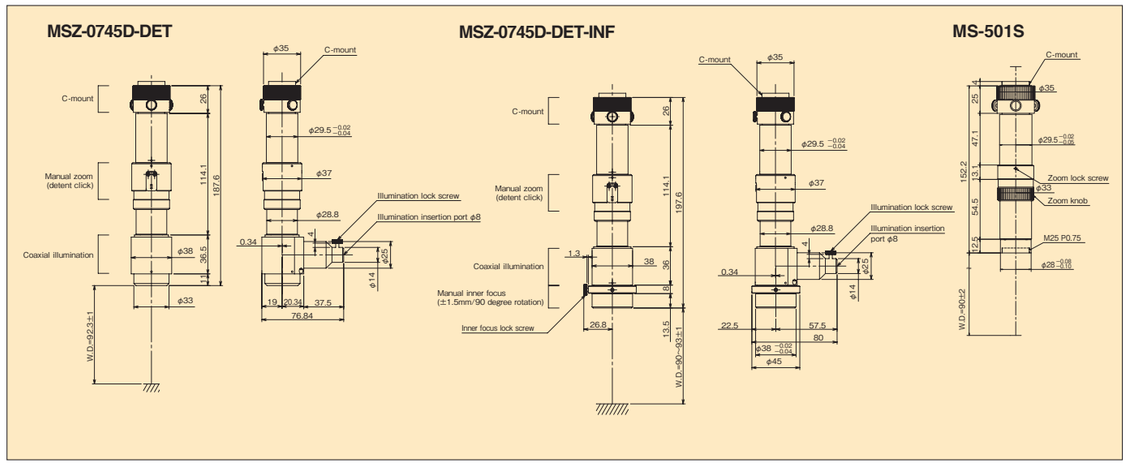


Compact Zoom Tube series

0.7X~4.5X Zoom Tube

0.7X~4.5X Short Zoom Tube

MSZ-0745D-DET(-INF) is a compact zoom tube lens with magnification of 0.7X-4.5X. Ideal for having consistent inspection at different magnifications. Discrete zoom values (in the zoom range) can be set by click detent. This feature is also provided for inner focus. Magnification of MS-501S can be changed by conversion lens (optional).



Specification

Model #	MSZ-0745-DET (-INF)		MSZ-0745D-DET (-INF)		MS-501S	
Magnification	0.7X	4.5X	0.7X	4.5X	0.7X	4.5X
Coaxial illumination	×		○		×	
Working distance	92.3mm		92.3mm		90mm	
Focal depth	1.8mm	0.13mm	1.8mm	0.13mm	1.8mm	0.13mm
Distortion	0.50%	0.10%	0.50%	0.10%	0.50%	0.10%
Resolution LP/mm	86LP/mm	204LP/mm	86LP/mm	204LP/mm	86LP/mm	204LP/mm
Resolution power	11.6μm	4.9μm	11.6μm	4.9μm	11.6μm	4.9μm
NA	0.029	0.069	0.029	0.069	0.029	0.069
F number	12.8	32.6	12.8	32.6	12.8	32.6
Camera mount	C-MOUNT					
Equivalent sensor	under 1/2 inch camera				under 2/3 inch camera	
Detent click	○				–	
An Accessory	2mm Hex wrench					
Weight	440g / (-INF : 470g)		470g / (-INF : 500g)		385g	

<Standard Accessories>

-DET : have mechanical click at the each magnification position on zoom dial so easy to set magnification.
MS-501S does not have mechanical click function.

<Option>

- INF : have Inner Focus function which is the fine focus adjustment inside of lens tube.
The focus amount by INF (Inner Focus) is ± 1.5 mm with a rotation of 90 degrees.
MS-501S is not available Inner Focus function.

MS-501S : Zoom magnification range changeable by attaching Conversion lens CV series.
WD is also changed by attaching CV series (Refer to P23).

Other : is possible to correspond to other magnification range by custom design.

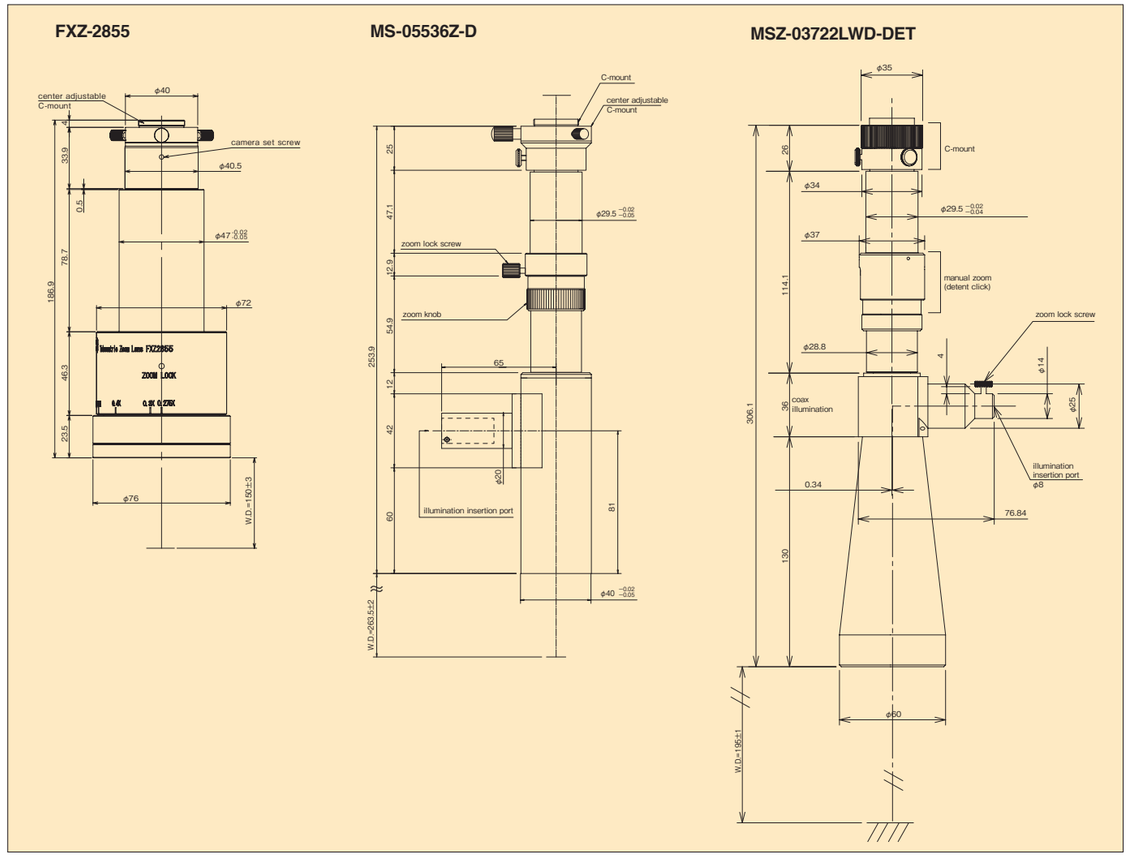
Low Magnification Zoom Tube series

1 inch camera compatible 0.275x - 0.55x Telecentric zoom tube

2/3 inch camera compatible 0.55x - 3.6x Zoom tube

1/2 inch camera compatible 0.37x - 2.23x Zoom tube

FXZ-2855 is telecentric zoom lens for 1 inch camera.
Low distortion, and possible to capture high resolution image in full area of FOV. MSZ-05536Z-D is for 2/3inch or smaller camera and MSZ-03722LWD-DET is for 1/2inch or smaller camera, and possible to capture unifmormed lighting image in full area of FOV.



Specification

Model #	FXZ-2855		MS-05536Z-D		MSZ-03722LWD-DET	
Magnification	0.275X	0.55X	0.55X	3.6X	0.37X	2.23X
Coaxial illumination	–		○			
Working distance	150mm		263.5mm		195mm	
Focal depth	5.04mm	1.48mm	1.82mm	0.24mm	9.99mm	0.6mm
Resolution	13.6μm	8.1μm	27.3μm	9.9μm	23μm	9.3μm
N.A.	0.0245	0.0414	0.012	0.034	0.04	0.043
Distortion	<0.001%		0.22%	0.18%	0.79%	0.26%
F number	5.6	6.6	40.7	14.8	17.1	37.6
Object side telecentricity	○		–			
Camera mount	C-MOUNT					
Equivalent sensor	under 1 inch camera		under 2/3 inch camera		under 1/2 inch camera	
Detent click	–				○	
An accessory	–				2mm Hex wrench	
Weight	700g		620g		680g	

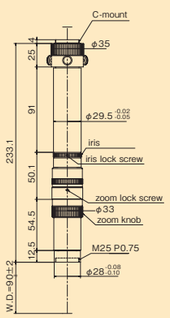
Note: Resolution power is calculated as theoretical resolution based on NA of wavelength of 550nm.

Zoom Tube series

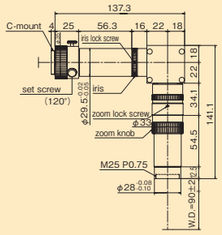
Zoom tube
Right angle zoom tube
Trinocular zoom tube
Coaxial zoom tube

Standard C-mount zoom tube for 0.75x - 4.5x. Choose from 4 types according to usage conditions. Trinocular inclined zoom tube have switches to exchange light path for observation from eyepiece and monitor. By coaxial lighting,MS-502-F40 is ideal for observation of deposition patterns on glass substrates and etched patterns of semiconductors.

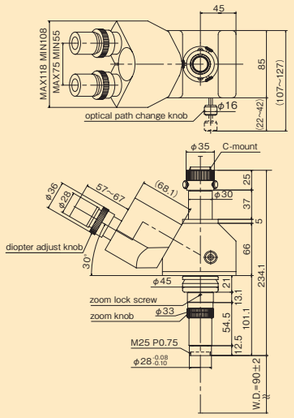
MS-501



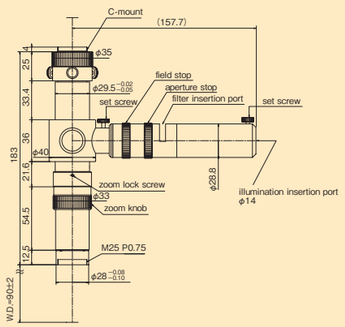
MS-507



MS-506



MS-502S-F40



Specification

Model #	MS-501／MS-507／MS-506／MS-502-F40					
Magnification	0.75X	1X	2X	3X	4X	4.5X
Working distance	90mm					
Focal depth	1.8mm	1.0mm	356μm	208μm	148μm	129μm
Distortion	0.5%	0.2%	0.05%	0.05%	0.1%	0.1%
Resolution LP/mm	86LP/mm	110LP/mm	167LP/mm	192LP/mm	204LP/mm	204LP/mm
Resolution power	11.6μm	9.1μm	6.0μm	5.2μm	4.9μm	4.9μm
NA	0.029	0.037	0.056	0.064	0.068	0.069
F number	12.8	13.5	17.8	23.4	29.6	32.6
Recommended magnification for coaxial illumination	MS-502-F40 ※When using coaxial illumination with magnification lower than 1.8X, there is vignetting on 4 corners in FOV. When using transmitted or oblique illumination, magnification available from 0.75X.					
Eyepiece field No. (10X)*	φ25.3mm	φ19mm	φ9.5mm	φ6.3mm	φ4.7mm	φ4.2mm
Camera mount	C-MOUNT					
Equivalent sensor	under 2/3 inch camera					
Weight	MS-501：400g／MS-507：550g／MS-506：1.4kg／MS-502-F40：800g					
An Accessory	MS-501／MS-507		MS-506		MS-502-F40	
	2mm Hex Wrench 1pc		Eye piece HWF-10X / 2mm Hex Wrench 1 set each		F20- W frosted filter / 2mm Hex Wrench 1 set each	

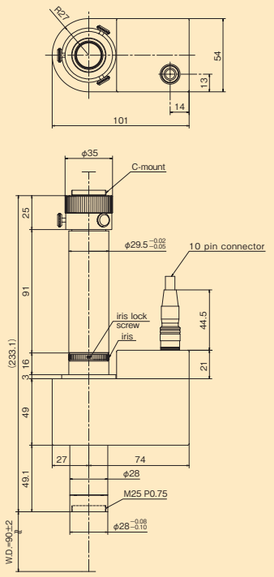
Note: Datas with using trinocular tilt zoom MS-506

Motorized Zoom Tube series

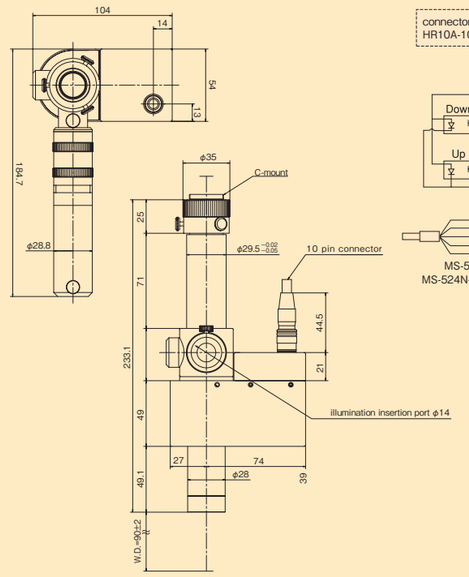
Pulse auto zoom tube lens
Coaxial illumination type pulse auto zoom tube lens

Motorized zoom through use of pulse motor.
Coaxial type is suitable for inspection of liquid crystal or semiconductor.

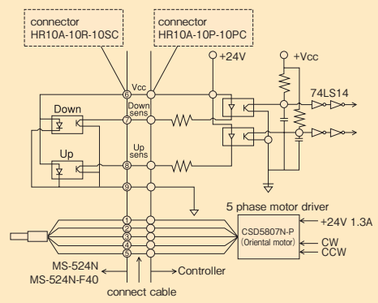
MS-524N



MS-524N-F40



■ Example of circuit



Specification

Model #	MS-524N／MS-524N-F40					
Magnification	0.75×	1×	2×	3×	4×	4.5×
Working distance	90mm					
Focal depth	1.8mm	1.0mm	356μm	208μm	148μm	129μm
Distortion	0.5%	0.2%	0.05%	0.05%	0.1%	0.1%
Resolution LP/mm	86LP/mm	110LP/mm	167LP/mm	192LP/mm	204LP/mm	204LP/mm
Resolution power	11.6μm	9.1μm	6.0μm	5.2μm	4.9μm	4.9μm
N.A.	0.029	0.037	0.056	0.064	0.068	0.069
F number	12.8	13.5	17.8	23.4	29.6	32.6
Recommended magnification for coaxial illumination	1.8×—4.5×		※When using coaxial illumination with magnification lower than 1.8X, there is vignetting on 4 corners in FOV. When using transmitted or oblique illumination, magnification available from 0.75X.			
Camera mount	C-MOUNT					
Equivalent sensor	under 2/3 inch camera					
Weight	MS-524N：900g　MS-524N-F40：1200g					
An Accessory	MS-524N		MS-524N-F40			
	2mm Hex wrench / connector　1 each		F20-W frosted filter / 2mm Hex wrench / connector　1 each			

■ Electrical Specification

※Motor is internally decelerated to 1/2

Operation	Controlled by pulse motor
Zoom function	5 phase stepper motor (Oriental Motor Corp)/Recommended Driver CSD5807N-P (Option)
Sensor	Top and Bottom limit sensor, Bottom limit ORG sensor DC12-24V
Connector	Optic side : HR10A-10R-10SC (Hirose) / user side : HR10A-10P-10PC (Hirose)
Full step	0.36°／pulse
Half step	0.18°／pulse
Valid pulse	670 steps/full,　1340 steps/half
Sensor in use	E2S-W13 (Omron)

■ Pin Assignment

No	function	No	function
1	motor blue	6	for sensor Vcc (DC12-24V)
2	motor red	7	Down Limit
3	motor yellow	8	Up Limit
4	motor green	9	GND(COM)
5	motor black	10	NC

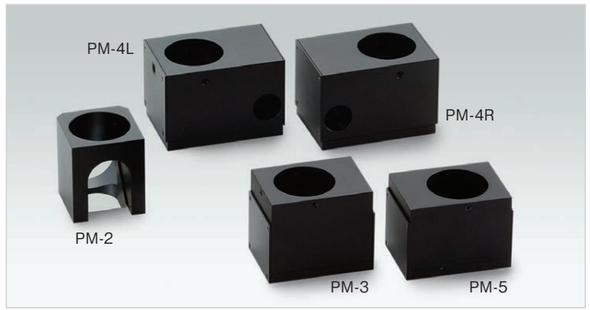
Prism for Zoom

Right angle prism for zoom tube

Light Path can be diverted 90 degrees. Useful when the space is limited in the Z direction.

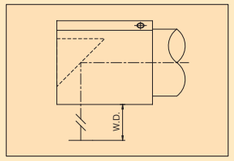
Dual right angle prism for zoom tube

Useful for the alignment of narrow pitch objects.

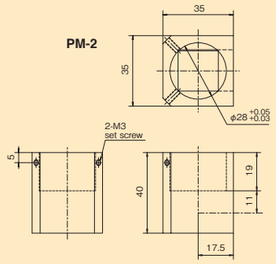


【Right Angle prism】

PM-2

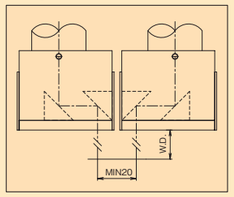


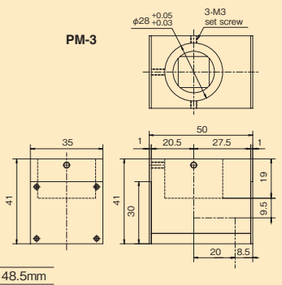
Focus	Inverted image	
Total internal optical length	Normal (No attachment)	35mm
	CV attached	28.5mm



【Dual right angle prism】

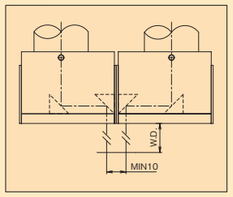
PM-3

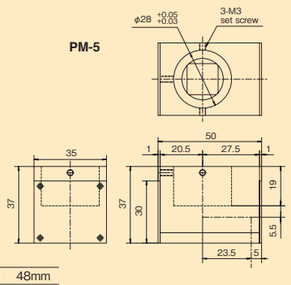




Focus	Orthoscopic image	
Total internal optical length	Normal (No attachment)	48.5mm
	CV attached	42mm
Minimum pitch	20mm	

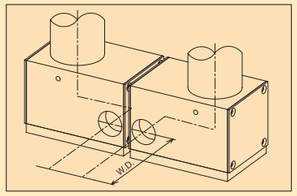
PM-5



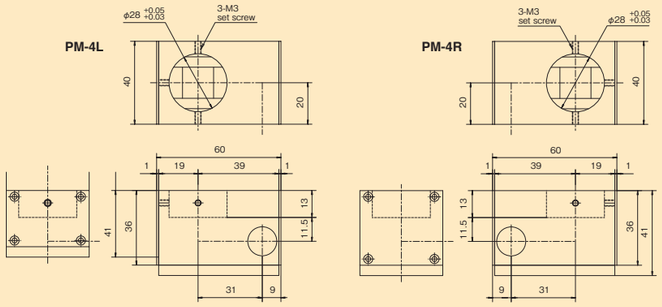


Focus	Orthoscopic image	
Total internal optical length	Normal (No attachment)	48mm
	CV attached	41.5mm
Minimum pitch	10mm	

PM-4L / PM-4R



Focus	Orthoscopic image	
Total internal optical length	Normal (No attachment)	63mm
	CV attached	62.5mm
Minimum pitch	18mm	



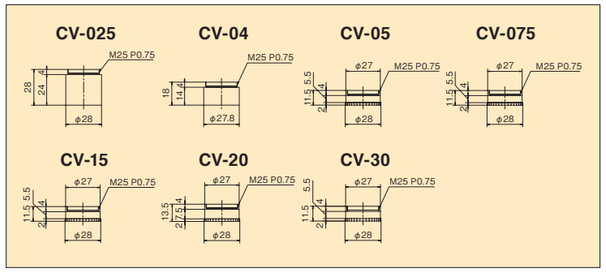
■Specification

Model	WD without PM	PM-2	PM-3	PM-5	PM-4R/L
One side pitch	–	10mm	8.5mm	5mm	9mm
No attachment	90mm	55mm	41.5mm	42mm	27mm
CV-04 attached	195mm	166.5mm	153mm	153.5mm	132.5mm
CV-05 attached	180mm	151.5mm	138mm	138.5mm	117.5mm
CV-075 attached	120mm	91.5mm	78mm	78.5mm	57.5mm
CV-15 attached	54mm	25.5mm	12mm	12.5mm	–
CV-20 attached	36mm	7.5mm	–	–	–
Weight	–	73g	132g	110g	185g

Accessories for zoom tube

Conversion lens

Easily convert the zoom range lower or higher. WD can also be changed.



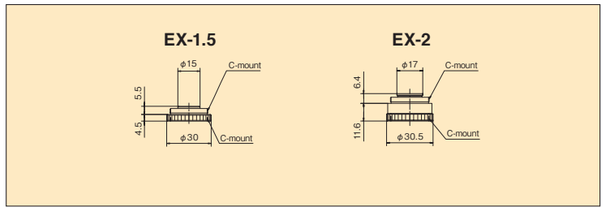
■Specification (Attached to regular zoom lens)

Model	CV-025	CV-04	CV-05	CV-075	CV-15	CV-20	CV-30
Conversion Lens	0.25×	0.4×	0.5×	0.75×	1.5×	2.0×	3.0×
Working distance	300mm	195mm	180mm	120mm	54mm	36mm	25mm

Note: Compatible with MS-501, MS-501S, MS-506, and MS-502-F40

Extender lens

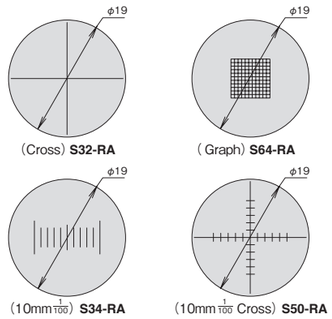
Increase the magnification by attaching these lenses between C-mount of lens tube and C-mount of camera. Possible to increase magnification easily without reducing WD.



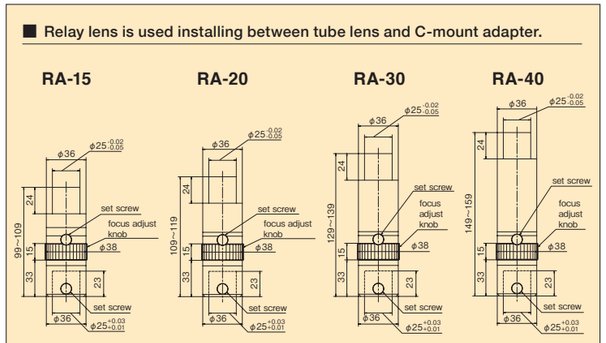
Relay lens

Magnification can be changed for higher magnification without changing the working distance. Scale can also be inserted as a measurement option.

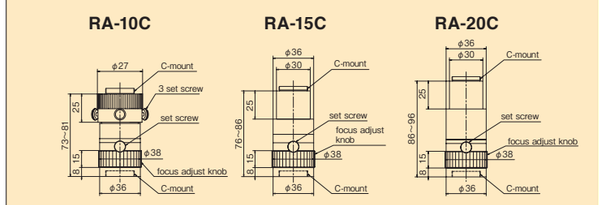
■ Option / Optical scale



■ Relay lens is used installing between tube lens and C-mount adapter.



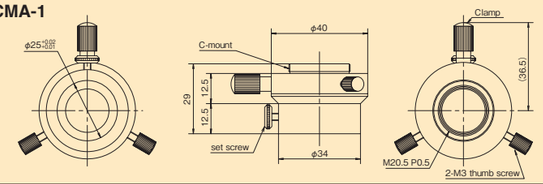
■ Relay lenses below are used installing direct to C-mount of tube lens



Center adjustable C-mount adapter

Possible to align optical axis of zoom tube and camera center, and fine adjustment of camera position.

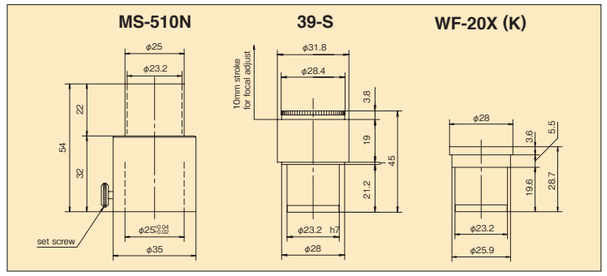
CMA-1



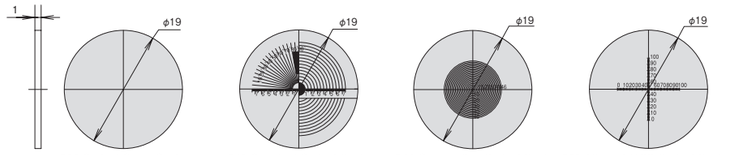
Adapter for eyepiece lens

Remove C-mount adapter, and exchange to this adapter for observing by eyepiece.

MS-510N 39-S WF-20X (K)



■ Option /39-S Optical Scale



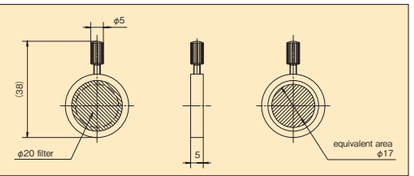
S32 Optical Cross Scale **S42** Standard Optical Scale **S44** Center align Optical Scale **S50** 10mm 1/100 Optical Scale

Filters for Coaxial zoom tube lens

Insertion Type Filters For Coaxial Illumination Of MS-502-F40

Used to increase the contrast of alignment marks or patterns.

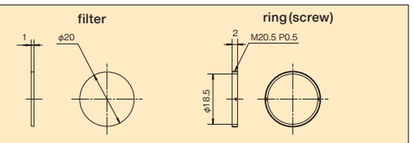
F20 filter dimensions

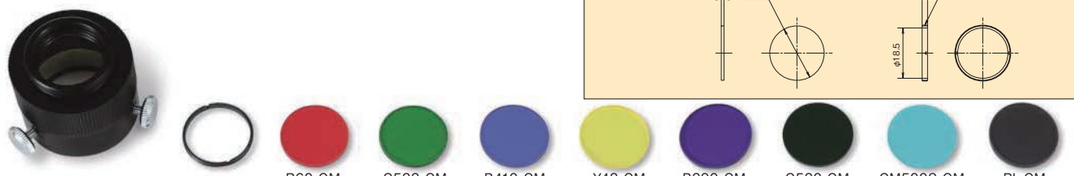


F20-R60 F20-G533 F20-B410 F20-Y48 **F20-B390** F20-G530 F20-CM500S F20-PL F20-W

Filters For Insertion Of C-mount Adapter

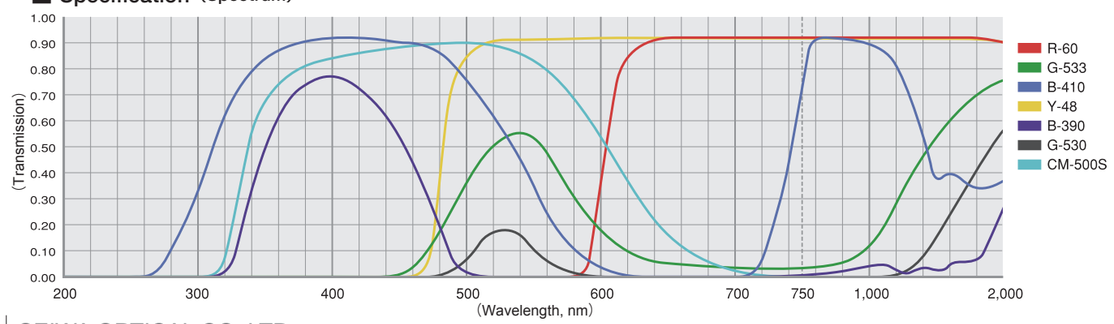
CM filter dimensions





R60-CM G533-CM B410-CM Y48-CM B390-CM G530-CM CM500S-CM PL-CM

■ Specification (Spectrum)

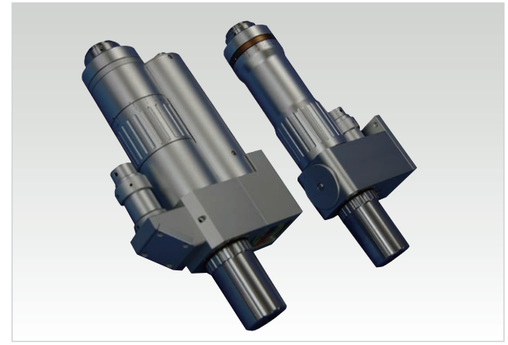


High Magnification Zoom Tube

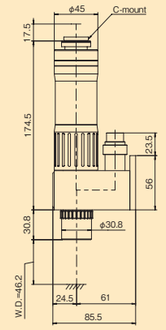
High Magnification Manual Zoom Tube

High Magnification Motorized Zoom Tube

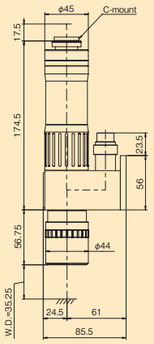
Compatible with wide range of options at zoom ratio 12X.
High magnification and high resolution inspection can be made with the use of objective lens. Ideal for integrating to systems due to its lightweight and compact design.



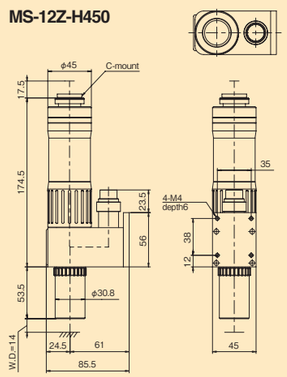
MS-12Z-L1215



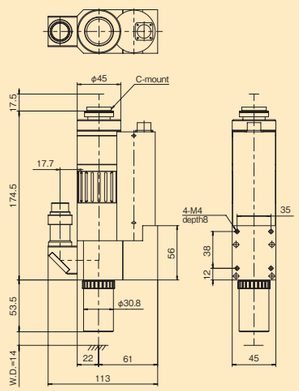
MS-12Z-M2530



MS-12Z-H450



MS-12AZ series



Connecting diagram with this lens tube.

Connector is HR10A-10R-12P(HIROSE) and feeding side connector is HR10A-10P-12S.

TELE(high magnification) limit
+V Brown
OUT Black
0V Blue
SUNX PM-F24

WIDE(low magnification) limit
+V Brown
OUT Black
0V Blue
SUNX PM-R24

0.72°／1Pulse (FullStep)
Motor : Oriental PK525PMA

Pin number	Signal name	Signal explanation	
1	+V	CW limit sensor+power supply(DC5-24V)	
2	CCWLS output	TELE limit sensor output(shading OFF)	
3	0V	CW limit sensor, signal ground	
		NPN open collector DC30V/50mA or less	
4	+V	CCW limit sensor+power supply (DC5-24V)	
5	CCWLS output	WIDE limit sensor output (shading OFF)	
6	0V	CCW limit sensor, signal ground	
		NPN open collector DC30V/50mA or less	
7	NC		
8	Motor lead	—	Blue
9	Motor lead	—	Red
10	Motor lead	—	Orange
11	Motor lead	—	Green
12	Motor lead	—	Black

Recommended driver CRD5103PB or CRD5103P

■ Specification

Model #	MS-12Z-L1215／MS-12AZ-L1215			MS-12Z-M2530／MS-12AZ-M2530			MS-12Z-H450／MS-12AZ-H450		
Magnification	1.25X	7.5X	15X	2.5X	15X	30X	4.16X	25X	50X
WD	46.2mm			35.25mm			14mm		
Focal depth	±305.56μm	±16.27μm	±6.88μm	±76.36μm	±3.51μm	± 2.12μm	±27.5μm	±1.42μm	± 1.36μm
Resolution	11.2μm	2.6μm	1.7μm	5.59μm	1.20μm	0.93μm	3.4μm	0.76μm	0.75μm
N.A	0.03	0.13	0.20	0.06	0.28	0.36	0.1	0.44	0.45
Illumination	Coaxial illumination								
Equivalent sensor	under 1/2 inch camera								
Camera mount	C-MOUNT								
Weight (without camera and LED)	1.05kg/1.4kg (Motorized type)			1.3kg/ 1.65kg (Motorized type)			1.15kg/1.5kg (Motorized type)		

For C-Mount Camera

VARIABLE MAGNIFICATION LENS series

Variable magnification, Fixed-tube

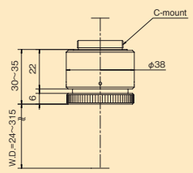
Wide angle variable magnification tube

Low magnification macro lens

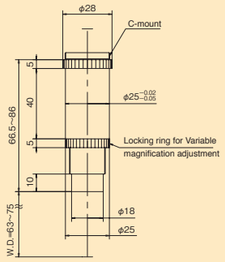
Variable focus lens (Varifocal lens)

Designed to be high resolution, low distortion and compact.

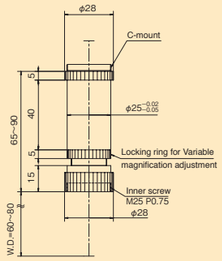
MS-016



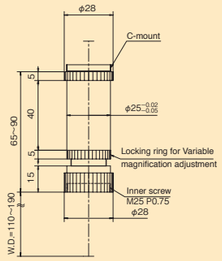
MS-509



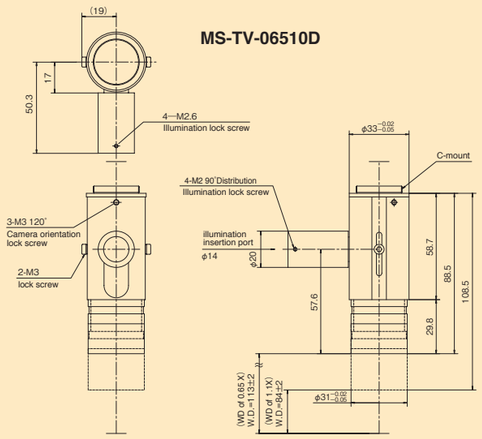
MS-509-S



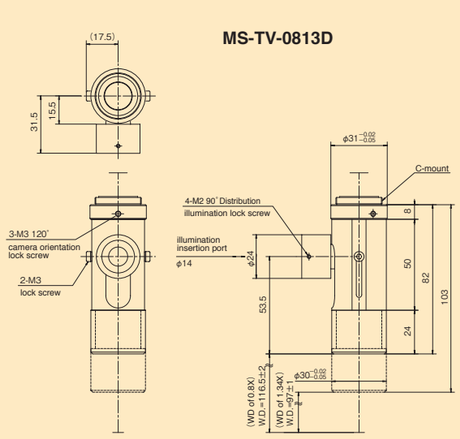
MS-509-051



MS-TV-06510D



MS-TV-0813D

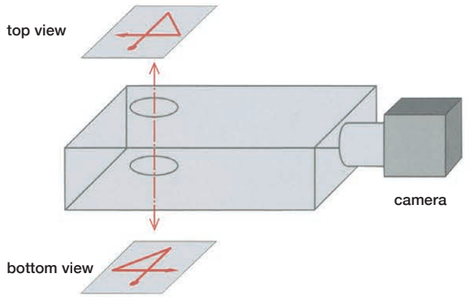


■ Specification

Model #	MS-509／MS-509-S		MS-509-051		MS-016					MS-TV-0813D		MS-TV-06510D	
Magnification	1X	1.5X	0.38X	0.88X	0.05X	0.1X	0.2X	0.3X	0.4X	0.8X	1.34X	0.65X	1.1X
Working distance	75mm	63mm	190mm	110mm	302.5mm	152.7mm	61.7mm	31.4mm	19.7mm	116.5mm	97mm	113mm	84mm
Focal depth	0.9mm	0.5mm	0.5mm	1.2mm	18.2mm	4.7mm	1.2mm	0.6mm	0.36mm	1.0mm	0.5mm	3.2mm	1.6mm
Distortion	＞0.02%	＞0.02%	＞0.05%	＞0.02%	＞0.2%	＞0.5%	＞1.1%	2%	＞＞2%	＞0.05%	＞0.05%	＞0.3%	＞0.2%
Resolution (LP/mm)	132LP/mm	161LP/mm	62.5LP/mm	108LP/mm	12LP/mm	24LP/mm	48LP/mm	71LP/mm	89LP/mm	149LP/mm	179LP/mm	57LP/mm	65LP/mm
Resolution power	7.6μm	6.2μm	16.0μm	9.3μm	83.9μm	41.9μm	21.0μm	14.0μm	11.2μm	6.7μm	5.6μm	17.6μm	15.3μm
N.A.	0.044	0.054	0.021	0.036	0.004	0.008	0.016	0.024	0.030	0.05	0.06	0.019	0.022
F number	11.3	14.1	9.2	12.4	5.7	5.9	6.3	6.8	7.2	8	11.2	17.1	25
Camera mount	C-MOUNT												
Equivalent sensor	under 2/3 inch camera									under 1/2 inch camera			
Weight	50g		50g		60g					140g		160g	

DATA

Dual View (Top and Bottom) Optical System (1 camera type)



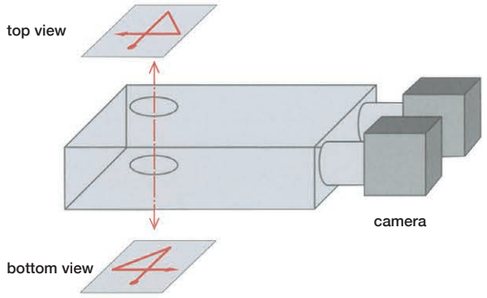
This system capable of simultaneously observing both top and bottom images . By switching the illumination path, it is possible to align top and bottom images individually as well. The images as seen in the monitors are as follows:

Top view
Inverted-Inverted image

Bottom View
Inverted-Orthoscopic image

The upper image is inverted due to Inverted-Inverted image. Both top and bottom image on monitor will move in the same direction that you move the stage. (Useful for manual alignment.)

Dual View (Top and Bottom) Optical System (2 camera type)



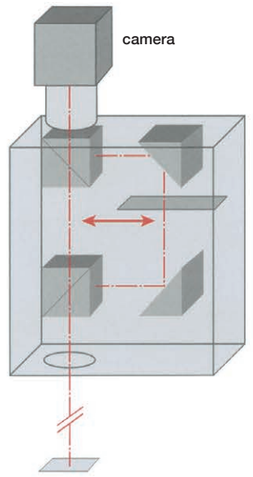
Both top and bottom light paths have individual optical paths and the images on the monitor are as follows:

Top view
Inverted-Orthoscopy image

Bottom view
Inverted-Orthoscopy image

Both top and bottom images are inverted orthoscopy images. However, when moving the stage, the X direction and Y direction on each monitor will be opposite. (Useful for auto alignment system.)

Switching Magnification unit

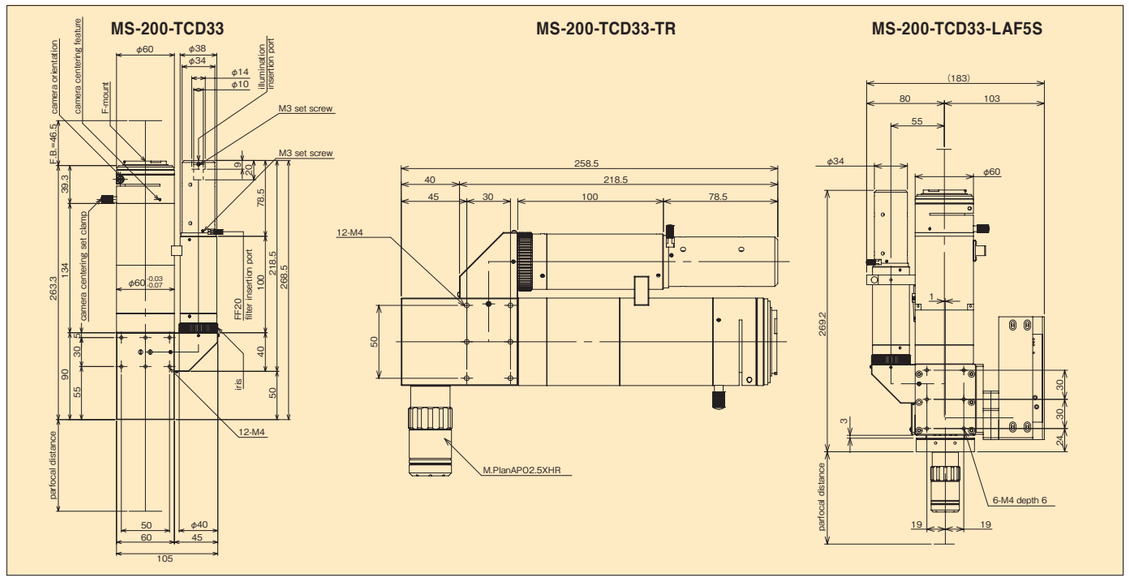


This unit is the system which can change two different magnification by shutter . The shutter is changed by solenoid or air cylinder . Useful for the system which allows two stages of alignment , fine and coarse.

MS-200-TCD33 series

f=200mm Camera sensor diagonal 33mm available

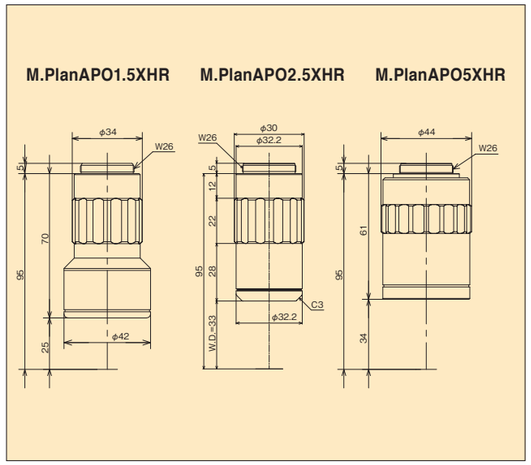
Infinity (f=200mm) F-mount lens tube for 12 megapixel camera (5.5micron, 4096x3072) 25 megapixel camera (4.5micron, 5120x5120) *Camera mount can be changed. Provides high magnification, wide FOV, high resolution images. This customizable series is ideal for installation in high-end equipment system.



M.PlanAPO HR series

Wide FOV Image circle 33mm Long WD Objective lens

Special objective lens for MS-200-TCD33. Parfocal distance 95mm. By mounting turret, possible to switch magnification.



Specification

※Objective lens is option.

Model #	M.PlanAPO1.5XHR	M.PlanAPO2.5XHR	M.PlanAPO5XHR	M.PlanAPO10XHR
Magnification	1.5X	2.5X	5X	10X
Working distance	25mm	33mm	34mm	18mm
Focal distance (f)	133.38mm	80mm	40mm	20mm
N.A.	0.048	0.08	0.16	0.3
Resolution	7.4μm	4.2μm	2.1μm	1.2μm
Focal depth (±D.F)	119.3μm	42.9μm	10.7μm	3.0μm
Weight	390g	180g	385g	-

Note: Resolution and focal depth of objective lens itself are calculated as theoretical resolution based on NA of wavelength of 550nm.
R=0.61×0.55/N.A Focal depth ±D (μm) =λ/{2(N.A)²}

DATA

MS-200-TCD33 Series System Diagram

Focus Adjustment
Focus Block (Manual)
Focus Block (Motorized)
Small Focus Block for Objective Lens (Motorized)

Camera
Camera with Diagonal 33mm Sensor Compatible

PC

Frame Grabber Board

MS-200-TCD33

Laser Auto Focus

Option
NIR Unit
MS-200-TCD33-TNIR
Compatible Wavelength 1100nm
Ideal for observation of silicon wafer pattern

Revolver
Slider Type
Horizontal Center Motor Type

Filter
Color Filter
Motorized Filter Wheel

Objective Lens
Special Objective Lens

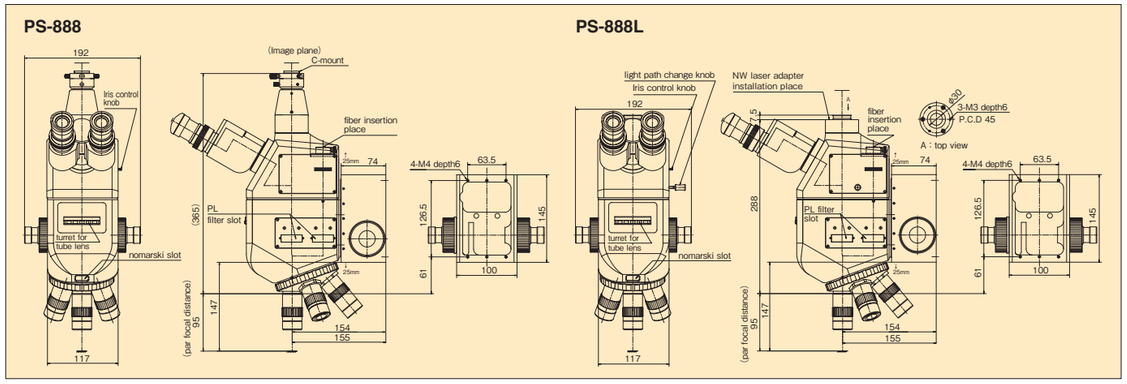
Light Source
Light Guide SL-B5 Series
Halogen Light Source FA-100C/FA-150EN
LED Light Source SLBX-15AS

Stage
Normal Stand
Stand with Stage
Stand with Motorized Stage

SUPER SCOPE MICROSCOPE

Microscope

This microscope is a high-power, high-resolution instrument and is ideal as a probe station for the semiconductor industry and for LCD assembly. The PS-888L features a 3 lens turret which mounts the 1064nm, 532nm and 355nm tube lenses. Additionally, a YAG Laser can be mounted on the PS-888L for semiconductor circuit and LCD substrate repair.



Models		PS-888	PS-888L
Name		Microscope for Prober M/C	Microscope for Laser Cutter
Optical tube type		Visible Light	Infrared~Ultraviolet Light
Erect Trinocular tube	Interpupillary distance	Siedentop type, Adjustment distance: 50-75mm	Siedentop type, Adjustment distance: 50-75mm
	Field of view	23mm	23mm
	Optical path	T:R=70:30 Simultaneous Observation	0 : 100/100 : 0 Switch path
Main body	Tube lens (Image formation lens)	1×(486-656)nm	1×(355-532)nm 1×(532-1064)nm
		2×(486-656)nm	2x (486-656)nm - laser processing not possible
		Turret Changeover System	Turret changeover system
	Laser	—	YAG laser(Basic, Second & Third height)
Camera mount		C-mount	Laser mount (N/W)
Coaxial vertical illumination		Bright field koelher illumination with field & aperture stop	Bright field koelher illumination with field & aperture stop
Revolver		Inward rotating bright field type	Inward rotating bright field type
		Revolver(4 holes) Par center & par focal adjustable	Revolver (4 holes) Par center & par focal adjustable
Objective lens		Infinity corrected objective lens (M.Plan APO lenses)	Infinity corrected objective lens (M.Plan APO lenses)
Weight		7kg or less	7.5kg or less
Focus unit	Load capacity	45kg	45kg
	Operation	(Coarse: 1 round/4mm, Fine: 1 round /0.1mm)	(Coarse: 1 round/4mm, Fine: 1 round /0.1mm)
		1 axis coarse and fine manual operation	1 axis coarse and fine manual operation
	Stroke	±25mm	±25mm
External dimension		192(W)×352(D)×365(H)mm	192(W)×352(D)×365(H)mm

OPTIONS

model		model #
Camera adaptor		LCA-1
Illuminator	Power Supply(Halogen)	FA-100C/FA-150EN
	Power Supply(LED)	SLBX-15AS
	Fiber Light Guide	SL-B5series
Motorized turret	45°/Horizontal type	
Filter unit		PL-2
Color filter	Red	FC-R
	Green	FC-G
	Blue	FC-B
	Yellow	FC-Y
Eyepiece	FWF10×DA	②-888
	WF15×	③-888
	WF20×	④-888
Objective lens	2.5×	M.PlanAPO2.5×
	5×	M.PlanAPO5×SB
	10×	M.PlanAPO10×SB
	20×	M.PlanAPO20×SB
	50×	M.PlanAPO50×SBS
	100×	M.PlanAPO100×SBS
Stand		STD-67

SUPER SCOPE MICROSCOPE

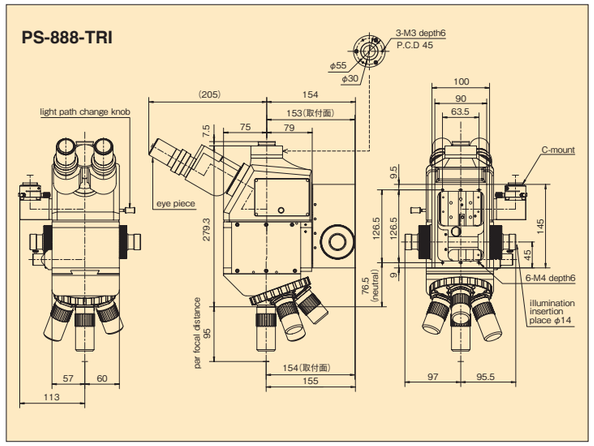
Made to Order

SIDE CAMERA PORT

This microscope is equipped with a port on the side of the body for mounting a camera. Additionally, a Koehler illumination port is also equipped on the side of the microscope body for better image contrast. The tube lens is not interchangeable because of its compact size. The working wavelength must be specified at time of order.

Model#	PS-888-TRI (with focus mount)
Load capacity	45kg
Stroke	50mm
1 round	Coarse 4mm / rev Fine 0.1mm / rev
Scale	1 increment / 1μm

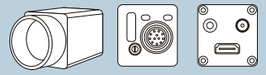
Seiwa optical Co., Ltd is not liable for the performance and safety of microscope systems equipped with Laser equipment.



DATA

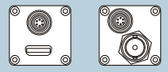
PS-888/PS-888L System Diagram

Area Sensor Camera
Analog Camera

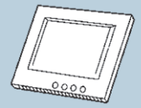


Digital Camera
IEEE1394/USB2.0/USB3.0/GigE

CoaXPress
Camera Link

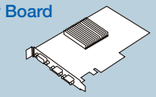


Monitor
LCD

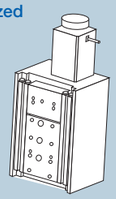


PC

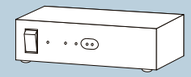
Frame Grabber Board



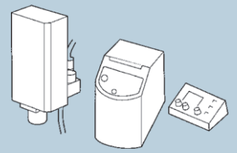
Motorized Z Axis



Auto Focus Unit

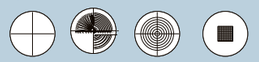


YAG Laser
(335nm/532nm/1064nm)
Single wavelength type /
2 wavelength type / 3 wavelength type
Confer with us



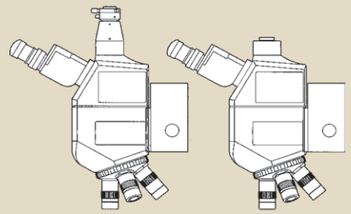
Eye Pieces
20× 15× 10×

Eye Piece Accessory



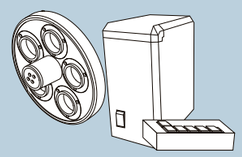
SUPER SCOPE

PS-888 PS-888L

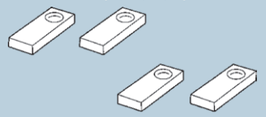


Standard For Laser (1064/532/355nm)

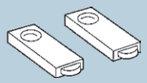
Motorized Revolver



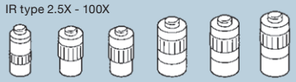
Color Filter (R, G, B, Y)



Polarizer Filter

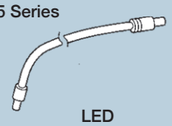


Objective Lens
Super long working distance
for visible wavelength type 2.5X - 100X
Near/Deep UV type 20X - 50X
IR type 2.5X - 100X



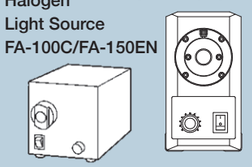
Please refer P32, 34, 35 for details.
For PS-888, super long working distance objective lens for visible wavelength can be used.

Light Source
Light Guide
SL-B5 Series

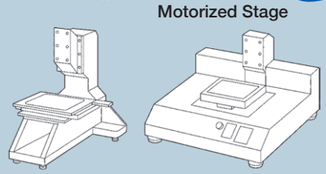


LED
Light Source
SLBX-15AS

Halogen
Light Source
FA-100C/FA-150EN



Stage
Stand with Stage
Stand with Motorized Stage
Confer with us

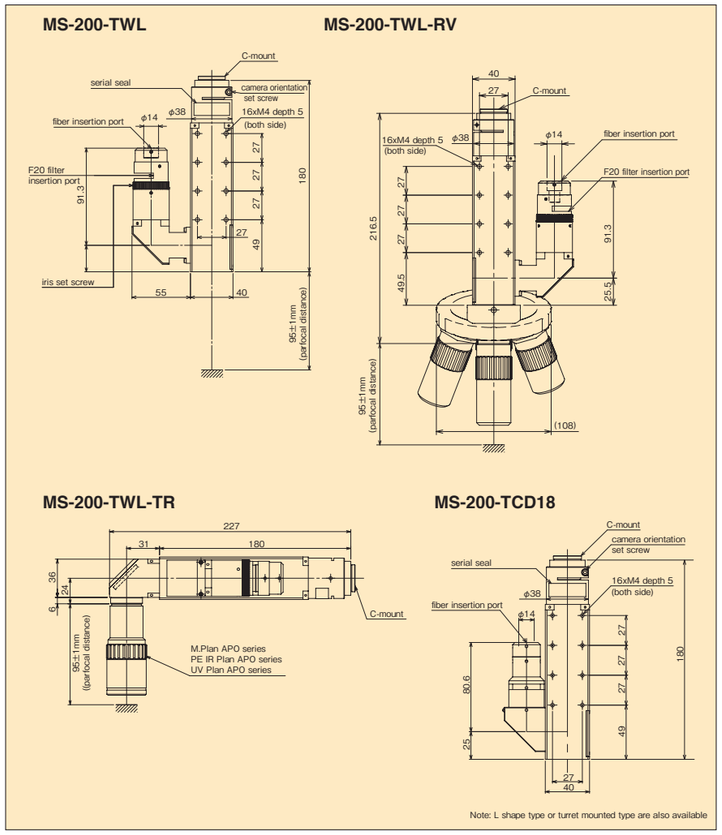


3 wavelength compatible Infinity Coaxial Tube lens

MS-200-TWL/TCD18

f=200mm Coaxial Tube Lens / L shape Tube Lens

Infinity f=200mm Tube Lens Available for high-resolution inspection in brightfield. In addition to 1.1inch camera sensor type, we have Diameter 18mm sensor available type. Corrected by YAG 1-3 higher harmonic wave (355/532/1064nm). Not only visible range objective lens, but it is available with ultraviolet objective (NUV, DUV) and infrared objective (PEIR). We accept customization requests from OEMs for use as laser tube lens.

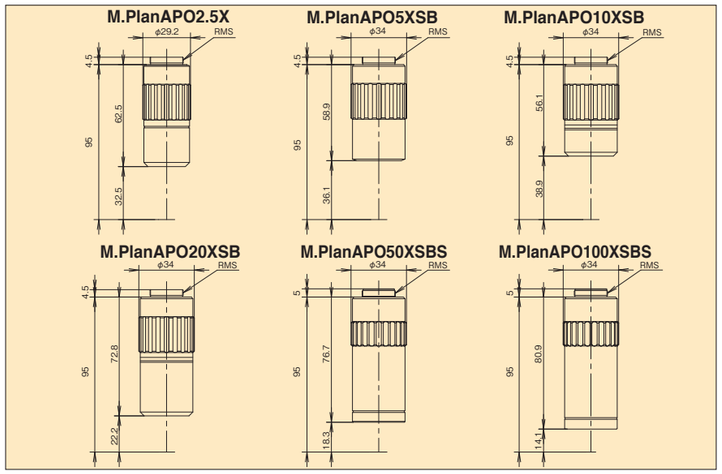


Note: L shape type or turret mounted type are also available

M.Plan APO series

Objective Lens

High resolution, long working distance, bright field M.Plan APO objective lens. Compatible with PS-888 series microscope and MS-200-TWL series tube lens.



Specification ※Objective lens is option.

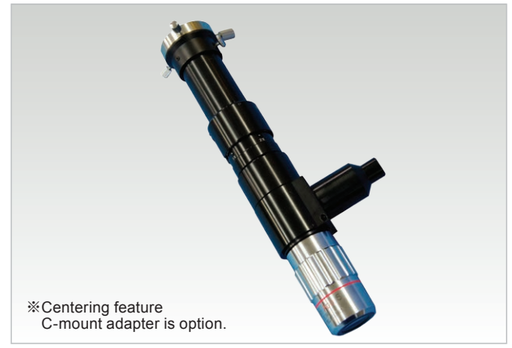
Model #	M.Plan APO2.5×	M.Plan APO5×SB	M.Plan APO10×SB	M.Plan APO20×SB	M.Plan APO50×SBS	M.Plan APO100×SBS
Magnification	2.5×	5×	10×	20×	50×	100×
Working distance	32.5mm	36.1mm	38.9mm	22.2mm	18.3mm	14.1mm
Focal distance (f)	80.0mm	40.0mm	20.0mm	10.0mm	4.0mm	2.0mm
N.A.	0.06	0.16	0.23	0.35	0.40	0.52
Resolution	5.6μm	2.1μm	1.5μm	1.0μm	0.8μm	0.6μm
Focal depth (±D.F)	76.4μm	10.7μm	5.2μm	2.2μm	1.7μm	1.0μm
Weight	232g	238g	215g	289g	321g	340g

Note: Resolution and focal depth is calculated using the wavelength of (λ=0.55μm)　R=0.61×0.55/N.A　Focal depth ±D (μm) =λ/〔2(N.A)²〕

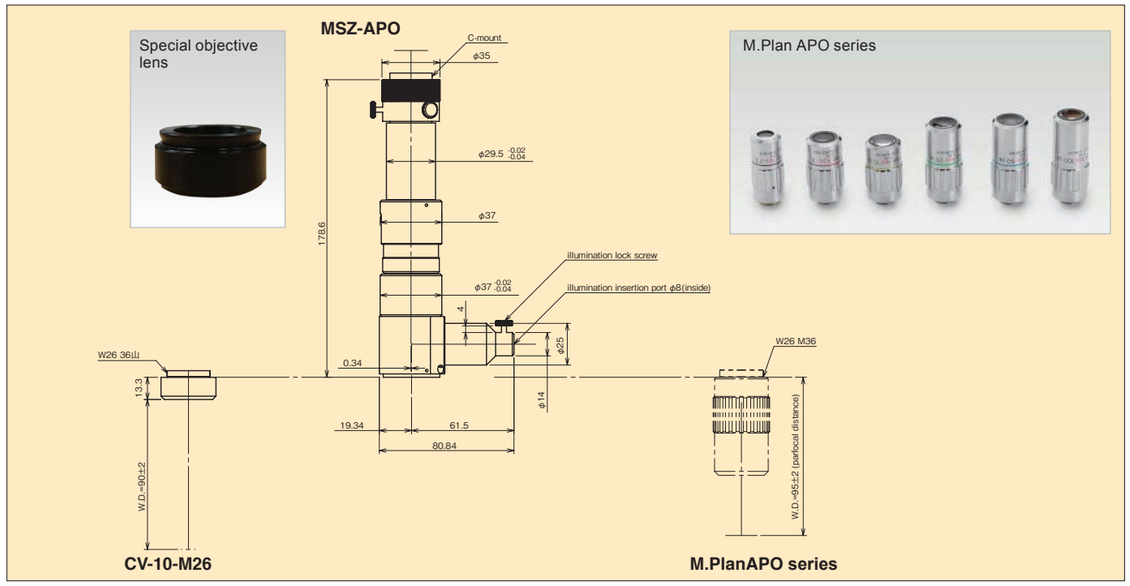
M.Plan APO Mounting Zoom Tube

MSZ-APO

High magnification compact zoom lens.
6X zoom lens inside the tube which can be combined with M.Plan APO objective lens. M.Plan APO objectives have long working distances.
With special objective lens(CV-10-M26), it can have WD92mm with 0.7X-4.5X wide view zoom.



※Centering feature
C-mount adapter is option.



Specification with M.Plan APO series

Objective lens	M.PlanAPO2.5X	M.PlanAPO5XSB	M.PlanAPO10XSB	M.PlanAPO20XSB	M.PlanAPO50XSBS
Total magnification	0.9 - 5.4X	1.8 - 10.8X	3.6 - 21.6X	7.2 - 43.2X	18 - 108X
Working distance	32.5mm	36.2mm	38.9mm	22.2mm	18.3mm
Focal depth	224 - 76μm	53 - 10μm	14 - 5.2μm	3.5 - 2.2μm	1.7μm
Resolution power	9.6 - 5.6μm	4.7 - 2.1μm	2.4 - 1.5μm	1.2 - 1.0μm	0.8μm
N.A	0.035 - 0.06	0.072 - 0.16	0.14 - 0.23	0.28 - 0.35	0.4

Note: Resolution and focal depth is calculated using the wavelength of (λ=0.55μm)　R=0.61Xλ/N.A　Focal depth ±D (μm) =λ/〔2 (N.A)²〕
Note: There will be vignetting depending on the size of CCD at low magnification.

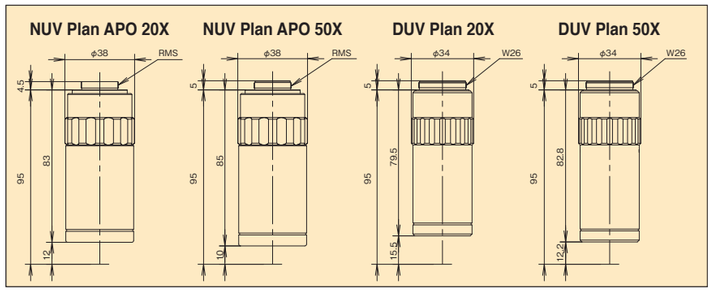
Specification with CV-10-M26

Model #	MSZ-APO + CV-10-M26	
Magnification	0.7X	4.5X
Working distance	92mm	
Focal depth	1.8mm	0.13mm
Distortion	0.50%	0.10%
Resolution LP/mm	86Lp/mm	204Lp/mm
Resolution	11.6μm	4.9μm
NA	0.029	0.069
F number	12.8	32.6
Mount	C-mount	
Equivalent sensor	1/2 inch camera	
Detent click	○	

Near Ultraviolet Objective Lens

NUV/DUV Plan APO20X·50X

Brightfield long working distance objective lens. The focal plane is corrected for both visible and Near UV (355/266nm) which allows both wavelengths to be in focus. Designed for high transmission at Near UV wavelength. Ideal for repairing semiconductor or LCD circuits, and processing thin film by attaching these lenses to the microscope with YAG laser unit.



■ Specification

Model #	NUV Plan APO 20X	NUV Plan APO50X	DUV Plan 20X	DUV Plan 50X
Magnification	20×	50×	20×	50×
Working distance	12mm	10mm	15mm	12mm
Focal length (f)	10mm	4mm	10mm	4mm
N.A.	0.5	0.5	0.36	0.4
Resolution	0.6μm	0.6μm	0.93μm	0.84μm
Depth of focus(±D.F)	1.1μm	1.1μm	2.1μm	1.7μm
Wavelength	355nm-1064nm		266-532nm	
Maximum allowable laser energy	0.1J/cm²@532nm Pulse width10nsec	0.1J/cm²@532nm Pulse width10nsec	—	—
	0.047J/cm²@355nm Pulse width10nsec	0.028J/cm²@355nm Pulse width10nsec	—	—
Glass correction	—/1.0mm(LCD)	—/1.0mm(LCD)	—	—
Weight	435g	510g	360g	320g

Note : Resolution and focal depth of objective lens is calculated using the wavelength of (λ=0.55μm) R=0.61X0.55/N.A Focal depth±D(μm) =λ/(2 (N.A)²)

PE IR Plan 1X·2.5X·10X·20X·50X·100X

Near IR lens for Photo emission application

Long working distance and high resolution objective lens with high spectral transmission percentage. Ideal for inspection of wafer backside and photo emission application. 20X and 50X can be attached to PS-888L microscope, and used for laser repair with YAG laser (wavelength 1064nm).
Note: LCD and silicon corrected lens are also available.

■ Specification

Model#	PE IR Plan 1X	PE IR Plan 2.5X	PE IR Plan 10X	PE IR Plan 20X	PE IR Plan 50X	PE IR Plan 100x
Magnification	1X	2.5X	10X	20X	50X	100X
Working distance	12mm	28mm	30.4mm	12mm	10mm	9.5mm
Focal length (f)	200mm	80mm	20mm	10mm	4mm	2mm
N.A	0.03	0.1	0.27	0.5	0.6	0.71
Resolution	22.4μm	6.7μm	2.5μm	1.3μm	1.1μm	0.9μm
Depth of focus(±D.F)	611μm	55μm	7.5μm	2.2μm	1.5μm	0.9μm
Transmission over 70%	800-1600nm	450-1600nm	550-1600nm	800-1600nm	900-1600nm	900-1400nm
Glass correction	—	—	—	-/1.0mm(LCD)	-/1.0mm(LCD)	—
Weight	420g	300g	335g	430g	500g	560g

Note : Resolution and focal depth of objective lens is calculated using the wavelength of (λ=0.55nm). R=0.61x0.55/N.A Focal depth ±D (μm) = λ / (2(N.A)²)

Near IR 2000nm Objective Lens

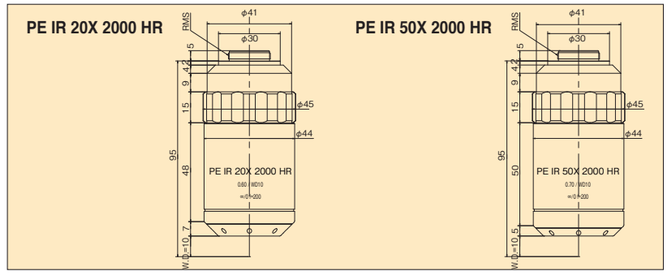
PEIR2000HR 20X·50X

Objective lens with high transmission rate near 1000-2000nm.
Ideal for failure analysis of semiconductor devices to detect extremely weak emission from leakage current. Provides good observation of highly integrated and multilayer wiring semiconductor when IR light transmitted from back-side of the chip through silicon.
Note: Silicon corrected lenses are also available.

■ Specification

Model #	PE IR 20X 2000 HR	PE IR 50X 2000 HR
Magnification	20X	50X
Working distance	10mm	10mm
Focal length (f)	10mm	4mm
N.A.	0.6	0.7
Resolution	1.6μm	1.4μm
Depth of focus(±D.F)	2.1μm	1.5μm
Transmission 1300nm	Over 80%	Over 80%
Transmission 2000nm	Over 80%	Over 80%
Weight	610g	560g

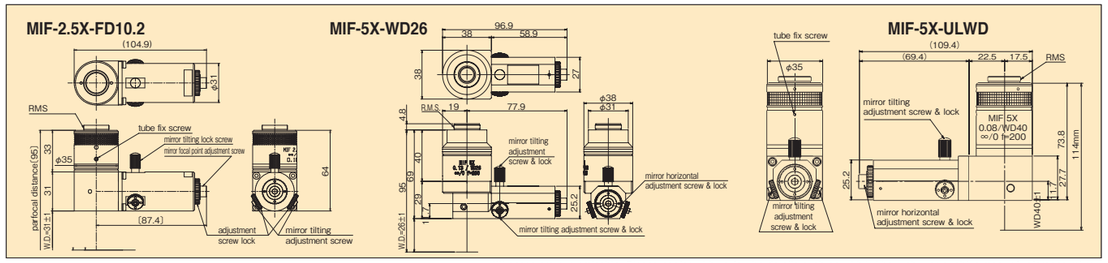
Note : Resolution and focal depth calculated using the wavelength of(λ=1550nm)
R=0.61X0.55/N.A Focal depth±D(μm) =λ/(2 (N.A)²)



Michelson Interferometer Objective Lens

MIF series

The interference objective operates by splitting the input optical beam into two beams at beam splitter. The path length for the beam reflected of the flat sample and reference mirror are set to be identical.Height variations in the sample produce phase variations which manifests as interference fringes. Fringe intensity is analyzed to determine sample's height variations.



※Lenses are customizable. Please confer with us for the details such as with/without shutter or adjustment of reference mirror. The refelectance ratio for the reference mirror can be tailored for the object.

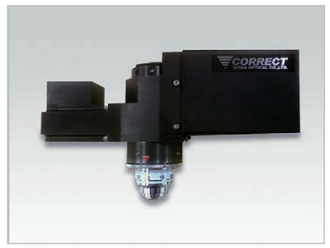
■ Specification

Model #	MIF-2.5X-FD10.2	MIF-5X-WD26	MIF-5X-ULWD
Magnification	2.5X	5X	5X
Working distance	31mm	26mm	40mm
Focal distance (f)	80mm	40mm	40mm
N.A	0.1	0.13	0.08
Resolution	3.4μm	2.6μm	4.2μm
Focal depth (±D.F)	27.5μm	16.3μm	42.9μm
Wavelength	486-656nm	486-656nm	486-656nm
Reference mirror accuracy	λ/20	λ/20	λ/20
Parfocal distance	95mm	95mm	114mm

※Resolution power = 0.61Xλ/N.A. Focal depth±D = λ(2 (N.A)²)

Linnik Interferometer Objective Lens

LIF series



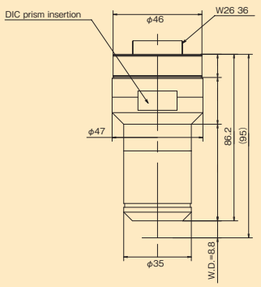
Lenses are customizable. Please confer with us.

MS-200-DIC-RSⅡ

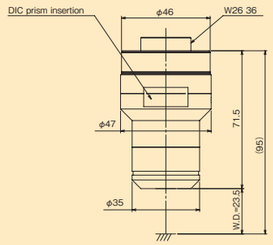
Differential interferance contrast tube

Ideal for the observation for minuscule bump by enhancing contrast. Locking feature for polarizer, analyser and Nomarski prism allowing adjustment and adoption to existing systems.

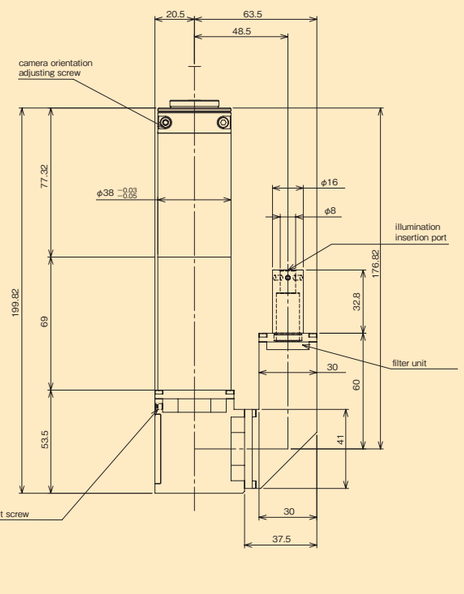
DICPlan2.5XRS-SB



DICPlan5XRS-SB

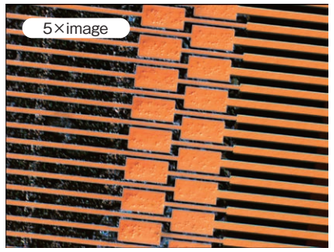


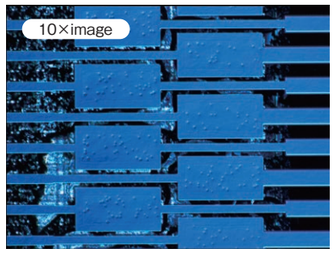
MS-200-DIC-RSⅡ

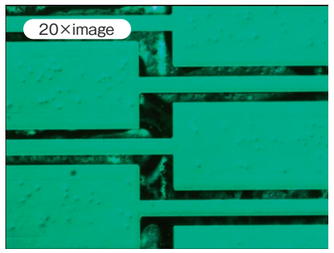


DICPlan10XRS-SB

DICPlan20XRS-SB







■ Specification

Model #	DICPlan2.5XRS-SB	DICPlan5XRS-SB	DICPlan10XRS-SB	DICPlan20XRS-SB
Magnification	2.5X	5X	10X	20X
Working distance	8.8mm	23.5mm	17.5mm	13.0mm
Focal length(f)	80	40	20	10
N.A	0.075	0.15	0.30	0.40
Resolution power	4.5μm	2.2μm	1.1μm	0.8μm
Focal depth(±D.F)	48.9μm	12μm	3μm	1.7μm
Weight	Approx 274g	Approx 230g	Approx 240g	Approx 266g

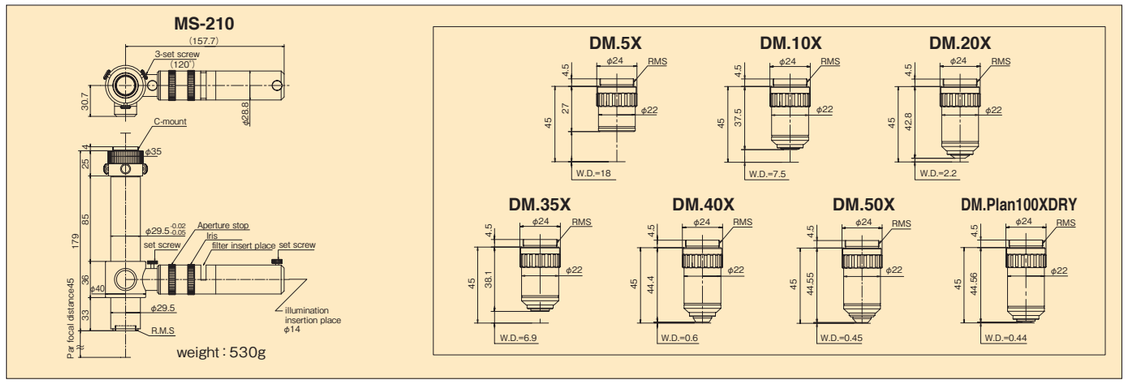
Note: Resolution and focal depth is calculated using the wavelength of （λ=0.55μm) R=0.61Xλ/N.A Focal depth ±D（μm）=λ/〔2 (N.A)²〕

Finite DM series

Coaxial tube lens, Mechanical tube length 210mm / Objective lens DM series

Series of Finite objective lenses of mechanical tube length of 210mm.
Choice of optical Magnification of 5X, 10X, 20X, 35X, 40X, 50X, 100X.

※Objective lens is option.



Model#	DM.5×	DM.10×	DM.20×	DM.35×	DM.40×	DM.50×	DM.Plan100×DRY
Magnification	5×	10×	20×	35×	40×	50×	100×
Working distance	18mm	7.5mm	2.2mm	6.9mm	0.6mm	0.45mm	0.44mm
Focal length (f)	37.9mm	22.17mm	11.72mm	6.06mm	5.78mm	4.66mm	2.17mm
N.A.	0.10	0.25	0.4	0.45	0.65	0.68	0.9
Resolution	3.4μm	1.3μm	0.8μm	0.7μm	0.5μm	0.5μm	0.4μm
Focal Depth(±D.F)	27.5μm	4.4μm	1.7μm	1.35μm	0.7μm	0.6μm	0.3μm
Weight	52g	85g	88g	85g	95g	96g	99g
Accessories	MS-210 : F20-W frosted filter						

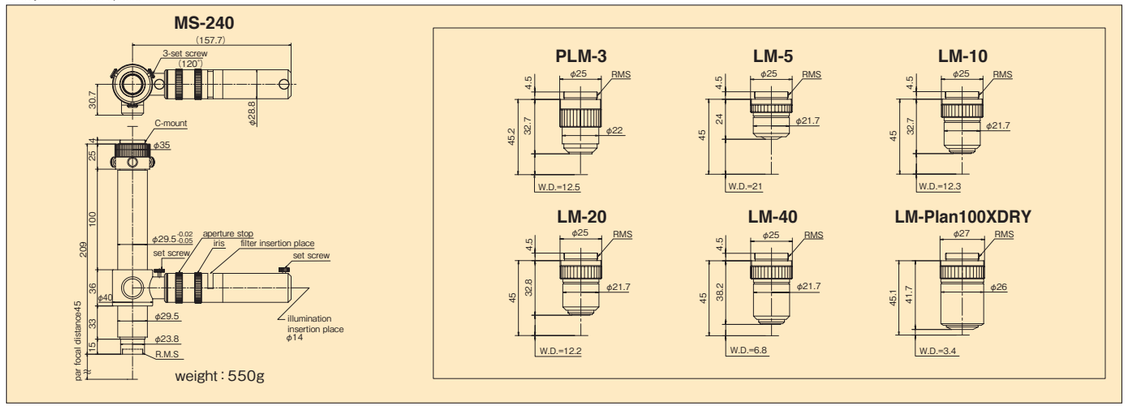
Note: Resolution and focal depth of objective lens is calculated using the wavelength of (λ=0.55nm). R=0.61x0.55/N.A Focal depth ±D (μm) = λ /〔2 (N.A)²〕

Finite LM series

Coaxial tube lens, Mechanical tube length 240mm / long working distance objective lens

Series of finite objective lens of mechanical tube length of 240mm.
Working distance is longer than DM series objective lenses.

※Objective lens is option.



Model#	PLM-3	LM-5	LM-10	LM-20	LM-40	LM-Plan100×DRY
Magnification	3×	5×	10×	20×	40×	100×
Working distance	12.5mm	21mm	12.3mm	12.2mm	6.8mm	3.4mm
Focal length (f)	78.07mm	53.88mm	22.5mm	11.45mm	6.06mm	2.33mm
N.A.	0.07	0.10	0.22	0.30	0.45	0.80
Resolution	4.8μm	3.4μm	1.5μm	1.1μm	0.7μm	0.4μm
Focal Depth(±D.F)	56.2μm	27.5μm	5.6μm	3.0μm	1.4μm	0.4μm
Weight	88g	43g	73g	76g	82g	95g
Accessories	MS-240 : F20-W frosted filter					

Note: Resolution and focal depth of objective lens is calculated using the wavelength of (λ=0.55nm). R=0.61x0.55/N.A Focal depth ±D (μm) = λ /〔 2 (N.A)²〕

Infinity M.Plan series

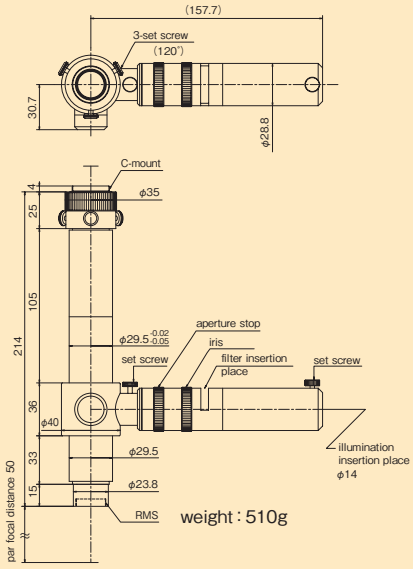
Coaxial tube, Infinity f=180mm

Long working distance lens - M.Plan Series

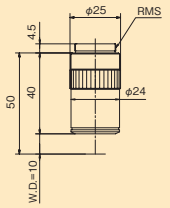
Compact tube (Infinity f=180mm) lens with choice of bright field M.Plan objective lenses.

※Objective lens is option.

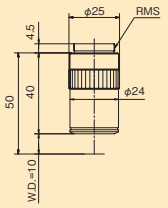
MS-180



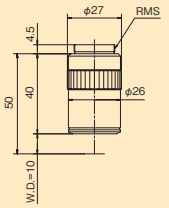
M.Plan10XLWD11



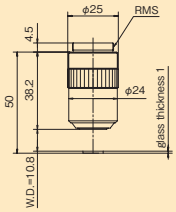
M.Plan20XLWD11



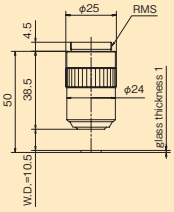
M.Plan40XLWD11



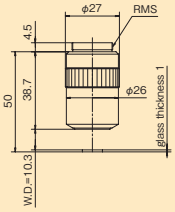
M.Plan10XLCD11



M.Plan20XLCD11



M.Plan40XLCD11



■ Specification

Model	M.Plan10×LWD11	M.Plan20×LWD11	M.Plan40×LWD11	M.Plan10×LCD11	M.Plan20×LCD11	M.Plan40×LCD11
Magnification	10×	20×	40×	10×	20×	40×
Working distance	10mm	10mm	10mm	10.8mm	10.5mm	10.3mm
Focal length (f)	18.0mm	8.99mm	4.49mm	18.0mm	8.99mm	4.49mm
N.A.	0.25	0.42	0.52	0.25	0.42	0.52
Resolution	1.3μm	0.8μm	0.6μm	1.3μm	0.8μm	0.6μm
Focal Depth(±D.F)	4.4μm	1.6μm	1.0μm	4.4μm	1.6μm	1.0μm
Weight	116g	113g	123g	116g	113g	123g
Accessories	MS-180:F20-W frosted filter					

Note: LCD typ : 1.1mm glass corrected lens for 1.1 mm through glass inspection Resolution and focal depth of objective lens is calculated using the wavelength of (λ=0.55nm) . R=0.61X0.55/NA Focal depth ±D (μm) = λ /[2 (N.A)^2]