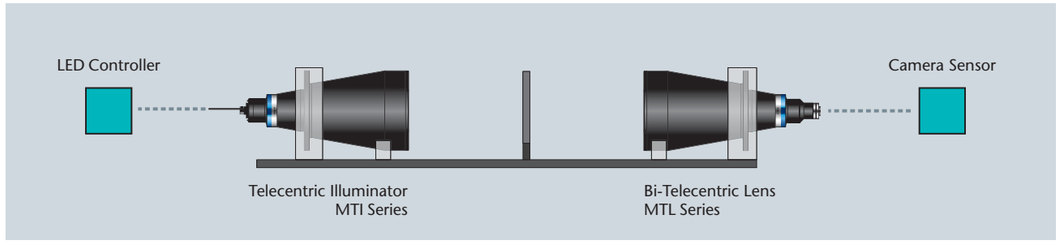
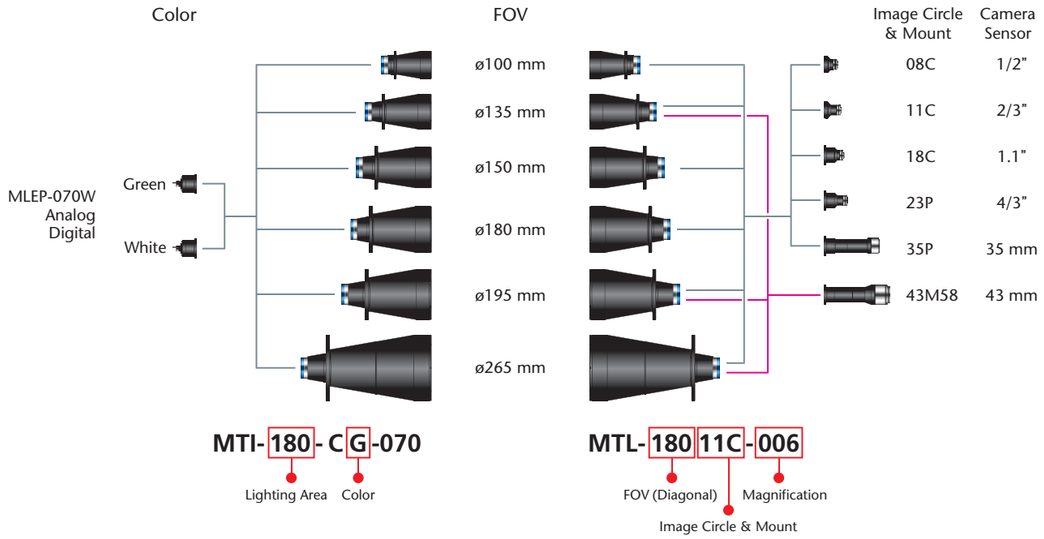
System chart





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MORITEX
Vision Creating Value

2015.11 Printed in Japan

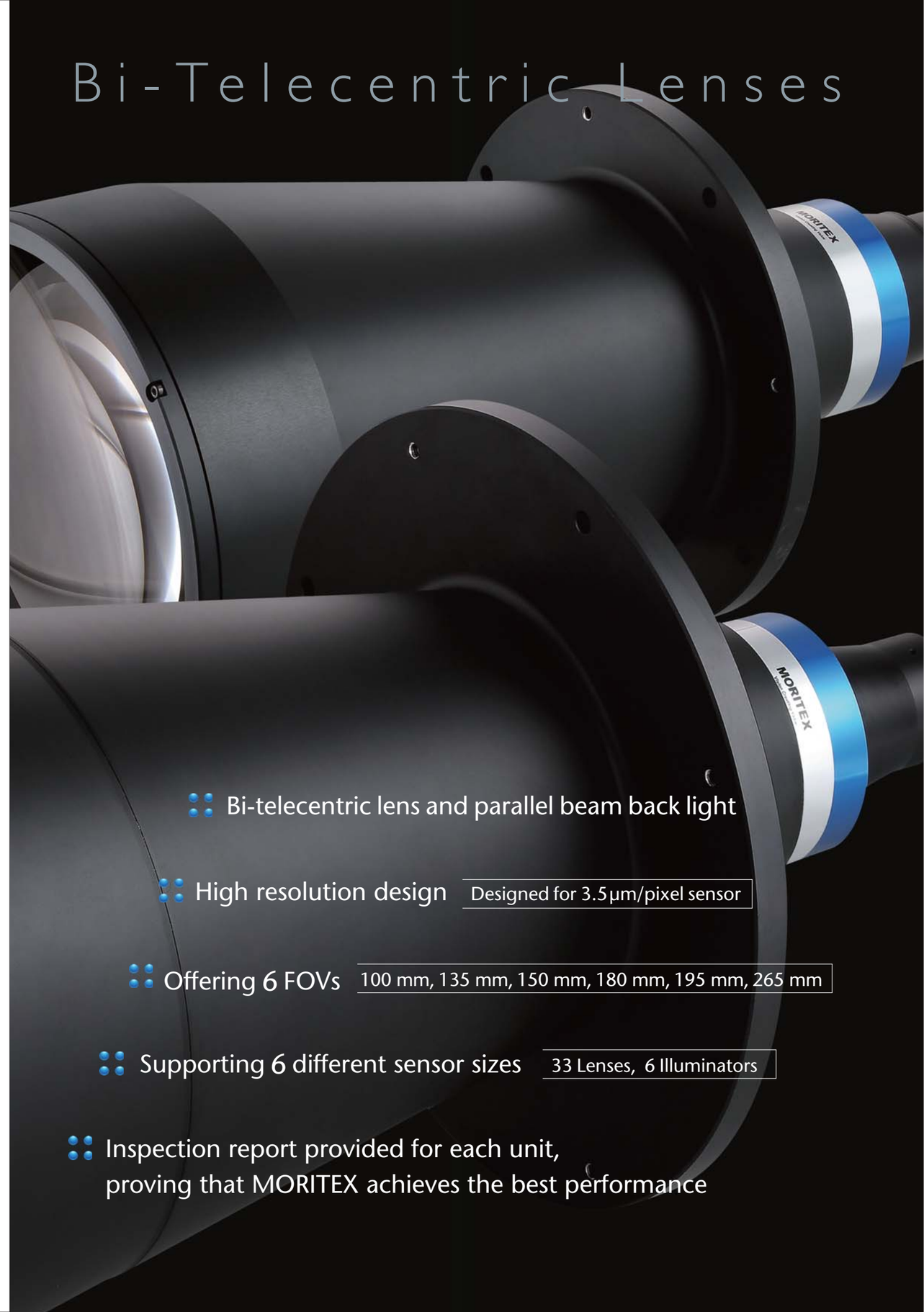
Low Magnification

Bi-Telecentric Lenses MTL Series

MORITEX's bi-telecentric lenses are the latest products to come from our cutting-edge lens design team which has over 25 years of experience designing and manufacturing telecentric optical systems, cultivated over the years by creating various types of optical products for both standard and custom applications.

Our unique optical design capabilities results in the tightest object and image side telecentricity in the market and enables near-zero distortion performance with the highest resolution from center to edge along the system FOV. This enables an optimized measurement condition for the highest accuracy that can be easily achieved by coupling these lenses with matched telecentric backlight illuminators.

Bi-Telecentric Lenses



- Bi-telecentric lens and parallel beam back light
- High resolution design — Designed for 3.5 µm/pixel sensor
- Offering 6 FOVs — 100 mm, 135 mm, 150 mm, 180 mm, 195 mm, 265 mm
- Supporting 6 different sensor sizes — 33 Lenses, 6 Illuminators
- Inspection report provided for each unit, proving that MORITEX achieves the best performance

Bi-Telecentric Lenses

MTL Series

Our unique optical design capabilities results in the tightest object and image side telecentricity in the market and enables near-zero distortion performance with the highest resolution from center to edge along the system FOV.

LINEUP						
MTL-100	1/2"	2/3"	1.1"	4/3"	35mm	
MTL-135	1/2"	2/3"	1.1"	4/3"	35mm	43mm
MTL-150	1/2"	2/3"	1.1"	4/3"	35mm	
MTL-180	1/2"	2/3"	1.1"	4/3"	35mm	
MTL-195	1/2"	2/3"	1.1"	4/3"	35mm	43mm
MTL-265	1/2"	2/3"	1.1"	4/3"	35mm	43mm

Specification

Model Name	Mag.	Image Circle	WD	Field of View 1/2" 6.4 x 4.8 x 8	Field of View 2/3" 8.8 x 6.6 x 11	Field of View 1.1" 14.1 x 10.3 x 18.1	Field of View 4/3" 18.1x13.6x22.5	Field of View 35mm 23 x 23 x 35	Field of View 43mm 36 x 24 x 43.5	Optical Specifications: Effective F#	Distortion	Telecentricity	Resolution @ 320 nm	DOF @ 40 µm	Dimensions: Diameter	Mount
	(x)	(mm)	(mm)	H x V x D	H x V x D	H x V x D	H x V x D	H x V x D	H x V x D		(%)	(deg.)	(µm)	(mm)	(mm)	
MTL-10008C-008	0.080	8	220	80 x 60 x 100						5.5	0.01	0.03	44.0	69.2	125	C
MTL-10011C-011	0.110	11	220	58 x 44 x 73	80 x 60 x 100					8.0	0.01	0.03	46.4	53.2	125	C
MTL-10018C-019	0.185	18.5	220	35 x 26 x 43	48 x 36 x 59	76 x 56 x 98				8.0	0.02	0.03	27.5	18.7	125	C
MTL-10023P-023	0.230	23	220	28 x 21 x 35	38 x 29 x 48	61 x 45 x 79	79 x 59 x 98			8.0	0.02	0.03	22.1	12.1	125	P*2
MTL-10035P-035	0.351	35	220	18 x 14 x 23	25 x 19 x 31	40 x 29 x 52	52 x 39 x 64	66 x 66 x 100		9.2	0.02	0.03	16.6	6.0	125	P*2
MTL-13508C-006	0.059	8	260	108 x 81 x 135						5.5	-0.02	0.05	59.3	126.1	160	C
MTL-13511C-008	0.081	11	260	79 x 59 x 98	108 x 81 x 135					8.0	-0.02	0.05	62.6	96.9	160	C
MTL-13518C-014	0.137	18.5	260	47 x 35 x 58	64 x 48 x 80	103 x 75 x 132				8.0	0.03	0.05	37.1	34.1	160	C
MTL-13523P-017	0.170	23	260	38 x 28 x 47	52 x 39 x 65	83 x 60 x 106	106 x 80 x 132			8.0	0.03	0.05	29.8	22.0	160	P*2
MTL-13535P-026	0.260	35	260	25 x 18 x 31	34 x 25 x 42	54 x 40 x 70	70 x 52 x 87	89 x 89 x 135		9.2	0.03	0.05	22.4	10.9	160	P*2
MTL-13543M58-032	0.322	43.5	260	20 x 15 x 25	27 x 20 x 34	44 x 32 x 56	56 x 42 x 70	71 x 71 x 109	112 x 74 x 135	13.7	0.03	0.05	26.9	10.5	160	M58
MTL-15008C-005*1																
MTL-15011C-007*1																
MTL-15018C-012*1																
MTL-15023P-015*1																
MTL-15035P-023*1																
MTL-18008C-004	0.045	8	350	144 x 108 x 180						5.5	-0.02	-0.04	79.1	224.1	210	C
MTL-18011C-006	0.061	11	350	105 x 78 x 131	144 x 108 x 180					8.0	-0.01	-0.04	83.5	172.1	210	C
MTL-18018C-010	0.103	18.5	350	62 x 47 x 78	86 x 64 x 107	137 x 100 x 176				8.0	0.02	-0.04	49.4	60.5	210	C
MTL-18023P-013	0.128	23	350	50 x 38 x 63	69 x 52 x 86	110 x 81 x 141	141 x 106 x 176			8.0	0.02	-0.04	39.7	39.1	210	P*2
MTL-18035P-019	0.195	35	350	33 x 25 x 41	45 x 34 x 56	72 x 53 x 93	93 x 70 x 115	118 x 118 x 180		9.2	0.02	-0.04	29.8	19.3	210	P*2
MTL-19508C-004	0.041	8	365	156 x 117 x 195						5.5	-0.05	0.04	85.8	263.7	230	C
MTL-19511C-006	0.056	11	365	114 x 85 x 142	156 x 117 x 195					8.0	-0.05	0.04	90.6	202.6	230	C
MTL-19518C-009	0.095	18.5	365	67 x 51 x 84	93 x 70 x 116	149 x 109 x 191				8.0	-0.04	0.04	53.6	71.3	230	C
MTL-19523P-012	0.118	23	365	54 x 41 x 68	75 x 56 x 93	120 x 87 x 154	154 x 115 x 191			8.0	-0.04	0.04	43.1	46.1	230	P*2
MTL-19535P-018	0.180	35	365	36 x 27 x 45	49 x 37 x 61	78 x 57 x 101	101 x 76 x 125	128 x 128 x 195		9.2	-0.04	0.04	32.4	22.7	230	P*2
MTL-19543M58-022	0.223	43.5	365	29 x 22 x 36	39 x 30 x 49	63 x 46 x 81	81 x 61 x 101	103 x 103 x 157	161 x 108 x 195	13.7	-0.04	0.04	39.0	22.0	230	M58
MTL-26508C-003	0.030	8	540	212 x 159 x 265						5.5	0.02	0.05	116.8	488.6	300	C
MTL-26511C-004	0.041	11	540	155 x 116 x 193	213 x 159 x 266					8.0	0.03	0.05	123.3	375.5	300	C
MTL-26518C-007	0.070	18.5	540	92 x 69 x 115	126 x 95 x 158	202 x 148 x 260				8.0	0.03	0.05	72.9	132.1	300	C
MTL-26523P-009	0.087	23	540	74 x 55 x 92	102 x 76 x 127	163 x 119 x 209	209 x 157 x 260			8.0	0.03	0.05	58.6	85.4	300	P*2
MTL-26535P-013	0.132	35	540	48 x 36 x 61	67 x 50 x 83	107 x 78 x 137	137 x 103 x 170	174 x 174 x 265		9.2	0.03	0.05	44.1	42.1	300	P*2
MTL-26543M58-016	0.164	43.5	540	39 x 29 x 49	54 x 40 x 67	86 x 63 x 110	110 x 83 x 137	140 x 140 x 214	220 x 146 x 266	13.7	0.03	0.05	53.0	40.8	300	M58

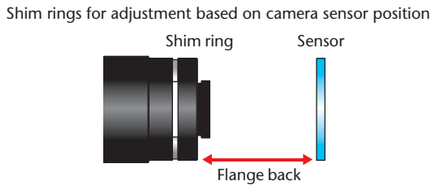
*1 MTL-150 Series is under development
*2 P : M42 x P=1

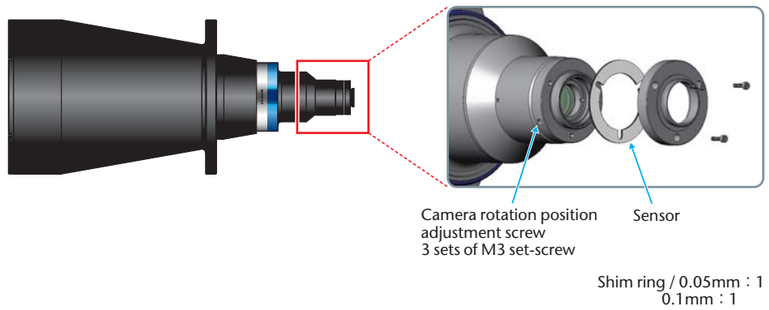
Bi-Telecentric Lenses: MTL Series

Adjustment Function

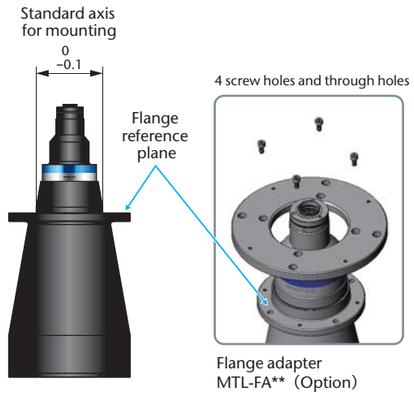
• Camera sensor position adjustment function

MORITEX's bi-telecentric lenses feature a camera adjustment function that can draw out the maximum performance. A filter can also be fitted to the lens, with the location designed with performance in mind.



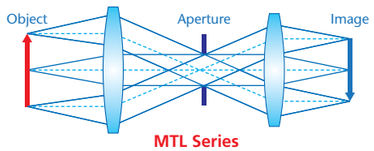


Lens Mounting



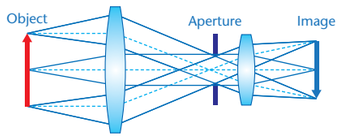
MORITEX's bi-telecentric lens features a high resolution, high contrast design ideal for workpiece shapes and dimension measurement that require a high degree of accuracy, making it well suited for countless applications. The design offers more even and smooth telecentric lighting thanks to a special telecentric illumination that delivers uniform brightness between the center and edges of the visual field and that irradiates parallel light even on the output side.

Bi-Telecentric Lens



MTL Series

Object Side Telecentric Lens



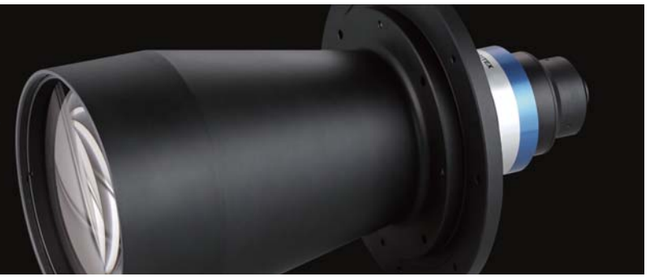
MML Series

Features

- Designed to position principal ray parallel to lens optical axis at both object side and image side by controlling viewing angle as "near-zero"
- Maintaining image side magnification regardless of how close/far the object is located, providing an ideal solution for dimension measurement
- Highly accurate measurement and gauging can be achieved even when objects are positioned at an angle or different height
- Incident angle to the sensor is constant generating less shading and resulting in an image with very uniform brightness
- Stable, repeatable measurement is possible in addition to reducing the effect of object position offset even if camera or sensor installation is not securely fixed along the optical axis

Telecentric Illuminators

MTI Series



Large area telecentric illumination for silhouette inspection,
provides optimized parallel beam to best match the MTL Series.

LINEUP

MTI-100	Lighting Area	ϕ100mm
MTI-135	Lighting Area	ϕ135mm
MTI-150	Lighting Area	ϕ150mm
MTI-180	Lighting Area	ϕ180mm
MTI-195	Lighting Area	ϕ195mm
MTI-265	Lighting Area	ϕ265mm

Model name	Color	Optical specifications		Mechanical specifications		
		Lighting Area (ϕmm)	WD (mm)	Length*1 (mm)	Outer diam. (mm)	Weight (kg)
MTI-100-CG-070	● Green	100	220	279	125	1.7
MTI-100-CW-070	○ White	100	220	279	125	1.7
MTI-135-CG-070	● Green	135	260	360.9	160	3.5
MTI-135-CW-070	○ White	135	260	360.9	160	3.5
MTI-150-CG-070*2	● Green	150				
MTI-150-CW-070*2	○ White	150				
MTI-180-CG-070	● Green	180	350	444.3	210	7.1
MTI-180-CW-070	○ White	180	350	444.3	210	7.1
MTI-195-CG-070	● Green	195	365	488.3	230	7.9
MTI-195-CW-070	○ White	195	365	488.3	230	7.9
MTI-265-CG-070	● Green	265	540	672.3	300	15.1
MTI-265-CW-070	○ White	265	540	672.3	300	15.1

Maximum rated current is 700mA and electrical power consumption is 3W
Blue color and red color is production on demand basis
*1 Lens tube length includes LED illumination unit, and adjustable length allowance is 12.5mm maximum depends on LED
*2 MTL-150 Series is under development

Accessories

- 90 degree, L-Shaped Mirror
- Diffusers
- LED Light Source Alternatives
- Flange Adapters
- Clamping Holders

Primary Applications

Automotive

- Engine components: cam shafts, engine cylinders, valves, valve springs, etc.
- Exhaust system: catalysts, etc.
- Exterior: window wiper blades, etc.

Foods and pharmaceuticals

- Bottle inspection
- Tablet inspection
- Blister package inspection

Electronics

- Smartphone inspection: housing, batteries, exterior components, etc.
- Inspection during smartphone assembly processes and highly accurate alignment

Machinery parts and fabrication

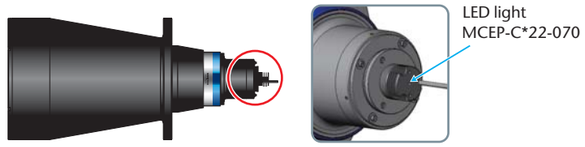
- Watch component inspection: lot manufacturing, assembly
- Machine tools: cutting tool inspection and fabricated component inspection

Telecentric Illuminators: MTI Series

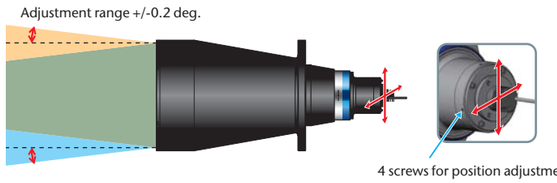
Adjustment Function

- Beam angle adjustment function

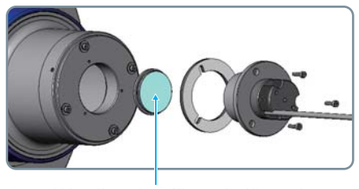
The telecentric illuminators for the bi-telecentric lenses have a beam angle adjustment function so that the beam angle can be fine tuned when the LED lamp is replaced. This enables optimum position adjustment.



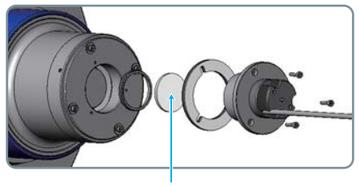
Utilizes the special features of a telecentric lens to make it possible to adjust beam angle irradiation by up to 0.2 degrees by changing the position of the LED element.



- Filter insertion function

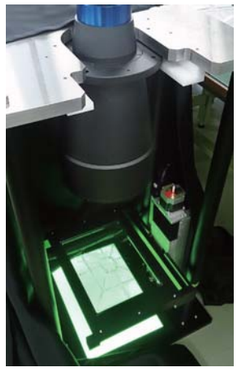


Compatible with most ND filters, color filters and edge filters sold in stores, etc.(M25.5xP0.75)



Achieve even more uniform images by inserting a diffuser. (Non white light illumination MTI***-CW-070 available as an optional product)
*Some measurement accuracy will be affected. Contact us if you would like to use a diffuser.

Inspection Reports



Inspection report data provided for every single unit.

[Lens]
- **Telecentricity measurement**
- **Distortion measurement**
- **MTF measurement**

[Illumination]
- **Parallelism**
- **Uniformity testing**

* MTF (Modulation Transfer Function) is spatial frequency.
It indicates contrast degradation of B/W pattern at 1mm area on image surface when B/W pattern chart with continuously changing spatial frequency and this is a characteristics evaluation method of reproductivity of the contrast.
This method provides the quality of image forming and contrast at same time, and inspected area covers from center to the edges.