Ordering method / Basic specifications

● Ordering method

RCX340

Controller	No. of controllable axes	Safety standards	Controller option A to D (OP.A to D)	Controller option E (OP.E)	Absolute battery
			TR: Tracking Note1	No entry: without RCXiVY2+ WY: with RCXiVY2+, without lighting WL: with RCXiVY2+, with lighting	

RCX320

Controller	No. of controllable axes	Safety standards	Regenerative unit	Controller option A to B (OP.A to B)	Vision System	Absolute battery
				TR: Tracking Note1	No entry: Non-selection WY: with RCXiVY2+, without lighting WL: with RCXiVY2+, with lighting	

Note1. Only one tracking board can be selected.
● Refer to the comprehensive catalog for details on the order format.

●Robot vision basic specifications

Item		RCXiVY2+ unit
Basic specifications	Applicable controllers	RCX340/RCX320
	Number of screen pixels	720(H) × 540(V) (400,000 pixels) 1440(H) × 1080(V) (1,600,000 pixels) 2048(H) × 1536(V) (3,200,000 pixels) 2592(H) × 1944(V) (5,000,000 pixels) Note1
	Model setting capacity	254 models
	Number of connectable cameras	2 cameras
	Connectable camera	GigE camera PoE: IEEE802.3af 1 ch up to 7W
	External interface	Ethernet (1000BASE-T) Note2 USB 2.0 2Ch (Up to 5V 2.5W / ch) Note3
	External monitor output	DVI-I Note4 Monitor resolution: 1024 × 768 Vertical periodic frequency: 60 Hz Horizontal periodic frequency: 48.4 kHz
	Power supply	24 VDC +/-10%, Maximum 1.5 A
	Dimensions	W45 × H195 × D130 (RCXiVY2+ unit only)
	Weight	0.8kg (RCXiVY2+ unit only, when the lighting control board option is selected)
	Operating environment	Compliant with the RCX340/RCX320 controller.
	Storage environment	Compliant with the RCX340/RCX320 controller.
Search method		Edge search (correlated edge filter, sobel filter), Measurement function, Blob search
Image capturing	Trigger mode	S/W trigger, H/W trigger
	External trigger input	2 points
Function		Position detection, coordinate conversion, automatic point data generation, distortion and inclination correction
Camera installation position		Fixed to the fixed camera (up, down) or robot (Y-axis, Z-axis). Perpendicular to the workpiece to be captured.
Setting support function		Calibration, image save function, model registration Note5, fiducial mark registration Note5, measurement function registration Note5, blob registration Note5, monitor function Note5
Lighting control options	Number of connectable lighting units	Maximum 2
	Modulated light format	PWM modulated light control (0 to 100%), PWM frequency switchable 62.5 kHz/ 125 kHz Continuous light, strobe light (follows camera exposure)
	Lighting power input	12VDC or 24VDC (external supply shared by both channels)
	Lighting output	For 12VDC supply: Total of less than 40W for both channels. For 24VDC supply: Total of less than 80W for both channels.

Note1. Since the rolling shutter is used, the tracking is not supported.
Note2. For setting and monitor operations
Note3. It is planned to support this USB later.
Note4. Also usable with an analog monitor by using a conversion adaptor.
Note5. RCXiVY2+ Studio function (requires a Windows PC)

●Tracking board basic Specifications

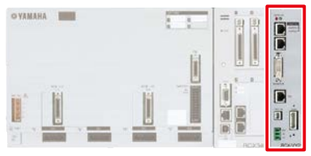
Item		Tracking board
Basic specifications	Applicable controllers	RCX340/RCX320
	Number of connected encoders	Up to 2 units.
	Encoder power supply	5VDC (2 counters total 500 mA or less) (Supplied from controller)
	Applicable encoder	26LS31/26C31 or equivalent line driver (RS-422 compliance).
	Input phase	A, $\overline{A}$, B, $\overline{B}$, Z, $\overline{Z}$
	Max. response frequency	2MHz or less
	Counter	0 to 65535
	Multiplier	4x
	Other	With disconnection detection function

Accessories and part options

Standard accessories

● RCXiVY2+ unit

The RCXiVY2+ unit adds robot vision to the RCX340/RCX320 robot controller.



Model		
	No lighting	KFR-M4400-V0
	With lighting	KFR-M4400-L0

• RCXiVY2+ unit accessories

Camera trigger input cable connector

Model	KX0-M657K-00

24V power supply connector

Model	KCF-M5382-00

● Support software for PC RCXiVY2+ Studio

RCXiVY2+ Studio is programming software for the RCXiVY2+ system that allows registering part types and reference marks as well as monitoring the work search status during automatic robot operation by connecting to the robot controller.

Download from website (member site)

■ Environment

OS	Microsoft Windows XP / Vista (32 bit / 64 bit) / 7 (32 bit / 64 bit) / 8, 8.1 (32 bit / 64 bit) / 10 (32 bit / 64 bit)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk capacity	30MB of available space required on installation drive. * Additional vacant space is required for saving images and data.
Display	800 x 600 dot, or higher, 32768 colors (16bit High Color) or higher (recommended)
Communication Port	Ethernet Port of TCP/IP

* Microsoft, Windows XP, Windows Vista, Windows 7, Windows 8, 8.1, and Windows 10 are registered trademarks of the Microsoft Corporation, USA.
* Ethernet is a registered trademark of the XEROX Corporation, USA.

Options

● CMOS camera

Model			
	400,000 pixel	720(H) × 540(V)	KFR-M6541-00
	1,600,000 pixel	1440(H) × 1080(V)	KFR-M6541-10
	3,200,000 pixel	2048(H) × 1536(V)	KFR-M6541-20
	5,000,000 pixel	2592(H) × 1944(V)	KFR-M6541-30

● Lens

Model		
	8mm	KCX-M7214-00
	12mm	KCX-M7214-10
	16mm	KCX-M7214-20
	25mm	KCX-M7214-30
	8mm (megapixel support)	KCX-M7214-40
	12mm (megapixel support)	KCX-M7214-50
	16mm (megapixel support)	KCX-M7214-60
	25mm (megapixel support)	KCX-M7214-70

* Common to iVY2.

● Close-up ring

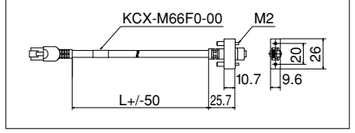
Model		
	0.5mm	KX0-M7215-00
	1.0mm	KX0-M7215-10
	2.0mm	KX0-M7215-20
	5.0mm	KX0-M7215-40

● Camera cable

Cable for connecting the camera to the RCXiVY2+ board.

Model		
	5m	KCX-M66F0-00
	10m	KCX-M66F0-10
	15m	KCX-M66F0-20

External diagram of camera cable



* Common to iVY2.

● Lighting control board

This board adds lighting control functionality to the RCXiVY2+ system. (Installed in the RCXiVY2+ unit when shipped)

Model	KCX-M4403-L0

• Lighting control board accessories

Lighting power cable connector

Model	KX0-M657K-10

● Tracking board

This board adds conveyor tracking functionality to the RCX340/RCX320 controller.

Model	KCX-M4400-T0

• Tracking board accessories

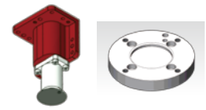
Tracking encoder connector

Model	KX0-M657K-20

● Calibration jig

(Large and small attachments are provided.)

Model	KCX-M7200-00



● LAN cable with shield cloth (5 m)

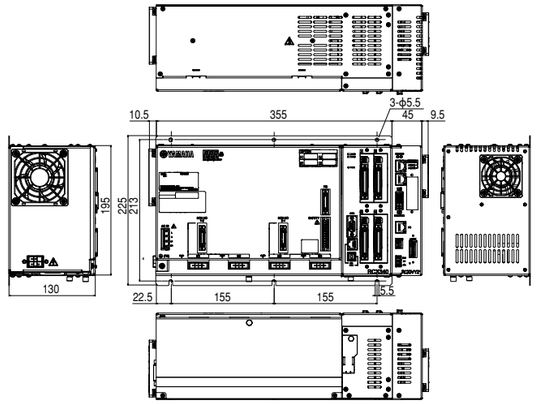
Model	KX0-M55G0-00

● Tracking encoder cable (10 m)

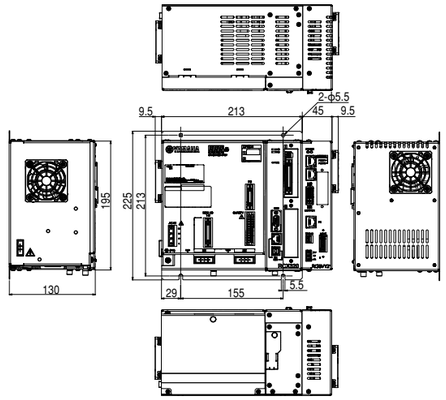
Model	KX0-M66AF-00

Dimensional outlines

RCX340+RCXiVY2+



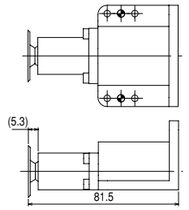
RCX320+RCXiVY2+



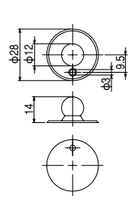
Calibration jig

Calibration jig
Model: KCX-M7200-00

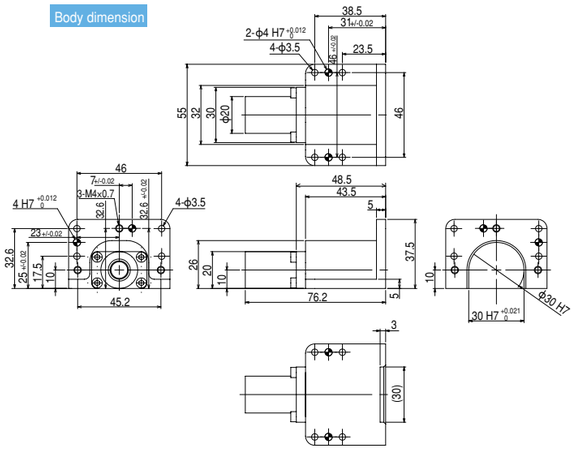
Mark gripper dimension



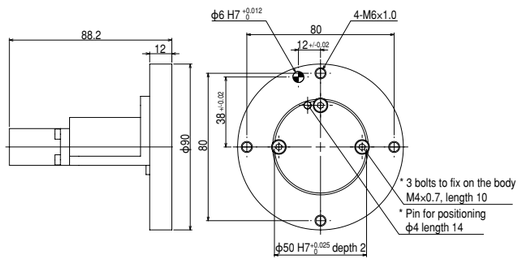
Mark dimension



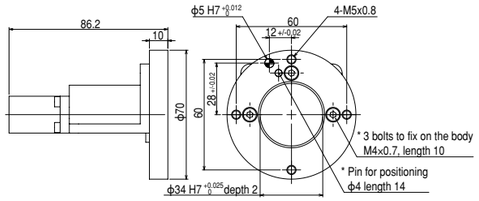
Body dimension



When using attachment (large)



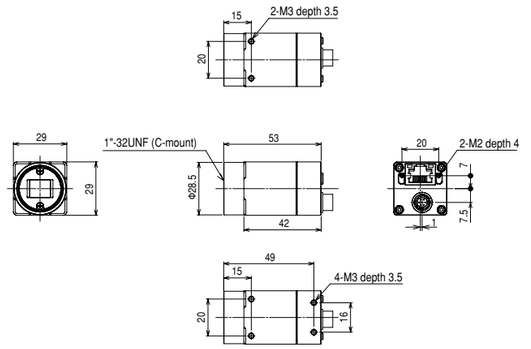
When using attachment (small)



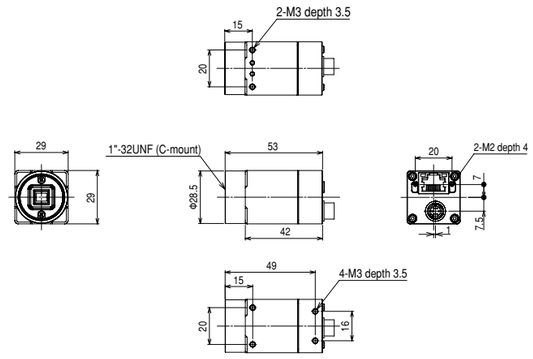
Dimensional outlines

Camera

● **CMOS camera** (400,000 pixel • 1,600,000 pixel • 3,200,000 pixel)

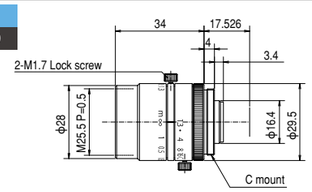


● **CMOS camera** (5,000,000 pixel)

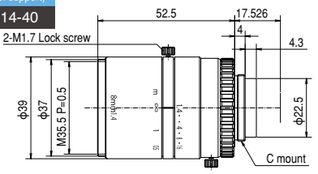


Lenses

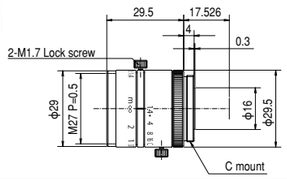
8 mm lens
Model: KCX-M7214-00



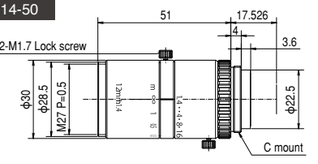
8 mm lens (megapixel support)
Model: KCX-M7214-40



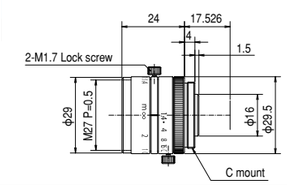
12 mm lens
Model: KCX-M7214-10



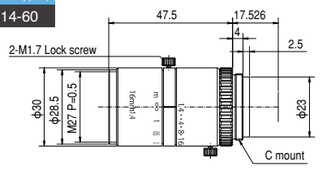
12 mm lens (megapixel support)
Model: KCX-M7214-50



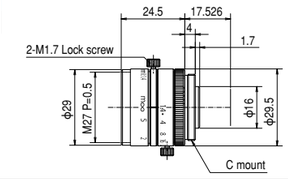
16 mm lens
Model: KCX-M7214-20



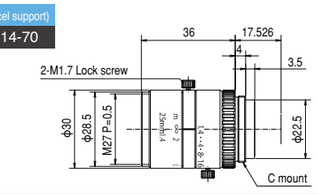
16 mm lens (megapixel support)
Model: KCX-M7214-60



25 mm lens
Model: KCX-M7214-30



25 mm lens (megapixel support)
Model: KCX-M7214-70



● Lens characteristics

Lens	Model	Focal length [mm]	Aperture value [F No.]	Angle-of-view (degrees)								Closest approach distance [m]
				KFR-M6541-00 (400,000 pixel camera)		KFR-M6541-10 (1,600,000 pixel camera)		KFR-M6541-20 (3,200,000 pixel camera)		KFR-M6541-30 (5,000,000 pixel camera)		
				Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	
8mm	KCX-M7214-00	8	F1.3–CLOSE	27.13	36.09	26.85	35.69	37.57	49.23	30.72	40.60	0.2
12mm	KCX-M7214-10	12	F1.4–CLOSE	17.23	23.01	17.05	22.74	24.11	31.95	19.57	26.03	0.3
16mm	KCX-M7214-20	16	F1.4–CLOSE	13.17	17.50	13.03	17.30	18.48	24.44	14.97	19.83	0.4
25mm	KCX-M7214-30	25	F1.4–CLOSE	8.57	11.42	8.47	11.29	12.05	16.01	9.74	12.95	0.5
8mm (megapixel support)	KCX-M7214-40	8	F1.4–F16	26.47	34.83	26.20	34.44	36.68	47.61	29.97	39.21	0.1
12mm (megapixel support)	KCX-M7214-50	12	F1.4–F16	17.49	23.19	17.31	22.92	24.47	32.19	19.86	26.23	0.1
16mm (megapixel support)	KCX-M7214-60	16	F1.4–F16	13.28	17.69	13.14	17.48	18.64	24.69	15.09	20.04	0.1
25mm (megapixel support)	KCX-M7214-70	25	F1.4–F16	8.62	11.48	8.52	11.34	12.12	16.09	9.80	13.02	0.15

Note. This table shows the angle-of-view for Yamaha's standard lenses. If the angle-of-view is greater, there might be more distortion at the edge of the image.

● Angle-of-view size, WD, and magnification when close-up ring is used

Close-up ring [mm]			Lens							
			8 mm KCX-M7214-00		12mm KCX-M7214-10		16mm KCX-M7214-20		25mm KCX-M7214-30	
None	WD[mm]		200		300		400		500	
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)	97.8 × 130.5		93 × 124		93 × 124		72.9 × 97.2	
		KFR-M6541-10 (1,600,000 pixels)	98.6 × 130.5		93.7 × 124		93.7 × 124		73.5 × 97.2	
		KFR-M6541-20 (3,200,000 pixels)	139.2 × 185.7		132.2 × 176.5		132.2 × 176.5		103.7 × 138.4	
		KFR-M6541-30 (5,000,000 pixels)	112.3 × 150		106.7 × 142.5		106.7 × 142.5		83.7 × 111.7	
	Optical magnification		0.038		0.040		0.040		0.051	
0.5	WD[mm]		69.5	118.6	143	296.8	222	524.1	358.5	1269.4
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)	37.2 × 49.6	60 × 80	46.5 × 62	93 × 124	52.3 × 69.8	120 × 160	53.1 × 70.8	186 × 248
		KFR-M6541-10 (1,600,000 pixels)	37.5 × 49.6	60.4 × 80	46.8 × 62	93.7 × 124	52.8 × 69.8	120.9 × 160	53.5 × 70.8	187.5 × 248
		KFR-M6541-20 (3,200,000 pixels)	52.9 × 70.6	85.3 × 113.8	66.1 × 88.2	132.2 × 176.5	74.5 × 99.4	170.6 × 227.7	75.5 × 100.8	264.5 × 353
		KFR-M6541-30 (5,000,000 pixels)	42.7 × 57	68.8 × 91.9	53.3 × 71.2	106.7 × 142.5	60.1 × 80.2	137.7 × 183.8	61 × 81.4	213.5 × 285
	Optical magnification		0.100	0.062	0.080	0.040	0.071	0.031	0.070	0.020
1.0	WD[mm]		38.7	53.8	91.3	142.3	152	257.1	280.8	635.9
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)	22.9 × 30.6	30 × 40	31 × 41.3	46.5 × 62	36.8 × 49.1	60.9 × 81.3	40.8 × 54.5	93 × 124
		KFR-M6541-10 (1,600,000 pixels)	23.1 × 30.6	30.2 × 40	31.2 × 41.3	46.8 × 62	37.1 × 49.1	61.4 × 81.3	41.2 × 54.5	93.7 × 124
		KFR-M6541-20 (3,200,000 pixels)	32.6 × 43.5	42.6 × 56.9	44 × 58.8	66.1 × 88.2	52.3 × 69.9	86.7 × 115.7	58.1 × 77.5	132.2 × 176.5
		KFR-M6541-30 (5,000,000 pixels)	26.3 × 35.1	34.4 × 45.9	35.5 × 47.5	53.3 × 71.2	42.2 × 56.4	70 × 93.4	46.9 × 62.6	106.7 × 142.5
	Optical magnification		0.162	0.124	0.120	0.080	0.101	0.061	0.091	0.040
1.5	WD[mm]				65.4	90.8	114.5	168.1	230.9	424.7
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)			23.1 × 30.8	30.7 × 40.9	28.1 × 37.5	40.4 × 53.9	33.5 × 44.6	62 × 82.6
		KFR-M6541-10 (1,600,000 pixels)			23.2 × 30.8	30.9 × 40.9	28.4 × 37.5	40.7 × 53.9	33.7 × 44.6	62.5 × 82.6
		KFR-M6541-20 (3,200,000 pixels)			32.8 × 43.8	43.7 × 58.3	40 × 53.4	57.5 × 76.7	47.6 × 63.6	88.1 × 117.6
		KFR-M6541-30 (5,000,000 pixels)			26.5 × 35.4	35.2 × 47.1	32.3 × 43.1	46.4 × 61.9	38.4 × 51.3	71.1 × 95
	Optical magnification				0.161	0.121	0.132	0.092	0.111	0.060
2.0	WD[mm]				50	65.1	91.2	123.6	196.3	319.1
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)			18.5 × 24.6	23.1 × 30.8	22.9 × 30.6	30.4 × 40.6	28.6 × 38.1	47 × 62.7
		KFR-M6541-10 (1,600,000 pixels)			18.6 × 24.6	23.2 × 30.8	23.1 × 30.6	30.7 × 40.6	28.8 × 38.1	47.4 × 62.7
		KFR-M6541-20 (3,200,000 pixels)			26.3 × 35.1	32.8 × 43.8	32.6 × 43.5	43.3 × 57.8	40.6 × 54.3	66.9 × 89.3
		KFR-M6541-30 (5,000,000 pixels)			21.2 × 28.3	26.5 × 35.4	26.3 × 35.1	35 × 46.7	32.8 × 43.8	54 × 72.1
	Optical magnification				0.201	0.161	0.162	0.122	0.130	0.079
5.0	WD[mm]								104.2	129
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)							14.8 × 19.8	18.6 × 24.9
		KFR-M6541-10 (1,600,000 pixels)							15 × 19.8	18.8 × 24.9
		KFR-M6541-20 (3,200,000 pixels)							21.1 × 28.2	26.5 × 35.4
		KFR-M6541-30 (5,000,000 pixels)							17 × 22.8	21.4 × 28.6
	Optical magnification								0.250	0.199

* WD is the lens tip reference.

Close-up ring [mm]			Lens							
			8 mm lens for megapixel KCX-M7214-40		12 mm lens for megapixel KCX-M7214-50		16 mm lens for megapixel KCX-M7214-60		25 mm lens for megapixel KCX-M7214-70	
None	WD[mm]		100		100		100		150	
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)	53.1 × 70.8		37.2 × 49.6		27.3 × 36.4		24.9 × 33.2	
		KFR-M6541-10 (1,600,000 pixels)	53.5 × 70.8		37.5 × 49.6		27.5 × 36.4		25.1 × 33.2	
		KFR-M6541-20 (3,200,000 pixels)	75.5 × 100.8		52.9 × 70.6		38.8 × 51.9		35.5 × 47.3	
		KFR-M6541-30 (5,000,000 pixels)	61 × 81.4		42.7 × 57		31.3 × 41.9		28.6 × 38.2	
	Optical magnification		0.070		0.100		0.136		0.149	
0.5	WD[mm]		46	113.6	66.1	283.2	77.8	505.4	130.3	1232.2
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)	28.1 × 37.5	59 × 78.7	25.8 × 34.4	90.7 × 120.9	22.4 × 29.8	120 × 160	22 × 29.3	186 × 248
		KFR-M6541-10 (1,600,000 pixels)	28.4 × 37.5	59.5 × 78.7	26 × 34.4	91.4 × 120.9	22.5 × 29.8	120.9 × 160	22.1 × 29.3	187.5 × 248
		KFR-M6541-20 (3,200,000 pixels)	40 × 53.4	83.9 × 112	36.7 × 49	129 × 172.1	31.8 × 42.5	170.6 × 227.7	31.3 × 41.7	264.5 × 353
		KFR-M6541-30 (5,000,000 pixels)	32.3 × 43.1	67.7 × 90.4	29.6 × 39.5	104.1 × 139	25.7 × 34.3	137.7 × 183.8	25.2 × 33.7	213.5 × 285
	Optical magnification		0.132	0.063	0.144	0.041	0.166	0.031	0.169	0.020
1.0	WD[mm]				47.2	131.9	62.6	243	114.6	607.2
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)			20.1 × 26.8	45.9 × 61.2	18.8 × 25.1	60 × 80	19.6 × 26.2	93 × 124
		KFR-M6541-10 (1,600,000 pixels)			20.2 × 26.8	46.2 × 61.2	19 × 25.1	60.4 × 80	19.8 × 26.2	93.7 × 124
		KFR-M6541-20 (3,200,000 pixels)			28.5 × 38.1	65.3 × 87.1	26.8 × 35.8	85.3 × 113.8	27.9 × 37.3	132.2 × 176.5
		KFR-M6541-30 (5,000,000 pixels)			23 × 30.8	52.7 × 70.3	21.6 × 28.9	68.8 × 91.9	22.5 × 30.1	106.7 × 142.5
	Optical magnification				0.185	0.081	0.197	0.062	0.189	0.040
1.5	WD[mm]				35.2	81.4	51.5	155.5	102	398.9
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)			16.5 × 22	33.2 × 44.2	16.3 × 21.7	40 × 53.3	17.7 × 23.7	62 × 82.6
		KFR-M6541-10 (1,600,000 pixels)			16.6 × 22	33.4 × 44.2	16.4 × 21.7	40.3 × 53.3	17.9 × 23.7	62.5 × 82.6
		KFR-M6541-20 (3,200,000 pixels)			23.5 × 31.3	47.2 × 63	23.2 × 30.9	56.8 × 75.9	25.3 × 33.7	88.1 × 117.6
		KFR-M6541-30 (5,000,000 pixels)			18.9 × 25.3	38.1 × 50.8	18.7 × 25	45.9 × 61.2	20.4 × 27.2	71.1 × 95
	Optical magnification				0.225	0.112	0.228	0.093	0.209	0.060
2.0	WD[mm]						43	111.7	91.5	294.7
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)					14.3 × 19.1	30.2 × 40.3	16.2 × 21.6	46.5 × 62
		KFR-M6541-10 (1,600,000 pixels)					14.4 × 19.1	30.4 × 40.3	16.3 × 21.6	46.8 × 62
		KFR-M6541-20 (3,200,000 pixels)					20.4 × 27.2	43 × 57.3	23.1 × 30.8	66.1 × 88.2
		KFR-M6541-30 (5,000,000 pixels)					16.4 × 22	34.7 × 46.3	18.6 × 24.8	53.3 × 71.2
	Optical magnification						0.259	0.123	0.229	0.080
5.0	WD[mm]								53.9	107.2
	Angle-of-view size X × Y [mm]	KFR-M6541-00 (400,000 pixels)							10.6 × 14.2	18.6 × 24.8
		KFR-M6541-10 (1,600,000 pixels)							10.7 × 14.2	18.7 × 24.8
		KFR-M6541-20 (3,200,000 pixels)							15.1 × 20.2	26.4 × 35.3
		KFR-M6541-30 (5,000,000 pixels)							12.2 × 16.3	21.3 × 28.5
	Optical magnification								0.349	0.200

* The above table shows the field of view when the standard lens and close-up ring are used. (Closest distance value is shown in No Close-up Ring column).
* If a close-up ring is not used, a WD less than the value shown in this table cannot be used.
* If a close-up ring is used, only WD in the region of this value can be used.
* Values in this table are for reference only; Actual values may vary

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