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FACTORY AUTOMATION LENSES

FA

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Working Distance	Optical Magnification	Extension Ring	Field of View(mm)			
			1/2"		1/3"	
(mm)		(mm)	H	V	H	V
900	0.006X	-	1179.8	882.3	882.3	657.2
850	0.006X	-	1115.4	834.2	834.2	621.3
800	0.006X	-	1051.0	786.0	786.0	585.4
750	0.007X	-	986.6	737.8	737.8	549.5
700	0.007X	-	922.3	689.6	689.6	513.6
650	0.008X	-	857.9	641.4	641.4	477.7
600	0.008X	-	793.5	593.2	593.2	441.8
550	0.009X	-	729.1	545.0	545.0	405.9
500	0.010X	-	664.7	496.9	496.9	370.0
450	0.011X	-	600.3	448.7	448.7	334.1
400	0.012X	-	535.9	400.5	400.5	298.2
350	0.014X	-	471.5	352.3	352.3	262.3
300	0.016X	-	407.1	304.1	304.1	226.4
250	0.019X	-	342.7	255.9	255.9	190.5
200	0.024X	-	278.4	207.8	207.8	154.6
150	0.031X	-	214.0	159.6	159.6	118.7
100	0.044X	-	149.6	111.4	111.4	82.8

[illegible][illegible]

Working Distance	Optical Magnification	Extension Ring	Field of View(mm)			
			2/3"		1/2"	
(mm)		(mm)	H	V	H	V
900	0.013X	-	672.7	504.0	488.7	366.0
850	0.014X	-	635.9	476.4	461.9	345.9
800	0.015X	-	599.1	448.9	435.2	325.9
750	0.016X	-	562.4	421.3	408.4	305.9
700	0.017X	-	525.6	393.7	381.7	285.8
650	0.018X	-	488.8	366.1	355.0	265.8
600	0.020X	-	452.1	338.5	328.2	245.7
550	0.021X	-	415.3	311.0	301.5	225.7
500	0.023X	-	378.5	283.4	274.7	205.7
450	0.026X	-	341.7	255.8	248.0	185.6
400	0.029X	-	305.0	228.2	221.2	165.6
350	0.033X	-	268.2	200.6	194.5	145.6
300	0.038X	-	231.4	173.0	167.7	125.5
250	0.046X	-	194.7	145.5	141.0	105.5
200	0.056X	-	157.9	117.9	114.3	85.4
150	0.074X	-	121.1	90.3	87.5	65.4
100	0.106X	0.5	84.3	62.7	60.8	45.4

Working Distance	Optical Magnification	Extension Ring	Field of View(mm)			
			2/3"		1/2"	
(mm)		(mm)	H	V	H	V
900	0.009X	-	976.8	731.5	709.1	530.1
850	0.010 X	-	923.3	691.4	670.2	501.0
800	0.010 X	-	869.8	651.3	631.4	471.9
750	0.011 X	-	816.3	611.2	592.5	442.8
700	0.012 X	-	762.8	571.1	553.6	413.8
650	0.013 X	-	709.3	531.0	514.7	384.7
600	0.014 X	-	655.8	490.9	475.8	355.6
550	0.015 X	-	602.3	450.8	437.0	326.5
500	0.016 X	-	548.8	410.7	398.1	297.5
450	0.018 X	-	495.3	370.6	359.2	268.4
400	0.020X	-	441.8	330.5	320.3	239.3
350	0.023X	-	388.3	290.4	281.4	210.2
300	0.027X	-	334.8	250.3	242.6	181.2
250	0.032X	-	281.2	210.2	203.7	152.1
200	0.039X	-	227.7	170.0	164.8	123.0
150	0.052X	-	174.2	129.9	125.9	93.9
100	0.075X	-	120.7	89.8	87.0	64.9

Technical drawing of the 1000 Series Encoder. The drawing includes a front view on the left and a side view on the right. The front view shows a circular encoder with a diameter of $\varnothing 31.5$ and a square output shaft with a diameter of $\varnothing 6.35$. The side view shows the encoder's profile with a total height of $\varnothing 31.5$ and a mounting flange diameter of $\varnothing 32$. Key dimensions and labels include:

- Index Ring**: Located at the top of the side view.
- Potentiometer**: Located below the Index Ring.
- Index Ring**: Located at the top of the side view.
- Tri-Ring**: Located at the top of the side view.
- 1-1/2" (38.1)**: Dimension for the mounting flange.
- 10.4**: Dimension for the mounting flange.
- 6.1**: Dimension for the mounting flange.
- 12**: Dimension for the mounting flange.
- 6.7**: Dimension for the mounting flange.
- 10.9**: Dimension for the mounting flange.
- 17.5 (44.3)**: Dimension for the mounting flange.
- 28.2**: Dimension for the mounting flange.
- 13 (33.0)**: Dimension for the mounting flange.

Working Distance	Optical Magnification	Extension Ring	Field of View(mm)			
			2/3"		1/2"	
(mm)		(mm)	H	V	H	V
900	0.018X	-	503.2	376.8	365.4	273.7
850	0.019X	-	475.6	356.2	345.3	258.6
800	0.020X	-	448.0	335.5	325.3	243.6
750	0.021X	-	420.4	314.8	305.2	228.6
700	0.023X	-	392.8	294.1	285.2	213.6
650	0.024X	-	365.2	273.4	265.1	198.5
600	0.026X	-	337.6	252.8	245.1	183.5
550	0.029X	-	310.0	232.1	225.0	168.5
500	0.031X	-	282.5	211.4	204.9	153.5
450	0.035X	-	254.9	190.7	184.9	138.4
400	0.039X	-	227.3	170.0	164.8	123.4
350	0.044X	-	199.7	149.4	144.8	108.4
300	0.052X	-	172.1	128.7	124.7	93.4
250	0.061X	-	144.5	108.0	104.7	78.3
200	0.076X	-	116.9	87.3	84.6	63.3
150	0.100X	0.5	89.3	66.6	64.6	48.3
100	0.145X	1.0	61.7	45.9	44.5	33.2

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MEGA-PIXEL LENSES

CCTV FACTORY AUTOMATION LENSES



M2514-MP2



Focal Length		25mm			
Max. Aperture Ratio		1:1.4			
Max. Image Format		8.8mm x 6.6mm (φ11mm)			
Operation Range	Iris	F1.4 - F16C			
	Focus	0.3m - Inf.			
Control	Iris	Manual			
	Focus	Manual			
Object Dimension at M.O.D.		10.6(H)cm x 7.9(V)cm 2/3"			
Angle of View	D	2/3"	24.9°	1/2"	18.2°
	H		20.0°		14.6°
	V		15.1°		11.0°
Operating Temperature		-10°C ~ +50°C			
Distortion	2/3"	-0.3% (y=5.5)	1/2"	-0.1% (y=4.0)	
Back Focal Length	13.1mm				
Flange Back Length	17.526mm				
Mount	C-Mount				
Filter Size	M30.5 P=0.5mm				
Dimensions	φ33.5mm x 36.0mm				
Weight	71g				

Working Distance (mm)	Optical Magnification	Extension Ring (mm)	Field of View(mm)			
			2/3"		1/2"	
			H	V	H	V
900	0.028X	-	317.5	237.7	230.5	172.7
850	0.029X	-	299.9	224.5	217.7	163.1
800	0.031X	-	282.3	211.3	204.8	153.5
750	0.033X	-	264.6	198.1	192.0	143.9
700	0.036X	-	247.0	184.9	179.2	134.3
650	0.039X	-	229.4	171.6	166.4	124.7
600	0.042X	-	211.8	158.4	153.6	115.1
550	0.046X	-	194.1	145.2	140.8	105.5
500	0.050X	-	176.5	132.0	128.0	95.9
450	0.056X	-	158.9	118.8	115.2	86.3
400	0.063X	-	141.2	105.6	102.4	76.7
350	0.072X	-	123.6	92.4	89.6	67.1
300	0.084X	-	106.0	79.2	76.8	57.5
250	0.100X	-	88.3	66.0	63.9	47.9
200	0.126X	-	70.7	52.7	51.1	38.3
150	0.168X	-	53.0	39.5	38.3	28.7
100	0.253X	1.5	35.3	26.3	25.5	19.0

Field of View = CCD Size / Optical Magnification

M5018-MP2



Focal Length		50mm			
Max. Aperture Ratio		1:1.8			
Max. Image Format		8.8mm x 6.6mm (φ 11mm)			
Operation Range	Iris	F1.8 - F16C			
	Focus	0.5m - Inf.			
Control	Iris	Manual			
	Focus	Manual			
Object Dimension at M.O.D.		8.7 (H)cm x 6.5(V)cm 2/3"			
Angle of View	D	2/3"	13.1°	1/2"	9.5°
	H		10.5°		7.6°
	V		7.9°		5.7°
Operating Temperature		-10°C ~ +50°C			

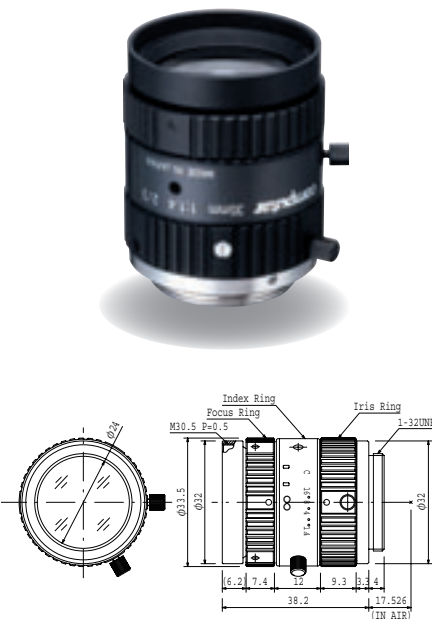
Distortion	2/3"	-0.3% (y=5.5)	1/2"	-0.2% (y=4.0)		
Back Focal Length	13.1mm					
Flange Back Length	17.526mm					
Mount	C-Mount					
Filter Size	M30.5 P=0.5mm					
Dimensions	φ 33.5mm x 38.1mm					
Weight	85g					

Working Distance (mm)	Optical Magnification	Extension Ring (mm)	Field of View(mm)			
			2/3"		1/2"	
			H	V	H	V
900	0.055X	-	160.8	120.4	116.7	87.5
850	0.058X	-	151.6	113.5	110.1	82.5
800	0.062X	-	142.4	106.6	103.4	77.5
750	0.066X	-	133.2	99.7	96.7	72.5
700	0.071X	-	124.0	92.9	90.0	67.5
650	0.077X	-	114.8	86.0	83.4	62.5
600	0.084X	-	105.6	79.1	76.7	57.5
550	0.092X	-	96.5	72.2	70.1	52.5
500	0.101X	-	87.3	65.3	63.3	47.5
450	0.113X	0.5	78.1	58.4	56.7	42.5
400	0.128X	1.5	68.9	51.6	50.0	37.5
350	0.148X	2.5	59.7	44.7	43.3	32.5
300	0.175X	3.5	50.5	37.8	36.6	27.4
250	0.214X	5.5	41.3	30.9	30.0	22.4
200	0.276X	8.5	32.1	24.0	23.3	17.4
150	0.387X	14.0	22.9	17.1	16.6	12.4
100	0.647X	26.5	13.6	10.2	9.9	7.4

Field of View = CCD Size / Optical Magnification

M3514-MP

NEW



Focal Length		35mm			
Max. Aperture Ratio		1 : 1.4			
Max. Image Format		8.8mm x 6.6mm (φ 11mm)			
Operation Range	Iris	F1.4 - F16C			
	Focus	0.3m - Inf.			
Control	Iris	Manual			
	Focus	Manual			
Object Dimension at M.O.D.		8.1(H)cm x 6(V)cm 2/3"			
Angle of View	D	2/3"	17.3°	1/2"	12.6°
	H		13.9°		10.1°
	V		10.4°		7.6°
Operating Temperature		-10°C ~ +50°C			

Distortion	2/3"	-0.8% (y=5.5)	1/2"	-0.4% (y=4.0)
Back Focal Length	17.1mm			
Flange Back Length	17.526mm			
Mount	C-Mount			
Filter Size	M30.5 P=0.5mm			
Dimensions	φ 33.5mm x 38.2mm			
Weight	87g			

Working Distance (mm)	Optical Magnification	Extension Ring (mm)	Field of View(mm)			
			2/3"		1/2"	
			H	V	H	V
900	0.037	-	236.2	176.9	171.5	128.6
850	0.040	-	223.2	167.2	162.1	121.5
800	0.042	-	210.3	157.5	152.7	114.5
750	0.045	-	197.3	147.8	143.3	107.4
700	0.048	-	184.3	138.1	133.9	100.3
650	0.052	-	171.4	128.4	124.5	93.3
600	0.056	-	158.4	118.6	115.0	86.2
550	0.061	-	145.5	108.9	105.6	79.1
500	0.067	-	132.5	99.2	96.2	72.1
450	0.074	-	119.6	89.5	86.8	65.0
400	0.083	-	106.6	79.8	77.4	58.0
350	0.094	-	93.7	70.1	67.9	50.9
300	0.110	-	80.7	60.4	58.5	43.8
250	0.131	1	67.7	50.6	49.1	36.8
200	0.162	2	54.7	40.9	39.7	29.7
150	0.213	5	41.8	31.2	30.2	22.6
100	0.310	7	28.7	21.4	20.8	15.5

Field of View = CCD Size / Optical Magnification

M7528-MP

NEW



Focal Length		75mm			
Max. Aperture Ratio		1 : 2.8			
Max. Image Format		8.8mm x 6.6mm (φ 11mm)			
Operation Range	Iris	F2.8 - F16C			
	Focus	0.3m - Inf. (※)			
Control	Iris	Manual			
	Focus	Manual			
Object Dimension at M.O.D.		4.1(H)cm x 3.1(V)cm 2/3"			
Angle of View	D	2/3"	8.5°	1/2"	6.2°
	H		6.8°		5°
	V		5.1°		3.7°
Operating Temperature		-10°C ~ +50°C			

Distortion	2/3"	-0.4% (y=5.5)	1/2"	-0.2% (y=4.0)		
Back Focal Length	21.5mm					
Flange Back Length	17.526mm					
Mount	C-Mount					
Filter Size	M30.5 P=0.5mm					
Dimensions	φ 33.5mm x 57.75mm					
Weight	113g					

※ Factory setting is 0.3-1.2m. Focus can be adjusted to infinity by removing "Focus Limit Screw".

Working Distance (mm)	Optical Magnification	Extension Ring (mm)	Field of View(mm)			
			2/3"		1/2"	
			H	V	H	V
900	0.077	-	113.8	85.4	82.8	62.1
850	0.082	-	107.8	80.8	78.4	58.8
800	0.086	-	101.7	76.3	74.0	55.5
750	0.092	-	95.7	71.8	69.6	52.2
700	0.098	-	89.6	67.2	65.2	48.9
650	0.105	-	83.6	62.7	60.8	45.6
600	0.114	-	77.6	58.1	56.4	42.3
550	0.123	-	71.5	53.6	52.0	39.0
500	0.135	-	65.5	49.1	47.6	35.7
450	0.148	-	59.4	44.5	43.2	32.4
400	0.165	-	53.4	40.0	38.8	29.1
350	0.187	-	47.3	35.4	34.4	25.8
300	0.214	-	41.3	30.9	30.0	22.5
250	0.251	5	35.2	26.4	25.6	19.1
200	0.304	7	29.2	21.8	21.2	15.8
150	0.384	13	23.1	17.3	16.8	12.5
100	0.522	23	17.1	12.7	12.3	9.2

Field of View = CCD Size / Optical Magnification



MEGA-PIXEL MACRO ZOOM LENS

CCTV FACTORY AUTOMATION LENSES

- Captures full resolution of mega-pixel cameras
 - High contrast & sharp picture in all areas of the screen
 - Compact design-Diameter 36.5mm
 - Locking set screws for zoom, focus, and iris
 - Low distortion
- High resolution macro zoom lens
 - 3.3X magnification
 - Attachment of fiber ring light can be installed (Ring Guide: M34 P=0.5)

MLM-3XMP



Field of View(mm)												
Optical Magnification	2/3"			Magnification on Monitor	1/2"			Magnification on Monitor	1/3"			Magnification on Monitor
	H	V	D		H	V	D		H	V	D	
0.3X	29.3	22.0	36.7	9.7X	21.3	16.0	26.7	13.3X	16.0	12.0	20.0	17.8X
0.4X	22.0	16.5	27.5	12.9X	16.0	12.0	20.0	17.8X	12.0	9.0	15.0	23.7X
0.5X	17.6	13.2	22.0	16.2X	12.8	9.6	16.0	22.2X	9.6	7.2	12.0	29.6X
0.6X	14.7	11.0	18.3	19.4X	10.7	8.0	13.3	26.7X	8.0	6.0	10.0	35.6X
0.7X	12.6	9.4	15.7	22.6X	9.1	6.9	11.4	31.1X	6.9	5.1	8.6	41.5X
0.8X	11.0	8.3	13.8	25.9X	8.0	6.0	10.0	35.6X	6.0	4.5	7.5	47.4X
0.9X	9.8	7.3	12.2	29.1X	7.1	5.3	8.9	40.0X	5.3	4.0	6.7	53.3X
1.0X	8.8	6.6	11.0	32.3X	6.4	4.8	8.0	44.5X	4.8	3.6	6.0	59.3X

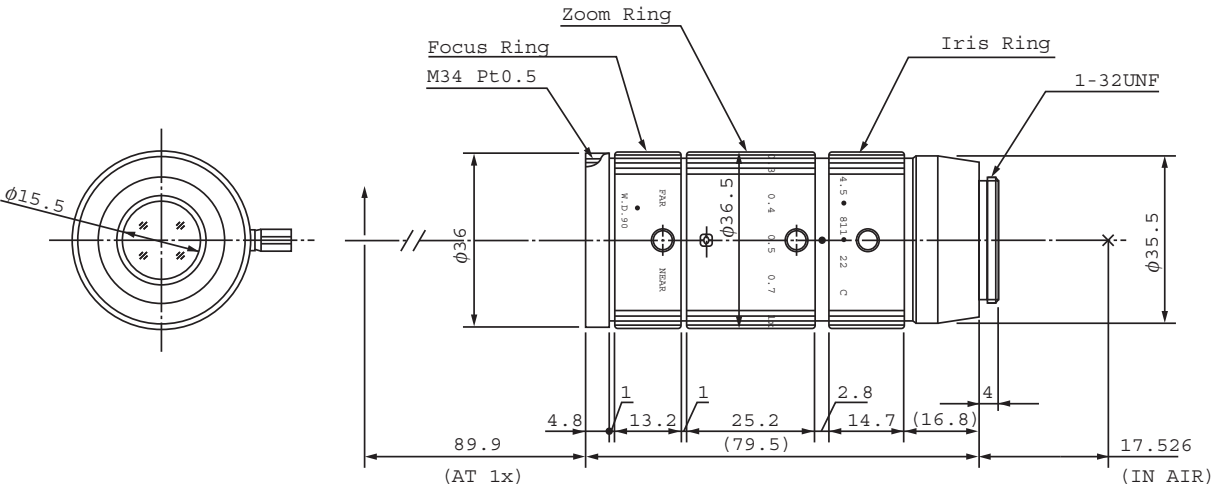
Max. Magnification		0.3X - 1.0X			
Max. Aperture Ratio		1:4.5			
Max. Image Format		8.8mm x 6.6mm (φ 11mm)			
Operation Range	Iris	F4.5 - F22C			
	Focus	90mm			
Control	Iris	Manual			
	Focus	Manual			
	Zoom	Manual			
Angle of View	D		14.88°- 2.84°		10.70°- .72°
	H	2/3"	11.80°- 2.78°	1/2"	8.48°- 2.18°
	V		8.74°- 2.24°		6.38°- 1.64°
Operating Temperature		-10°C ~ +50°C			

Distortion		2/3"	+0.02% at 0.3X (y=5.5) +1.78% at 1.0X (y=5.5)	1/2"	-0.12% at 0.3X (y=4.0) +0.77% at 1.0X(y=4.0)
Back Focal Length		20.4mm			
Flange Back Length		17.526mm			
Mount		C-Mount			
Filter Size		M34 P=0.5mm			
Dimensions		φ 36.5mm x 79.5mm			
Weight		150g			

CCD Size		H(mm)		V(mm)		D(mm)	
2/3"		8.8		6.6		11.0	
1/2"		6.4		4.8		8.0	
1/3"		4.8		3.6		6.0	
1/4"		3.6		2.7		4.5	

Monitor Magnification on 14inch Monitor
Working Distance: 90mm

Monitor Magnification on 14inch Monitor
Working Distance: 90mm
Magnification on Monitor = Optical Magnification x Monitor Size / CCD Size



MEGA-PIXEL VARI-FOCAL LENS

CCTV FACTORY AUTOMATION LENSES



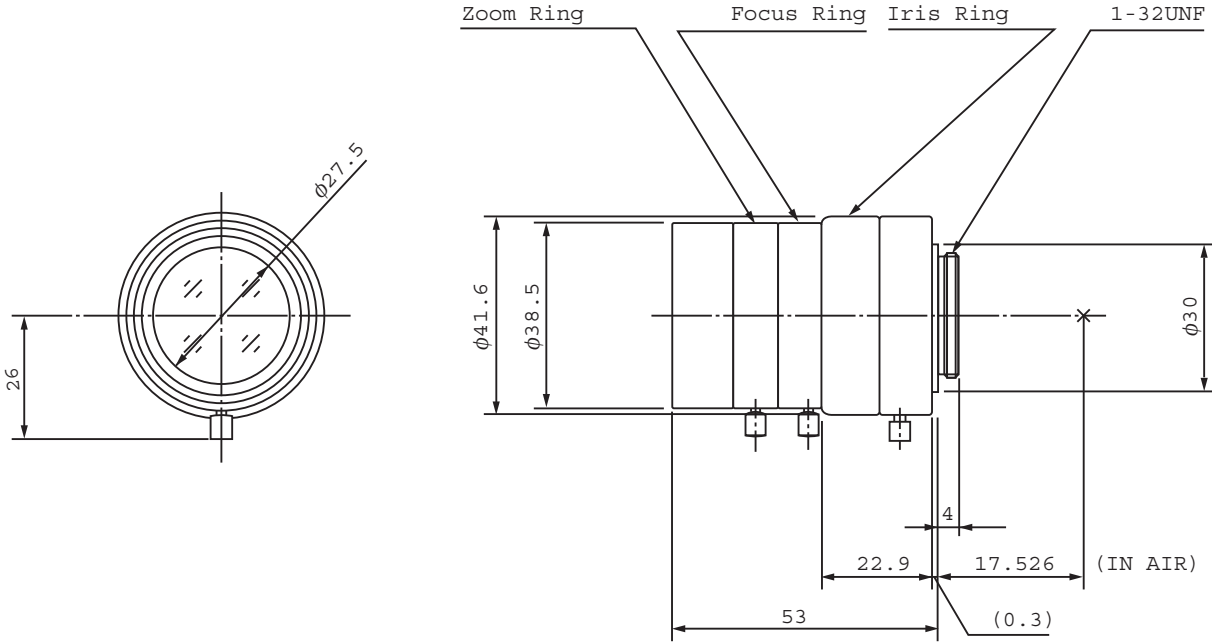
- Useful range of focal length for Factory Automation:f=12mm - 36mm
- Locking set screws for zoom, focus and iris

M3Z1228C-MP



Focal Length	12mm - 36mm	Effective Lens Front	φ 27.2mm
Max. Aperture Ratio	1 : 2.8	Aperture Rear	φ 12.1mm
Max. Image Format	8.8mm x 6.6mm (φ 11mm)	Back Focal Length Tele	13.5mm
Operation Range	Iris F2.8 - F16C	Wide	14.7mm
	Focus 0.2m - Inf.(Tele) 0.05m - Inf.(Wide)	Distortion Tele	+3.5% (y=5.5)
	Zoom 12mm-36mm	Wide	-2.6% (y=5.5)
Control	Iris Manual		+1.7% (y=4.0)
	Focus Manual		-1.9% (y=4.0)
	Zoom Manual	Flange Back Length	17.526mm
Object Dimension at M.O.D.	12mm 4.0(H)cm x 3.0(V)cm 1/2"	Mount	C-Mount
	36mm 4.8(H)cm x 3.6(V)cm 1/2"	Filter Size	M35.5 P=0.5mm
Angle of View	D 50.4° - 16.8°	Dimensions	φ 41.6mm x 53mm
	H 2/3" 41.0° - 13.6°	Weight	105g
	V 31.2° - 10.4°		
Operating Temperature	-10°C ~ +50°C		

※ Please note M3Z1228C-MP is produced to order



- Wide zoom range for general inspection, documentation, and visual aid applications.

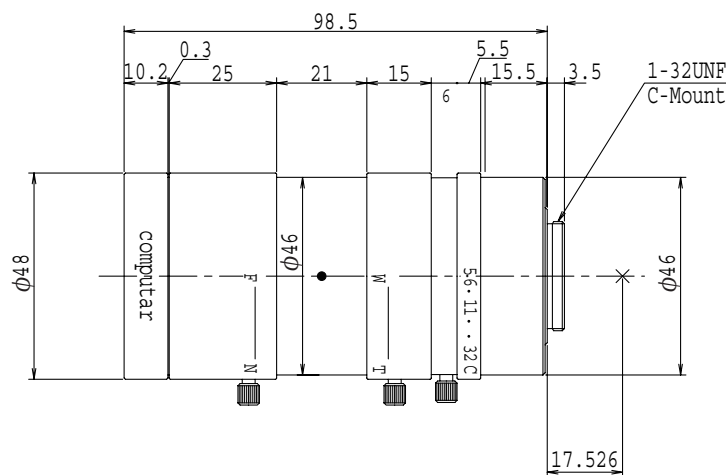
MLH-10X



Max. Magnification					0.084mm - 0.84mm					Distortion	1/2"	+0.9% at 0.084X (y=4.0)	
Max. Aperture Ratio					1:5.6							+1.6% at 0.84X (y=4.0)	
Max. Image Format					6.4mm x 4.8mm(φ 8mm)					Back Focal Length	23.29mm		
Operation Range		Iris	F5.6 - F32C							Flange Back Length	17.526mm		
		Focus	0.15m - 0.45m							Mount	C-Mount		
Control		Iris	Manual							Filter Size	M46 P=0.75mm		
		Focus	Manual							Dimensions	φ 48mm x 98.5mm		
		Zoom	Manual							Weight	260g		
Angle of View	D	1/2"	21.6°- 4.5°		1/3"	17.0°- 3.3°		1/4"	13.0°- 2.5°				
	H		18.0°- 3.6°			13.8°- 2.7°			10.6°- 2.0°				
	V	13.8°- 2.7°		10.6°- 2.0°		8.0°- 1.5°							
	Operating Temperature		-10°C ~ +50°C										

Working Distance(mm)		Optical Magnification	Field of View(mm)											
			1/2"			Magnification on Monitor	1/3"			Magnification on Monitor	1/4"			Magnification on Monitor
			H	V	D		H	V	D		H	V	D	
150	Wide	0.084X	76.2	57.1	95.2	3.73X	57.1	42.9	71.4	4.98X	42.9	32.1	53.6	6.64X
	Middle	0.19X	33.5	25.2	42.3	8.47X	25.2	18.9	31.4	11.29X	18.9	14.2	23.6	15.06X
	Tele	0.84X	7.6	5.7	9.5	37.34X	5.7	4.3	7.1	49.78X	4.3	3.2	5.4	66.38X
200	Wide	0.06X	106.7	80.0	133.3	2.67X	80.0	60.0	100.0	3.56X	60.0	45.0	75.0	4.74X
	Middle	0.13X	47.8	36.1	59.4	5.87X	36.1	27.2	44.9	7.83X	27.2	20.4	33.9	10.44X
	Tele	0.60X	10.7	8.0	13.3	26.67X	8.0	6.0	10.0	35.56X	6.0	4.5	7.5	47.41X
250	Wide	0.045X	142.2	106.7	177.8	2.00X	106.7	80.0	133.3	2.67X	80.0	60.0	100.0	3.56X
	Middle	0.101X	62.3	47.1	77.0	4.49X	47.1	35.5	58.5	5.99X	35.5	26.7	44.2	7.98X
	Tele	0.45X	14.2	10.7	17.8	20.00X	10.7	8.0	13.3	26.67X	8.0	6.0	10.0	35.56X
300	Wide	0.036X	177.8	133.3	222.2	1.60X	133.3	100.0	166.7	2.13X	100.0	75.0	125.0	2.84X
	Middle	0.082X	76.8	58.2	94.8	3.63X	58.2	43.8	72.2	4.84X	43.8	33.0	54.6	6.46X
	Tele	0.36X	17.8	13.3	22.2	16.00X	13.3	10.0	16.7	21.34X	10.0	7.5	12.5	28.45X
350	Wide	0.03X	213.3	160.0	266.7	1.33X	160.0	120.0	200.0	1.78X	120.0	90.0	150.0	2.37X
	Middle	0.069X	91.4	69.3	112.7	3.05X	69.3	52.2	85.9	4.07X	52.2	39.3	65.0	5.42X
	Tele	0.30X	21.3	16.0	26.7	13.34X	16.0	12.0	20.0	17.78X	12.0	9.0	15.0	23.71X
400	Wide	0.025X	256.0	192.0	320.0	1.11X	192.0	144.0	240.0	1.48X	144.0	108.0	180.0	1.98X
	Middle	0.06X	106.0	80.3	130.7	2.63X	80.3	60.6	99.7	3.5X	60.6	45.6	75.4	4.67X
	Tele	0.25X	25.6	19.2	32.0	11.11X	19.2	14.4	24.0	14.82X	14.4	10.8	18.0	19.76X
450	Wide	0.022X	290.9	218.2	363.6	0.98X	218.2	163.6	272.7	1.30X	163.6	122.7	204.5	1.74X
	Middle	0.05X	120.7	91.5	148.7	2.31X	91.5	69.0	113.5	3.08X	69.0	51.9	85.9	4.1X
	Tele	0.22X	29.1	21.8	36.4	9.78X	21.8	16.4	27.3	13.04X	16.4	12.3	20.5	17.38X

Field of View : Horizontal (mm) x Vertical (mm) x Diagonal (mm)
Monitor Magnification on 14inch Monitor
Magnification on Monitor = Optical Magnification x Monitor Size / CCD Size



- Very low distortion compared to standard macro lenses
- Wide depth of field
- Working distance: 140mm - Infinity
- Suitable for use as a telephoto lens and macro lens
- Fast F2.8 F-stop at Infinity

TEC-M55



Max. Magnification		55mm			Distortion	2/3"	+0.2% at 0.2X (y=5.5)		1/2"	+0.1% at 0.2X (y=4.0)		
Max. Aperture Ratio		1:2.8					+0.6% at 0.5X (y=5.5)			+0.3% at 0.5X (y=4.0)		
Max. Image Format HxVxD		8.8mm x 6.6mm (φ 11 mm)			Back Focal Length		29.8mm					
Operation Range		Iris		F2.8 - F32C		Flange Back Length		17.526mm				
Focus		0.14m - Inf.			Mount		C-Mount					
Magnification		Inf. - 0.5X (Max 10X at 140mm with 2X Converter)			Filter Size		M43 P=0.75mm					
Relative Illumination		78.5% (at 0.5X)			Dimensions		φ 53.0mm x 92.9mm (Max. at 0.5X)					
Depth of Field		1/2"	3.5mm(at 0.5X F2.8), 6.0mm(at 0.5X F5.6)				Weight			320g		
Control		Iris		Manual								
Focus		Manual										
Object Dimension at M.O.D												
1.7(H)cm x 1.3(V)cm 2/3"												
Angle of View		D	2/3"	11.5°		1/2"	8.3°		1/3"	6.0°		
		H		9.2°			6.7°					
		V		6.9°			5.0°					
Operating Temperature		-10℃ ~ +50℃										

CCD Size	H(mm)	V(mm)	D(mm)
2/3"	8.8	6.6	11.0
1/2"	6.4	4.8	8.0
1/3"	4.8	3.6	6.0
1/4"	3.6	2.7	4.5

f=55mm

Working Distance (mm)	Optical Magnification	Field of View(mm)					
		2/3"		1/2"		1/3"	
		H	V	H	V	H	V
5000	0.011X	796.2	597.8	579.7	435.0	435.0	326.3
4000	0.014X	636.1	477.6	463.1	347.5	347.5	260.7
3000	0.018X	476.0	357.4	346.6	260.1	260.1	195.1
2000	0.028X	315.9	237.2	230.0	172.6	172.6	129.5
1500	0.037X	235.9	177.1	177.1	128.9	128.9	96.7
1000	0.056X	155.8	117.0	113.4	85.1	85.1	63.9
950	0.059X	147.8	111.0	107.6	80.7	80.7	60.6
900	0.063X	139.8	105.0	101.8	76.4	76.4	57.3
850	0.067X	131.8	99.0	96.0	72.0	72.0	54.0
800	0.071X	123.8	92.9	90.1	67.6	67.6	50.7
750	0.076X	115.8	86.9	84.3	63.2	63.2	47.4
700	0.081X	107.8	80.9	78.5	58.9	58.9	44.2
650	0.088X	99.8	74.9	72.6	55.5	55.5	40.9
600	0.096X	91.8	68.9	66.8	50.1	50.1	37.6
550	0.105X	83.8	62.9	61.0	45.8	45.8	34.3
500	0.116X	75.8	56.9	55.2	41.4	41.4	31.0
450	0.130X	67.8	50.9	49.3	37.0	37.0	27.8
400	0.147X	59.8	44.9	43.5	32.6	32.6	24.5
350	0.170X	51.8	38.8	37.7	28.3	28.3	21.2
300	0.201X	43.8	32.8	31.8	23.9	23.9	17.9
250	0.246X	35.7	26.8	26.0	19.5	19.5	14.6
200	0.317X	27.7	20.8	20.2	15.1	15.1	11.4
150	0.446X	19.7	14.8	14.3	10.8	10.8	8.1
140	0.486X	18.1	13.6	13.2	9.9	9.9	7.4

f=55mm with 0.75X Converter

Working Distance (mm)	Optical Magnification	Field of View(mm)					
		2/3"		1/2"		1/3"	
		H	V	H	V	H	V
5000	0.008X	1066.2	797.6	773.3	579.2	579.2	434.0
4000	0.010X	851.9	637.3	617.8	462.7	462.7	346.8
3000	0.014X	637.6	476.9	462.4	346.3	346.3	259.5
2000	0.021X	423.2	316.6	306.9	229.9	229.9	172.3
1500	0.028X	316.1	236.4	229.2	171.7	171.7	128.6
1000	0.042X	208.9	156.2	151.5	113.4	113.4	85.0
950	0.045X	198.2	148.2	143.7	107.6	107.6	80.6
900	0.047X	187.4	140.2	135.9	101.8	101.8	76.3
850	0.050X	176.7	132.2	128.1	96.0	96.0	71.9
800	0.053X	166.0	124.2	120.4	90.1	90.1	67.5
750	0.057X	155.3	116.1	112.6	84.3	84.3	63.2
700	0.061X	144.6	108.1	104.8	78.5	78.5	58.8
650	0.066X	133.8	100.1	97.0	72.7	72.7	54.5
600	0.072X	123.1	92.1	89.3	66.8	66.8	50.1
550	0.079X	112.4	84.1	81.5	61.0	61.0	45.7
500	0.087X	101.7	76.0	73.7	55.2	55.2	41.4
450	0.097X	90.9	68.0	65.9	49.4	49.4	37.0
400	0.110X	80.2	60.0	58.2	43.6	43.6	32.6
350	0.127X	69.5	52.0	50.4	37.7	37.7	28.3
300	0.151X	58.7	43.9	42.6	31.9	31.9	23.9
250	0.184X	48.0	35.9	34.8	26.1	26.1	19.5
200	0.238X	37.3	27.9	27.0	20.2	20.2	15.2
150	0.334X	26.5	19.8	19.2	14.4	14.4	10.8
140	0.363X	24.4	18.2	17.7	13.2	13.2	9.9

f=55mm with 2X Converter

Working Distance Distance (mm)	Optical Magnification	Field of View(mm)					
		2/3"		1/2"		1/3"	
		H	V	H	V	H	V
5000	0.019X	453.1	340.3	330.0	247.7	247.7	185.8
4000	0.024X	362.0	271.9	263.6	197.9	197.9	148.5
3000	0.032X	270.9	203.3	197.3	148.1	148.1	111.1
2000	0.049X	179.8	135.0	130.9	98.3	98.3	73.7
1500	0.065X	134.3	100.8	97.8	73.4	73.4	55.0
1000	0.098X	88.7	66.6	64.6	48.5	48.5	36.4
950	0.104X	84.1	63.2	61.3	46.0	46.0	34.5
900	0.110X	79.6	59.8	58.0	43.5	43.5	32.6
850	0.116X	75.0	56.3	54.6	41.0	41.0	30.8
800	0.124X	70.5	52.9	51.3	38.5	38.5	28.9
750	0.133X	65.9	49.5	48.0	36.0	36.0	27.0
700	0.142X	61.4	46.1	44.7	33.5	33.5	25.2
650	0.154X	56.8	42.7	41.4	31.0	31.0	23.3
600	0.167X	52.3	39.2	38.1	28.6	28.6	21.4
550	0.183X	47.7	35.8	34.7	26.1	26.1	19.6
500	0.203X	43.2	32.4	31.4	23.6	23.6	17.7
450	0.227X	38.6	29.0	28.1	21.1	21.1	15.8
400	0.257X	34.0	25.6	24.8	18.6	18.6	14.0
350	0.297X	29.5	22.1	21.5	16.1	16.1	12.1
300	0.352X	24.9	18.7	18.2	13.6	13.6	10.2
250	0.431X	20.4	15.3	14.8	11.1	11.1	8.4
200	0.558X	15.8	11.9	11.5	8.7	8.7	6.5
150	0.789X	11.3	8.5	8.2	6.2	6.2	4.6
140	0.861X	10.4	7.8	7.6	5.7	5.7	4.3



1. Calculation of Working Distance (WD)

Distance from lens to object (WD) is calculated by putting the size of a camera's imaging device, focal length and an object size into the following formula.

<Formula>
 $WD = H1 + y \times f / y'$

2. Calculation of Focal Length

When size of a camera's imaging device, the object size and WD are fixed, focal length can be calculated by the following formula. You can select appropriate lens from the focal length.

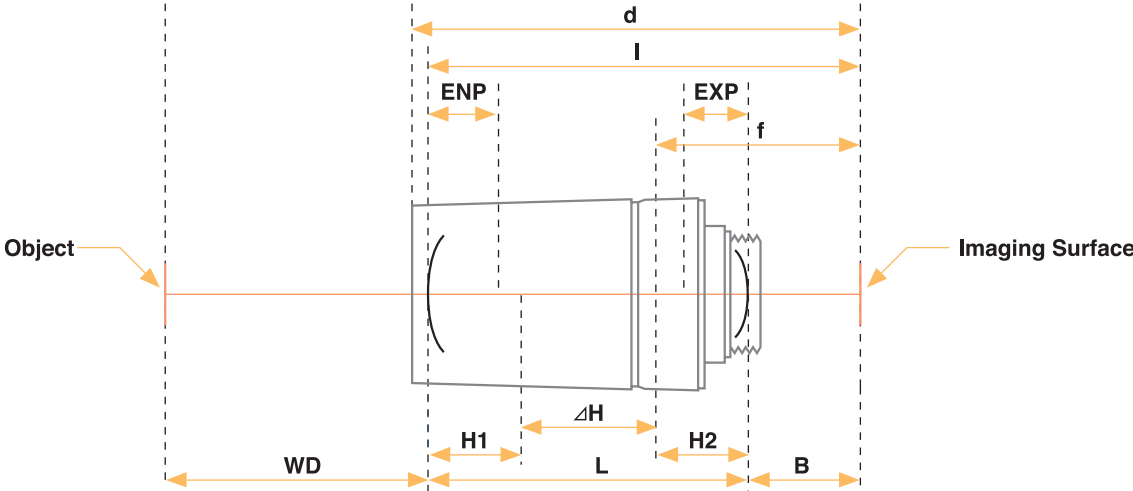
<Formula>
 $f = y' \times WD / y$

[Ex]
When 2/3" camera with M2514-MP films an object whose vertical size is 120 mm.
f : 25 mm
H1 : 26.77mm
y : 120mm
y' : 6.6mm

Distance from lens to object=
 $WD = 26.77 + 120 \times 25 / 6.6 = 481.32 \text{ mm}$

f = focal length of lens
WD = distance from lens to object
H1 : first principal point
y : vertical size of object
y' : vertical size of camera's imaging device

OPTICAL DATA



	Focal Length	First Principal Point	Second Principal Point	L-(H1+H2)	Total Length	Back Focus	Optical Path Length	Entrance Pupil Diameter	Entrance Pupil Position	Exit Pupil Diameter	Exit Pupil Position	Distortion	Extension	Length
	f	H1	H2	ΔH	L	B	l		ENP		EXP			d
MEGA-PIXEL MACRO ZOOM LENS														
MLM-3XMP (Wide)	30.22	30.22	-18.82	12.52	61.56	20.46	82.02	9.47	38.94	6.96	-10.82	0.36	-	97.53
(Tele)	29.13	44.73	-37.76	-20.93	61.56	20.50	82.06	61.43	313.83	4.62	-10.82	2.27	-	97.53
MEGA-PIXEL VARI-FOCAL LENS														
M321228C-MP(Wide)	12.00	36.23	2.71	19.77	53.30	14.71	68.01	4.29	25.63	36.76	-88.23	-2.56	-	70.53
(Tele)	36.01	95.26	-22.57	-63.32	54.50	13.44	67.94	12.73	68.44	49.89	-127.65	3.51	-	70.53
MEGA-PIXEL LENS														
M7528-MP	72.56	111.55	-63.11	-119.46	55.20	13.71	68.91	24.80	47.84	203.33	-585.50	0.19	15.77	71.03
M5018-MP2	48.00	22.14	-34.93	-16.20	40.86	13.08	53.94	25.94	52.85	15.82	-16.20	-0.29	4.91	55.63
M3514-MP	33.98	43.67	-19.75	-25.81	37.60	15.19	52.79	24.00	37.28	29.56	-27.62	-0.29	4.91	55.73
M2514-MP2	25.00	26.77	-11.90	-9.32	29.34	13.10	42.44	17.47	15.78	31.17	-31.50	-0.34	4.91	53.53
M1614-MP2	16.00	29.19	-2.90	-2.36	29.73	13.10	42.82	11.18	17.31	43.44	-49.05	-0.08	1.25	45.73
M1214-MP2	12.00	27.71	1.10	5.13	31.73	13.11	44.84	8.40	17.69	50.76	-59.45	0.11	1.25	45.73
M0814-MP2	8.31	22.47	4.83	16.09	33.73	13.14	46.87	5.81	15.36	40.39	-44.65	-0.11	1.25	45.73
H0514-MP2	5.08	20.25	5.73	35.98	50.50	10.84	61.34	3.55	14.99	102.99	158.24	-0.71	1.44	63.03
TELECENTRIC LENS														
TEC-M55	54.84	27.78	-23.48	-3.95	47.31	31.49	78.81	20.05	75.14	10.76	1.93	0.39	27.40	83.03
×0.75	41.17	51.63	-26.51	-14.13	64.01	14.66	78.67	19.80	73.77	12.87	-12.11	-0.88	27.40	83.03
×2.0	95.67	83.68	-70.81	-85.73	68.76	25.12	93.88	19.79	73.77	7.48	-11.30	0.45	27.40	83.03
MACRO ZOOM LENS														
MJH-10X(0.15mWide)	18.80	91.31	2.92	4.33	92.71	23.36	116.07	3.75	83.50	6.42	-10.45	2.53	-	116.03
(0.15m Tele)	68.75	2.96	-102.80	-14.64	91.13	25.15	116.27	19.48	-264.94	6.69	-10.45	2.92	-	116.03

Mega-Pixel Board Lenses

No.	Model Name	Format inch	Mount	Pitch	Focal Length(mm)	Aperture (F)	Distortion	Angle of view at INF(degrees)			Angle of view at INF(degrees)			Angle of view at INF(degrees)			Iris	
								1/2"			1/3"			1/4"			No Iris	Manual
								D	H	V	D	H	V	D	H	V		
1	H0320KP	1/2	M12	0.5	3mm	F2.0	-37.5%	125.3	104.3	80.5	98.6	80.5	61.3	75.8	61.3	46.3	○	
2	HM0320KP	1/2	M12	0.5	3mm	F2.0	-37.5%	125.3	104.3	80.5	98.6	80.5	61.3	75.8	61.3	46.3		○
3	H0624KP	1/2	M12	0.5	6mm	F2.4	-9.0%	72.5	59.1	45.0	55.6	45.0	34.0	42.3	34.0	25.6	○	
4	HM0624KP	1/2	M12	0.5	6mm	F2.4	-9.0%	72.5	59.1	45.0	55.6	45.0	34.0	42.3	34.0	25.6		○
5	H0924KP	1/2	M12	0.5	9mm	F2.4	-1.6%	48.6	39.6	30.1	37.3	30.1	22.7	28.3	22.7	17.1	○	
6	HM0924KP	1/2	M12	0.5	9mm	F2.4	-1.6%	48.6	39.6	30.1	37.3	30.1	22.7	28.3	22.7	17.1		○
7	H1620KP	1/2	M12	0.5	16mm	F2.0	0.4%	27.9	22.6	17.0	21.2	17.0	12.8	16.0	12.8	9.6	○	
8	HM1620KP	1/2	M12	0.5	16mm	F2.0	0.4%	27.9	22.6	17.0	21.2	17.0	12.8	16.0	12.8	9.6		○
9	H2520KP	1/2	M12	0.5	25mm	F2.0	1.0%	18.0	14.5	10.9	13.6	10.9	8.2	10.3	8.2	6.2	○	
10	HM2520KP	1/2	M12	0.5	25mm	F2.0	1.0%	18.0	14.5	10.9	13.6	10.9	8.2	10.3	8.2	6.2		○

Mega-Pixel Fisheye Board Lens

No.	Model Name	Format inch	Mount	Pitch	Focal Length(mm)	Aperture (F)	Distortion	Angle of view at INF(degrees)			Angle of view at INF(degrees)			Angle of view at INF(degrees)			Iris	
								1/2"			1/3"			1/4"			No Iris	Manual
								D	H	V	D	H	V	D	H	V		
11	H1328KP	1/2	M12	0.5	1.3mm	F2.8	-99.4%	180.0			180.0	151.0	177.3	151.0	117.6		○	

Image of angle of view for 1/2" Fisheye Board Lens

