RCXiVY2+ System

Applicable controllers
RCX3 series

Robot with image processing functions

Integrated Robot Vision System with "plug-and-play" simplicity.
New functions have been added to the conventional iVY2 to make the vision system even easier to use.

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 / B (OP.A / OP.B)	Vision System	Absolute battery
				TR: Tracking Note1	No entry: Non-selection WY: with RCXiVY2+, without lighting WL: with RCXiVY2+, with lighting	

For details on the various selection items
RCX320 ▶ P.626
RCX340 ▶ P.637

Note1. Only one tracking board can be selected.

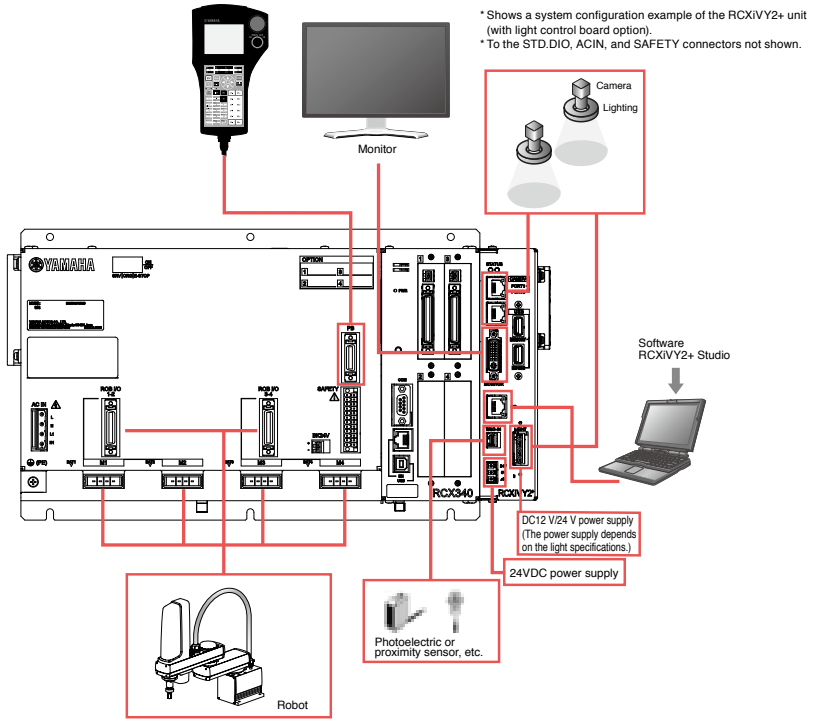
Basic specifications

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 (8 units when the HUB is used.)
	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)
	External monitor output	DVI-I Note3 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, Measuring search, Blob search, Code 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). Vertical direction to the image capturing target workpiece is recommended.
Setting support function		Calibration, image save function, model registration Note4, fiducial mark registration Note4, measuring registration Note4, blob registration Note4, code registration Note4, monitor function Note4
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	12V DC or 24V DC (external supply shared by both channels)
	Lighting output	For 12V DC supply: Total of less than 40W for both channels. For 24V DC 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. Also usable with an analog monitor by using a conversion adaptor.
Note4. RCXiVY2+ Studio function (requires a Windows PC)

System configuration illustration

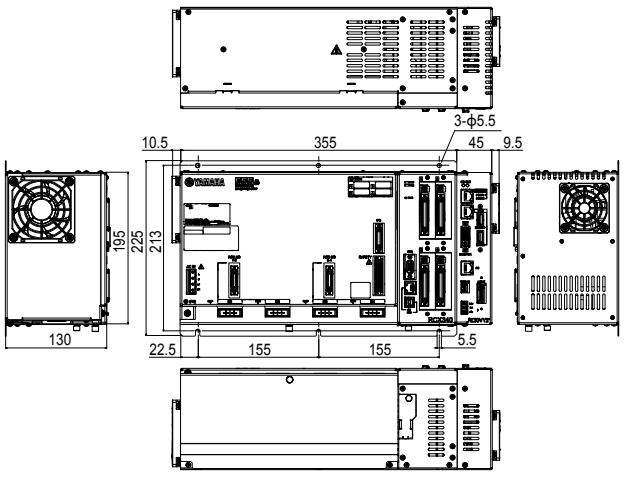


Tracking board basic Specifications

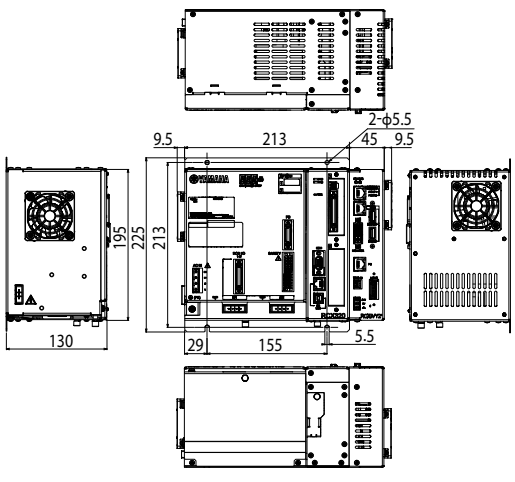
Item		Tracking board
Basic specifications	Applicable controllers	RCX340 / RCX320
	Number of connected encoders	Up to 2 units.
	Encoder power supply	5VDC (2 counters total 500 mA or less) (Supplied from controller)
	Applicable encoder	26LS31/26C31 or equivalent line driver (RS-422 compliance).
	Input 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

Dimensional outlines

RCX340+RCXiVY2+



RCX320+RCXiVY2+

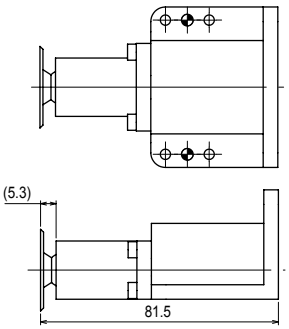


Dimensional outlines

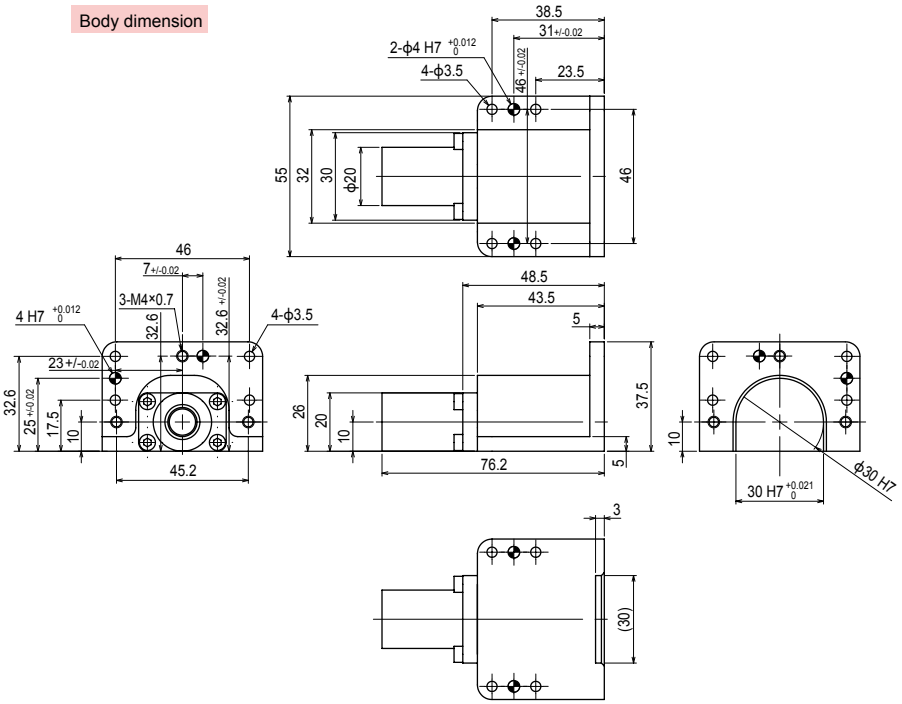
Calibration jig

Calibration jig
(Model: KCX-M7200-00)

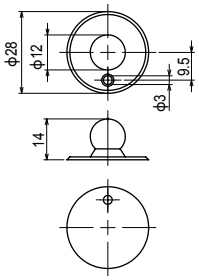
Mark gripper dimension



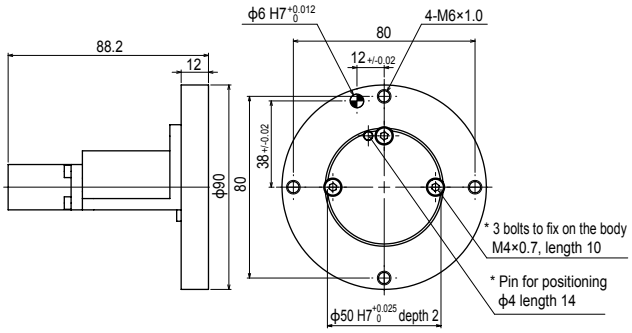
Body dimension



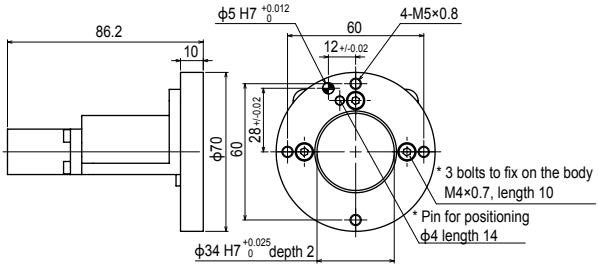
Mark dimension



When using attachment (large)



When using attachment (small)

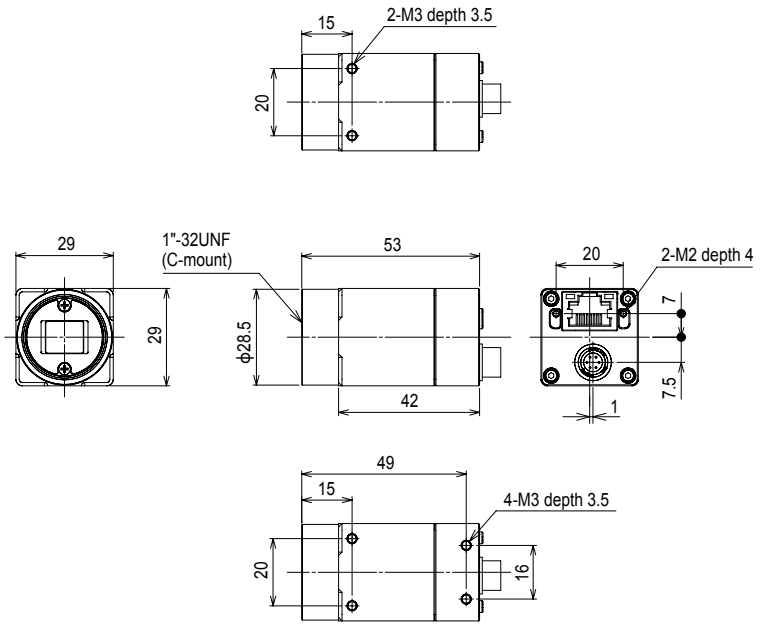


Dimensional outlines

Camera

CMOS camera

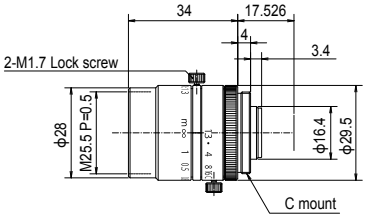
(400,000 pixel • 1,600,000 pixel • 3,200,000 pixel)



Lenses

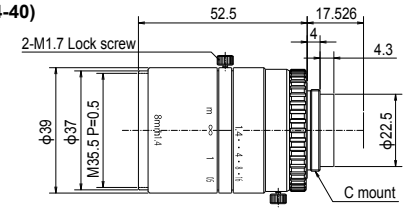
8mm lens

(Model: KCX-M7214-00)



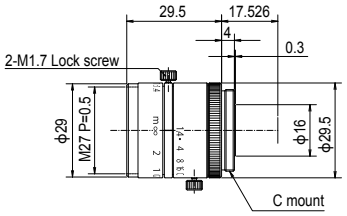
8mm lens (megapixel support)

(Model: KCX-M7214-40)



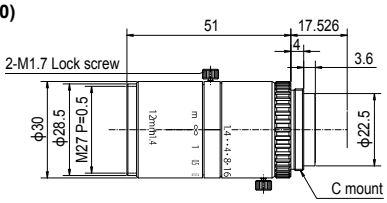
12mm lens

(Model: KCX-M7214-10)



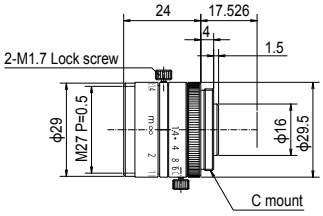
12mm lens (megapixel support)

(Model: KCX-M7214-50)



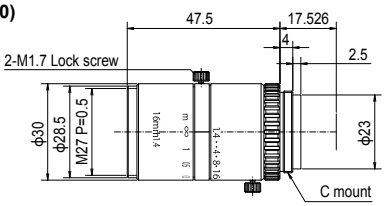
16mm lens

(Model: KCX-M7214-20)



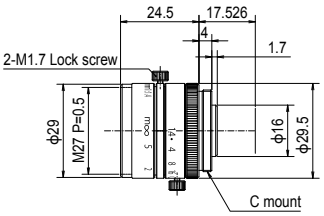
16mm lens (megapixel support)

(Model: KCX-M7214-60)



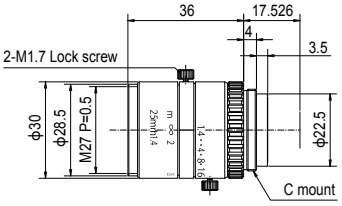
25mm lens

(Model: KCX-M7214-30)



25mm lens (megapixel support)

(Model: KCX-M7214-70)



RCXiVY2+ System

Lens characteristics

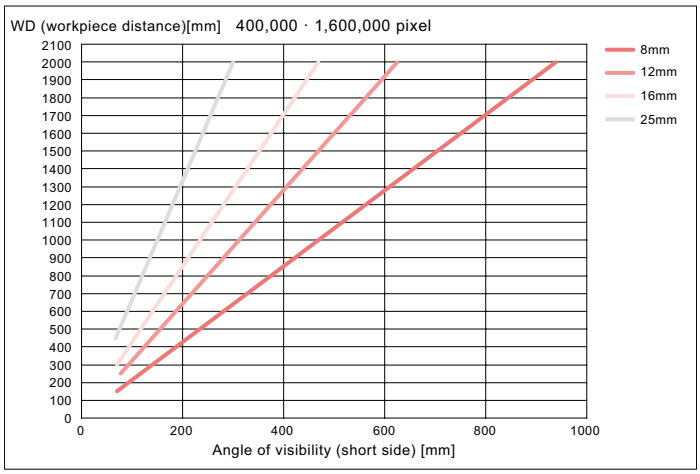
Lens	Model	Focal length [mm]	Aperture value [F No.]	Angle-of-view (degrees)								Closest approach distance [m]
				KFR-M6541-01 (400,000 pixel camera)		KFR-M6541-11 (1,600,000 pixel camera)		KFR-M6541-21 (3,200,000 pixel camera)		KFR-M6541-32 (5,000,000 pixel camera)		
				Vertical	Horizontal	Vertical	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.

Contact angle ⇔ WD (workpiece distance) table

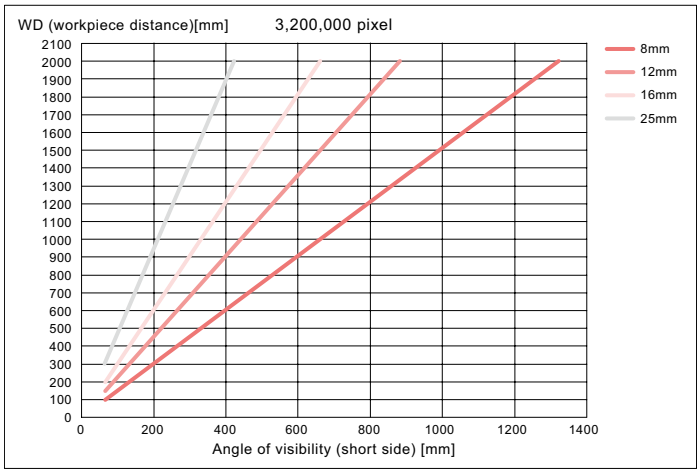
400,000 pixel (KFR-M6541-01) • 1,600,000 pixel (KFR-M6541-11)

	Lens							
	8mm KCX-M721-40		12mm KCX-M721-50		16mm KCX-M721-60		25mm KCX-M721-70	
WD[mm]	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
100	63	47	42	31	31	23		
150	94	70	63	47	47	35	30	23
200	126	94	84	63	63	47	40	30
250	157	117	105	78	78	59	50	38
300	188	141	126	94	94	70	60	45
350	220	164	146	109	110	82	70	53
400	251	188	167	125	126	94	80	60
450	282	211	188	141	141	105	90	68
500	314	234	209	156	157	117	100	75
550	345	258	230	172	173	129	110	83
600	377	281	251	188	188	141	120	90
650	408	305	272	203	204	152	131	98
700	439	328	293	219	220	164	141	105
750	471	352	314	234	235	176	151	113
800	502	375	335	250	251	188	161	120
850	533	398	356	266	267	199	171	128
900	565	422	377	281	282	211	181	135
950	596	445	397	297	298	223	191	143
1000	628	469	418	313	314	234	201	150
1500	941	703	628	469	471	352	301	225
2000	1255	938	837	625	628	469	402	300



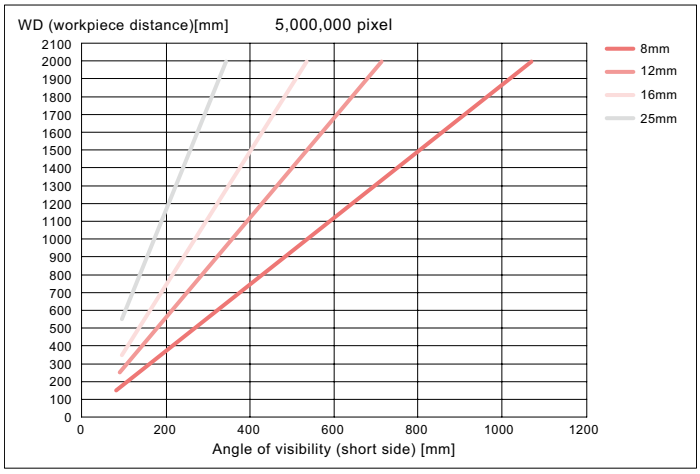
3,200,000 pixel (KFR-M6541-21)

	Lens							
	8mm KCX-M721-40		12mm KCX-M721-50		16mm KCX-M721-60		25mm KCX-M721-70	
WD[mm]	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
100	88	66	59	44	44	33		
150	132	99	88	66	66	50	42	32
200	177	132	118	88	88	66	56	42
250	221	165	147	110	110	83	71	53
300	265	198	177	132	132	99	85	63
350	309	231	206	154	154	116	99	74
400	353	265	235	176	177	132	113	85
450	397	298	265	198	199	149	127	95
500	441	331	294	220	221	165	141	106
550	485	364	324	242	243	182	155	116
600	530	397	353	265	265	198	169	127
650	574	430	382	287	287	215	184	138
700	618	463	412	309	309	231	198	148
750	662	496	441	331	331	248	212	159
800	706	529	471	353	353	265	226	169
850	750	562	500	375	375	281	240	180
900	794	595	530	397	397	298	254	190
950	838	628	559	419	419	314	268	201
1000	883	661	588	441	441	331	282	212
1500	1324	992	883	661	662	496	424	317
2000	1765	1323	1177	882	883	661	565	423



5,000,000 pixel (KFR-M6541-32)

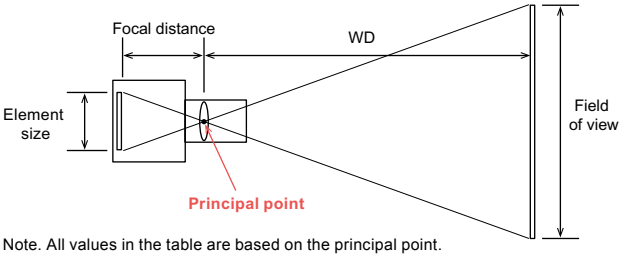
	Lens							
	8mm KCX-M721-40		12mm KCX-M721-50		16mm KCX-M721-60		25mm KCX-M721-70	
WD[mm]	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
100	71	54	48	36	36	27		
150	107	80	71	54	53	40	34	26
200	143	107	95	71	71	54	46	34
250	178	134	119	89	89	67	57	43
300	214	161	143	107	107	80	68	51
350	249	187	166	125	125	94	80	60
400	285	214	190	143	143	107	91	68
450	321	241	214	161	160	120	103	77
500	356	268	238	178	178	134	114	86
550	392	294	261	196	196	147	125	94
600	428	321	285	214	214	161	137	103
650	463	348	309	232	232	174	148	111
700	499	375	333	250	249	187	160	120
750	534	401	356	268	267	201	171	128
800	570	428	380	285	285	214	182	137
850	606	455	404	303	303	227	194	146
900	641	482	428	321	321	241	205	154
950	677	508	451	339	338	254	217	163
1000	713	535	475	357	356	268	228	171
1500	1069	803	713	535	534	401	342	257
2000	1425	1070	950	713	713	535	456	342



Minimum WD (workpiece distance) when close-up ring is used.

Close-up ring [mm]	Lens							
	8mm KCX-M721-40		12mm KCX-M721-50		16mm KCX-M721-60		25mm KCX-M721-70	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
None	100	∞	100	∞	100	∞	150	∞
0.5	46	114	67	284	78	506	131	1233
1.0			48	132	63	243	115	608
1.5			36	82	52	116	102	399
2.0					43	112	92	295
5.0							54	108

Note. The values in this table are for reference only and are not absolute indexes.



Note. All values in the table are based on the principal point.

Accessories and part options

RCXiVY2+ System

Standard accessories

RCXiVY2+ unit

The RCXiVY2+ unit adds robot vision to the RCX340/RCX341/RCX320 robot controller.

RCXiVY2+ unit

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

RCXiVY2+ unit accessories

Name	Model
Trigger input cable connector set	KX0-M657K-00
24V power supply connector	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) / 11 (Supported version: V.3.06.03.00 or later)
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

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

Options

CMOS camera

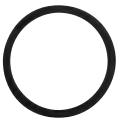
Model	400,000 pixel	720(H) × 540(V)	KFR-M6541-01
	1,600,000 pixel	1440(H) × 1080(V)	KFR-M6541-11
	3,200,000 pixel	2048(H) × 1536(V)	KFR-M6541-21
	5,000,000 pixel	2592(H) × 1944(V)	KFR-M6541-32

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

Lighting control board

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

Lighting control board

Name	Model
Lighting control board	KCX-M4403-L0

Lighting control board accessories

Name	Model
Lighting power cable connector set	KX0-M657K-10

Tracking board

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

Tracking board

Name	Model
Tracking board	KCX-M4400-T0

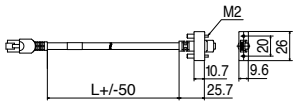
Tracking board accessories

Name	Model
Tracking encoder connector	KX0-M657K-20

Camera cable

Cable for connecting the camera to the RCXiVY2+ board.

External diagram of camera cable



Cable length (L)	Model
5m	KCX-M66F0-00
10m	KCX-M66F0-10
15m	KCX-M66F0-20

* Common to iVY2.

LAN cable with shield cloth (5 m)

Model	KX0-M55G0-00

Tracking encoder cable (10 m)

Model	KX0-M66AF-00

Calibration jig (Large and small attachments are provided.)

Model	KCX-M7200-00