RICOH
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FA

Factory Automation

CAMERAS

FA Camera line up

Industrial cameras: RICOH FV Series

FA cameras satisfying a diverse range of inspection needs.

The RICOH FV Series is a line of both Camera Link and GigE Vision type cameras matched to your resolution requirements.

These cameras support high-precision manufacturing.

Cameras: RICOH FV Series

Camera Link	GigE Vision
5 Megapixel 2/3" Format	
▶ P. 03	
2 Megapixel 1/1.8" Format	2 Megapixel 1/1.8" Format
▶ P. 04	▶ P. 06
300,000 Pixels 1/3" Format	300,000 Pixels 1/3" Format
▶ P. 05	▶ P. 07

Camera Link™ 5 Megapixel Camera

FV-L500B1

5 Mega-pixel | Camera Link | PoCL

5M Camera Link with highly rigid case and compact design

Use in tasks such as fault inspection, display inspection, solder defect inspection, and high-precision flaw detection for semiconductors, liquid crystal and plasma flat panel displays, circuit boards, etc.

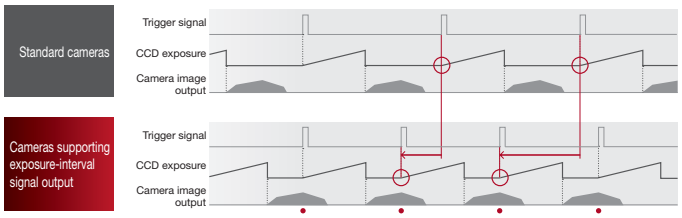
- 35 mm×35 mm compact design
- Uses PoCL (Power over Camera Link), which has a strong track record as a high-resolution digital camera interface
- High-speed frame rate of 5M: 16 fps
- Various trigger modes (pulse width, edge preset trigger) as standard features
- In addition to camera tripod screw holes, M4 screw holes are located on four sides (top, bottom, left, right)
- To increase mounting precision, mounting holes are arranged based on the CCD optical axis

■ [Exposure-interval signal output] outputs the camera exposure interval and enables efficient inspection

[Supported cameras] FV-L500B1, FV-L200B1, FV-L030B1, FV-G200B1, FV-G030B1

Exposure-interval signal output – which can start the next exposure during the transfer of the previous image – makes it possible to achieve high-speed work inspection*, thereby raising inspection efficiency. In addition, since the camera exposure interval is output externally, it can be used for various purposes.

*Limited to cases where the next exposure does not end before the completion of image transfer.

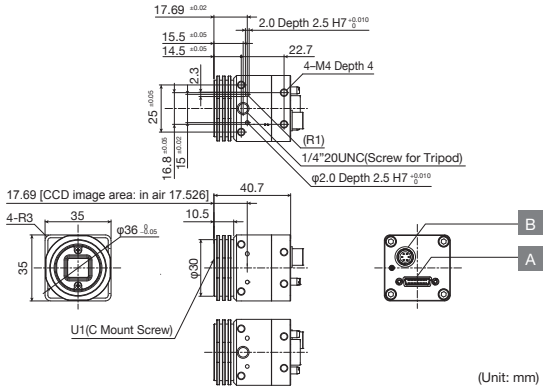


• Exposure starts during image transfer.
The CCD exposure start marked with the ○ is speeded up, thereby making high-speed work detection possible.

FV-L500B1 Product specifications

Imager		2/3" interline 5.0 Mega pixels monochrome progressive CCD
Active picture elements		2448 (H) × 2058 (V)
Cell size		3.45 (H) × 3.45 (V) µm
Vertical frequency (Frame rate)		16 Hz
Horizontal frequency		33.264 kHz
Pixel frequency		64 MHz
Minimum scene illumination		0.24 lux at F1.2
Sync. System		Internal
Video output		Digital 8 , 10 or 12 bit Raw Data (Base configuration)
Shutter speed		OFF, 1/8 to 1/209,000 sec. (Variable at every H and clock)
Gain		0 to 18.309 dB
Gamma		1.0
Power supply	Input voltage	12 Vdc ± 10%
	Consumption	Less than 4.0 W
Dimensions		35 (W) × 35 (H) × 40.7 (D) mm (excluding the connector)
Lens mount		C mount
Weight		Approximately 80 g
Operational environment	Operational temperature	-5 to 40 deg. C
	Storage temperature	-30 to 65 deg. C

Dimensions and rear connector specifications



A Camera Link connector 3M-made SDR equivalent

B Input/output signal connector
Hirose-made HR10A-7R-6PB equivalent Trigger signal input can be done in accordance with the camera setting.Optional connector RICOH FP-CN6PB is supported.
Note: For the frame grabber board and cable, the PoCL type should be used.

Pin No.	Signal name	IN/ OUT	Voltage		
				Low voltage	High voltage
1	GND	IN		0V	
2	I/O-1	IN/OUT	IN	0 to +0.99V	+2.3 to +3.3V
			OUT	0V	+3.3V
3	I/O-2	IN/OUT	IN	0 to +0.99V	+2.3 to +3.3V
			OUT	0V	+3.3V
4	I/O-3	IN/OUT	IN	0 to +0.99V	+2.3 to +3.3V
			OUT	0V	+3.3V
5	TRIGGER	OUT	OUT	0V	+3.3V
6	N.C.				

Camera Link™ 2 Megapixel Camera

FV-L200B1

2 Mega-pixel | Camera Link | PoCL

2M Camera Link with preprocessing functions

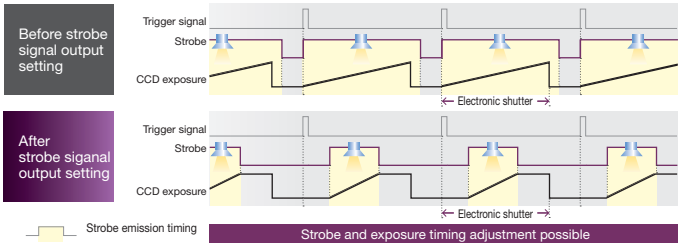
Handles a wide range of inspection uses, such as positioning prior to liquid crystal glass processing, circuit board mounted device part checks and mounting inspection, automotive component flaw detection, medicine tablet inspection, etc.

- High-speed frame rate of 2M:15 fps
- Ultra-compact 28 mm×28 mm CCD camera among the smallest in the industry
- Uses PoCL (Power over Camera Link), which has a strong track record as a high-resolution digital camera interface
- Camera contains automatic control functions for gain and shutter
- Various trigger modes (pulse width, edge preset trigger) as standard features
- Image processing with a lookup table possible in the camera
- M4 screw holes are located on four sides (top, bottom, left, right) Highly rigid case to increase mounting precision
- For the power supply, either PoCL or an external supply possible

■ [Strobe signal output] enables user adjustment of exposure and the timing of light emission

[Supported cameras] FV-L200B1, FV-L030B1, FV-G200B1, FV-G030B1

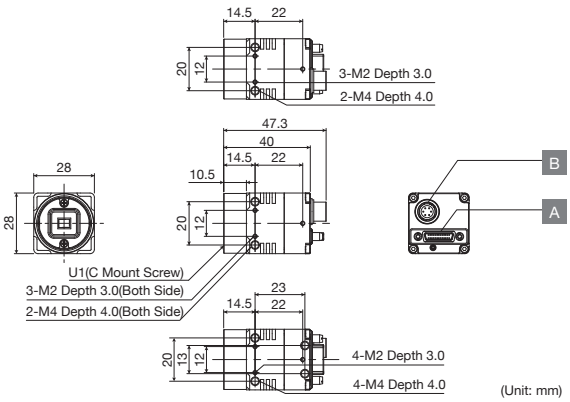
There is a strobe signal output (LVCMOS level) function for light emission use. With this function, it is possible for the user to adjust the camera exposure timing (delay, time) and light emission timing (delay, time) in accordance with the trigger input signal received by the camera.



FV-L200B1 Product specifications

Imager		1/1.8" interline UXGA monochrome progressive CCD
Active picture elements		UXGA class: 1620 (H) × 1236 (V)
Cell size		4.4 (H) × 4.4 (V) µm
Vertical frequency (Frame rate)		15.3164 Hz
Horizontal frequency		19.176 kHz
Pixel frequency		36.8181 MHz
Minimum scene illumination		0.1 lux at F1.2
Sync. System		Internal
Video output		Digital 8 , 10 or 12 bit Raw Data (Base configuration)
Shutter speed		OFF, 1/4 to 1/120,000 sec. (Variable at every H and clock)
Gain		0 to 27 dB
Power supply	Input voltage	12 Vdc ± 10%
	Consumption	Less than 3.0 W
Dimensions		28 (W) × 28 (H) × 40 (D) mm (excluding the connector)
Lens mount		C mount
Weight		Approximately 43 g
Operational environment	Operational temperature	-5 to 45 deg. C
	Storage temperature	-30 to 65 deg. C

Dimensions and rear connector specifications



A **Camera Link connector** 3M-made SDR equivalent
Note: If the frame grabber board does not support PoCL, please supply power (12 Vdc) from a power and input/output signal connector.

B **Input/output signal connector** Hirose-made HR10A-7R-6PB equivalent
Trigger signal input can be done in accordance with the camera setting.
Optional connector RICOH FP-CN6PB is supported.

Pin No.	Signal name	IN/ OUT	Voltage		
				Low voltage	High voltage
1	GND	IN		0V	
2	TRIGGER	IN	IN	0 to +0.5V	+2.5 to +5.0V
3	N.C.				
4	N.C.				
5	STROBE SIGNAL	OUT	OUT	0V	+3.3V
6	+12Vdc	IN		+12Vdc	

Camera Link™ VGA Camera

FV-L030B1

300 000 Pixel | Camera Link | PoCL

VGA Camera Link with preprocessing functions

Suitable for uses such as component alignment, positioning, simple direction determination before component processing, taping and mounted device part presence/absence confirmation, etc.

- High-speed frame rate of VGA: 90 fps
- Ultra-compact 28 mm×28 mm CCD camera among the smallest in the industry
- Uses PoCL (Power over Camera Link), which has a strong track record as a high-resolution digital camera interface
- Camera contains automatic control functions for gain and shutter
- Various trigger modes (pulse width, edge preset trigger) as standard features
- Image processing with a lookup table possible in the camera
- M4 screw holes are located on four sides (top, bottom, left, right) Highly rigid case to increase mounting precision
- For the power supply, either PoCL or an external supply possible

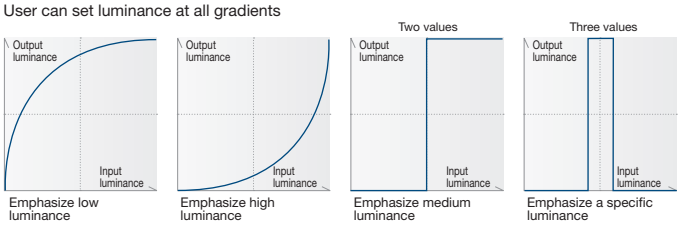
■ [Lookup table (gamma curve)] enables luminance settings at all gradients for creation of finely detailed images

[Supported cameras] FV-L200B1, FV-L030B1, FV-G200B1, FV-G030B1

On a camera with preprocessing functions, it is possible to correct luminance at all gradients using a lookup table prepared by the user based on subject characteristics and inspection objectives. This also reduces the burden on the personal computer CPU and increases processing speed. In addition, the lookup table can be prepared as a CSV file and uploaded.

Note: For preprocessing functions see page 7.

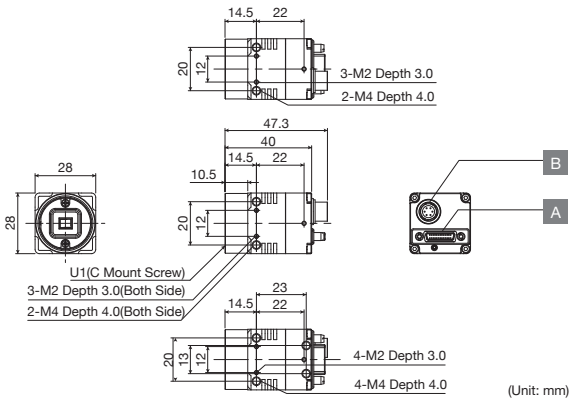
User can set luminance at all gradients



FV-L030B1 Product specifications

Imager		1/3" interline VGA monochrome progressive CCD
Active picture elements		VGA class: 648 (H) × 494 (V)
Cell size		7.4 (H) × 7.4 (V) µm
Vertical frequency (Frame rate)		31.47 (30fps) / 62.94 (60fps) / 94.784 (90fps) Hz
Horizontal frequency		15.7343 (30fps) / 31.4685 (60fps) / 47.2028 (90fps) kHz
Pixel frequency		12.2727 (30fps) / 24.5454 (60fps) / 36.8181 (90fps) MHz
Minimum scene illumination		0.4 lux at F1.2
Sync. System		Internal
Video output		Digital 8 , 10 or 12 bit Raw Data (Base configuration)
Shutter speed		OFF, 1/3 to 1/40,000 sec. (Variable at every H and clock) (30fps) OFF, 1/7 to 1/80,000 sec. (Variable at every H and clock) (60fps) OFF, 1/11 to 1/120,000 sec. (Variable at every H and clock) (90fps)
Gain		0 to 27 dB
Power supply	Input voltage	12 Vdc ± 10%
	Consumption	Less than 2.7 W
Dimensions		28 (W) × 28 (H) × 40 (D) mm (excluding the connector)
Lens mount		C mount
Weight		Approximately 43 g
Operational environment	Operational temperature	-5 to 50 deg. C
	Storage temperature	-30 to 65 deg. C

Dimensions and rear connector specifications



A Camera Link connector 3M-made SDR equivalent
Note: If the frame grabber board does not support PoCL, please supply power (12 Vdc) from a power and input/output signal connector.

B Input/output signal connector Hirose-made HR10A-7R-6PB equivalent
Trigger signal input can be done in accordance with the camera setting.
Optional connector RICOH FP-CN6PB is supported.

Pin No.	Signal name	IN/OUT	Voltage		
				Low voltage	High voltage
1	GND	IN		0V	
2	TRIGGER	IN	IN	0 to +0.5V	+2.5 to +5.0V
3	N.C.				
4	N.C.				
5	STROBE SIGNAL	OUT	OUT	0V	+3.3V
6	+12Vdc	IN	+12Vdc		

GigE Vision™ 2 Megapixel Camera

FV-G200B1

2 Mega-pixel | GigE Vision

Preprocessing functions and 2M GigE Vision for a wide range of uses

Suitable for diverse inspection uses, including positioning before each process in screen printing, circuit board mounted device part checks, automotive component flaw detection, etc. Also excellent for outdoor monitoring uses.

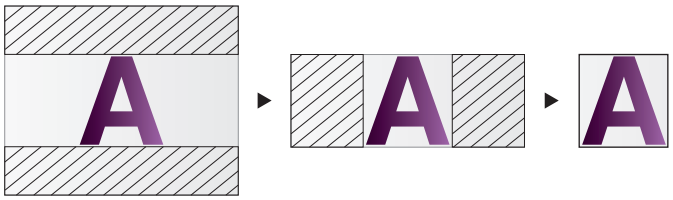
- High-speed frame rate of 2M: 15 fps
- High image quality with a CCD global shutter
- Camera contains automatic control functions for gain and shutter
- Various scan modes (full, AOI) as standard features
- Various trigger modes (pulse width, edge preset trigger) as standard features
- Supports DC iris lens so also excellent for outdoor monitoring uses
- Excellent for industrial uses as it handles a wide voltage range (10.8 - 26.4 V)
- Supports updating of camera firmware via Ethernet
- In addition to camera tripod screw holes, M4 screw holes are located on two sides (top and bottom)
- Highly rigid case to increase mounting precision
- [AOI* scan mode] raises inspection quality and speed with efficient scanning

[Supported cameras] FV-G200B1, FV-G030B1

AOI scan mode handles high-speed inspection. The user can freely define the start line and width of the image data. By scanning images of only the necessary portions, it is possible to transfer only the areas needed. This, in turn, makes it possible to do speedy inspections by shortening the time required for reading and transferring data.

*Area of Interest

Image sensor image data



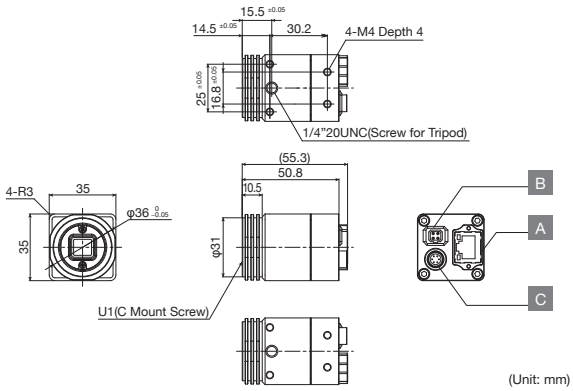
1. Eliminate hatched areas
2. Eliminate additional unnecessary areas

Transfer time reduced by sending only areas necessary for inspection

FV-G200B1 Product specifications

Imager		1/1.8" interline UXGA monochrome progressive CCD
Active picture elements		UXGA class : 1624 (H) × 1236 (V)
Cell size		4.4 (H) × 4.4 (V) µm
Vertical frequency (Frame rate)		15.31668 Hz
Horizontal frequency		19.1761 kHz
Pixel frequency		36.818175 MHz
Minimum scene illumination		0.16 lux at F1.2
Sync. System		Internal
Video output		Digital 8, 10 or 12 bit Raw data GigE Vision
Exposure time		Preset free-run mode: 10 µ seconds to 16,777,216 µ seconds Preset trigger mode: 10 µ seconds to 16,777,216 µ seconds Pulse width mode: 10 µ seconds to Unlimited
Gain		0 to 20.4 dB
Gamma		1.0
Power	Input voltage	+ 10.8 to + 26.4 Vdc
	Consumption	Less than 5.0 W
Dimensions		35 (W) × 35 (H) × 50.8 (D) mm (excluding the connector)
Lens mount		C mount
Weight		Approximately 120 g
Operational environment	Temperature (Min)	Environmental temperature -5 deg. C
	Storage Temperature (Max)	Environmental temperature 35 deg. C or camera housing temperature (Top plate): 65 deg. C Note: Please use the unit under conditions that satisfy at least one of the above criteria. In cases where the ambient temperature exceeds the above limit, when installing the unit please take suitable heat dissipation measures so that the upper portion of the case stays at a temperature of 65°C or less. Inside this unit, between the case and the electronic components we have taken thermal resistance measures of as small a size as possible. As a result, by controlling the case temperature, it is possible to keep the camera's internal electronic components within the rated level.

Dimensions and rear connector specifications



(Unit: mm)

A RJ45 connector Note: Not PoE type. Power provided separately from C.

B DC iris lens connector M1951(EMUDEN-made) equivalent
Note: For details, see product specifications.

C Input/output signal connector Hirose-made HR10A-7R-6PB equivalent
Power input and input/output signal can be done.
Optional connector RICOH FP-CN6PB is supported.

Pin No.	Signal name	IN/OUT	Signals	Initial output signal
1	GND	IN	GND	
2	I/O-1	OUT	+3.3V LVTTL	Frame Trigger Wait
3	I/O-2	OUT	+3.3V LVTTL	Exposure Active
4	TRIGGER_In-	IN	Isolated -	
5	TRIGGER_In+	IN	Isolated +	
6	POWER IN	IN	+10.8 to +26.4 Vdc	

GigE Vision™ VGA Camera

FV-G030B1

300 000 Pixel | GigE Vision

Preprocessing functions and VGA GigE Vision for a wide range of uses

Handles a wide range of inspections, including monochrome image measurement, defect checking, etc. Suitable for applications involving installation in various types of devices that make up a machine vision system.

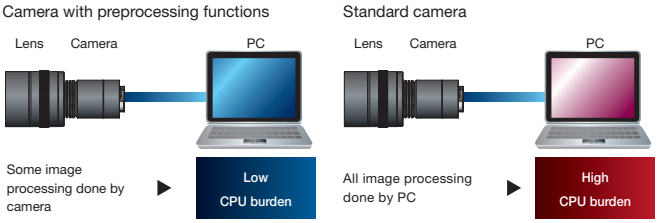
- High-speed frame rate of VGA: 90 fps
- High image quality with a CCD global shutter
- Various scan modes (full, AOI) as standard features
- Various trigger modes (pulse width, edge preset trigger) as standard features
- Supports DC iris lens so also excellent for outdoor monitoring uses
- Excellent for industrial uses as it handles a wide voltage range (10.8 - 26.4 V)
- Supports updating of camera firmware via Ethernet
- In addition to camera tripod screw holes, M4 screw holes are located on two sides (top and bottom)
- Highly rigid case to increase mounting precision

[Preprocessing functions] reduce PC processing burden and increase image processing performance

[Supported cameras] FV-L200B1, FV-L030B1, FV-G200B1, FV-G030B1

On models with preprocessing functions, the camera itself has the various image processing functions shown below. Compared to cameras where there is an intervening board, it is possible to reduce the personal computer CPU burden and increase the transfer speed.

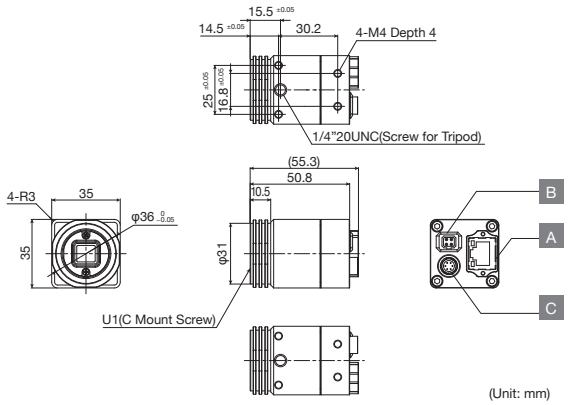
- **[Lookup table] enables finely detailed image creation** ▶See page 6
- **[AGC (auto gain control)] enables automatic gain adjustment in camera**
- **[Auto electronic shutter control] automatically controls the shutter in response to changes in subject light intensity**



FV-G030B1 Product specifications

Imager		1/3" interline VGA monochrome progressive CCD
Active picture elements		VGA class : 648 (H) × 494 (V)
Cell size		7.4 (H) × 7.4 (V) µm
Vertical frequency (Frame rate)		89.91172 Hz
Horizontal frequency		47.2028 kHz
Pixel frequency		36.818175 MHz
Minimum scene illumination		0.58 lux at F1.2
Sync. System		Internal
Video output		Digital 8, 10 or 12 bit Raw data GigE Vision
Exposure time		Preset free-run mode: 10 µ seconds to 16,777,216 µ seconds Preset trigger mode: 10 µ seconds to 16,777,216 µ seconds Pulse width mode: 10 µ seconds to Unlimited
Gain		0 to 20.4 dB
Gamma		Gamma 1.0 (Factory default) or uploadable gamma table
Power	Input voltage	+ 10.8 to + 26.4 Vdc
	Consumption	Less than 5.0 W
Dimensions		35 (W) × 35 (H) × 50.8(D) mm (excluding the connector)
Lens mount		C mount
Weight		Approximately 120 g
Operational environment	Temperature (Min)	Environmental temperature -5 deg.C
	Storage Temperature (Max)	Environmental temperature 35 deg. C or camera housing temperature (Top plate): 65 deg. C Note: Please use the unit under conditions that satisfy at least one of the above criteria. In cases where the ambient temperature exceeds the above limit, when installing the unit please take suitable heat dissipation measures so that the upper portion of the case stays at a temperature of 65°C or less. Inside this unit, between the case and the electronic components we have taken thermal resistance measures of as small a size as possible. As a result, by controlling the case temperature, it is possible to keep the camera's internal electronic components within the rated level.

Dimensions and rear connector specifications



A RJ45 connector Note: Not PoE type. Power provided separately from C.

B DC iris lens connector M1951(EMUDEN-made) equivalent
Note: For details, see product specifications.

C Input/output signal connector Hirose-made HR10A-7R-6PB equivalent
Power input and input/output signal input can be done.
Optional connector RICOH FP-CN6PB is supported.

Pin No.	Signal name	IN/OUT	Signals	Initial output signal
1	GND	IN	GND	
2	I/O-1	OUT	+3.3V LVTTL	Frame Trigger Wait
3	I/O-2	OUT	+3.3V LVTTL	Exposure Active
4	TRIGGER_In-	IN	Isolated -	
5	TRIGGER_In+	IN	Isolated +	
6	POWER IN	IN	+10.8 to +26.4 Vdc	

Options

RICOH FP Series options increase the accuracy and performance of the RICOH FV and FL series

Cables

FP-CAC03
Camera Link cable: 3 m
Connector specs
(camera end: board end)
SDR: MDR Standard thin PoCL

FP-CAC05
Camera Link cable: 5 m
Connector specs
(camera end: board end)
SDR: MDR Standard thin PoCL

FP-CAG03
GigE Vision cable: 3 m
Connector specs
(camera end: board end)
Horizontal straight: Latch type

FP-CAG05
GigE Vision cable: 5 m
Connector specs
(camera end: board end)
Horizontal straight: Latch type

Tripod bracket

Camera anchoring fixture facilitates high-precision sensing

[Supported cameras] FV-L200B1, FV-L030B1

FP-TPHCA

Power supply and input/output connector

A 6-pin connector for power supply and input/output signal use

[Supported cameras] FV-L500B1, FV-L200B1, FV-L030B1, FV-G200B1, FV-G030B1

FP-CN6PB

⚠ For safe product use	• Carefully read the user guide and use the product correctly. • Use the correct power supply and voltage as indicated. • Do not install or use the products in locations with excessive water, humidity, steam, dust, smoke, etc. • Use a ground connection. In the event of a malfunction or short circuit, there is a danger of electric shock.

RICOH Company, Ltd. Imaging System Business Group, Industrial Optical Systems Division, http://www.ricoh.com/fa_security/
For inquiries concerning the products in this catalogue, please contact us as shown below

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