



Fixed Magnification MMLs for Alignment



Fixed Magnification MMLs for Alignment



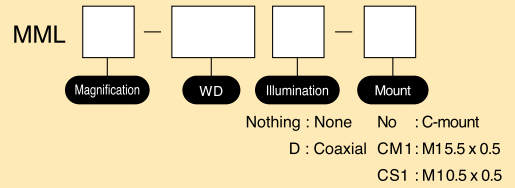
- MML-WD40mm Series** P.6
- MML-WD65mm Series** P.7
- MML-WD110mm Series** P.8
- MML-WD195mm Series** P.9
- MML-LongWD Series** P.9
- MML-CM1 Series** P.10
- MML-CS1 Series** P.11

MML (Machine Micro Lens) Series models are high-performance fixed magnification lenses for alignment. They are small with a long working distance for mounting on equipment and meet required optical performance conditions for alignment and part recognition.

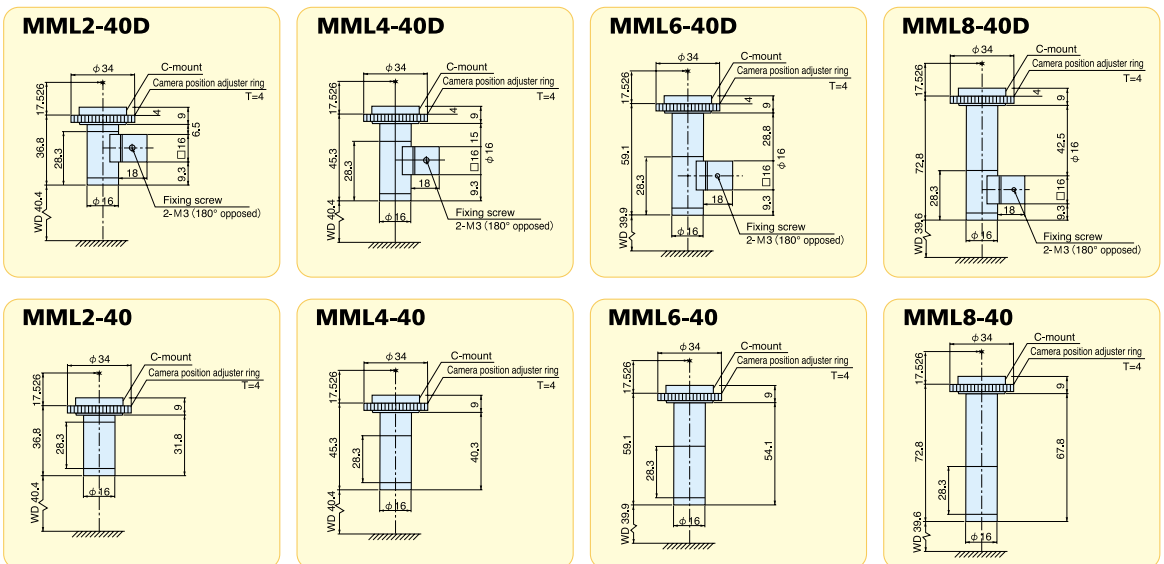
Features

- Telecentric optical design (object side).
- Equipped with a uniform coaxial illumination system that covers the entire view.
- Small with a long working distance for mounting on equipment.
- A variety of products by WD and camera mount.

Model explanation



WD40 Series Telecentric



Product name	Magnification	Effective FNO	O/I	WD	Depth of field	Resolution	TV distortion	NA	Weight	Largest compatible CCD	Mount
MML2-40/40D	x 2	14.3	94.8	40.4mm	280μm	4.8μm	0.9% or less	0.07	40g/50g	1/2"	C-mount
MML4-40/40D	x 4	28.6	103.3	40.4mm	140μm	4.8μm	0.6% or less	0.07	40g/50g	1/2"	C-mount
MML6-40/40D	x 6	43	116.5	39.9mm	95μm	4.8μm	0.3% or less	0.07	50g/60g	1/2"	C-mount
MML8-40/40D	x 8	57.3	129.9	39.6mm	71μm	4.8μm	0.2% or less	0.07	53g/63g	1/2"	C-mount

* Depth of field is calculated assuming a horizontal 320 TV resolution using a 1/2" CCD camera. (Permissible circle of confusion on the image-formation side: 40μm)
 * Resolution indicates a theoretical resolution at a wavelength of 550nm.

Fixed Magnification MMLs for Alignment

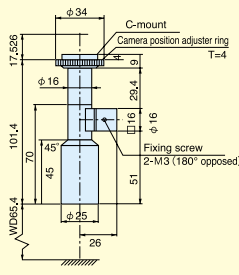


Fixed Magnification MMLs for Alignment

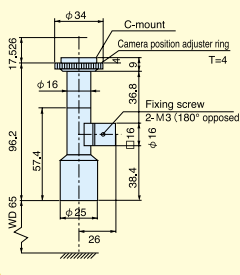
WD65 Series

Telecentric

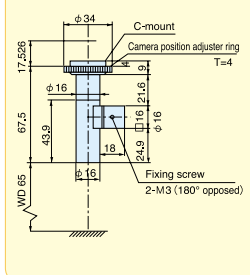
MML08-65D



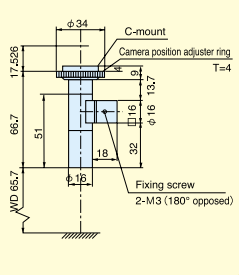
MML1-65D



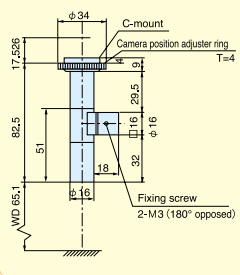
MML2-65D



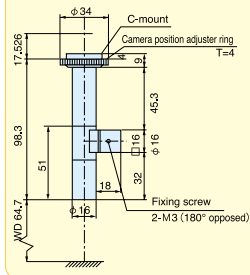
MML4-65D



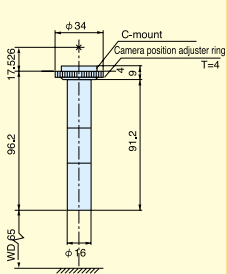
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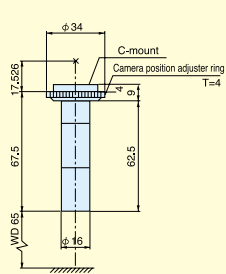
MML8-65D



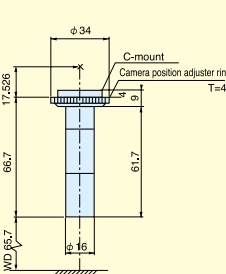
MML1-65



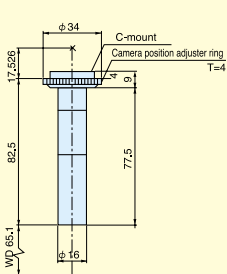
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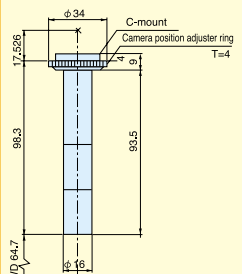
MML4-65



MML6-65



MML8-65



Product name	Magnification	Effective FNO	O/I	WD	Depth of field	Resolution	TV distortion	NA	Weight	Largest compatible CCD	Mount
MML08-65D	x 0.8	14.9	184.4	65.4mm	1.9mm	12 μ m	0.1% or less	0.03	66g	2/3"	C-mount
MML1-65/65D	x 1	18.6	178.8	65mm	1.5mm	12 μ m	0.1% or less	0.03	54g/66g	1/2" / 2/3"	C-mount
MML2-65/65D	x 2	17.4	150.1	65mm	350 μ m	5.8 μ m	0.1% or less	0.06	48g/60g	2/3"	C-mount
MML4-65/65D	x 4	27	149.9	65.7mm	130 μ m	4.5 μ m	0.4% or less	0.07	50g/62g	1/2"	C-mount
MML6-65/65D	x 6	40.8	165.1	65.1mm	90 μ m	4.5 μ m	0.2% or less	0.07	53g/65g	1/2"	C-mount
MML8-65/65D	x 8	54.7	180.5	64.7mm	68 μ m	4.6 μ m	0.1% or less	0.07	58g/70g	1/2"	C-mount

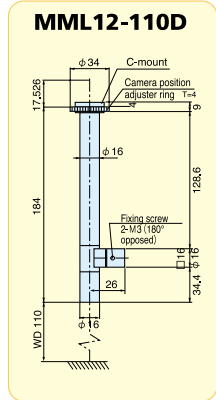
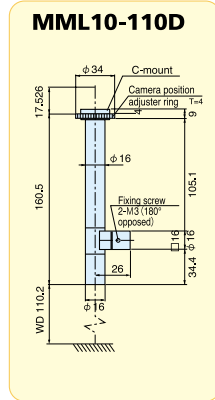
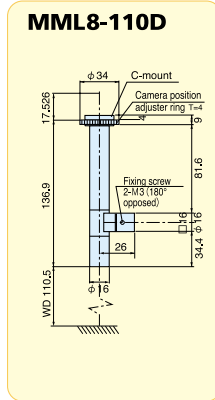
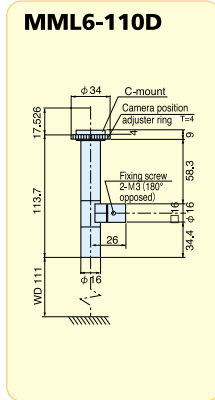
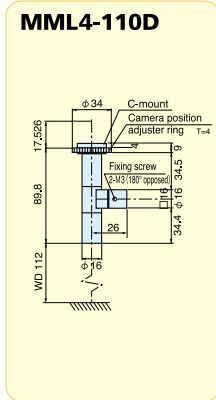
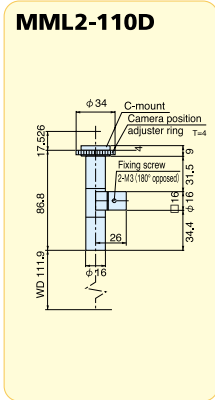
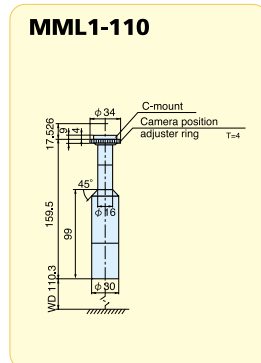
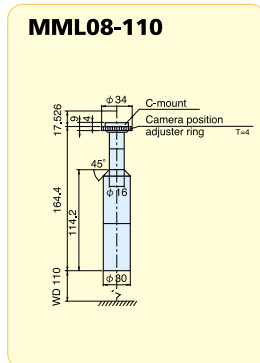
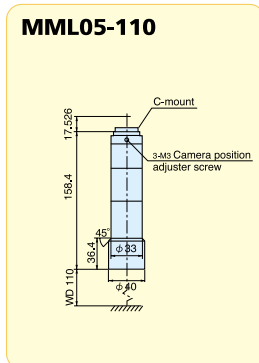
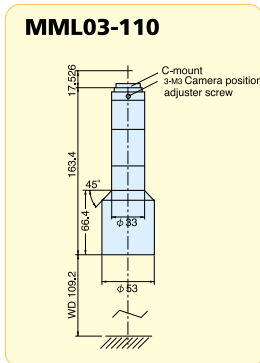
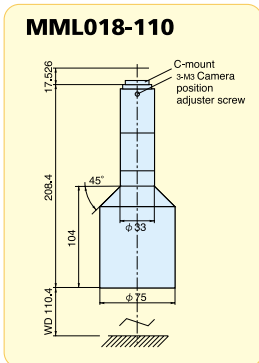
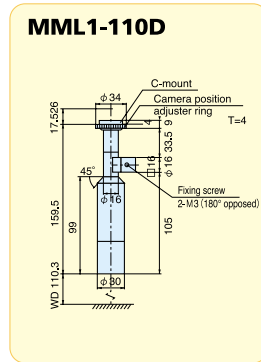
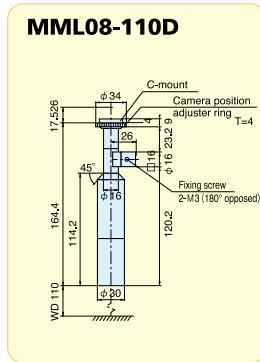
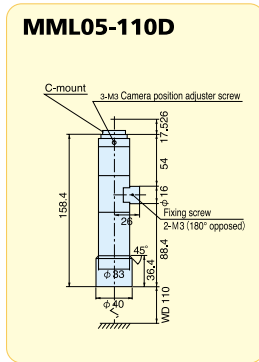
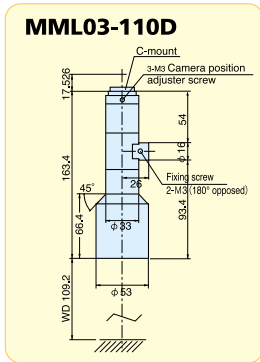
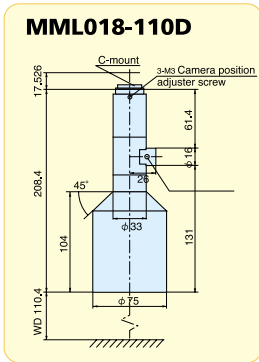
* Depth of field is calculated assuming a horizontal 320 TV resolution using a 1/2" CCD camera. (Permissible circle of confusion on the image-formation side: 40 μ m)
 * Resolution indicates a theoretical resolution at a wavelength of 550nm.

WD 110 Series

Telecentric



Fixed Magnification MMLs for Alignment



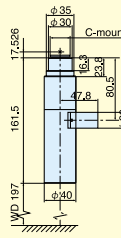
Product name	Magnification	Effective FNO	O/I	WD	Depth of field	Resolution	TV distortion	NA	Weight	Largest compatible CCD	Mount
MML018-110/110D	x 0.18	6.4	336.3	110.4mm	15mm	24 μ m	0.1% or less	0.01	700g/700g	2/3"	C-Mount
MML03-110/110D	x 0.3	7	290.1	109.2mm	6mm	16 μ m	0.3% or less	0.02	380g/380g	2/3"	C-Mount
MML05-110/110D	x 0.5	11.6	286	110mm	3.7mm	16 μ m	0.3% or less	0.02	280g/280g	2/3"	C-Mount
MML08-110/110D	x 0.8	16.1	292	110mm	2mm	14 μ m	0.3% or less	0.02	150g/150g	2/3"	C-Mount
MMI1-110/110D	x 1	16.7	287.4	110.3mm	1.3mm	11 μ m	0.2% or less	0.03	140g/140g	2/3"	C-Mount
MML2-110D	x 2	33.2	216.3	111.9mm	670 μ m	11 μ m	0.1% or less	0.03	73g	2/3"	C-Mount
MML4-110D	x 4	43.9	219.3	112mm	230 μ m	7.7 μ m	0.2% or less	0.04	75g	2/3"	C-Mount
MML6-110D	x 6	66.2	242.2	111mm	170 μ m ^{*1}	7.6 μ m	0.2% or less	0.04	78g	2/3"	C-Mount
MML8-110D	x 8	88	265	110.5mm	170 μ m ^{*1}	7.6 μ m	0.1% or less	0.04	80g	2/3"	C-Mount
MML10-110D	x 10	112.7	288.2	110.2mm	180 μ m ^{*1}	8 μ m ^{*2}	0.1% or less	0.04	85g	2/3"	C-Mount
MML12-110D	x 12	135.1	311.6	110mm	220 μ m ^{*1}	10 μ m ^{*2}	0.1% or less	0.04	88g	2/3"	C-Mount

*Depth of field is calculated assuming a horizontal 320 TV resolution using a 1/2" CCD camera. (Permissible circle of confusion on the image-formation side: 40 μ m) But *1 is calculated based on resolution. *Resolution indicates a theoretical resolution at a wavelength of 550nm. But *2 indicates a theoretical resolution when a green filter is used.

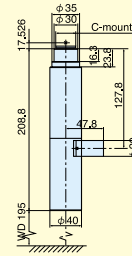
WD195 Series

Telecentric

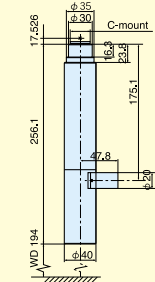
MML4-195D



MML6-195D



MML8-195D



Fixed Magnification MMLs for Alignment

Product name	Magnification	Effective FNO	O/I	WD	Depth of field	Resolution	TV distortion	NA	Weight	Largest compatible CCD	Mount
MML4-195D	x 4	25.3	376	197mm	130 μ m	4.2 μ m	0.1% or less	0.08	480g	2/3"	C-mount
MML6-195D	x 6	37.6	421.3	195mm	80 μ m	4.2 μ m	0.1% or less	0.08	490g	2/3"	C-mount
MML8-195D	x 8	49.9	467.6	194mm	60 μ m	4.2 μ m	0.1% or less	0.08	500g	2/3"	C-mount

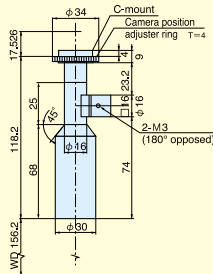
*Depth of field is calculated assuming a horizontal 320 TV resolution using a 1/2" CCD camera. (Permissible circle of confusion on the image-formation side: 40 μ m)
 *Resolution indicates a theoretical resolution at a wavelength of 550nm.

Long WD Series

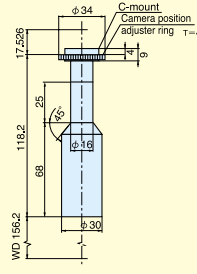
Telecentric

Made to order

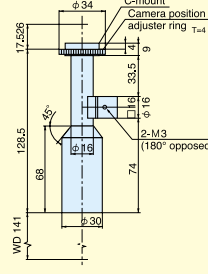
MML08-156D



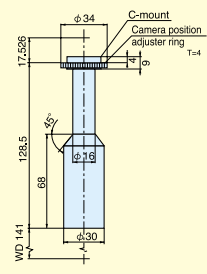
MML08-156



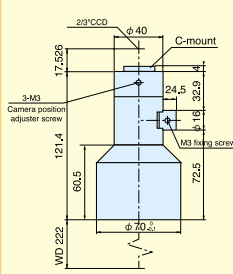
MML1-141D



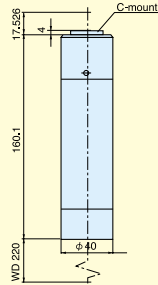
MML1-141



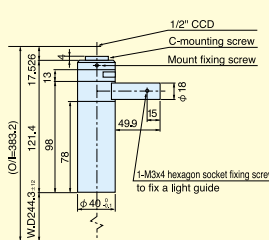
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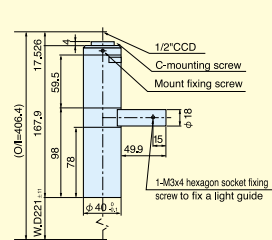
MML2-220



MML1-244D



MML2-221D



Product name	Magnification	Effective FNO	O/I	WD	Depth of field	Resolution	TV distortion	NA	Weight	Largest compatible CCD	Mount
MML08-156/156D	x 0.8	16.1	292	156.2mm	2mm	14 μ m	0.3% or less	0.02	125g/130g	2/3"	C-mount
ML1-141/141D	x 1	16.7	287.4	141.3mm	1.3mm	11 μ m	0.2% or less	0.03	115g/120g	2/3"	C-mount
MML02-220D	x 0.2	5	360.9	222mm	10mm	16.7 μ m	0.1% or less	0.02	450g	2/3"	C-mount
MML2-220	x 2	18	397.6	220mm	370 μ m	6.2 μ m	0.2% or less	0.05	400g	2/3"	C-mount
MML1-244D	x 1	11	383.2	244.3mm	880 μ m	7.4 μ m	0.1% or less	0.05	260g	1/2"	C-mount
MML2-221D	x 2	21.9	406.4	221mm	220 μ m	7.4 μ m	0.1% or less	0.05	320g	1/2"	C-mount

*Depth of field is calculated assuming a horizontal 320 TV resolution using a 1/2" CCD camera. (Permissible circle of confusion on the image-formation side: 40 μ m)
 *Resolution indicates a theoretical resolution at a wavelength of 550nm.

Fixed Magnification MMLs for Alignment

MML-CM1/CS1 Series Fixed Magnification



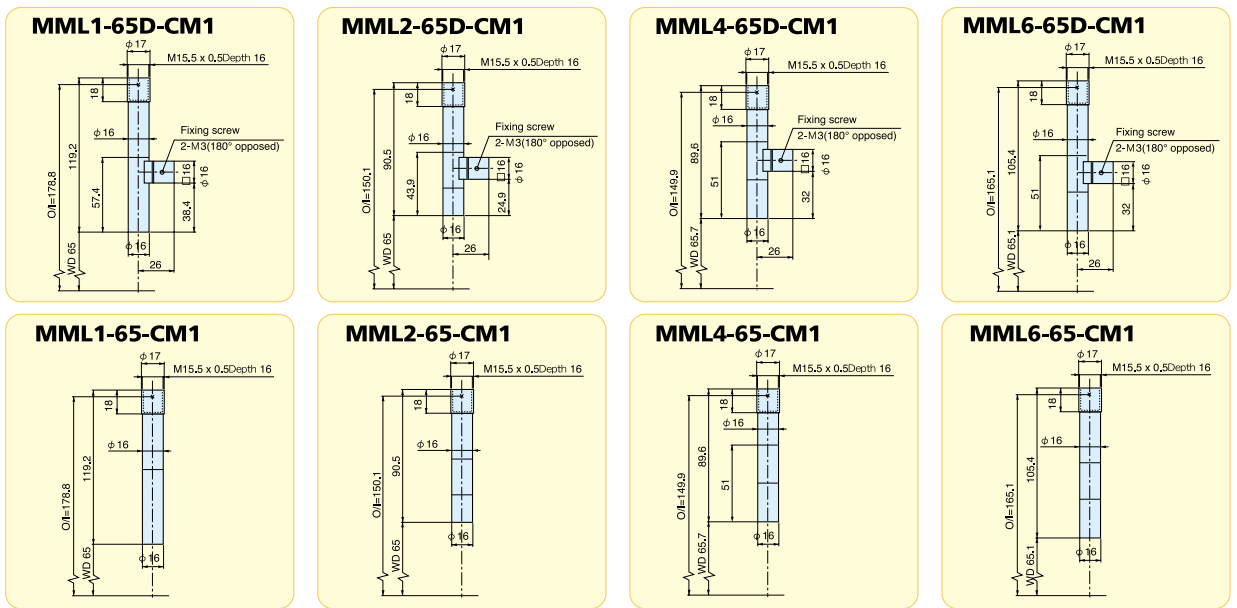
MML-CM1/CS1 Series models are thin, space-saving, and lightweight so they can be mounted on micro-head cameras.

MML-CM1 Series models are mounted on 17mm ϕ (M15.5x0.5) and MML-CS1 Series models are mounted on 12mm ϕ (M10.5x0.5).

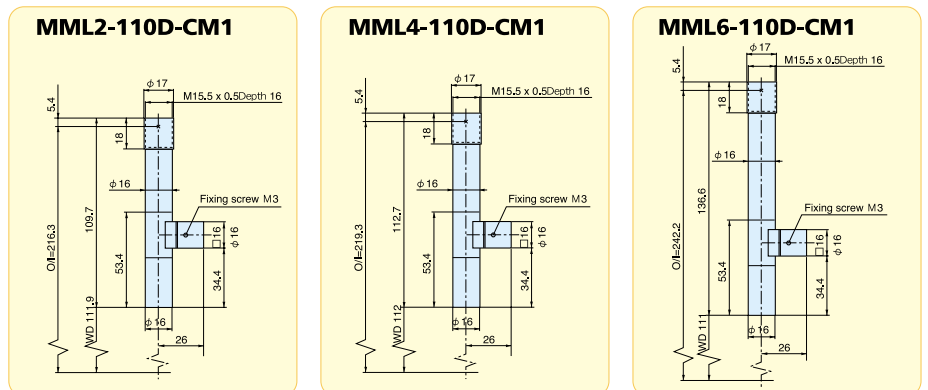


Fixed Magnification MMLs for Alignment

WD65-CM1 Series Telecentric



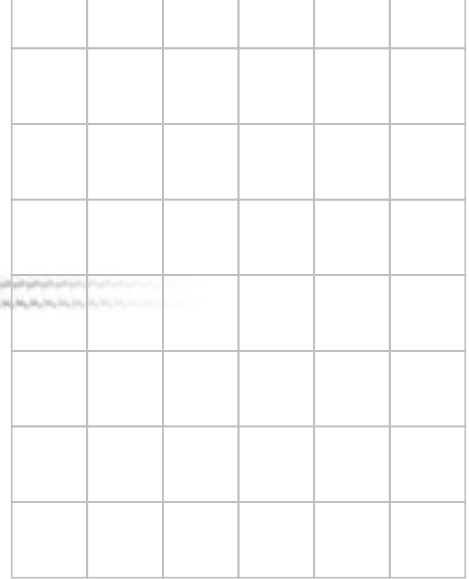
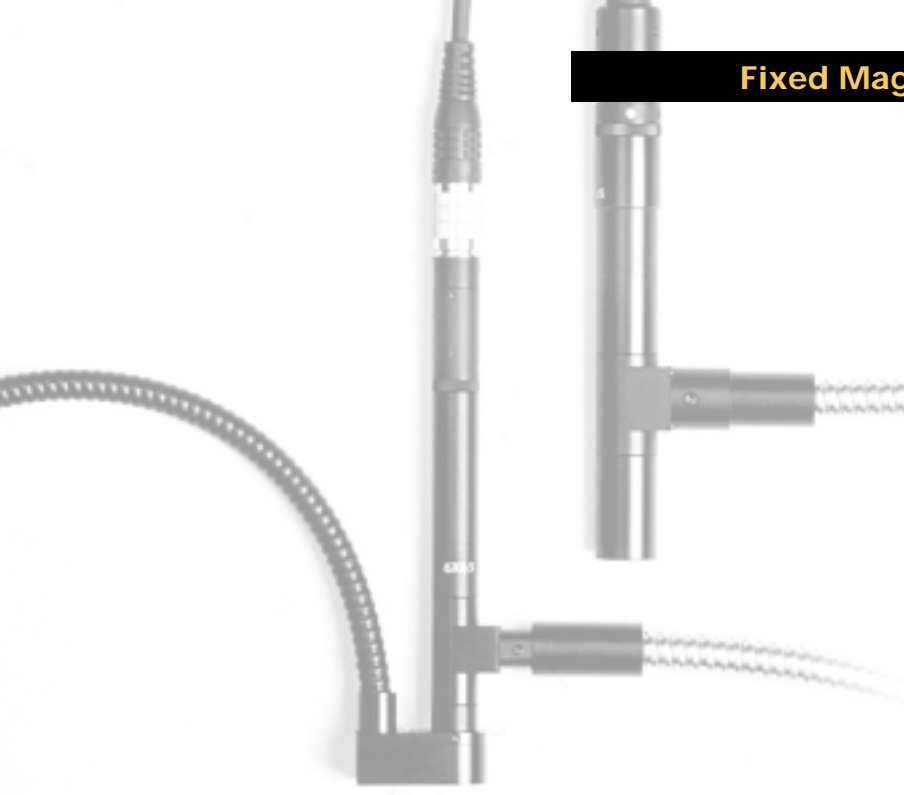
WD110-CM1 Series Telecentric



Product name	Magnification	Effective FNO	O/I	WD	Depth of field	Resolution	TV distortion	NA	Weight	Largest compatible CCD	Mount
MML1-65-CM1/D-CM1	x 1	18.6	178.8	65mm	1.5mm	12 μ m	0.1% or less	0.03	55g/62g	1/2"	M15.5 P0.5
MML2-65-CM1/D-CM1	x 2	17.4	150.1	65mm	350 μ m	5.8 μ m	0.1% or less	0.06	48g/55g	1/2"	M15.5 P0.5
MML4-65-CM1/D-CM1	x 4	27	149.9	65.7mm	130 μ m	4.5 μ m	0.4% or less	0.07	50g/57g	1/2"	M15.5 P0.5
MML6-65-CM1/D-CM1	x 6	40.8	165.1	65.1mm	90 μ m	4.5 μ m	0.2% or less	0.07	53g/60g	1/2"	M15.5 P0.5
MML2-110D-CM1	x 2	33.2	216.3	111.9mm	670 μ m	11 μ m	0.1% or less	0.03	68g	1/2"	M15.5 P0.5
MML4-110D-CM1	x 4	43.9	219.3	112mm	230 μ m	7.7 μ m	0.2% or less	0.04	70g	1/2"	M15.5 P0.5
MML6-110D-CM1	x 6	66.2	242.2	111mm	170 μ m ^{*1}	7.6 μ m	0.2% or less	0.04	73g	1/2"	M15.5 P0.5

*Depth of field is calculated assuming a horizontal 320 TV resolution using a 1/2" CCD camera. (Permissible circle of confusion on the image-formation side: 40 μ m) But *1 is calculated based on resolution. *Resolution indicates a theoretical resolution at a wavelength of 550nm.

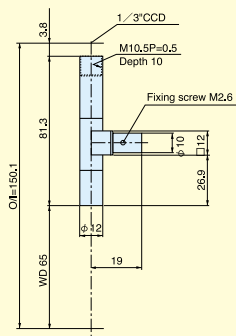
Fixed Magnification MMLs for Alignment



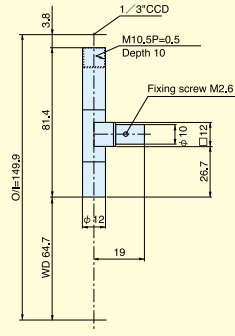
WD65-CS1 Series

Telecentric

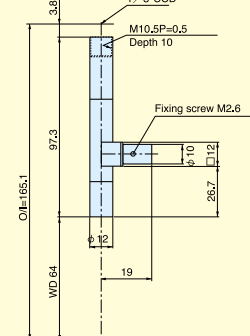
MML2-65D-CS1



MML4-65D-CS1



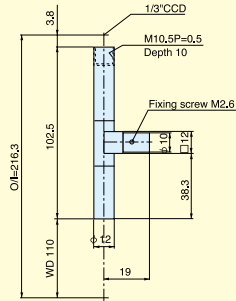
MML6-65D-CS1



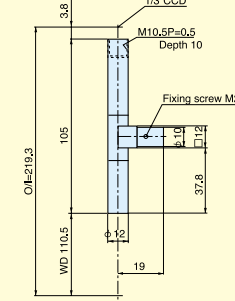
WD110-CS1 Series

Telecentric

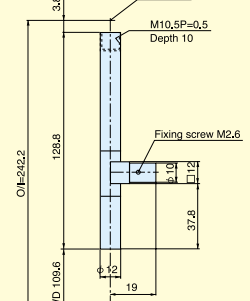
MML2-110D-CS1



MML4-110D-CS1



MML6-110D-CS1



Product name	Magnification	Effective FNO	O/I	WD	Depth of field	Resolution	TV distortion	NA	Weight	Largest compatible CCD	Mount
MML2-65D-CS1	x 2	17.4	150.1	65mm	260 μ m	5.8 μ m	0.1% or less	0.06	45g	1/3"	M10.5 P0.5
MML4-65D-CS1	x 4	29.8	149.9	64.7mm	110 μ m	5 μ m	0.2% or less	0.07	47g	1/3"	M10.5 P0.5
MML6-65D-CS1	x 6	44.2	165.1	64mm	74 μ m	5 μ m	0.1% or less	0.07	50g	1/3"	M10.5 P0.5
MML2-110D-CS1	x 2	33.2	216.3	110mm	500 μ m	11 μ m	0.1% or less	0.03	60g	1/3"	M10.5 P0.5
MML4-110D-CS1	x 4	51.1	219.3	110.5mm	220 μ m	8.6 μ m	0.1% or less	0.04	60g	1/3"	M10.5 P0.5
MML6-110D-CS1	x 6	76.3	242.2	109.6mm	220 μ m [*]	8.5 μ m	0.1% or less	0.04	63g	1/3"	M10.5 P0.5

*Depth of field is calculated assuming a horizontal 320 TV resolution using a 1/3" CCD camera. (Permissible circle of confusion on the image-formation side: 30 μ m) But *1 is calculated based on resolution.
^{*}Resolution indicates a theoretical resolution at a wavelength of 550nm.