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2010
Machine Vision Product Catalogue

Last update: October 2010

IMAGE SENSING SOLUTIONS

- Intelligent Cameras
- Digital Interface – IEEE1394b-2002
- Digital Interface – Camera Link
- Digital Interface – GigE Vision
- Non-TV Format
- TV Format
- 3-CCD Colour Video Cameras

Machine Vision

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Monochrome Camera Function Chart

		Intelligent Cameras		Digital Interface IEEE1394b-2002			Digital Interface Camera Link			Digital Interface GigE Vision				
Model														
		XCI-SX100	XCI-V100	XCD-U100	XCD-SX90	XCD-V60	XCL-U100	XCL-5005	XCL-U1000	XCG-5005E	XCG-U100E	XCG-SX97E	XCG-SX99E	XCG-V60E
Image device														
Progressive Scan		■	■	■	■	■	■	■	■	■	■	■	■	■
CCD														
Square pixel		■	■	■	■	■	■	■	■	■	■			■
1/3 type		■	■		■	■								■
1/2 type														
1/1.8 type				■			■		■		■			
2/3 type								■		■		■	■	
Lens Mount														
C		■	■	■	■	■	■	■	■	■	■	■	■	■
NF														
CS		■	■											
Output														
VS (Video Sync.)														
VBS														
RGB														
Y/C														
VGA format			■			■								■
SVGA format														
XGA format														
SXGA format		■			■							■	■	
UXGA format				■			■		■		■			
5 Mega								■		■				
1N non interface														
Partial scanning		■	■	■	■	■	■	■	■	■	■	■	■	■
Digital	IEEE1394			■	■	■								
	Camera Link						■	■	■					
	GigE Vision									■	■	■	■	■
Long exposure														
		■	■	■	■	■	■	■	■	■	■	■	■	■
Shutter														
Normal		■	■	■	■	■	■	■	■	■	■	■	■	■
External trigger shutter	Mode1 (Non-reset mode)													
	Mode2 (Reset mode)						■	■	■					■
	Others	■	■	■ *1	■ *1	■ *1				■	■	■	■	■
One shot														
				■	■	■				■	■	■	■	■
CCD Iris														
		■	■	■	■	■								
Others														
Negative/ positive reversal		■	■	■	■	■	■	■ *2	■	■	■	■	■	■
RS-232C control		■	■				■	■	■					
Near infrared ray measures														
Near ultraviolet ray measures														
Auto iris		■ *3	■ *3											
See page		p8	p8	p15	p15	p15	p23	p27	p31	p38	p38	p38	p38	p38

*1: IEEE1394 Digital camera protocol (ver. 1.30) Trigger mode 0 or 1 *2: Gamma; Arbitrary setting *3: DC control compliant

Monochrome Camera Function Chart

		Non-TV Format							TV Format	
Model										
		XC-HR90	XC-HR70	XC-HR50	XC-HR57	XC-HR58	XC-56	XC-56BB	XC-ST70 XC-ST70CE	XC-ST50 XC-ST50CE
Image device										
Progressive Scan		■	■	■	■	■	■	■		
CCD										
Square pixel		■	■	■	■	■	■	■		
1/3 type		■	■	■			■	■		
1/2 type					■	■				■
1/1.8 type										
2/3 type									■	
Lens Mount										
C		■	■	■	■	■	■		■	■
NF								■		
CS										
Output										
VS (Video Sync.)		■	■	■	■	■	■	■	■	■
VBS										
RGB										
Y/C										
VGA format				■ *2	■ *2		■ *2	■ *2	■	■
SVGA format						■ *2			■	■
XGA format			■ *2							
SXGA format		■ *2								
UXGA format										
5 Mega										
1N non interface		■ (1/30s)*2	■ (1/30s)*2	■ (1/60s)*2	■ (1/60s)*2	■ (1/50s)*2	■ (1/30s)*2	■ (1/30s)*2		
Partial scanning		■	■	■	■	■	■	■		
External synchronization										
HD/VC		■	■	■	■	■	■	■	■	■
VS									■	■
Restart / Reset										
		■	■	■	■	■	■	■	■	■
Long exposure										
		■	■	■	■	■	■	■	■	■
Shutter										
Normal		■	■	■	■	■	■	■	■	■
External trigger shutter	Mode1 (Non-reset mode)	■	■	■	■	■	■	■	■	■
	Mode2 (Reset mode)	■	■	■	■	■	■	■	■	■
	Others									
Others										
Negative/ positive reversal										
RS-232C control		■								
Near infrared ray measures										
Near ultraviolet ray measures										
Auto iris										
See page		p48	p52	p56	p56	p60	p64	p68	p77	p77

*2: When the image input is connected

Monochrome Camera Function Chart

		TV Format								
Model										
		XC-ST51 XC-ST51CE	XC-ST30 XC-ST30CE	XC-ES50 XC-ES50CE	XC-ES51 XC-ES51CE	XC-ES30 XC-ES30CE	XC-EI50 XC-EI50CE	XC-EI30 XC-EI30CE	XC-EU50 XC-EU50CE	XC-ES50L XC-ES50LCE
Image device										
Progressive Scan										
CCD										
Square pixel										
1/3 type			■			■		■		
1/2 type		■		■	■		■		■	■
1/1.8 type										
2/3 type										
Lens Mount										
C		■	■	■	■	■	■	■	■	■
NF										
CS										
Output										
VS (Video Sync.)		■	■	■	■	■	■	■	■	■
VBS										
RGB										
Y/C										
VGA format		■	■	■	■	■	■	■	■	■
SVGA format		■	■	■	■	■	■	■	■	■
XGA format										
SXGA format										
UXGA format										
5 Mega										
1N non interface										
Partial scanning										
Digital	IEEE1394									
	Camera Link									
External synchronization										
HD/VC		■	■	■	■	■	■	■	■	■
VS		■	■						■	■
Restart / Reset										
		■	■	■	■	■	■	■	■	■
Long exposure										
		■	■	■	■	■	■	■	■	■
Shutter										
Normal		■	■	■	■	■	■	■	■	■
External trigger shutter	Mode1 (Non-reset mode)	■	■	■	■	■	■	■	■	■
	Mode2 (Reset mode)	■	■	■	■	■	■	■	■	■
	Others									
Others										
Negative/ positive reversal										
RS-232C control										
Near infrared ray measures							■	■		
Near ultraviolet ray measures									■	
Auto iris										
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Colour Camera Function Chart

		Intelligent Cameras		Digital Interface IEEE1394b-2002			Digital Interface Camera Link		TV Format	3-CCD Colour Video Cameras		
Model												
		XCI-SX100C	XCI-V100C	XCD-U100CR	XCD-SX90CR	XCD-V60CR	XCL-5005CR	XCL-U1000C	XC-505 XC-505P	DXC-C33/P	DXC-390/P	DXC-990/P
Image device												
Progressive Scan		■	■	■	■	■	■	■				
CCD												
Square pixel		■	■	■	■	■	■	■				
1/3 type		■	■		■	■				■ 3 x 1/3" CCD	■ 3 x 1/3" CCD	
1/2 type									■			■ 3 x 1/2" CCD
1/1.8 type				■				■				
2/3 type							■					
Lens Mount												
C		■	■	■	■	■	■	■		■	■	
NF									■			Bayonet
CS		■	■									
Output												
VS (Video Sync.)										■	■	■
VBS									■	■	■	■
RGB										■	■	■
Y/C									■	■	■	■
VGA format			■			■			■			
SVGA format									■			
XGA format												
SXGA format		■			■							
UXGA format				■				■				
5 Mega							■					
1N non interface												
Partial scanning		■	■	■	■	■	■	■				
Digital	IEEE1394			■	■	■				■		
	Camera Link						■	■				
External synchronization												
HD/VC									■	■	■	■
VS									■	■	■	■
Restart / Reset												
Long exposure												
		■	■	■	■	■	■	■				
Shutter												
Normal		■	■	■	■	■	■	■	■	■	■	■
External trigger shutter	Mode1 (Non-reset mode)											
	Mode2 (Reset mode)						■	■		■	■	■
	Others	■	■	■ *1	■ *1	■ *1						
One shot												
				■	■	■						
CCD Iris												
		■	■	■	■	■			■		■	■
White balance												
ATW		■	■	■	■	■			■	■	■	■
One push		■	■	■	■	■	■	■	■ *4	■	■	■
Fixed		■	■	■	■	■	■	■	■	■	■	■
Manual		■	■	■	■	■	■	■	■	■	■	■
Others												
Negative/ positive reversal		■	■	■	■	■	■ *5	■	■ *4			
RS-232C control		■	■				■	■	■	■	■	■
Near infrared ray measures												
Near ultraviolet ray measures												
Auto iris		■ *3	■ *3									
See page		p8	p8	p15	p15	p15	p27	p31	p98	p114	p119	p124

*1: IEEE1394 Digital camera protocol (ver. 1.30) Trigger mode 0 or 1 *3: DC control compliant *4: Only controlled by RS-232C *5: Gamma; Arbitrary setting

Intelligent Cameras

XCI-SX100 (Monochrome)	8
XCI-SX100C (Colour)	8
XCI-V100 (Monochrome)	8
XCI-V100C (Colour)	8
Connection Diagram	*13*

Intelligent Camera Monochrome

XCI-SX100 NEW
XCI-V100 NEW

Intelligent Camera Colour

XCI-SX100C NEW
XCI-V100C NEW

Intelligent | All-in-One | PC Less | Progressive Scan | 1/3 Type CCD | Square Pixels | C/CS Lens Mount | SXGA Output *1 | VGA Output *2 | RGB RAW *3 | B/W *4

Normal Shutter | External Trigger Shutter | Long Exposure | Partial Scan | Auto Airis I/F | ATW White Balance | RS232C Control | All-in-One INTELLIGENT | IPS

*1: XCI-SX100/SX100C
*2: XCI-V100/V100C
*3: XCI-SX100C/V100C
*4: XCI-SX100/V100

Outline

XCI-SX100, XCI-SX100C, XCI-V100 and **XCI-V100C** are intelligent cameras which are capable of image scanning, image processing and peripheral device controlling.

The cameras are equipped with enhanced sensor processor, and progressive functions and performances. The specifications are provided so that the cameras can serve not only for machine vision processing but also for security management purposes. Available in monochrome and colour.

Features

All-in-one body and high shock and vibration resistance

High performance sensor and processor

- CCD sensor capable of high speed image capturing
- x86-compatible CPU (1GHz) and 512MB DDR2 SDRAM
- FPGA customisable for hardware image processing
- Microsoft Windows® XP Embedded Support

Camera driver for Microsoft Windows® XP Embedded is equipped. CompactFlash and OS are optional. Windows is a trademark of Microsoft Corporation in USA and other countries.

Colour Model Equipped with a Colour Separation Technology that enables High-Definition Image Reproduction

Security specifications

- CS mount lens support (C mount lens attached when shipped)
- Auto Iris control, convenient for a wide range of security application
- Dual Read out by Wide-D Technology
- AWB
- AGC

Various interfaces

- Easy and direct monitor output (D-sub 15-pin)
- High-speed network connectivity, up to 1000Base-T
- USB 2.0 interface
- Two USB ports allow users to control the camera via a mouse and/or keyboard
- Digital Input/Output and RS-232C allow cameras to connect with external equipment, such as sensors, strobe lights, and Programmable Logic Controllers (PLC)

Power requirements adjustable for environment (+12V and +24V)

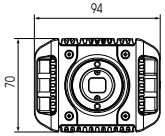
Excellent picture quality/high frame rates

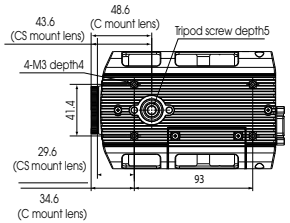
- XCI-SX100/SX100C: SXGA (1280 × 960) at 30 fps, ideal for applications that require the capture of highly detailed images
- XCI-V100/V100C: VGA (640 × 480) at 90 fps, perfect for applications that require high-speed image capture

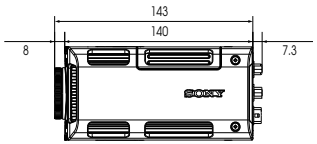
Binning function (for monochrome model only)

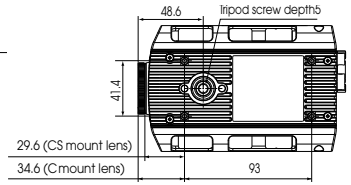
Partial scan function

Dimensions (mm)









Connection Diagram p13

Accessories

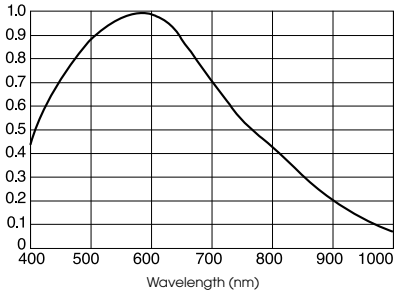
12-pin camera cable

- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

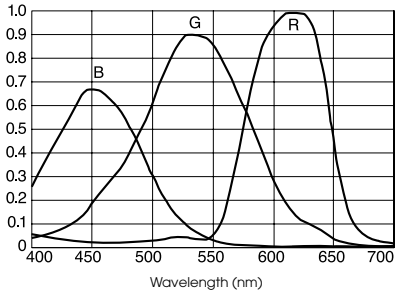
XCI-SX100

Relative sensitivity



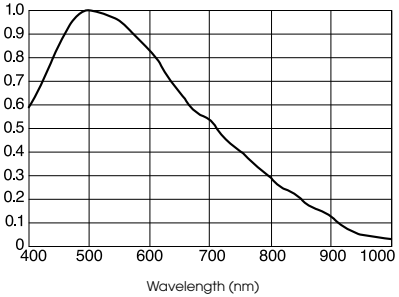
XCI-SX100C

Relative sensitivity



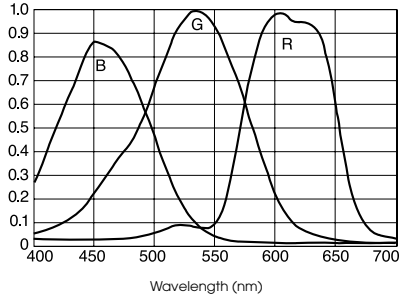
XCI-V100

Relative sensitivity



XCI-V100C

Relative sensitivity

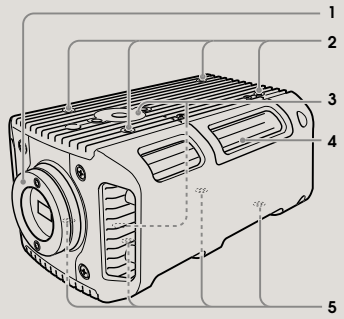


Specifications

	XCI-SX100	XCI-SX100C	XCI-V100	XCI-V100C
Image device	1/3 type IT Progressive Scan CCD			
Effective picture elements (H) × (V)	1,280 × 960 (SXGA)		640 × 480 (VGA)	
Cell size (H) × (V)	3.75 μm × 3.75 μm		7.4 μm × 7.4 μm	
Resolution depth	Mono 8: 8 bits/pixel Mono 16: 10 bits/pixel	Raw 8: 8 bits/pixel Raw 16: 10 bits/pixel Y 8: 8 bits/pixel Y 16: 10 bits/pixel BGRi: 8 bits B/G/R, Interleave RGBp: 8 bits R/G/B, Plane YUVi: 8 bits Y/U/ V, Interleave YUVp: 8 bits Y/U/ V, Plane Y+BGRi: Y8 bits+8 bits B/G/R, Interleave Y+RGBp: Y8 bits+8 bits R/G/B, Plane	Mono 8: 8 bits/pixel Mono 16: 10 bits/pixel	Raw 8: 8 bits/pixel Raw 16: 10 bits/pixel Y 8: 8 bits/pixel Y 16: 10 bits/pixel BGRi: 8 bits B/G/R, Interleave RGBp: 8 bits R/G/B, Plane YUVi: 8 bits Y/U/ V, Interleave YUVp: 8 bits Y/U/ V, Plane Y+BGRi: Y8 bits+8 bits B/G/R, Interleave Y+RGBp: Y8 bits+8 bits R/G/B, Plane
Frame rate	30 fps (SXGA)		90 fps (VGA)	
Sensitivity	400 lx F5.6 (0 dB)	2000 lx F5.6 (0 dB)	400 lx F5.6 (0 dB)	2000 lx F5.6 (0 dB)
Gain control	Manual (0 to +18 dB, 0.1 dB steps)			
Readout modes	Normal, Binning (1 × 2, 2 × 2), Partial scanning (H/ V 16 division), LUT, 5 × 5 filter	Normal, Partial scanning (H/V 16 division), LUT, 5 × 5 filter	Partial scanning (H/ V 16 division), LUT, 5 × 5 filter	Normal, Partial scanning (H/ V 16 division), LUT, 5 × 5 filter
Shutter speed	Normal (2 to 1/100,000 s) / Trigger shutter (2 to 1/50,000 s)			
External trigger shutter	Trigger start and exposure duration (4 s Max), Trigger inhibit function, Trigger delay function: 0 to 4 s, 1ms step			
Strobe delay function	0 to 4 ms (1 μs steps)			
Auto features	AGC, AWB*, ATW*, Auto Iris Control			
CPU	x86 1GHz, VIA Eden ULV (L1 caches 64 KB × 2, L2 caches 128 KB)			
Memory	512 MB DDR2 SDRAM			
OS	Windows® XP Embedded			
Ethernet	1000 Base-T/100 Base-TX/10 Base-T			
Monitor output	D-sub 15 pin for multi scan monitor			
USB	Hi-Speed USB (USB 2.0) × 2			
Serial communication	RS-232C			
Iris control	DC			
Digital I/Os	Isolated IN (4), Isolated OUT (8)			
Lens mount	C mount/CS mount switchable (C mount of the shipment)			
Power requirements	DC +10.5 to 26.4 V			
Power consumption	17.4 W (Max.)	18.2 W (Max.)	17.4 W (Max.)	18.2 W (Max.)
Dimensions	94 (W) × 70 (H) × 140 (D) mm (not including projecting parts)			
Mass	Approx. 760 g			
Operating temperature	–5 to +45°C			
Storage temperature	–30 to +60°C			
Operating humidity	20 to 80% (non condensation)			
Storage humidity	20 to 95% (non condensation)			
Performance assurance temperature	0 to +40°C			
Vibration resistance	10 G (20 to 200 Hz)			
Shock resistance	70 G			
MTBF	18,951 hours (Approx. 2.2 years)	18,945 hours (Approx. 2.2 years)	18,856 hours (Approx. 2.2 years)	18,850 hours (Approx. 2.2 years)
Regulations	UL60950-1+CSA60950.1, FCC: Class A, IC: Class A, CE: EN55022, EN55024, UL60950-1+EN61326, AS/NZ: EN55022, VCCI: Class A, JATE, Korea MIC			
Supplied Accessories	Lens mount cap (1), C mount conversion adopter (installed) (1), Fall-prevention wire rope (1), Screw (1), Operating instructions (1)			

* AWB, ATW: Colour model only

Location and Function of Parts and Controls



1. Lens Mount (C mount/CS mount)

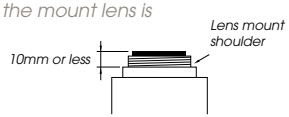
C/CS mount lens or other optical devices can be attached.

NOTE

The maximum height of the mount lens is shown below.

C mount lens: 10mm

CS mount lens: 5mm



2. Fall-prevention wire screw hole (surface)/ auxiliary reference screw holes (at the top)

3. Tripod screw hole (at the top/bottom)

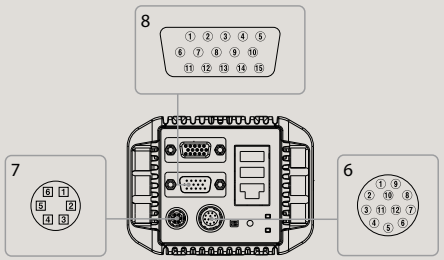
4. CompactFlash slot cover/CompactFlash slot (internal)

CompactFlash must be purchased separately.

5. Reference screw holes (at the bottom)

These precision screw holes are for locking the camera. Locking the camera into these holes secures the optical axis alignment.

Rear Panel



6. DC IN 12-pin male connector

DC+12V power is supplied through camera cable.

Pin No.	Signal	Pin No.	Signal
1	GND	7	NC
2	VCC	8	GND
3	GND	9	VCC
4	NC	10	EXPOSURE_OUT*
5	GND	11	TRIG_IN
6	NC	12	GND

7. Serial/Auto iris 6-pin male connector

Using serial cable, you can control the camera from a camera control device. DC iris lens can be controlled from the camera.

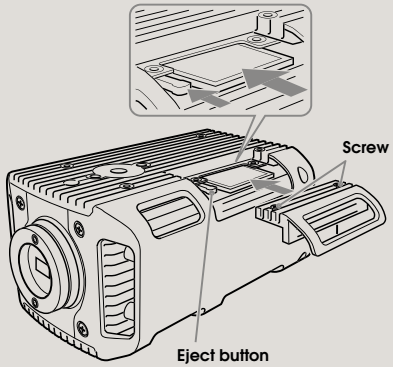
Pin No.	Signal	Pin No.	Signal
1	TXD	4	IRIS_CONT-
2	RXD	5	IRIS_CONT+
3	GND	6	IRIS_DRV+

8. Digital I/O 15-pin male connector

You can transmit data between control devices through digital I/O cable.

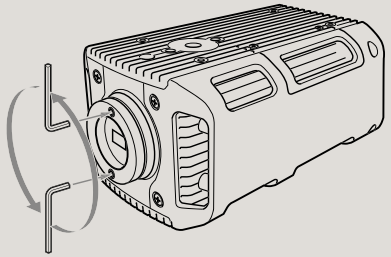
Pin No.	Signal	Pin No.	Signal
1	ISO_IN1	9	ISO_OUT4
2	ISO_IN2	10	ISO_OUT_COM1
3	ISO_IN3	11	ISO_OUT5
4	ISO_IN4	12	ISO_OUT6
5	ISO_IN_COM	13	ISO_OUT7
6	ISO_OUT1	14	ISO_OUT8
7	ISO_OUT2	15	ISO_OUT_COM2
8	ISO_OUT3		

Inserting the CompactFlash



1. Loosen the two screws to remove the cover.
2. Press the eject button and insert a CompactFlash slot.
3. Mount the cover to the camera module, press the CompactFlash slot with the cover inside.
4. Fasten the two screws to secure the cover.

Fitting the CS Mount Lens



This camera module supports a C mount lens as the factory setup.
If you will be using a CS mount lens, perform the following steps:

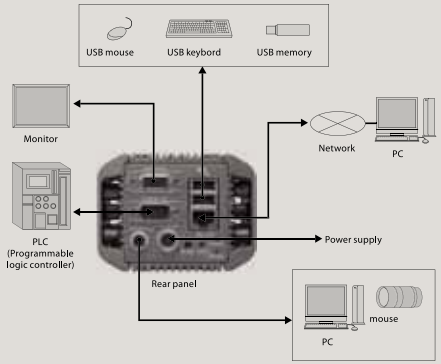
1. Insert two 3-mm Allen wrenches (commercially available) through the screw-recess holes of the C mount adaptor.
2. Turn the Allen wrenches counterclockwise.
3. Remove the C mount adaptor.

If you need to use the C mount adaptor again, follow steps 1 to 3 in reverse order.

NOTE

When you fit the C mount adaptor again after removal, a flange focal length may change. When refitting the mount, turn the wrenches while applying about 2.5 Nm of torque.

Connecting the Cables



Trigger Signal Specifications

C/CS mount lens

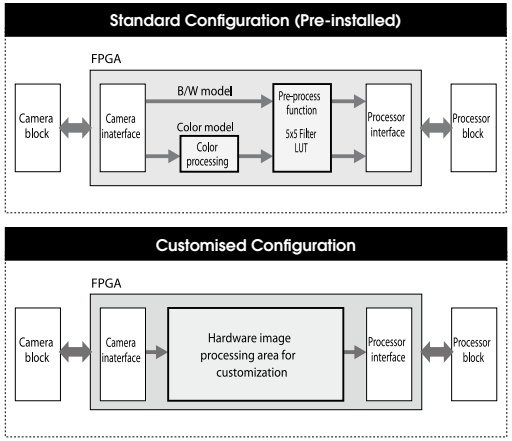
C/CS mount lens attachable to support both machine vision and high-end security applications, such as Intelligent Traffic System (ITS).

For machine vision (C mount)

For high-end security (CS mount)

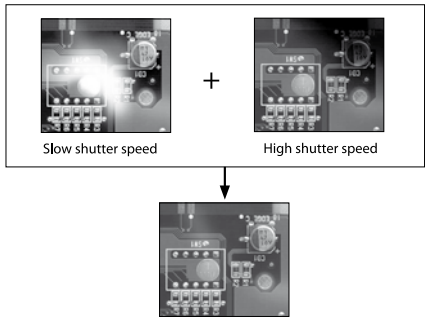
Customisable FPGA (Field Programmable Gate Array)

All four camera models contain customisable space in their FPGA block. This allows you to replace part of the pre-installed area with your own image-processing software, thereby increasing the camera's overall image-processing capability.



Dual Readout by Wide-D Technology

This function allows you to capture two images at different shutter speeds. For machine vision applications, you can obtain two different images simultaneously and analyse them in separate ways without changing the lighting. In addition, for security applications, a composite image with a wide dynamic range can be produced with software image processing.

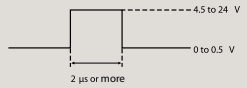


Composite image with Wide-D technology

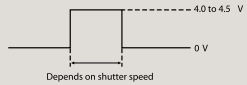
Trigger Input Regulations

The voltage and pulse width indicated are the value measured using the DC IN 12-pin connector and Serial 6-pin connector on the rear side of the camera.

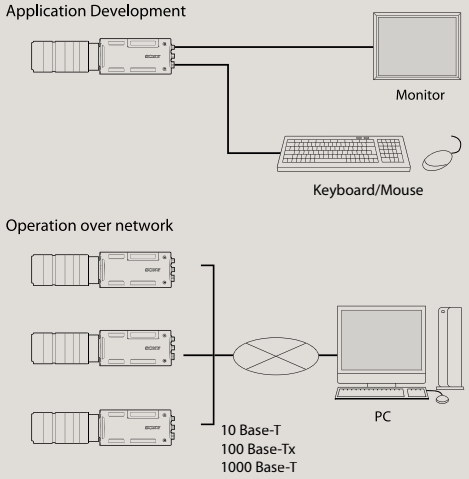
Trigger Input (DC IN 12-pin connector)
Input impedance: Stated in the voltage determined at more than 10kΩ.



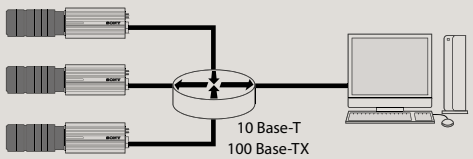
Exposure Output (DC IN 12-pin connector)
The amplitude level is the measure of central tendency terminated with 10kΩ.



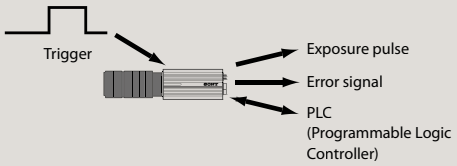
Trigger Signal Specifications



Example of Use



Management and monitoring of image processing result with a host PC via a network

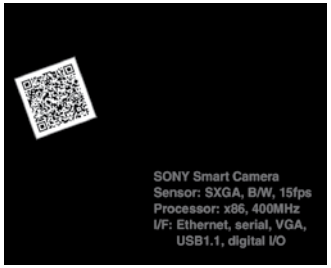


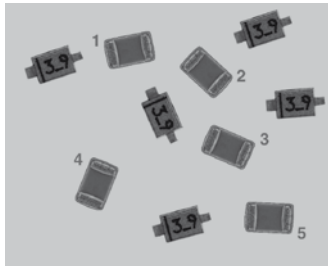
Peripheral equipment control via RS-232C/digital I/O

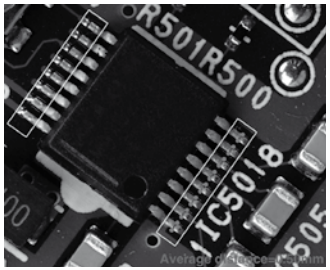
Example of Application

By embedding the image processing application

- Barcode recognition
- Character recognition
- Measurement
- Pattern matching
- Monitoring
- Monitoring application, etc.

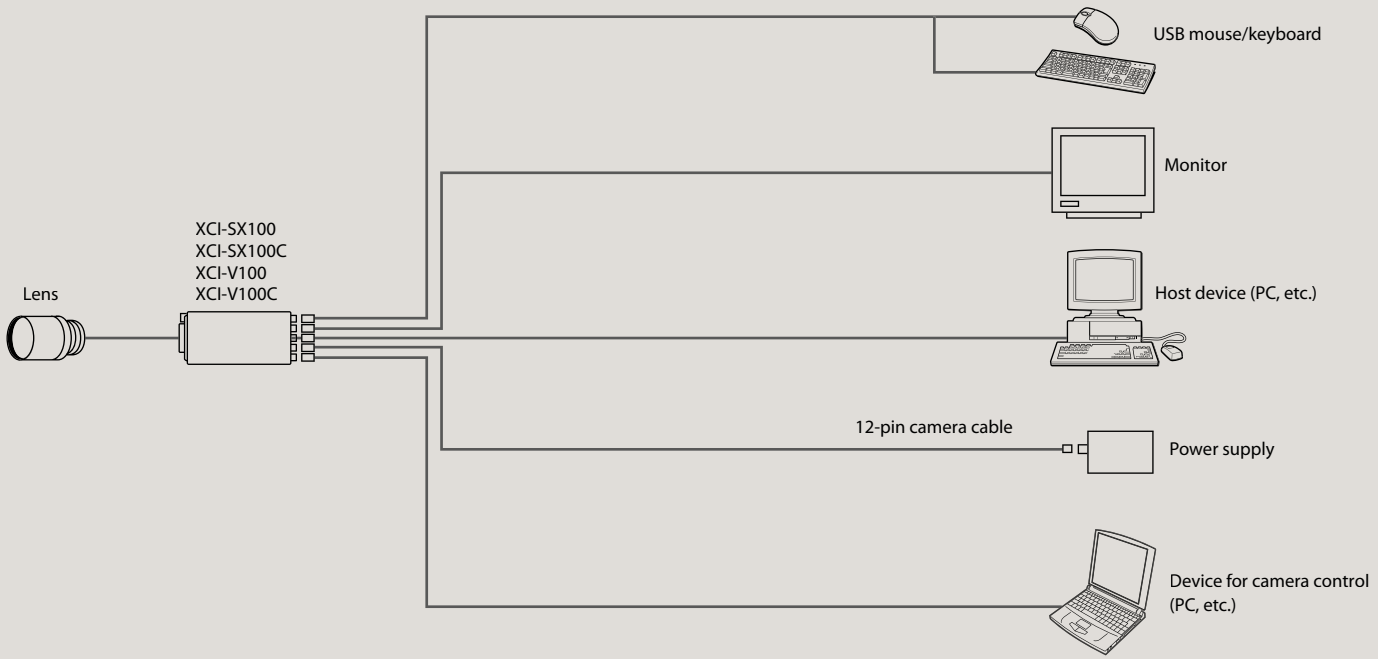






Connection Diagram

XCI-Series



Digital Interface / IEEE1394b-2002

XCD-U100 (Monochrome)	15
XCD-U100CR (RAW Colour)	15
XCD-SX90 (Monochrome)	15
XCD-SX90CR (RAW Colour)	15
XCD-V60 (Monochrome)	15
XCD-V60CR (RAW Colour)	15
Connection Diagram	*21*

Digital Camera Module Monochrome

XCD-U100
XCD-SX90
XCD-V60

Digital Camera Module RAW Colour

XCD-U100CR
XCD-SX90CR
XCD-V60CR

IEEE-1394b Digital Output | Progressive Scan | Square Pixels | 1.18 Type CCD *1 | 1/3 Type CCD *2,3 | C Lens Mount | UXGA Output *1 | SXGA Output *2 | VGA Output *3 | Partial Scan | Long Exposure

Normal Shutter | External Trigger Shutter | One-Push White Balance *4 | Fixed White Balance *4 | Manual White Balance *4 | One Shot | CCD Iris | Nega/Posi Reversal | Raw Colour *4 | B/W *5

*1: XCD-U100/U100CR
*2: XCD-SX90/SX90CR
*3: XCD-V60/V60CR
*4: XCD-U100CR/SX90CR/V60CR
*5: XCD-U100/SX90/V60

Outline

The six models of the **XCD Series Digital Camera Modules** (monochrome models and RAW colour models) employing the IEEE1394b-2002 standard are equipped with quality digital camera features.

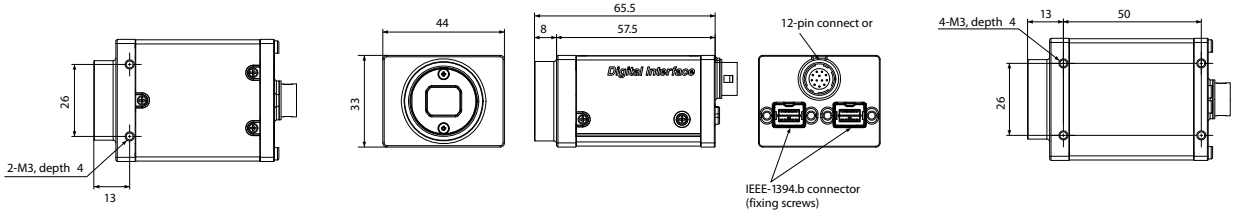
Although it is compact, the camera allows high-speed image transfer and daisy-chain connection with two IEEE1394b connectors. The camera also has versatile features such as hardware preprocessing in the camera that reduces the load of image processing in a PC, bus synchronisation, and broadcast delivery of commands.

The XCD Series digital output cameras conforming to the IIDC 1.31 protocol take full advantages of IEEE1394 capabilities.

Features

- **High image quality, high-speed image output**
  The image device, output frame rate and resolution of the cameras are as follows:
  - XCD-U100/U100CR: 1/1.8 type PS IT CCD, 15 fps, UXGA
  - XCD-SX90/SX90CR: 1/3 type PS IT CCD, 30 fps, SXGA
  - XCD-V60/V60CR: 1/3 type PS IT CCD, 90 fps, VGA
- **Daisy-chain connection**
  The camera is equipped with two IEEE1394b connectors that support connection of multiple cameras. As the power can be supplied from a 12-pin connector (EIAJ), the camera achieves daisy-chain connection without limitation of power supply capacity so that a simple image processing system with multiple cameras can be developed.
- **Hardware preprocessing**
  The camera is equipped with hardware LUT (Look Up Table). The black and white models are also equipped with 3x3 image matrix operation.
- **Bus synchronisation**
  The cameras connected to the same bus automatically operate in synchronisation with the 1394 bus, without using an external sync signal. The exposure timing on multiple cameras is synchronised correctly via the IEEE1394b cable only.
- **Broadcast delivery of commands**
  The camera settings for all the cameras connected to the same bus can be changed at the same time. For example, the gain or shutter speed is set to the same value on all the cameras, or exposure starts on all the cameras simultaneously using a software trigger.
- **Memory channel**
  The memory channel allows storage of up to 15 sets of camera settings such as gain and shutter.
- **Bulk trigger mode**
  The Bulk trigger mode allows output of multiple images with a shot of a trigger signal. Each image is shot with the camera settings stored in the memory channel. Up to 15 image settings are possible.

Dimensions (mm)



Connection Diagram p21

Accessories

Compact camera adaptor
DC-700CE

Tripod adaptor
VCT-ST70I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Features

Memory shot

The image exposed from the sensor is stored in the camera's built-in memory. The stored image can be read out using a command from the host PC when required.

		XCD-U100 XCD-U1000CR	XCD-SX90 XCD-SX90CR	XCD-V60 XCD-V60CR
Standard image size (H x V)		1,600 x 1,200 (UXGA)	1,280 x 960 (SXGA)	640 x 480 (VGA)
Bit length	Mono8/ Raw8	8 frames	13 frames	54 frames
	Mono16/ Raw16	4 frames	6 frames	27 frames

Partial scan

Partial scan clips a required angle of view (area) from the entire screen to be read out. As a part of the image is read out, the unit takes advantage of reduced image data and high-speed transfer. The minimum clipping unit is 32 pixels × 24 lines.

Binning

Binning increases the sensitivity and frame rate based on mixing the pixel data.

9-pin connector with fixing screws

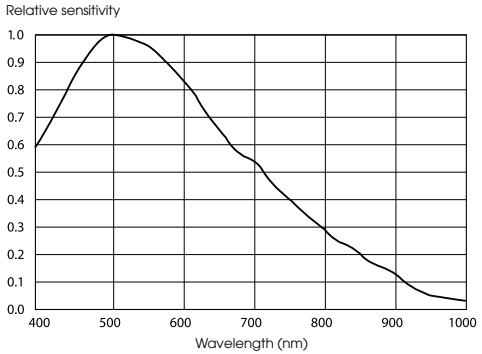
Low power consumption, vibration-resistant structure, and compact size

IIDC Ver. 1.31 protocol compliant

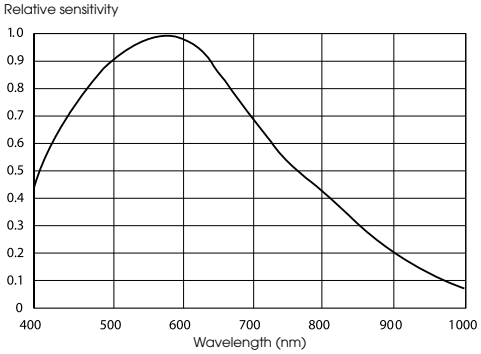
Spectral Sensitivity Characteristics

Spectral sensitivity (relative response) parameters (without lens and light source parameters)

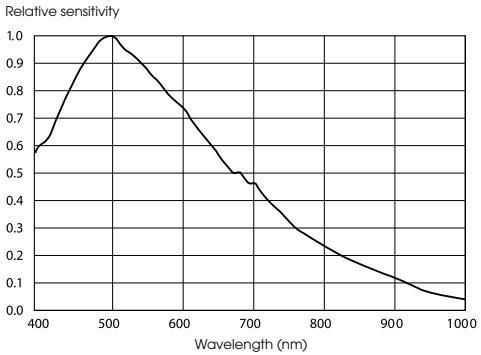
XCD-V60



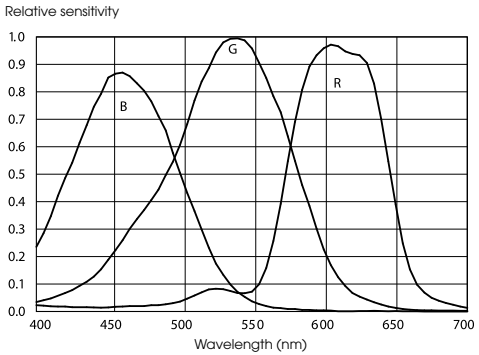
XCD-SX90



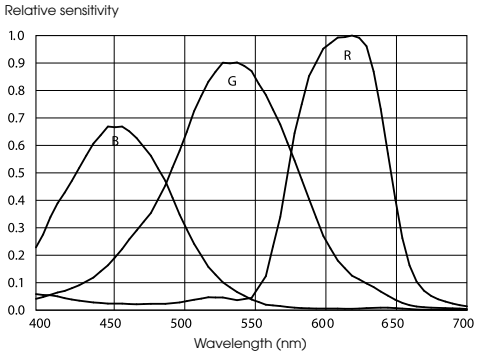
XCD-U100



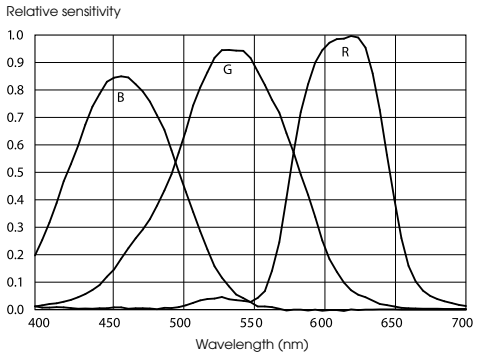
XCD-V60R



XCD-SX90CR



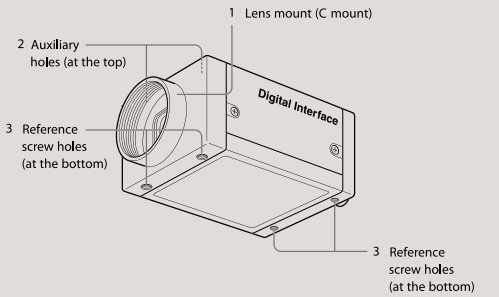
XCD-U100CR



Specifications

	XCD-U100	XCD-U100CR	XCD-SX90	XCD-SX90CR	XCD-V60	XCD-V60CR
Image sensor	1.18 type IT progressive scan IT transfer CCD		1/3 type IT progressive scan IT transfer CCD			
Effective lines Output image size (H) × (V)	1,600 × 1,200 (UXGA)		1,280 × 960 (SXGA)		640 × 480 (VGA)	
Unit Cell size (H) × (V)	4.4 µm × 4.4 µm		3.75 µm × 3.75 µm		7.4 µm × 7.4 µm	
Minimum illumination	2 lx F1.4 Gain: +24dB	20 lx F1.4 Gain: +18dB	2 lx F1.4 Gain: +24dB	20 lx F1.4 Gain: +18dB	2 lx F1.4 Gain: +24dB	20 lx F1.4 Gain: +18dB
Bit length	Mono 8: 8bits/pixel Mono 16: 10bits/pixel	Raw 8: 8bits/pixel Raw 16: 10bits/pixel	Mono 8: 8bits/pixel Mono 16: 10bits/pixel	Raw 8: 8bits/pixel Raw 16: 10bits/pixel	Mono 8: 8bits/pixel Mono 16: 10bits/pixel	Raw 8: 8bits/pixel Raw 16: 10bits/pixel
Lens mount	C mount					
Digital interface	IEEE1394b-2002 x2, bilingal (with fixing screw)					
Protocol	IIDC 1394-based Digital Camera Specification Version 1.31 compliant					
Transfer rate	800 / 400 Mbps					
Frame rate	15 fps		30 fps		90 fps	
Gain	Auto/Manual (0 to 24dB)	Auto/Manual (0 to 18dB)	Auto/Manual (0 to 24dB)	Auto/Manual (0 to 18dB)	Auto/Manual (0 to 24dB)	Auto/Manual (0 to 18dB)
Electronic shutter	1/100,000 to 16 s (Absolute value control possible)					
External trigger shutter	Edge detection (Mode 0), Exposure time setting by trigger width (Mode 1), Software trigger (IEEE1394 bus), Bulk trigger, Sequential trigger, Trigger inhibition setting, Trigger/strobe delay setting					
Image memory	16 MB					
Memory channel	15 sets					
Broadcast delivery of commands	Using IEEE1394 BUS, Camera software setting					
Functions	Partial scan, binning, LUT, 3×3 filter (For B/W models), Optical filter (Colour model only), AWB (Colour model only)					
Power requirements	DC +8 to +30 V (from IEEE1394b 9pin cable or 12pin connector: 12pin : Priority)					
Power consumption	3.0 W (+12 V)		2.8 W (+12 V)			
Dimensions	44 (W) × 33 (H) × 57.5 (D) mm (not including projecting parts)					
Mass	Approx. 140 g					
Operation temperature	–5 to +45°C					
Storage temperature	–30 to +60°C					
Performance guarantee temperature	0 to +40°C					
Operation humidity	20 to 80% (no condensation)					
Storage humidity	20 to 95% (no condensation)					
Vibration resistance	10 G (20 to 200 Hz)					
Shock resistance	70 G					
MTBF	56,270 hours (Approx. 6.4 years)		58,260 hours (Approx. 6.7 years)		57,170 hours (Approx. 6.5 years)	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003: Class A, CE: EN61326, AS/NZ: EN55022, VCCI: Class A, Korea MIC					
Supplied accessories	Lens mount cap (1), Operating Instructions (1)					

Location and Function of Parts and Controls

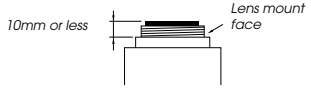


1. Lens mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

The lens must not project more than 10 mm from the lens mount.



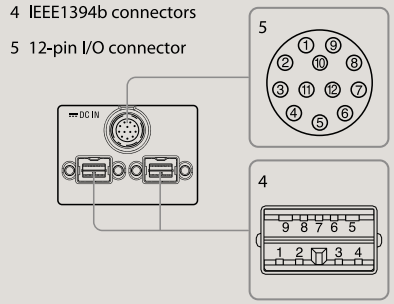
2. Auxiliary screw holes (at the top)

3. Reference screw holes/Tripod screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

Four screw reference holes (3) can be used as the tripod adaptor screw holes, too. Screw the VCT-ST70I tripod adaptor into the four screw holes when you use a tripod.

Rear and Connector Pin Assignments



4. IEEE1394b connectors

Connect an IEEE1394b camera cable (not supplied) to this connector.

Pin No.	Signal	Pin No.	Signal
1	TPB-	6	VG
2	TBP+	7	NC
3	TBA-	8	VP
4	TBA+	9	TPBG
5	TPAG		

5. 12-pin I/O connector

When power from the IEEE1394b connector is insufficient, power is supplied through this connector. Connect a camera cable such as the CCXC-12P05N to this connector.

Pin No.	Signal	Pin No.	Signal
1	Power GND	7	GPIO IN 2
2	Power IN	8	GPIO OUT 2-
3	ISO GND	9	GPIO OUT 2+
4	Strobe OUT	10	GPIO IN 1
5	GPIO OUT 1-	11	Trigger IN
6	GPIO OUT 1+	12	ISO GND

Gain

Both Manual and Auto Gain settings are available with this camera. The variable range extends from 0 to 24 dB for the black and white models or from 0 to 18 dB for the colour models. The camera is designed so that the gain can be subdivided and set by 0.0359 dB.

At the factory default setting, the gain is set to 0 dB. When Auto Gain is selected, the gain is adjusted automatically, based on the brightness of the subject. At this time, the reference level (target point) is set in the AutoExposure register.

Shutter

This camera allows both Manual and Auto Shutter settings. The variable range extends from 10 microseconds to 16.0 seconds; relative values are indicated by a 12-bit integer, and absolute values are indicated using a 32-bit floating point value.

The relationship between the parameter and the exposure time is given by the following formulas, where:

P = Parameter (003h to 47Eh)
E = Exposure time (s)

If P= 3

$E = 0.00001$

If 4 <= P <= 1000

$$E = \frac{P^2}{1000000}$$

If 1000 <= P <= 1150

$$E = (P - 1000) \times 0.1 + 1$$

Setting examples

3 (003h) : 10 µs (1/100000)
32 (020h) : 1 ms (1/1000)
100 (064h) : 10 ms (1/100)
1000 (3E8h) : 1 s
1010 (3F2h) : 2 s
1150 (47Eh) : 16 s

When Auto Shutter is selected, the exposure time is adjusted automatically, based on the brightness of the subject. At this time, the reference level (target point) is set in the AutoExposure register.

For long exposure times

When the exposure time is longer than the frame period, the camera enters the long exposure time mode, and the actual frame rate is reduced in accordance with the exposure time.

Trigger

Trigger shutter is useful for capturing images in response to a trigger that starts the exposure to match a preset timing. It can also be used to capture an image using multiple cameras with the same timing. When a trigger shutter is used, the required trigger is input via the 12-pin connector on the rear panel. The input signal is a 5 to 24 V negative pulse.

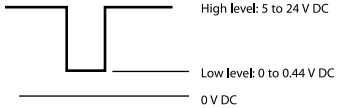
As the input connector is pulled inside of the camera, the camera can receive a trigger only by short-circuiting the input pin and ISO (GND) pin.

NOTE

To connect to ground, use a device having a minimum pulse width of 10 microseconds and an input current of 0.5 mA or more.

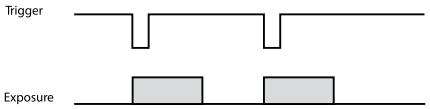
When using DC-700, use a 5-volt negative polarity pulse for the input signal.

This camera supports four trigger modes: 0, 1, 14 and 15.



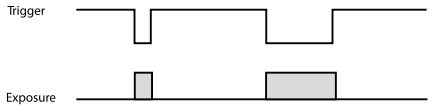
Trigger mode 0

Trigger mode 0 starts exposure by detecting the falling edge of a trigger signal. The exposure time is determined by the shutter parameter.



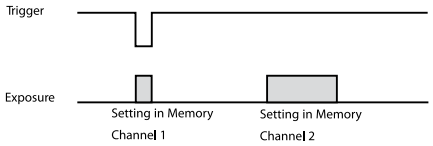
Trigger mode 1

Trigger mode 1 controls the exposure time using the width of the trigger signal pulse. When trigger mode 1 is used, there is actually no limit to the exposure time.



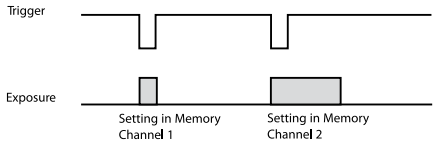
Trigger mode 14 (Bulk trigger mode)

Trigger mode 14 allows shooting of multiple images with different camera settings using only one trigger signal. The camera settings should be prestored in memory channels.



Trigger mode 15 (Sequential trigger mode)

Trigger mode 15 allows shooting of images by loading the camera settings prestored in memory channels in sequence each time a trigger is input.



As this camera is equipped with 15 memory channels, a repeat pattern of up to 15 image shootings can be set for trigger mode 14 or 15. The number of the repeat patterns to be set in one cycle can be determined by the parameter of the trigger mode.

Memory channel 0 is not used for the Bulk trigger mode and the Sequential trigger mode.

The following features are loaded from the memory to be set for shooting:

- Brightness
- Sharpness
- Saturation
- White balance
- Hue
- Gamma
- Shutter
- Gain
- Pan/Tilt
- Optical Filter

NOTE

The Auto mode of White Balance, Shutter and Gain cannot be set. Also note that Pan/Tilt is set only when the current video mode is the same as the video mode selected when the setting has been stored in the memory channel.

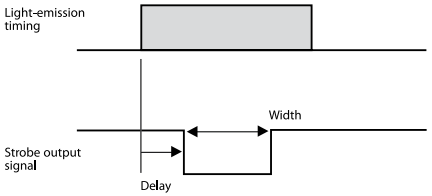
This camera can also be used with a software trigger that issues the trigger signal via software command. Trigger modes 0, 1, 14 and 15 can be used with software triggers.

Strobe Control

A strobe control signal is assigned in the 12-pin connector.

This allows direct command of light-emission from the strobe connected to the camera and controls the light-emission timing and the signal width.

The output terminal is of the open-collector type and should be pulled at the strobe side. A strobe that emits light by short- circuiting the input to ground can be connected to the camera directly.



NOTE

Use the following conditions:

Recommended pull-up resistor: 4.7 kΩ

Recommended pull-up voltage: 5 V

The camera is equipped with a protective resistor of 220Ω. If the above conditions prove difficult in use, check the output voltage and determine the external pull-up resistor. The camera is capable of outputting a signal of about 10 microsecond width, although the rise time depends on the pull-up resistor.

Saturation (Colour models only)

This feature controls the colour density.

White Balance (Colour models only)

This feature controls the white balance by setting the R and B levels relative to the G level.

The camera also supports the Auto white balance by which the camera automatically adjusts the white balance.

Optical Filter

You can change the Bayer patterns by moving the starting position from which to output pixel data by one position up, down, right, or left.

Patterns of Bayer arrangement are as follows:

Pattern 0

G	B
R	G

Pattern 1

B	G
G	R

Pattern 2

R	G
G	B

Pattern 3

G	R
B	G

Memory Shot

The camera is equipped with Memory Shot that temporarily stores an image in the frame memory inside the camera and transfers it later.

When multiple cameras are connected in the same bus, all the cameras may not output images at the same time due to the restriction of 800 Mbps band. Memory Shot may resolve this inconvenience.

When exposure starts, each camera stores an image in the frame memory without allocating the isochronous resource.

When outputting, each PC outputs the image from the camera allocating the isochronous resource.

The number of images to be stored depends on the video mode.

Broadcast Command

The normal 1394 communication method specifies the node number at the host side so that only a specified camera responds to the command.

If the node number is set to 63, all the cameras connected to the same bus can receive the command simultaneously, i.e., only one command issued from the host can control multiple cameras at the same time.

All the commands including the video mode setting and the feature control are capable of broadcasting except the block writing command.

When setting different types of cameras using a broadcast command, be careful not to issue a command that the cameras do not support.

1394 Bus Synchronisation

Timing used to start exposure is synchronised with the 1394 bus time cycle register.

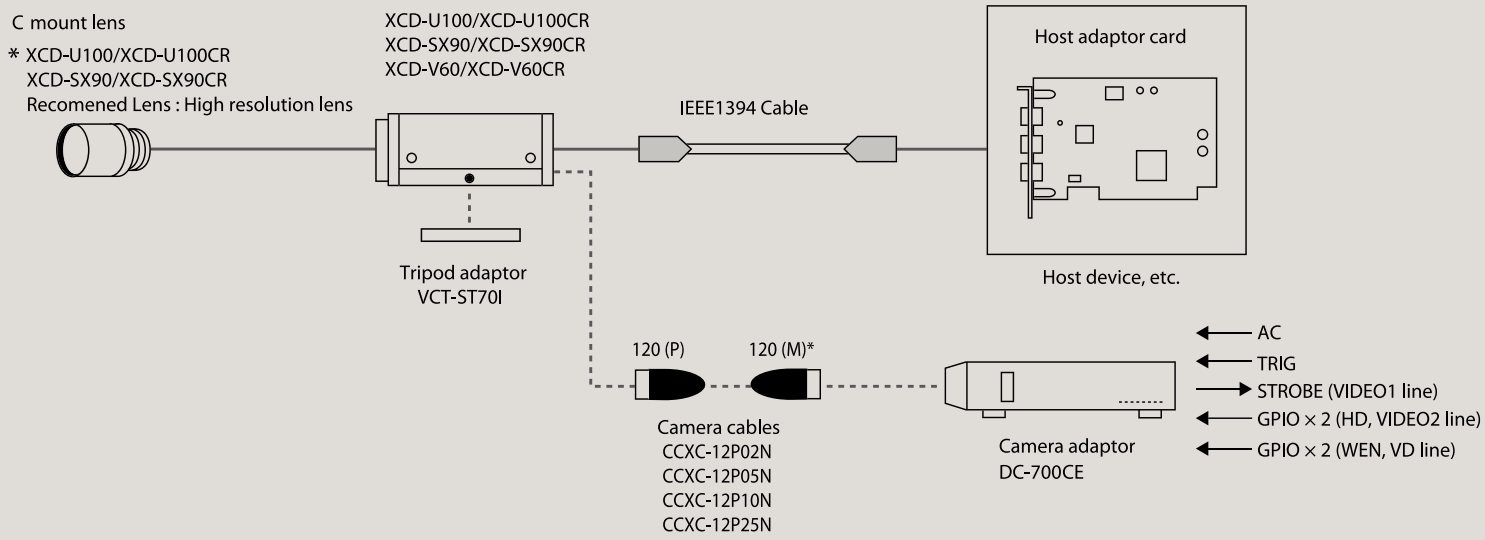
If cameras are connected to the same bus, they are automatically synchronised in a 1394 bus operation. As 800 Mbps band restriction can affect the synchronisation, you must set the video mode in which the cameras can transmit a video signal at the same time.

1394 synchronisation does not work in long exposure mode and Partial scan mode. In a long exposure, the exposure time is set longer than the image transmission cycle.

1394 bus synchronisation includes up to 1H cycle jitter. Hardware external synchronisation will ensure greater accuracy.

Connection Diagram

XCD Series



* Power supply from the IEEE1394b connector is insufficient.

Digital Interface / Camera Link

XCL-U100 (Monochrome)	23
XCL-5005 (Monochrome)	27
XCL-5005CR (Colour)	27
XCL-U1000 (Monochrome)	31
XCL-U1000C (Colour)	31
Connection Diagrams	*35*

CCD Digital Camera Module Monochrome

XCL-U100 NEW

CL Output | 1.18 Type CCD | Square Pixels | C Lens Mount | UXGA Output | Long Exposure | Partial Scan | Normal Shutter | Mode 2 (Non-Reset mode) Reversal | RS232C Control

Outline

The **XCL High Resolution Series** from Sony is the perfect fit for a variety of industrial inspection applications such as microscopy, semiconductors, electronic parts and display panels.

All the XCL Series cameras in this series conform to the Camera Link standard (non-PoCL/PoCL*). Joining the popular XCL High Resolution Series is the extremely compact XCL-U100. This new camera boasts high-resolution images of UXGA resolution, similar to the existing XCL-U1000/U1000C cameras.

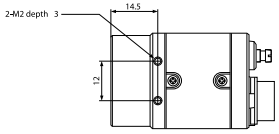
However, the XCL-U100 camera is PoCL-capable, providing users with single-cable operation. The XCL Series delivers outstanding functionality and excellent picture quality, bringing a new level of power and effectiveness to industrial applications.

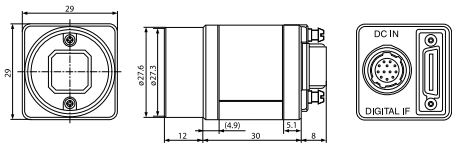
*PoCL (Power over Camera Link)

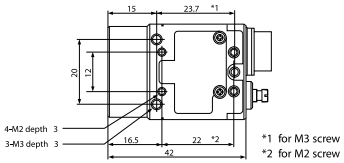
Features

- 1/1.8 type progressive scan IT CCD that provides UXGA resolution
- Frame rate: 15 fps
- Supports the camera link PoCL standard
- C mount
- High shock and vibration tolerance
- Various mode settings
- Gain
- Read mode: Normal/Binning
- Partial scan
- Shutter: Normal/Trigger shutter
- Shutter speed
- Gamma
- Switching an output Bit Length
- 3×3 image filter
- Binarisation

Dimensions (mm)







Connection Diagram p35

Accessories

Compact camera adaptor
- DC-700CE

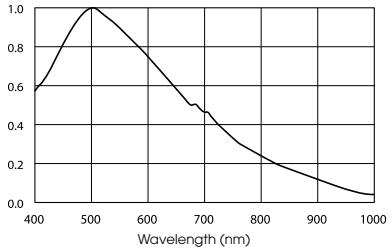
Tripod adaptor
- VCT-333I (Insulated type)

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

XCL-U100

Relative sensitivity

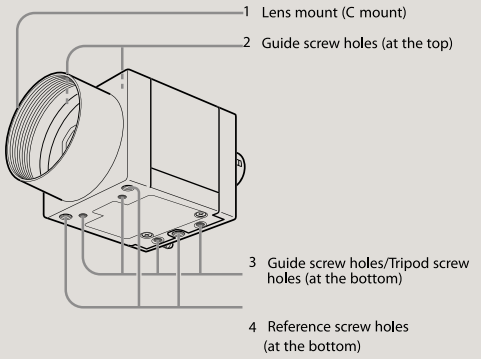


(Lens characteristics and light source characteristics excluded.)

Specifications

	XCL-U100
Type	Monochrome
Image device	1/1.8 type Progressive scan IT CCD
Standard picture size (H) × (V)	1,600 × 1,200 pixels
Cell size (H) × (V)	4.4 µm × 4.4 µm
Resolution depth	8/10/12 bits/pixels (Default: 8)
Lens mount	C mount
Digital interface	PoCL (Power over Camera Link) / Standard Camera Link, Base Configuration
Frame rate	15 fps
Output data clock	36 MHz (1 tap)
Sensitivity	400 lx, F5.6 (0 dB)
Minimum illumination	1 lx (GAIN +18 dB, F1.4)
Gain control	0 to +18 dB
Readout mode	Normal / Binning / Partial scan
Shutter speed	2 to 1/10,000 s
Shutter mode	External trigger shutter
Extended signal output	DVAL / EXPOSURE / GND output (selectable)
Power requirements	DC +12 V (10 to 15 V: DC IN conector/10 to 13 V: DIGITAL IF connector)
Power consumption	2.2 W
Dimensions	29 (W) × 29 (H) × 30 (D) mm (not including projecting parts)
Mass	Approx. 55 g
Operating temperature	–5 to +45°C
Storage temperature	–30 to +60°C
Operating humidity	20 to 80% (no condensation)
Storage humidity	20 to 95% (no condensation) 0 to +40°C
Vibration resistance	10 G (20 Hz to 200 Hz)
Shock resistance	70 G
MTBF	83.000 hours (approx. 9.5 years)
Supplied accessories	Lens mount cap (1), Operating Instructions (1)

Location and Function of Parts and Controls

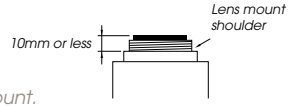


1. Lens mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

The lens must not project more than 10 mm from the lens mount.



When you use the camera with the lens attached, the resolution of the image output from the camera may differ according to the performance of the lens. Note it when you select a lens.

The performance of a lens may change according to the aperture level. If the resolution is not enough, adjust the aperture level.

2. Guide screw holes (at the top)

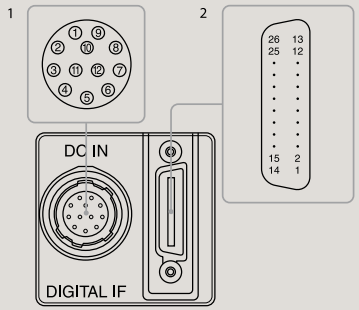
3. Guide screw holes/Tripod screw holes (at the bottom)

When using a tripod, use these four screw holes to attach a VCT-333I tripod adaptor.

4. Reference screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

Rear Panel



1. DC IN (DC power input) connector (12-pin)

You can connect a camera cable CCXC-12P05N etc. to input the +12 V DC power supply. The pin configuration of this connector is as follows. You can operate the camera without using this connector when using a PoCL-compatible camera module interface board. For details please see Connector Pin Assignments.

2. DIGITAL IF (Interface) connector (26-pin mini connector)

Camera Link Base Configuration:
You can connect a Camera Link cable to this connector to control a camera module from a host device utilising the serial communication protocol while outputting a video signal from the camera module. If you use a camera module interface board with support for PoCL, you can also supply power from this connecter. You can input the external trigger signal via the 26-pin mini connector and operate a camera module in the external trigger mode. Please see Connector Pin Assignments for the relation of the DIGITAL IF (interface) connector and the input/output signals.

Connector Pin Assignments

1. DC IN (DC power input) connector (12-pin)

Pin No.	Signal	Pin No.	Signal
1	Ground	7	NC
2	+12 V DC	8	Ground
3	Ground	9	NC
4	NC	10	Signal output*
5	Ground	11	Trigger pulse input
6	NC	12	Ground

*Signal output from the Tenth pin of 12 pins connector.
You can select one of the following signals according to the setting.
Ground / DVAL output / Exposure pulse output.
The default setting in the factory is Ground.

2. DIGITAL IF (Interface) connector (26-pin miniconnector)

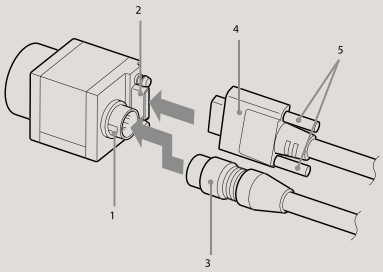
Camera Link Base Configuration

Pin No.	Signal	Pin No.	Signal
1	Power supply or Ground	14	INNER_SHIELD (GND)
2	X0– output (signal)	15	X0+ output (signal)
3	X1– output (signal)	16	X1+ output (signal)
4	X2– output (signal)	17	X2+ output (signal)
5	XCLK- output (signal)	18	XCLK+ output (signal)
6	X3– output (signal)	19	X3+ output (signal)
7	SerTC+ (signal)	20	SerTC- (signal)
8	SerTFG– (signal)	21	SerTFG+ (signal)
9	TRIG– input (signal)	22	TRIG+ input (signal)
10	NC	23	NC
11	NC	24	NC
12	NC	25	NC
13	INNER_SHIELD (GND)	26	Power supply or Ground

About the 1st pin and 26th pin of the 26-pin miniconnector.
The connection differs depending on the type of camera module interface board you use.

In the case of PoCL support:	Both the 1st pin and 26th pin are POWER (power supply)
In the case of non-PoCL support:	Both the 1st pin and 26th pin are INNER_SHIELD (Ground)

Connecting the Cables



1.DC IN connector
2.DIGITAL IF (Interface) connector
3.Camera cable
4.Camera Link cable
5.Fastening screws

Connect the camera cable to the DC IN connector and the Camera Link cable to the DIGITAL IF (interface) cable respectively. If you use a camera module interface board with support for PoCL, you can operate the camera even if you do not connect the camera cable to the DC IN connector. When you connect the Camera Link cable, turn the two fastening screws on the connector to secure the cable tightly. Connect the other end of the camera cable to the DC-700CE and the other end of the Camera Link cable to the camera module interface board.

When using the camera with a PoCL connection, make sure you connect a PoCL compatible cable. Connecting a cable that is not compatible with PoCL (non-PoCL) may cause a malfunction of the camera or camera module interface board.

Controlling the Camera from the Host Device

You can control the camera from a host device such as a PC. The following table shows the control functions.

Control functions		Description
Operating mode		Normal/Trigger
Shutter speed	Normal	2 to 1/10,000 s
	Trigger edge	2 to 1/10,000 s
	Trigger pulse width	Setting by trigger pulse width
Gain		0 to +18 dB
Partial Scan		OFF/ON
Edge detection, Edge emphasis		OFF/ON
Binarisation		OFF/ON
Gamma control		OFF/ON (mode1 to mode 7)
3x3 Image filtering		OFF/ON
Video output switch		12 bits/10 bits/ 8 bits
External trigger input		26 pin connector/12 pin connector

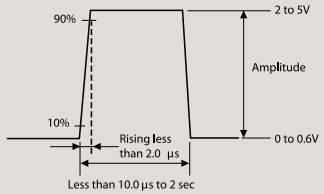
NOTE

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting a trigger signal. If you input trigger signal to a camera module without the power supplied, this may cause a malfunction of the camera module.

Trigger Signal Specifications

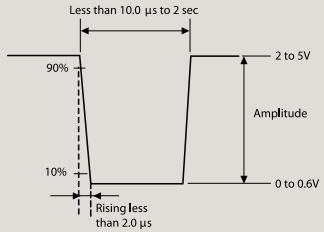
DC IN terminal

(When positive pole is set)



Input Impedance: Stated in the voltage determined at more than 10 kΩ.

(When negative pole is set)



Input Impedance: Stated in the voltage determined at more than 10 kΩ.

DIGITAL IF terminal

Convert the signal which meets the specifications above into LVDS format (3.3V power drive IC output), and inputs the converted signal.

Specification for the External Trigger Signal

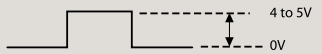
Amplitude: LVDS using 3.3 volt IC
Connections: Input a TRIG (–) signal to the 9th pin
Input a TRIG (+) signal to the 22nd pin

NOTE

The signal level cannot be recognised correctly by the camera if it does not meet the following conditions.

H level: 1.5 V to 1.7V
L level: 0.8 V to 1.0V

DVAL/Exposure output specific (only DC IN terminal)



Stated in the voltage of when terminating at more than 10 kΩ

CCD Digital Camera Module Monochrome

XCL-5005

CCD Digital Camera Module Colour

XCL-5005CR

CL Output | 2/3 Type CCD | Progressive Scan | Square Pixels | C Lens Mount | 5 Mega Output | Partial Scan | Long Exposure

Normal Shutter | Mode 2 (Reset mode) External Trigger Shutter | One-Push White Balance *1 | Fixed White Balance *1 | Manual White Balance *1 | RS232C Control | B/W *2 | RGB / RAW *1

*1: XCL-5005CR
*2: XCL-5005

Outline

The **XCL-5005 Series** cameras incorporate a 5-megapixel 2/3 type CCD that produces detailed images.

The XCL-5005 is a monochrome camera, while the XCL-5005CR outputs 24-bit RGB or RAW Colour data that enables true colour reproduction. Both models are compatible with the Mini Camera Link standard (non-PoCL/PoCL*), are equipped with 12-pin connectors, and feature a selectable power supply (12-pin power supply has priority). The cameras are equipped with new functions such as selectable image output for various bit lengths, as well as hardware-based pre-processing functions and partial scan function, which are found only on digital cameras. High resistance to shock and vibration makes these camera modules ideal for machine vision and other applications that require high-definition image reproduction.

*PoCL (Power over Camera Link)

Features

XCL-5005 series

- 2/3 type 5 Mega pixel CCD
- Effective picture elements: 2,456 (H) × 2,058 (V)
- Frame rate: 15 fps
- Partial scan function (Vertical random read scan)
- Normal/External trigger shutter
- C mount
- High shock and vibration resistance
- RS-232C Control
- Camera Link: Standard (non-PoCL)/PoCL
- Switching an Output tap (1TAP/2TAP)
- Various mode setting
  - Shutter speed
  - Gamma
  - Partial scan

XCL-5005

- Read mode: Normal/Binning
- Outline detection, Outline Emphasis
- Binarisation
- 3×3 pixel image filter
- Flip-Flop

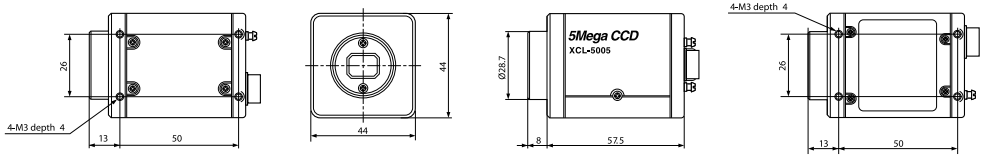
XCL-5005CR

- One-push white balance function
- Switching Colour output (RAW Colour or RGB)
- Colour Bar Chart

Digital output Camera Link Base Configuration

	1tap	2tap
XCL-5005	8/10/12bit 80MHz	8/10/12bit 40MHz
XCL-5005CR	8/10/12bit 80MHz 24bit RGB 80MHz	8/10/12bit 40MHz

Dimensions (mm)



Connection Diagram p35

Accessories

Compact camera adaptor

- DC-700CE

Tripod adaptor

- VCT-ST70I

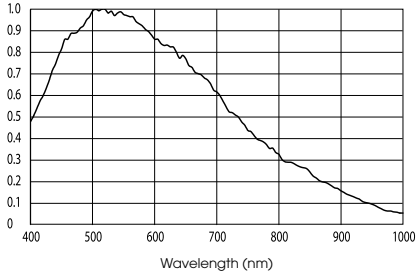
12-pin camera cable (CE standard)

- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

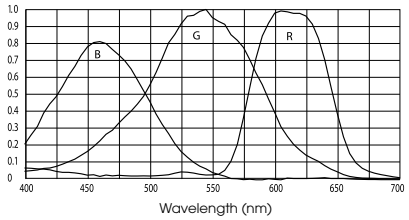
XCL-5005

Relative sensitivity



XCL-5005CR

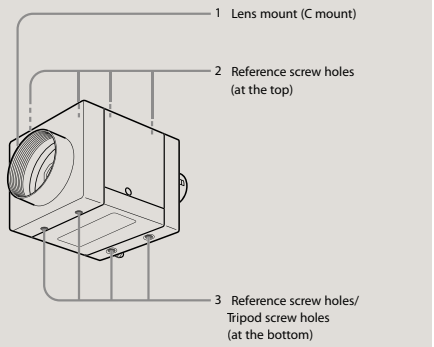
Relative sensitivity



Specifications

	XCL-5005	XCL-5005CR
Type	Monochrome	Colour
Image device	2/3 type Progressive Scan IT transfer CCD	
Effective picture elements (H) × (V)	2,456 × 2,058	
Effective lines (H) × (V)	2,448 × 2,050	
Cell size (H) × (V)	3.45 µm × 3.45 µm	
Lens mount	C mount	
Sync system	Internal	
Video output	Digital output	
	LVDS 12 bits/10 bits/8 bits switching	RAW data/RGB data switching, RAW data: LVDS 12 bits/10 bits/8 bits switching, RGB data: LVDS R/G/B 8 bits
Reference video output level	3,760 steps (12 bits)	
Reference pedestal level	240 steps (12 bits)	
Output data clock	15 Hz	
Sensitivity	400 lx F5.6 (0 dB)	2,000 lx F5.6 (0 dB)
Minimum illumination	1 lx (GAIN +18 dB, F1.4)	8 lx (GAIN +18 dB, F1.4)
Gain	0 to +18 dB	
Gamma	OFF/ON (Mode 0 to 7)	
Read mode	Normal/Binning/Partial scan	Normal/Partial scan
Frame rate	15 fps	
Output data clock	1Tap: 80 MHz/2Tap: 40 MHz 1Tap/2Tap switching (However, only 1TAP when RGB data output of XCL-5005CR)	
Shutter mode	Normal/External trigger shutter	
Normal shutter speed	2 to 1/10,000 s	
External trigger shutter	2 to 1/10,000 s	
Partial Scanning	ON/OFF (Starting Position: per 5 lines, Area: per line)	ON/OFF (Starting Position: per 10 lines, Area: per 2 lines)
Binning	Vertical (1 × 2)	–
White balance	–	PRESET/MANUAL/ONE PUSH (AUTO)
Signal output	DVAL/EXPOSURE/GND output (selectable, default setting GND)	
Edge detection, Edge emphasis	yes	–
Binarise	yes	–
3×3 pixel image filter	yes	–
Power requirements	12V DC (Range: +10.5 to 15V with DC IN connector/digital interface connector)	
Power consumption	3.8 W	
Dimensions	44 (W) × 44 (H) × 57.5 (D) mm (not including projecting parts)	
Mass	Approx. 130g	
Operating temperature	–5 to +45°C	
Storage temperature	–30 to +60°C	
Performance guarantee temperature	0 to +40°C	
Operating humidity	20 to 80% (no condensation)	
Storage humidity	20 to 95% (no condensation)	
Vibration resistance	10 G (20 Hz to 200 Hz, 20 minutes for each direction-x, y, z)	
Shock resistance	70 G	
MTBF	75,300 hours (Approx. 8.6 years)	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003 : Class A, CE : EN61326, AS/NZ : EN61326, VCCI : Class A, Korea MIC	
Supplied accessories	Lens mount cap (1), Operating Instructions (1)	

Location and Function of Parts and Controls

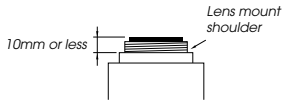


1. Lens mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

The lens must not project more than 10 mm from the lens mount.

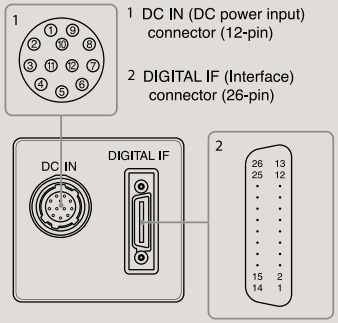


2. Reference screw holes (at the top)

3. Reference screw holes/Tripod screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment. You can install the camera on a tripod. To install on a tripod, you will need to install a tripod adaptor VCT-ST70I to the camera on the reference holes. 10 mm or less Lens mount shoulder.

Rear Panel



1. DC IN (DC power input) connector (12-pin)

You can connect a CCXC-12P05N camera cable to input the +12 V DC power supply. If you use a camera module interface board with support for PoCL, you can operate the camera without using this connector. The pin configuration of this connector is as follows.

2. DIGITAL IF (Interface) connector (26-pin)

You can connect a Camera Link cable to this connector to control a camera module from a host device utilising the serial communication protocol while outputting a video signal from the camera module. If you use a camera module interface board with support for PoCL, you can also supply power from this connector. You can input the external trigger signal via the 26-pin connector and operate a camera module in the external trigger mode. The pin configuration of this connector is as follows.

NOTE

When you operate a camera module by inputting an external trigger signal via the 26-pin connector, make sure to input external trigger signal that meet the following specifications to both the two pins.

Connector Pin Assignments

1. DC IN (DC Power input) 12-pin connector

Pin No.	Signal	Pin No.	Signal
1	Ground	7	NC
2	+12 V DC	8	Ground
3	Ground	9	NC
4	NC	10	Signal* output
5	Ground	11	Trigger pulse input
6	NC	12	Ground

*Signal output from the Tenth pin of 12 pins connector.
You can select one of the following signals according to the setting.
Ground/DVAL output/Exposure pulse output.
The default setting in the factory is Ground.

2. DIGITAL IF (Interface) connector (26-pin)

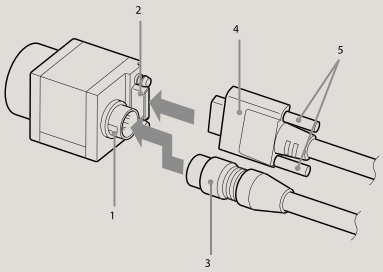
Camera Link Base Configuration: 1tap

Pin No.	Signal	Pin No.	Signal
1	Power supply or Ground*	14	INNER_SHIELD (GND)
2	X0– output (signal)	15	X0+ output (signal)
3	X1– output (signal)	16	X1+ output (signal)
4	X2– output (signal)	17	X2+ output (signal)
5	XCLK- output (signal)	18	XCLK+ output (signal)
6	X3– output (signal)	19	X3– output (signal)
7	SerTC+ (signal)	20	SerTC- (signal)
8	SerTFG– (signal)	21	SerTFG+ (signal)
9	TRIG– input (signal)	22	TRIG+ input (signal)
10	NC	23	NC
11	NC	24	NC
12	NC	25	NC
13	INNER_SHIELD (GND)	26	Power supply or Ground*

*The connection differs depending on the type of camera module interface board you use.

In the case of PoCL support:	Both the 1st pin and 26 th pin are POWER (Power supply)
In the case of non PoCL support:	Both the 1st pin and 26 th pin are INNER_SHELD (Ground)

Connecting the Cables



1.DC IN connector
2.DIGITAL IF (Interface) connector
3.Camera cable
4.Camera Link cable
5.Fastening screws

Connect the Camera cable to the DC IN connector and the Camera Link cable to the digital Interface cable respectively. If you use a camera module interface broad with support for PoCL, you can operate the camera even it connect the Camera Link cable, turn the two fastening screws on the connector to secure the cable tightly.

Connect the other end of the Camera cable to the DC-700CE and the other end of the Camera Link cable to the camera module interface board.

Controlling the Camera from the Host Device

You can control the camera from a host device such as a PC. The following table shows the control functions.

Control functions		XCL-5005	XCL-5005CR
Operating mode		Normal/Trigger	
Shutter speed	Normal	2 to 1/10,000 s	
	Trigger	Trigger edge: 2 to 1/10000s Trigger pulse width: Setting by trigger pulse width	
Gain		0 to +18 dB	
Binning		OFF/ON	–
Partial Scan		OFF/ON	
Edge detection, Edge emphasis		OFF/ON	–
Binarisation		OFF/ON	–
Gamma control		OFF/ON (mode1 to mode 7)	
3x3 Image filtering		OFF/ON	–
Video output switch		12 bits/10 bits/8 bits	
External trigger input		26 pin connector/12 pin connector	
Switch output tap		1 Tap/2 Tap	
White balance		RESET/MANUAL/ONE PUSH (AUTO)	
Switch Colour output		RAW data/RGB data	

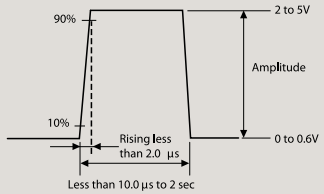
NOTE

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting a trigger signal. If you input external signals to a camera module without the power supplied, this may cause a malfunction of the camera module.

Trigger Signal Specifications

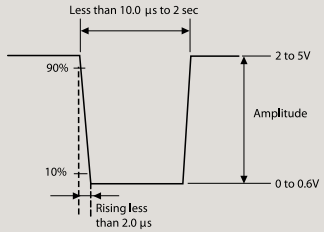
DC IN terminal

(When positive pole is set)



Input Impedance: Stated in the voltage determined at more than 10 kΩ.

(When negative pole is set)



Input Impedance: Stated in the voltage determined at more than 10 kΩ.

DIGITAL IF terminal

Convert the signal which meets the specifications above into LVDS format (3.3V power drive IC output), and inputs the converted signal.

Specification for the External Trigger Signal

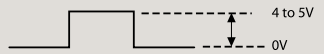
Amplitude: LVDS using 3.3 volt IC
Connections: Input a TRIG (–) signal to the 9th pin
Input a TRIG (+) signal to the 22nd pin

NOTE

The signal level cannot be recognised correctly by the camera if it does not meet the following conditions.

H level: 1.5 V to 1.7V
L level: 0.8 V to 1.0V

DVAL/Exposure output specific (only DC IN terminal)



Stated in the voltage of when terminating at more than 10 kΩ

CCD Digital Camera Module Monochrome

XCL-U1000

CCD Digital Camera Module Colour

XCL-U1000C

CL Output | 1.18 Type CCD | Square Pixels | C Lens Mount | UXGA Output | Partial Scan | Long Exposure | Normal Shutter

Mode 2 (Reset mode) External Trigger Shutter | One-Push White Balance *2 | Fixed White Balance *2 | RS232C Control | Manual White Balance | B/W *1 | RGB *2

*1: XCL-U1000
*2: XCL-U1000C

Outline

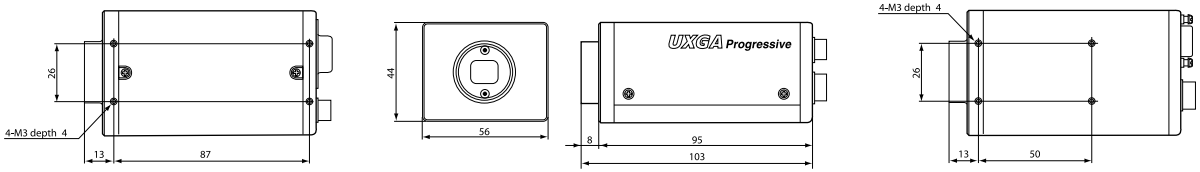
The **XCL-U1000** and **XCL-U1000C** are vibration-resistant video camera modules equipped with digital video interface that output image data using the LVDS signal.

These black/white and colour models are housed in a same body. The adoption of a compact Camera Link connector enables the image digital output at 15 fps.

Features

- **1/1.8 type progressive scanning CCD with square pixels**
- **UXGA image (1,600 x 1,200 pixels) captures video at 15 fps**
- **High sensitivity**
  - XCL-U1000: 400 lx at F 5.6
  - XCL-U1000C: 2,000 lx at F8
- **Digital output Camera Link (non-PoCL)**
  - XCL-U1000: 10 bit
  - XCL-U1000C: R/G/B 8 bit
- **Monitor output**
- **External trigger shutter: 1/15 to 1/10,000 s**
- **C mount lens**
- **Partial scanning**
- **Binning function (XCL-U1000)**
- **White balance (XCL-U1000C)**
  - Auto/Manual/Preset selectable
- **Matrix function for accurate colour reproduction (XCL-U1000C)**
- **High shock and vibration resistance**

Dimensions (mm)



Connection Diagram p36

Accessories

Compact camera adaptor
- DC-700CE

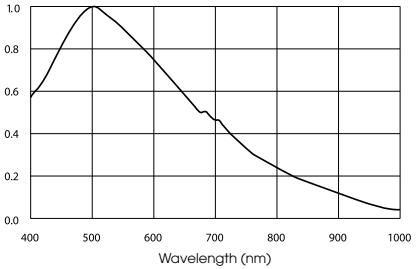
Tripod adaptor
- VCT-ST70I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

XCL-U1000 (Typical Values)

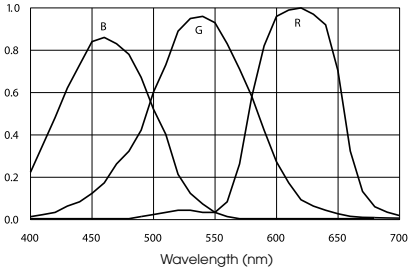
Relative sensitivity



(Lens characteristics and light source characteristics excluded.)

XCL-U1000C (Typical Values)

Relative sensitivity

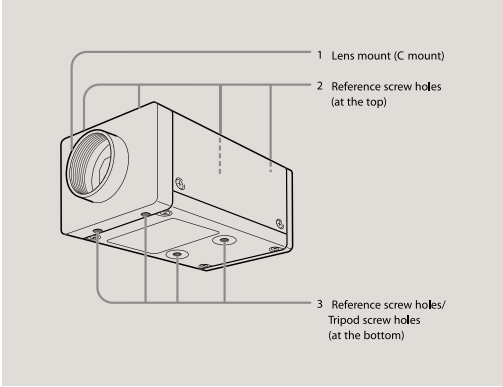


(Lens characteristics and light source characteristics excluded.)

Specifications

	XCL-U1000	XCL-U1000C
Type	Monochrome	Colour
Image device	1/1.8 type Progressive scan IT CCD	
Effective picture elements (H) × (V)	1,628 × 1,236	
Effective lines (H) × (V)	1,600 × 1,200	
Output image size	UXGA	
Cell size (H) × (V)	4. 4 µm × 4.4 µm	
Lens mount	C mount	
Sync system	Internal	
Video output	Digital output	
	LVDS 10 bit	LDVS R/G/B 8bit
Reference video output level	940 steps	235 steps
Reference pedestal level	64 steps	16 steps
Monitor output (analog output)	Reference video output level: 700 mV, HD frequency: 75 kHz positive VD frequency: 60 Hz positive	
Output data clock	15 Hz	
Sensitivity	400 lx F5.6 (0 dB)	2,000 lx F5.6 (0 dB)
Minimum illumination	2 lx (GAIN +18dB, F1.4)	4 lx (GAIN +18dB, F1.4)
Gain	0 to +18 dB	
Gamma	OFF/ON	
Read mode	Normal/Binning/Partial scan	Normal/Partial scan
Frame rate	15 fps	
Output data clock	36 MHz	
Shutter mode	Normal/External trigger shutter	
Normal shutter speed	1 to 1/10,000 s	
External trigger shutter	Edge detection mode: 1/15 to 1/10,000 s, Pulse width detection mode: 1 to 1/10,000 s	
High rate scan	ON/OFF (Vertical 1/16V to 15/16V)	
Binning	Vertical (1 × 2)	–
Detail	ON/OFF	ON/OFF
White balance	–	Pre-set/Manual/AWB
Matrix	–	ON/OFF
Power requirements	12V DC	
Power consumption	5.5 W	
Dimensions	56 (W) × 44 (H) × 95 (D) mm (not including projecting parts)	
Mass	Approx. 250g	
Operating temperature	–5 to +45°C	
Storage temperature	–30 to +60°C	
Performance guarantee temperature	0 to +40°C	
Operating humidity	20 to 80% (no condensation)	
Storage humidity	20 to 95% (no condensation)	
Vibration resistance	10 G (20 Hz to 200 Hz, 20 minutes for each direction-x, y, z)	
Shock resistance	70 G	
MTBF	49,059 hours (Approx. 5.6 years)	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003: Class A, CE: EN61326, AS/NZ: EN61326, VCCI: Class A	
Supplied accessories	Lens mount cap (1), Operating Instructions (1)	

Location and Function of Parts and Controls

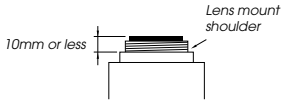


1. Lens mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

The lens must not project more than 10mm from the lens mount.



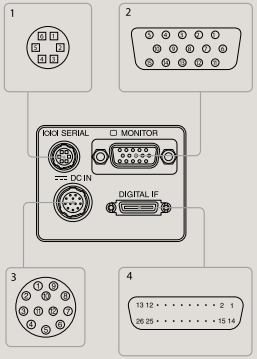
2. Reference screw holes (at the top)

3. Reference screw holes/Tripod screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

You can install the camera on a tripod. To install on a tripod, you will need to install a tripod adaptor VCT-ST70I to the camera on the reference holes. The lens must not project more than 10mm from the lens mount.

Rear Panel



1. RS-232C connector (6-pin)

You can connect a senal cable to this connector to control a camera module from a camera control device.

2. Monitor output connector (15-pin)

You can connect a monitor cable to this connector to display an image on a multiscan monitor supporting UXGA resolution.

NOTE

If you connect a multiscan monitor that does not support UXGA resolution, an image may not be displayed.

3. DC IN (DC power input) connector (12-pin)

You can connect a CCXC-12P05N camera cable to input the +12 V DC power supply. The pin configuration of this connector is as follows.

4. DIGITAL IF (Interface) connector (26-pin)

You can connect a digital interface cable to this connector to control a camera module from a host device utilising the serial communication protocol while outputting a video signal from the camera module. You can input the external trigger signal via the 26-pin connector and operate a camera module in the external trigger mode. The pin configuration of this connector is as follows.

4. DIGITAL IF (Interface) connector (26-pin)

You can connect a digital interface cable to this connector to control a camera module from a host device utilising the serial communication protocol while outputting a video signal from the camera module. You can input the external trigger signal via the 26-pin connector and operate a camera module in the external trigger mode. The pin configuration of this connector is as follows.

NOTE

When operating a camera module by inputting an external trigger signal via the 26-pin connector, be careful about trigger pulse input specifications (DIGITAL IF terminal).

Connector Pin Assignments

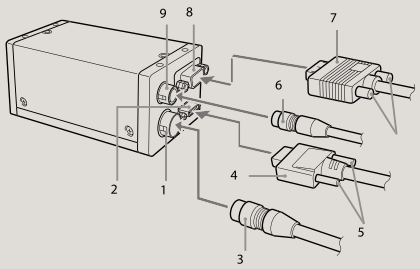
Pin No.	Signal	Pin No.	Signal
1	TXD	4	NC
2	RXD	5	NC
3	Ground	6	NC

Pin No.	Signal	Pin No.	Signal
1	R output	9	NC
2	G output	10	Ground
3	B output	11	NC
4	NC	12	NC
5	Ground	13	HD output
6	Ground	14	VD output
7	Ground	15	NC
8	Ground		

Pin No.	Signal	Pin No.	Signal
1	Ground	7	NC
2	+12 V DC	8	Ground
3	Ground	9	NC
4	NC	10	Exposure pulse output
5	Ground	11	Trigger pulse input
6	NC	12	Ground

Pin No.	Signal	Pin No.	Signal
1	INNER_SHIELD (Ground)	14	INNER_SHIELD (GND)
2	X0– output (signal)	15	X0+ output (signal)
3	X1– output (signal)	16	X1+ output (signal)
4	X2– output (signal)	17	X2+ output (signal)
5	XCLK- output (signal)	18	XCLK+ output (signal)
6	X3– output (signal)	19	X3+ output (signal)
7	SerTC+ (signal)	20	SerTC- (signal)
8	SerTFG– (signal)	21	SerTFG+ (signal)
9	TRIG– input (signal)	22	TRIG+ input (signal)
10	NC	23	NC
11	NC	24	NC
12	NC	25	NC
13	INNER_SHIELD (GND)	26	Power supply or Ground*

Connecting the Cables



1.DC IN connector
2.Digital interface connector
3.Camera cable
4.Digital interface cable
5.Fastening screws
6.Serial cable
7.Monitor cable
8.Monitor output connector
9.RS-232C connector

Connect the camera cable to the DC IN connector and the digital interface cable to the digital interface cable respectively. Also, if needed, connect the monitor cable to the monitor output connector and the serial cable to the RS-232C connector respectively. When you connect the digital interface cable or monitor cable, turn the two fastening screws on the connector to secure the cable tightly.

Connect the other end of the camera cable to the DC-700CE and the other end of the digital interface cable to the camera module interface board. Also, if needed, connect the other end of the monitor cable to the monitor and the other end of the serial cable to the camera control device.

About the Camera Control Method

You can control the camera from a host device such as a PC. The following table shows the control functions. You can send a command corresponding to the control items, with parameters for the desired settings, if necessary, from the host device to control the camera.

Control functions		Description
Operating mode		Normal/Trigger
Shutter speed	Normal	1 to 1/10000
	Trigger edge	Internal setting: 1/15 to 1/10000
		Setting by trigger pulse width
Gain		0 to +18 dB
Binning function (XCL-U1000 only)		OFF/ON
Partial Scan function		OFF/ON
Detail		OFF/ON
External trigger input		26 pin connector/ 12 pin connector
White balance (XCL-U1000C only)		Preset/Manual/AWB
Matrix (XCL-U1000C only)		OFF/ON

NOTE

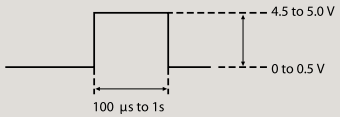
Make sure to supply power to the camera module and confirm that the camera module is operating before inputting a trigger signal.

If you input external signals to a camera module without the power supplied, this may cause a malfunction of the camera module.

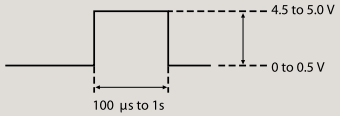
Trigger Pulse Input Specifications

DC IN terminal

(When positive pole is set)



(When negative pole is set)



Input Impedance: 10 kΩ or more

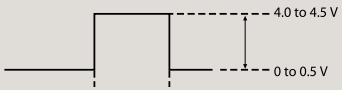
DIGITAL IF terminal

When operating a camera module by inputting an external trigger signal via the 26-pin connector, be sure to input trigger signals that satisfy the following specifications to both of the two terminals.

Trigger signal specifications (conditions) Polarity: positive

Amplitude: LVDS (output by the 3.3 volt IC)
Connections: Input a TRIG (-) signal to the 9th pin
Input a TRIG (+) signal to the 22nd pin

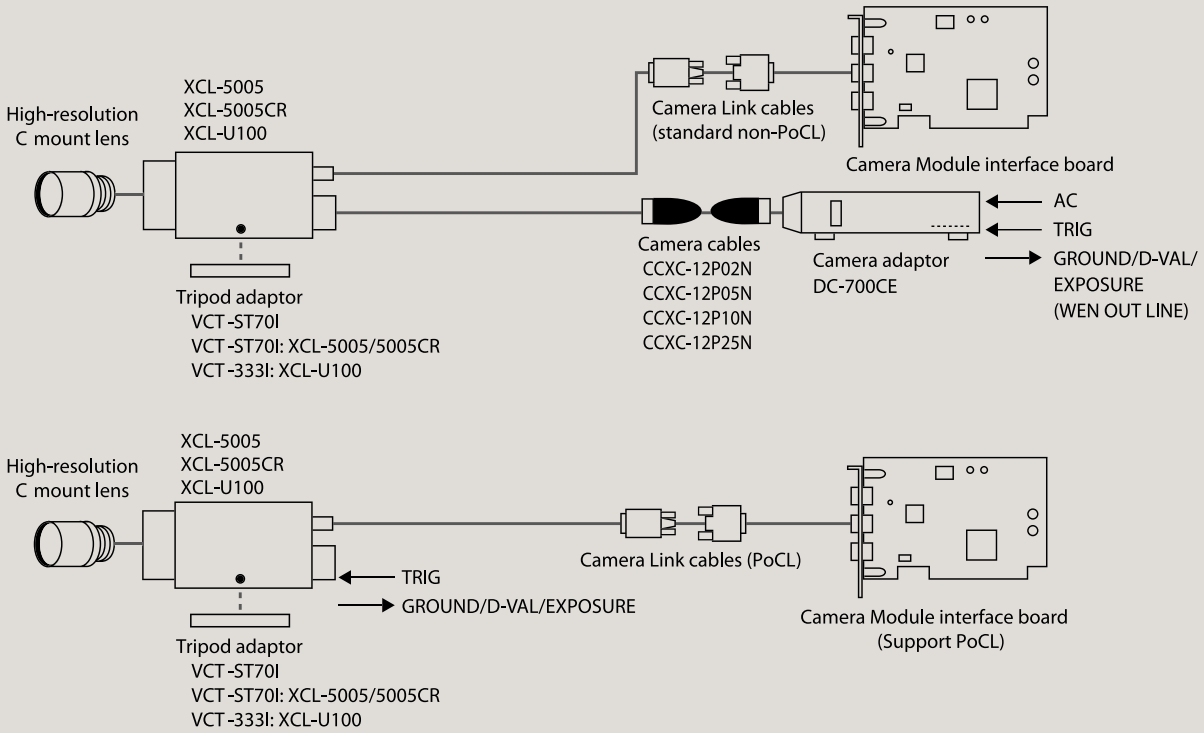
Exposure Output Specifications (DC IN terminal only)



Exposure output is output as a pulse that indicates exposure time when trigger mode is selected.

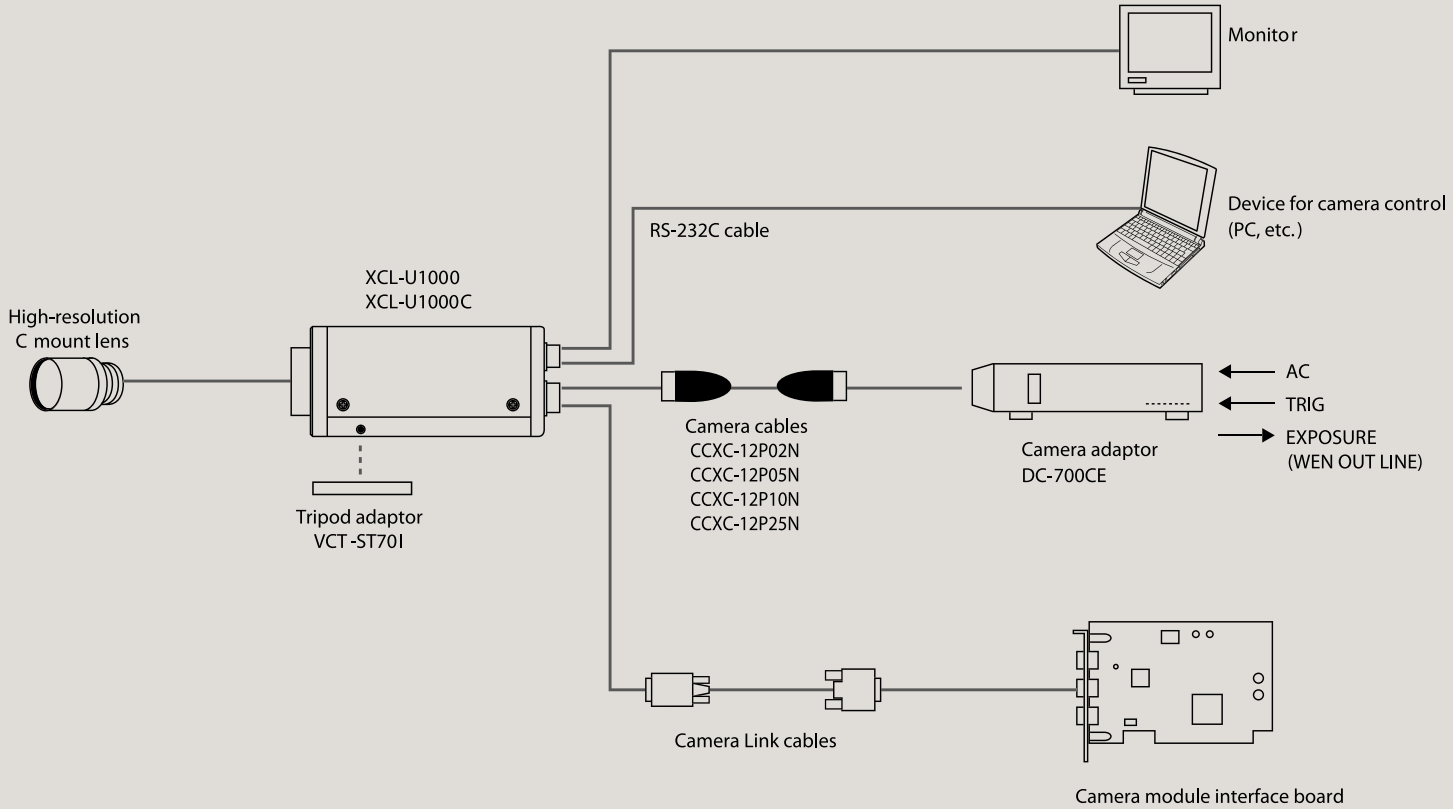
Connection Diagram

XCL-U100/XCL-5005/XCL-5005CR



Connection Diagram

XCL-U1000/XCL-U1000C



Digital Interface / GigE Vision

XCG-V60E	38
XCG-SX97E	38
XCG-SX99E	38
XCG-U100E	38
XCG-5005E	38
Connection Diagram	*46*

Digital Video Camera Module Monochrome

XCG-V60E
XCG-SX97E
XCG-SX99E
XCG-U100E
XCG-5005E

GigE Vision | Progressive Scan | 1/3 Type CCD *1 | 2/3 Type CCD *2 *4 | 1/1.8 Type CCD *3 | VGA Output *1 | SXGA Output *2 | UXGA Output *3 | 5 Mega Output *4

B/W | Partial Scan | C Lens Mount | External Trigger Shutter | Normal Binning Read Mode | IR Sensitivity *2 | High Speed *1 | Vertical Binning

*1: XCG-V60E
*2: XCG-SX97E / XCG-SX99E
*3: XCG-U100E
*4: XCG-5005E

Outline

The **XCG-V60E / XCG-SX97E / XCG-SX99E / XCG-U100E / XCG-5005E** is a monochrome digital video camera module that supports 1000Base-T interface.

The XCG camera series offers choice, flexibility, and high image quality options to match your specific inspection application requirements. By utilising the features and benefits of the GigE Vision interface, the XCG Series expands the possibilities for factory automation and security applications, while also delivering the potential of significant cost savings.

Features

GigE Vision-compliant

Conforming to GigE Vision version 1.0 standards, this unit is capable of transmitting uncompressed images at high efficiency.

High image quality

- Progressive-scan CCD produces high-precision, high-speed images
- The XCG-V60E equips a 330,000-pixel CCD that enables image output at 90 frames per second
- The XCG-SX97E equips a 1,450,000-pixel CCD that enables image output at 16 frames per second
- The XCG-SX99E equips a 1,450,000-pixel CCD that enables image output at 27 frames per second
- The XCG-U100E equips a 2,000,000-pixel CCD that enables image output at 15 frames per second
- The XCG-5005E equips a 5,000,000-pixel CCD that enables image output at 15 frames per second
- By adopting square pixels, images can be processed using the original aspect ratio without a converting procedure

Body fixing

The screw holes to install the camera module are located under the front and rear panels. Installing the camera module at these points minimizes deviation of the optical axis.

Various mode settings

The following mode settings can be configured via controls from the host device.

- Gain
- Read mode: Normal/Binning
- Partial scan
- Shutter: Normal/Trigger shutter
- Shutter speed
- Gamma
- Switching an output Bit Length
- Binarisation

External trigger shutter function (2 to 1/100,000 sec.)

You can obtain still images by synchronising with external trigger signals and operating the shutter at your own timing. This function is useful to shoot a fast moving object clearly.

Partial scan

The camera module can limit the number of effective video output lines to achieve high frame rates, enabling high-speed image processing.

Frame rate control

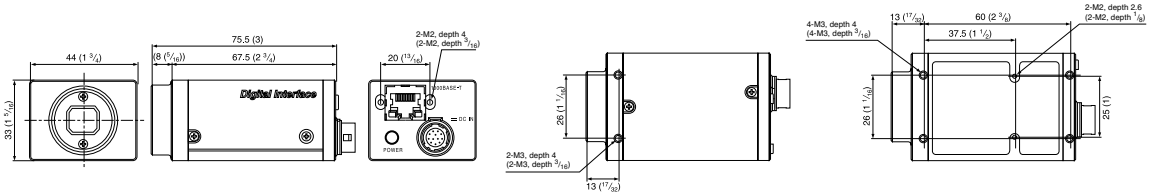
You can change the frame rate while maintaining the shutter setting. This is useful when you want to reduce packet sizes per time by lowering the frame rate and reduce network traffic.

NOTE

Normal connection between the camera and the host system may not be established if the camera is turned on before system initialisation is complete on the host device. Wait for completion of host device system initialisation before turning on the camera.

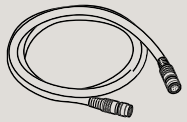
Dimensions (mm)

Connection Diagram p46



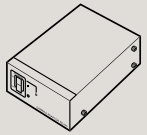
Accessories

CCXC-12P02N (2 m) / 05N (5 m) / 10N (10 m) / 25N (25 m) camera cable
This is attached to the DC IN connector of the camera module and is used for power supply and exchange of trigger signals.

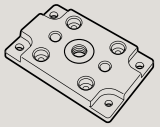


C mount lens
For XCG-SX97E/SX99E/U100E/5005E, use a high-resolution lens.

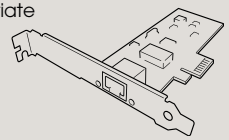
DC-700/700CE camera adaptor
This is connected to the camera module to enable power supply from ordinary AC power source.



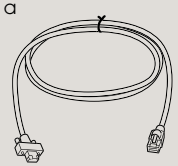
VCT-ST701 tripod adaptor
This attaches to the bottom of the camera module to fix the camera module to a tripod.



Network card (commercially available)
Install the board in the expansion slot of the host device (ex: computer). Select a card that is appropriate for your system and that supports 1000Base-T and jumbo packets.

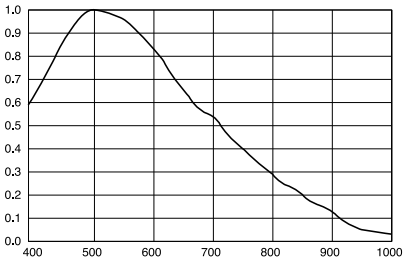


LAN cable (commercially available)
This cable connects to the RJ45 connector on the rear panel of the camera module. Image/control signals are transmitted via this cable. Select a LAN cable that supports 1000Base-T (CAT5e or higher cable standard). Depending on the attributes of the LAN cable, images may become less clear and the camera module may become unstable. Be sure to use a LAN cable that has sufficient noise reduction.



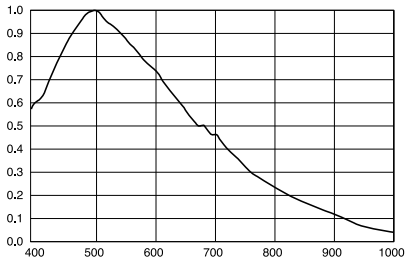
Spectral Sensitivity Characteristics

XCG-V60E
Relative sensitivity



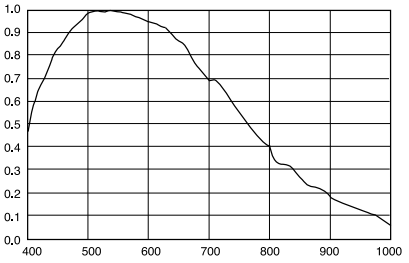
Wavelength (nm)
(Without lens and light source parameters.)

XCG-U100E
Relative sensitivity



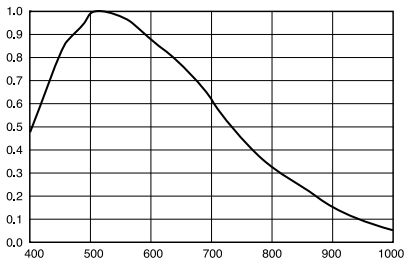
Wavelength (nm)
(Without lens and light source parameters.)

XCG-SX97E / XCG SX99E
Relative sensitivity



Wavelength (nm)
(Without lens and light source parameters.)

XCG-5005E
Relative sensitivity

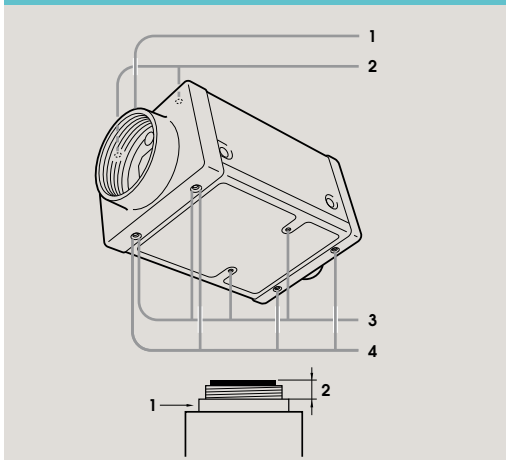


Wavelength (nm)
(Without lens and light source parameters.)

Specifications

	XCG-V60E	XCG-SX97E	XCG-SX99E	XCG-U100E	XCG-5005E
Image sensor	1/3 type Progressive Scan IT transfer CCD	2/3 type Progressive Scan IT transfer CCD	2/3-type Progressive scan IT transfer CCD	1/1.8 type Progressive Scan IT transfer CCD	2/3 type Progressive Scan IT transfer CCD
Cell size	7.4 (H) x 7.4 (V) µm	6.45 (H) x 6.45 (V) µm	6.45 (H) x 6.45 (V) µm	4.4 (H) x 4.4 (V) µm	3.45 (H) x 3.45 (V) µm
Chip size	5.79 (H) x 4.89 (V) mm	10.20 (H) x 8.30 (V) mm	10.2 (H) × 8.3 (V) mm	8.50 (H) x 6.80 (V) mm	9.93 (H) x 8.70 (V) mm
Number of effective pixels	Approx. 330,000 659 (H) x 494 (V)	Approx. 1,450,000 1392 (H) x 1040 (V)	Approx. 1,450,000 1392 (H) × 1040 (V)	Approx. 2,000,000 1628 (H) x 1236 (V)	Approx. 5,000,000 2456 (H) x 2058 (V)
Standard output pixels	640 (H) x 480 (V)	1360 (H) x 1024 (V)	1360 (H) × 1024 (V)	1600 (H) x 1200 (V)	2448 (H) x 2048 (V)
Frame rate	90 fps	16 fps	27 fps	15 fps	15 fps
Interface	1000BASE-T				
Transfer speed	1 Gbps				
Protocol	GigE Vision Version 1.0 Compliant				
Read method	Normal/Binning/Partial				
Image output bit length	Selectable, 12-/10-/8-bit				
Gain	Auto/Manual: 0 to 18 dB				
Gamma	Adjustable using the Lookup table				
Shutter speed	2 to 1/100,000 s				
External trigger shutter	Edge/width mode, software trigger (via 1000BASE-T), bulk trigger, sequential trigger, trigger inhibit, trigger/strobe delay				
Lens mount	C mount				
Flange back	17.526 mm				
Minimum illumination	1 lx Iris: F1.4 Gain: +18 dB Shutter: 11,046 µs	0.2 lx Iris: F1.4 Gain: +18 dB Shutter: 62,320 µs	0.4 lx Iris: F1.4 Gain: +18 dBShutter: 36,931 µs	1 lx Iris: F1.4 Gain: +18 dB Shutter: 66,506 µs	1 lx Iris: F1.4 Gain: +18 dB Shutter: 66,570 µs
Sensitivity	F5.6 (400 lx, 0 dB)	F11 (400 lx, 0 dB)	F8 (400 lx, 0 dB)	F5.6 (400 lx, 0 dB)	F5.6 (400 lx, 0 dB)
Power supply	DC +12 V (+10.5 to +15.0 V) (from 12-pin connector)				
Power consumption	3.1 W	3.1 W	3.6 W	3.1 W	4.3 W
Performance guaranteed temperature	0 to +40°C				
Operating temperature	-5 to +45°C				
Storage temperature	-30 to +60°C				
Operating relative humidity	20 to 80% (No condensation)				
Storage relative humidity	20 to 95% (No condensation)				
Vibration resistance	10 G (20 to 200 Hz, 20 minutes for each direction X, Y, Z)				
MTBF	Approx. 9.7 years	Approx. 9.9 years	Approx. 9.9 years	Approx. 9.9 years	Approx. 8.5 years
Shock resistance	70 G				
Dimensions	44 (W) x 33 (H) x 67.5 (D) mm, not including projecting parts				
Mass	Approx. 145 g				

Location and Function of Parts and Controls



1. Lens Mount (C mount)

NOTE

The lens must not project more than 10 mm from the lens mount.

1 Lens mount face

2 10 mm or less

2. Guide screw holes (top)

3. Guide screw holes/Tripod screw holes (bottom)

When using a tripod, use these four screw holes to attach a VCT-ST70I tripod adaptor.

NOTE

Use the screws (M2 × 6 (2); M3 × 8 (2)) supplied with the tripod adaptor when installing it on the camera module.

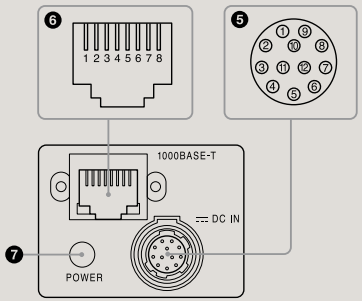
4. Reference screw holes (bottom)

These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

NOTE

Refer to XCG-V60E/XCG-SX97E/ XCG-SX99E/ XCG-U100E/XCG-5005E Dimensions for the position/size of the Guide hole and the Reference hole.

Rear Panel



5.DC IN (DC power input) connector (12-pin)

You can connect a camera cable CCXC-12P05N etc. to input the +12 V DC power supply. The pin configuration of this connector is as follows. For details on the pin arrangement, see the following table.

Pin No.	Signal	Pin No.	Signal
1	Ground	7	GPI input (ISO +)
2	+12 V DC	8	Ground
3	Ground	9	NC
4	Multi-function output* (TTL)	10	NC
5	Multi-function output* (ISO –)	11	Triger input
6	Multi-function output* (ISO +)	12	GPI input (ISO –)

* About multi-function output. You can select from the following signals based on settings. Exposure output/strobe control outputs/GPO (fixed value Hi or Low).

6.RJ45 connector

You can connect a LAN cable to this connector to control the camera module from a host device to output image to a host device.

Pin No.	Signal	Pin No.	Signal
1	TP1 +	9	TP3 –
2	TP1 –	10	TP2 –
3	TP2 +	11	TP4 +
4	TP3 +	12	TP4 –

7.POWER LED

Flashes or lights based on the internal status of the camera.
Flashing: Obtaining IP address
Lit: IP address obtained

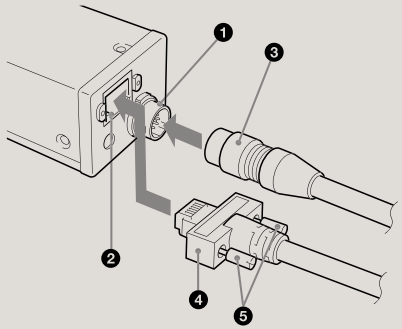
Using a Tripod

To use the tripod, install the tripod adaptor VCT-ST70I (not supplied) on the camera module. Use a tripod screw with a protrusion (4) extending from the installation surface, as follows, and tighten it, using a screwdriver.

NOTE

If you install a tripod adaptor (not supplied), use the screws provided.

Connecting the Cables



Connect the camera cable to the DC IN connector and the LAN cable to the RJ45 connector respectively. When you connect the LAN cable, turn the two fastening screws on the connector to secure the cable tightly.

1.DC IN connector

2.RJ45 connector

3.Camera cable

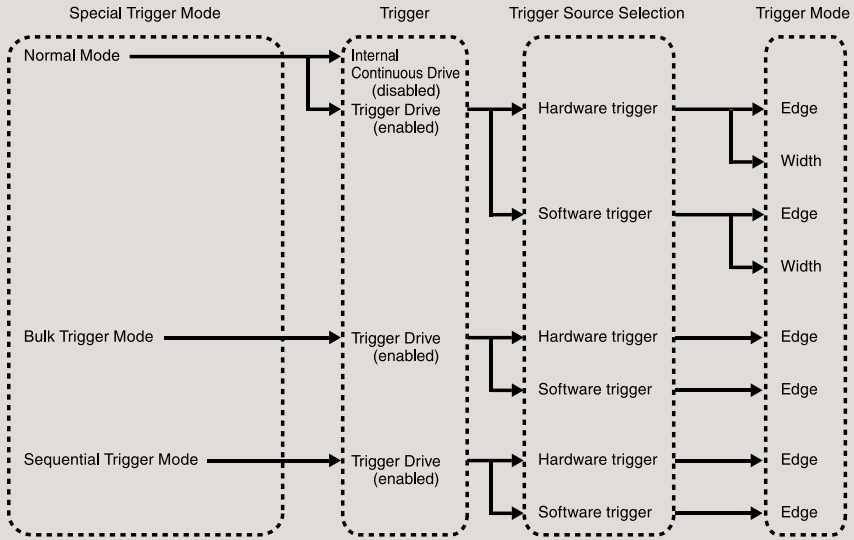
4.LAN cable

5.Fastening screws

Connect the other end of the camera cable to the DC-700/700CE and the other end of the LAN cable to the Network card.

Camera Drive System

The camera drive system functions as follows.



Triggering

The camera can be triggered by hardware or software triggering events.

Hardware Triggering

Hardware triggering is performed by applying a signal to an input on the 12-pin connector. Exposure occurs according to the predetermined timing of the trigger signal, which serves as the drive signal for acquiring video images. An image is acquired whenever the drive signal is valid. This function is used for shooting simultaneous video with multiple cameras.

Software Triggering

Software triggering is performed by an internal drive signal generated within the camera in response to network commands. Exposure occurs according to this trigger signal. This drive signal is useful for triggering when hardware triggering is not suitable.

Trigger Polarity

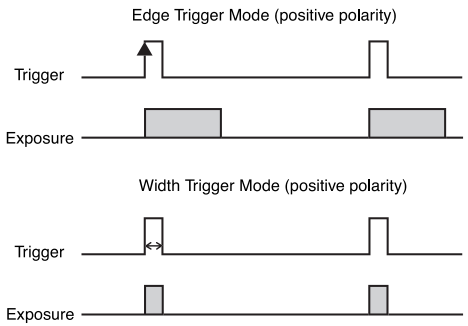
This is a function to select the polarity of the signal that enables triggering from positive or negative. Select the trigger polarity before using other trigger functions.

Special Trigger Modes

The three special trigger modes are Normal, Bulk and Sequential triggering.

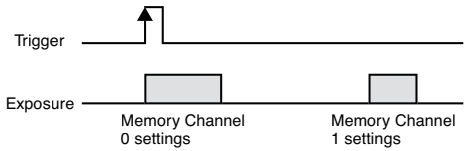
Normal trigger mode (disabled)

The Normal mode outputs images continuously according to internal continuous drive. When trigger drive is enabled, the camera is driven by either hardware or software triggering. In this mode, the following two drive methods are available according to the trigger mode: Edge Trigger Mode (exposure begins at the rising edge of trigger pulses with duration based on the shutter settings) or Width Trigger Mode (exposure duration is the same as the duration set for the trigger pulse width).



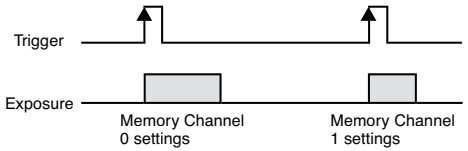
Bulk trigger mode

Different camera setting configurations are stored in memory channels beforehand, with the different settings applied to acquire multiple video images at each trigger event. In the following diagram, two images are acquired in one cycle.



Sequential trigger mode

Different camera setting configurations are stored in memory channels beforehand, with the different settings applied in sequence to acquire a different image with each trigger event. In the following diagram, two images with different exposure settings are acquired in one cycle.



The camera provides 16 memory channels, so up to 16 setting configurations can be assigned to each cycle. For bulk and sequential trigger modes, the following functions are read from each memory channel.

Image parameters

- Image size (H) offset X
- Image size (V) offset Y

Feature parameters

- Manual Gain (Gain L/R with XCG-5005E)
- Digital Clamp L/R (XCG-5005E only)
- Digital ON/OFF (XCG-5005E only)
- Digital Pedestal
- Digital Gain
- Shutter
- Look Up Table
- Binarisation Threshold
- Multi-Function Output Mode
- Strobe Polarity
- Strobe Delay
- Strobe Pulse Width
- GPO
- User Memory

NOTE

- *When using Bulk or Sequential trigger mode, be sure to allow sufficient trigger cycle time. Images are disrupted if the trigger period is shorter than the time required to output a frame.*
- *With the XCG-5005E, using Bulk or Sequential trigger mode with different gain values in different memory channels may result in different left and right video levels. In such cases, verify operation before use.*
- *When using Bulk or Sequential trigger mode, bear in mind that the following settings are ignored and have no effect.*

Image parameters

- Image Size (H)
- Image Size (V)
- Pixel Format
- Binning
- Test Chart
- Auto Gain Detection Frame ON/OFF
- Auto Gain Detection Frame Area Setting
- Manual Frame Rate
- Auto Frame Rate
- Gamma Curve Coefficient
- Gamma Curve Reference Level

Feature Parameters

- Auto Clamp ON/OFF (XCG-5005E only)
- Auto Gain ON/OFF
- Trigger ON/OFF (ON = fixed trigger drive)
- Trigger Mode (fixed edge)
- Trigger Polarity
- Trigger Inhibit
- Trigger Delay
- Software Trigger Pulse Output
- Trigger Source Select

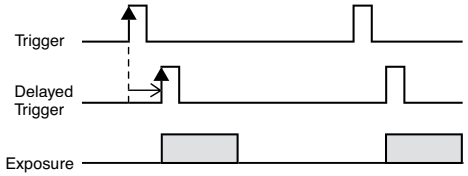
When using the Bulk or Sequential special trigger mode, you must select the trigger type (hardware or software trigger) with the Special Trigger Source select parameter, and select the polarity with the Special Trigger Polarity parameter.

Shutter

The camera supports manual shutter control.
With Edge triggering, the exposure time can be set from 10 µs to 2 s, in 1 µs units.

Trigger Delay

This function applies a trigger delay within the camera. Use it to synchronise trigger timing when the trigger signal is offset from the desired object exposure timing. Setting range is 0 to 4 sec. (in 1 µs units).



NOTE

To use trigger delay, the input trigger period must be longer than the trigger delay value. Otherwise, images cannot be output properly.

Trigger Inhibit

This function disables the camera's trigger input. When multiple camera's are connected, use this to disable triggering for only specified cameras at specific times.

Gain

The camera provides both manual and automatic gain control.

Manual gain control

Variable gain control in models XCG-V60E/ XCG-SX97E/XCG-SX99E/XCG-U100E can be set from 0 to 18 dB in 0.0358 dB increments, or from 0 to 502 in 0.0358 dB steps. In addition to the above, the XCG-5005E provides independent left and right controls (GainL and GainR). When left and right gain should be the same, set only the left level (GainL).

Auto gain control

The camera provides the auto gain control function to automatically control image brightness according to a user-specified detection frame and image average level (variable from 0 to 16383 in 14 bit). The variable range is the same as for manual gain control. Also, the auto gain control detection frame showing each area's image average level can be displayed and adjusted. The detection frame is defined by Offset X and Y, Width and Height percentage values (relative to the (100%) width and height of the output video image).

Digital Gain

The camera provides a digital gain function. Gain values are from 1X to 2X (0 to 64, in 0.015625X increments).

NOTE

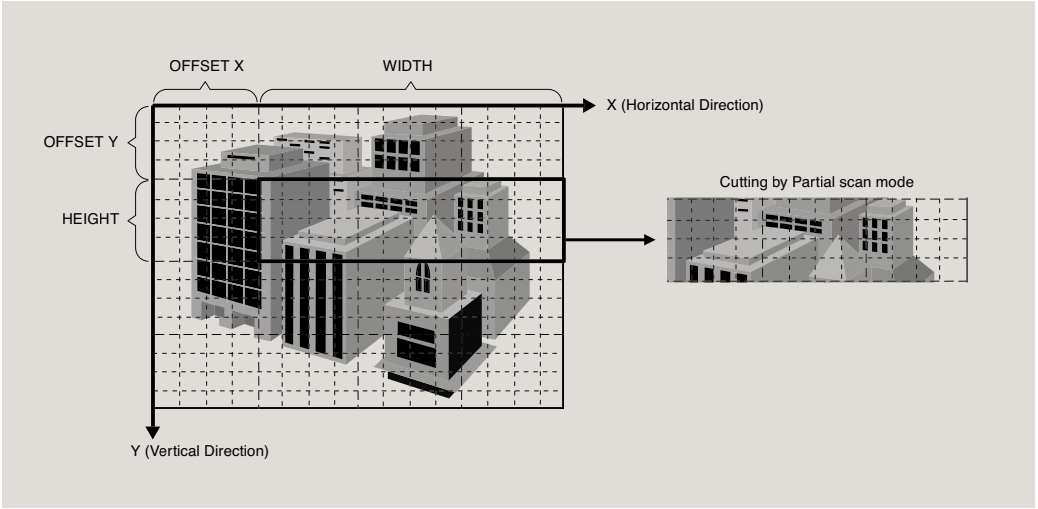
When using digital gain, discontinuity may occur in the spacing between output levels. This occurs due to the lack of an image signal output that is equivalent to the output steps. This is not a malfunction.

Look Up Table

The camera's Look Up Table consists of 4,096 values, with 12-bit input and output. The Look Up Table allows setting an arbitrary gamma curve or binarisation. Also, a gamma curve coefficient can be specified for the standard black level. For levels below the standard black level, set the gamma value to 1 to prevent burnt-out highlights in the black level. Selectable from 0: Linear 1: Reverse 2: Binarisation 3: Gamma Curve Coefficient 4: User Setting.

Partial Scan

The Partial scan function outputs a user-defined region (Area Of Interest) within the overall image area. The cut-out region for partial scan is defined by Offset X and Offset Y (which indicate the start point for cutting), and Width and Height (which indicate the area). Contiguous blocks of minimum areas can be selected to define regions. However, the defined region must be a square or right rectangle. T- and L-shaped regions are invalid.



Minimum area sizes for partial scan are as follows:

XCG-V60E	64 pixels × 48 lines
XCG-SX97E	64 pixels × 100 lines
XCG-SX99E	64 pixels × 100 lines
XCG-U100E	64 pixels × 120 lines
XCG-5005E	64 pixels × 480 lines

Cut-out position settings are specified with the following units:
Horizontal: 8-pixel units
Vertical: 4-scan line units

NOTE

Be aware that the frame rate increases for vertical cut-outs, while the frame rate remains unchanged for horizontal cut-outs.

Binning Mode

This mode increases sensitivity and frame rate by combining vertically adjacent pixel data from the CCD.

NOTE

Binning mode approximately doubles sensitivity by combining vertical signals on alternate pairs of adjacent lines. However, because the frame rate is also doubled, available exposure time that is consequently halved. Setting a shorter exposure time enhances the effect, and sensitivity is further increased. Consider the effect on exposure time when using the Binning mode.

Image Acquisition Modes

The following three image acquisition modes are available:

- Continuous image output
- Output a user-specified number of frames (from 1 to 255)
- Single frame output

Memory Channels and User Memories

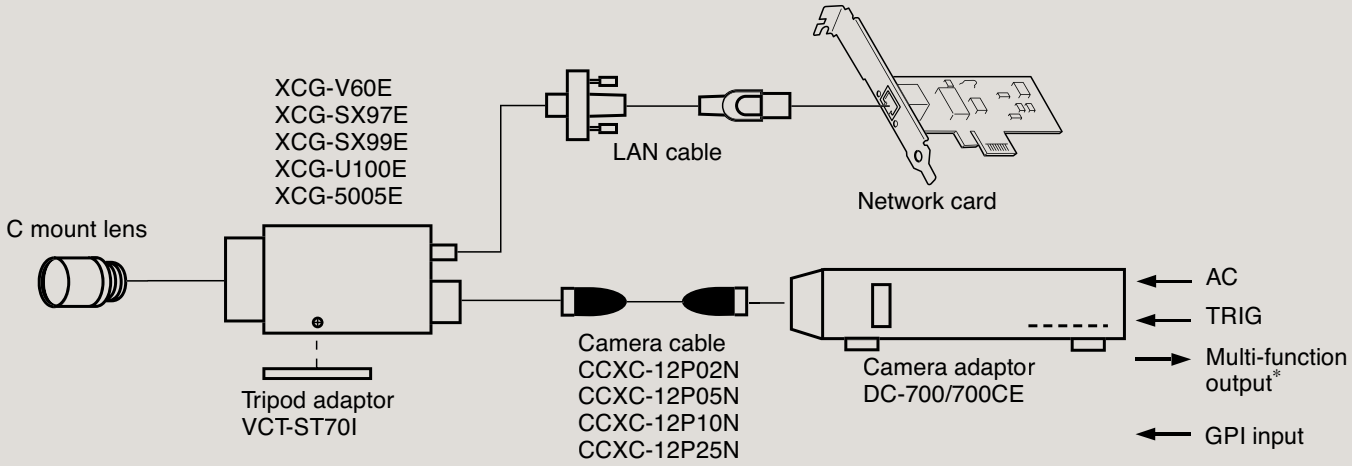
Memory channels

Sixteen memory channels are provided for camera parameters that can be switched at each frame when using bulk and sequential trigger modes. The memory channels can also be used to store user settings when the special trigger mode is set to Normal, to be applied when switching the camera state for particular situations.

User Memories

Each memory channel provides 64 bytes of non-volatile read-write storage for users to store data freely. Stored data is preserved even when the power is turned off.

Connection Diagram



*About multi-function output
You can select from the following signals based on settings.
Exposure output/strobe control outputs/fixed value (Hi or Low)

Non-TV Format

XC-HR90	48
XC-HR70	52
XC-HR50	56
XC-HR57	56
XC-HR58	60
XC-56	64
XC-56BB	68
Connection Diagrams	*72*

High Resolution Monochrome Camera Module

XC-HR90

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | C Lens Mount | VS Output | SXGA Output | Partial Scan

HD / VD External Sync | 30/15 fps Selectable | Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | RS232C Control

Outline

The **XC-HR90** is an analog interface camera with high-speed, high-quality picture output of approximately 1.25 megapixels (SXGA) at a standard frame rate of 30 fps, with a compact size that makes it ideal for use in combination with industrial equipment.

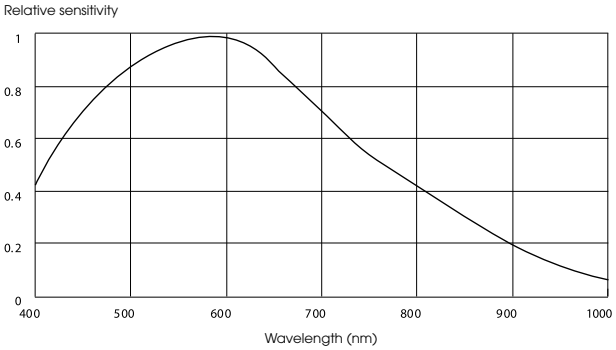
Other features include a partial scan function that enables faster image read-out, and settings that can be made via the rear panel or remotely via RS-232C serial interface.

Features

- **1/3 type high-resolution progressive scan CCD monochrome camera module**
- **Full pixel read-out, SXGA size**
  (Effective lines: 1,280 (H) × 960 (V))
  Image output: 30 fps, 15 fps (selectable)
- **Vertical frequency**
  49.302 MHz (30 fps)
  24.651 MHz (15 fps)
- **Analog output**
- **Partial scan function**
- **Binning function**
- **External control possible (RS-232C)**

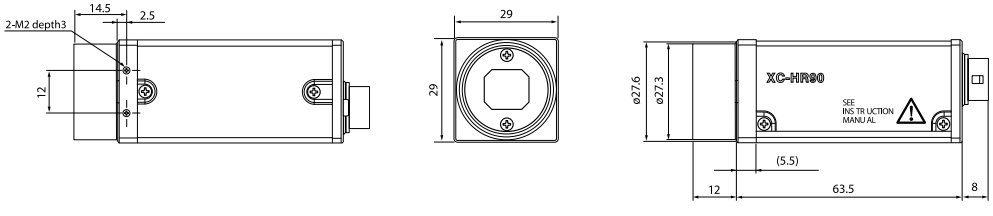
Spectral Sensitivity Characteristics

XC-HR90
(Typical values)

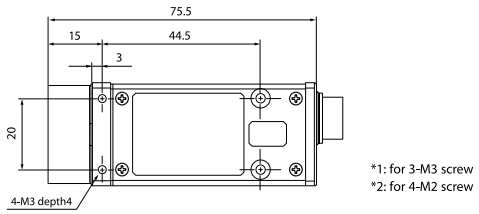


(Lens characteristics and light source characteristics excluded.)

Dimensions (mm)



Connection Diagram p72



*1: for 3-M3 screw
*2: for 4-M2 screw

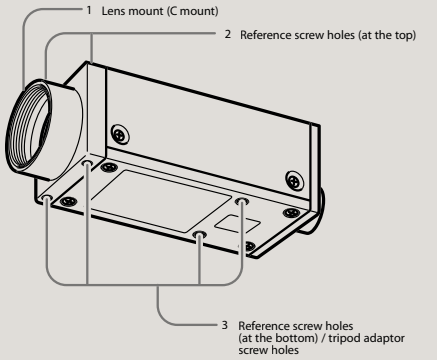
Accessories

Compact camera adaptor
- DC-700CE

Tripod adaptor
- VCT-55I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Location and Function of Parts and Controls

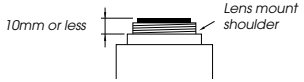


1. Lens mount (C mount)

Attach any C mount lens or optical equipment suitable for high-resolution images (SXGA-compatible).

NOTE

Be sure that the lens does not project more than 10 mm from the lens mount.



2. Reference screw holes (at the top)

3. Reference screw holes/tripod screw holes (at the bottom)

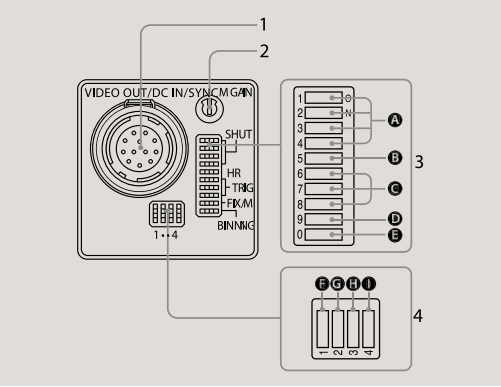
These precision screw holes are for locking the camera module. Using these holes to lock the camera module secures the optical axis alignment.

The reference screw holes can also be used as tripod adaptor screw holes. To install on a tripod, attach the VCT-551 tripod adaptor using these four screw holes.

Specifications

	XC-HR90
Image device	1/3 type progressive scan IT CCD
Effective picture elements (H) × (V)	1,296 × 966
Effective lines (H) × (V)	1,280 × 960
Image size	SXGA
Cell size (H) × (V)	3.75 µm × 3.75 µm
Lens mount	C mount
Sync system	Internal/External (auto)
External sync signal input/output	HD/VD (HD/VD level: 2.5 to 5 Vp-p, 75 W)
External sync allowable frequency	±1% (in horizontal synchronous frequency)
Jitter	Less than 20 ns
Scanning system	Non-interlace Progressive scan
Output signal frequency	Binning: 2-line combined / Normal: 1-line sequential output
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced
CCD vertical drive frequency	30 fps: 29.7 kHz (Normal mode) 26.79 kHz (Binning mode) 15fps: 14.85 kHz (Normal mode) 14.85 kHz (Binning mode)
CCD horizontal drive frequency	30 fps: 30 Hz (Normal mode) 54.1Hz (Binning mode) 15fps: 15 Hz (Normal mode) 30 Hz (Binning mode)
Horizontal resolution	960 TV lines
Sensitivity	400 lx F5.6 (g=OFF, FIX GAIN (0 dB))
Minimum illumination	1 lx (F1.4, g=OFF, GAIN +18 dB)
S/N ratio	56 dB (0 dB GAIN)
Gain	Manual (0 to +18dB)/FIX (0dB) (adjustable on rear panel or via RS-232C)
Gamma	OFF (fixed)
White clip	820 mV ±70 mV (F1.8, FIX GAIN (0 dB))
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/50,000 s
External trigger	Polarity: +, Width: 2 ms to 250 ms, Input impedance: 10kΩ or more (H: +2.5 to 5.0 V, L: 0 to +0.6 V)
Partial scanning	Readout of center 480 lines at 56 fps, Readout of center 240 lines at 95.8 fps (settable using DIP switches) Readout of 60 effective lines selectable from 16 vertical divisions at max. 204.8 fps (settable via RS-232C)
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	Approx. 2.8 W
Dimensions	29 (W) × 29 (H) × 63.5 (D) mm (not including projecting parts)
Mass	Approx. 80g
Operating temperature	–5 to +45°C
Storage temperature	–30 to +60°C
Performance guarantee temperature	0 to +40°C
Operating humidity	20 to 80%
Storage humidity	20 to 95%
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction–x, y, z)
Shock resistance	70G
MTBF	73,880 hours (Approx. 8.4 years)
Regulatory compliance	UL60065, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326, VCCI : Class A
Supplied accessories	Lens mount cap (1), Operating instructions (1)

Rear Panel



NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 230 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1.VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals (HD/VD signals).

2.M Gain (Manual Gain) control knob

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

3.Shutter speed/Mode setting DIP switch

A. Shutter speed (bits 1-4)
Set an appropriate shutter speed (factory setting: OFF).

B. Partial scan mode switch (5)
The factory setting of this switch is partial scan OFF.

C. Restart reset/External trigger shutter mode switch (bits 6 to 8)
By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture imaging information on fast-moving objects at a precise moment in time. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

D. Gain switch (bit 9)
This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

E. Binning mode switch (bit 0)
Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

4 Mode setting DIP switch

F. 75Ω termination switch
Turn this to OFF (switch down position) when not terminating the external sync signal. The factory setting of this switch is ON (switch up position).

G. HD/VD signal input/output switch
Set the switch to the down position (INT) to output HD/VD signals from the camera module, and set it to the up position (EXT) to input HD/VD signals from an external unit. The factory setting for this switch is the up position (EXT).

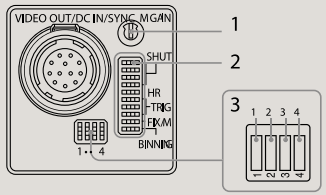
NOTE

Even when the switch is in the up position (EXT), the camera operates in internal synchronisation mode unless an external HD signal is input. In this case, however, the camera module will not output internal sync signals.

H. 30 fps/15 fps switch
30 fps: switch down position
15 fps: switch up position

I. RS-232C ON/OFF switch
ON: switch up position
OFF: switch down position

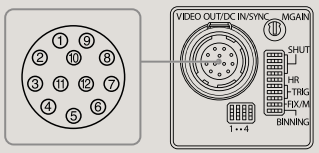
Factory Mode Settings of Rear Panel



No.	Switch	Factory setting mode
1	M GAIN control knob	— *
2	Shutter speed and mode setting DIP switches	All OFF (left)
3	Mode setting DIP switches	VCC
	1. 75Ω termination switch	ON (switch up position)
	2. HD/VD signal input/output switch	HD/VD signal input (switch up position)
	3. 30 fps/15 fps switch	30 fps (switch down position)
	4. RS-232C ON/OFF switch	OFF (switch down position)

*This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	(RS-232C (Rx)) *1	(RS-232C (Rx)) *1	(RS-232C (Rx)) *1	(RS-232C (Rx)) *1
9	(RS-232C (Tx)) *1	(RS-232C (Tx)) *1	(RS-232C (Tx)) *1	(RS-232C (Tx)) *1
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground) *2

*1 When communicating with RS-232C.
*2 Common ground for pins 7, 10, 11.

About the Camera Control Method

This camera can be controlled via a host device (such as a PC). The table below shows the functions that can be controlled. The camera can be controlled by sending commands that correspond to the control items, with parameters for the desired settings, if necessary, from the host device.

Control function	Description	
Operating mode	Normal/ Restart reset/ Trigger mode 1 / Trigger mode 2	
Shutter speed	Normal	30 fps mode: OFF (1/30) to 1/1,000,000
		15 fps mode: OFF (1/15) to 1/5000
	Trigger	Internal setting: OFF (same as above) to 1/100,000
		Setting by trigger pulse width
Gain	0 to +18 dB	
Binning function	OFF/ON	
Partial scan function	OFF/ON: Area settings can be made for 16 zones	
HD/VD signal input/ output	External sync signal input/Internal sync signal output	
75Ω termination	ON/OFF	
Frame rate	30 fps/15 fps	

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting an external sync or trigger signal. Inputting an external signal before supplying the power may cause the camera module to malfunction.

Note: When using the external sync in combination with control from a host device (such as a PC), make sure the frequency is within the specified range. The camera cannot be controlled when the input is outside the specified frequency range.

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

Normal shutter speed settings

30fps

1/125	1/250	1/500	1/1000	The shutter will be off when the DIP switch is set as below
				OFF OFF
1/2000	1/4000	1/10000	1/20000	
				OFF OFF
1/50000	1/100000	1/100		
				OFF

15fps

1/125	1/250	1/500	1/1000	The shutter will be off when the DIP switch is set as below
				OFF OFF
1/2000	1/4000	1/10000	1/25000	
				OFF OFF
1/50000	1/100			
				OFF OFF

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

NOTE

High-rate scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- The video signal is synchronised with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronised with an internal VD signal when no external HD*/VD signal is input.

*External or internal synchronisation is selected automatically depending on the presence or absence of external HD input.

Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to OFF. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 µsec to 250 msec.

Exposure time = Trigger pulse width + 5 µsec

Mode 1 (Non-reset mode) / Mode 2 (Reset mode)

NOTE

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

Restart reset

R/R
6 7 8

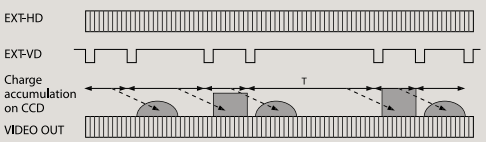
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



High Resolution Monochrome Camera Module

XC-HR70

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | C Lens Mount | VS Output | XGA Output | Partial Scan

HD / VD External Sync | 1/30 sec 1N: Non-interface | Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | XGA High Frame Rate | PS

Outline

The **XC-HR70** is an ultra-compact monochrome camera module ideal for high-resolution image capturing applications.

A 1/3 type progressive scan CCD incorporated in the XC-HR70 allows the output of XGA resolution (1024 × 768) images at a rate of 30 frames/sec. In addition, the XC-HR70 has a "high rate scanning" function to enable the output of up to 120 frames/sec. for high-speed image capturing.

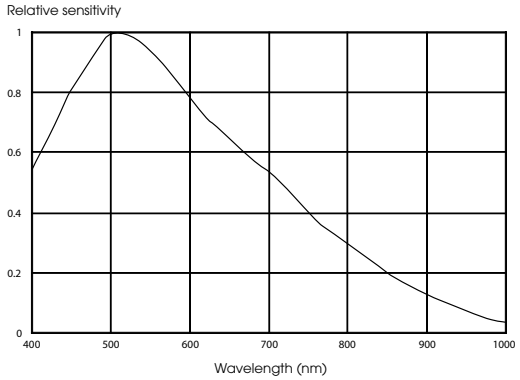
The compact and lightweight body of the XC-HR70 makes it easy to install in space-restricted areas. With high-speed capturing capability offered in a compact body, the XC-HR70 is the ideal camera module for demanding applications such as the inspection of semiconductor production lines and high-speed assembly lines.

Features

- **High resolution image capturing**
  - XGA resolution (1,024 × 768 pixels) image capturing at a speed of 30 fps
  - 1/3 type progressive scanning CCD with square pixels. Effective picture element: XGA size 1,034 (H) × 779 (V)
- **Partial scanning (at restart/reset ON, Binning OFF)**
  Up to 120 fps (Effective line: 152 lines)
- **External trigger shutter (1/4 to 1/100,000 s)**
- **Electronic shutter (1/100 to 1/20,000 s)**
- **Synchronisation internal/external (HD/VD)**
- **C mount system**
- **High shock and vibration tolerant**

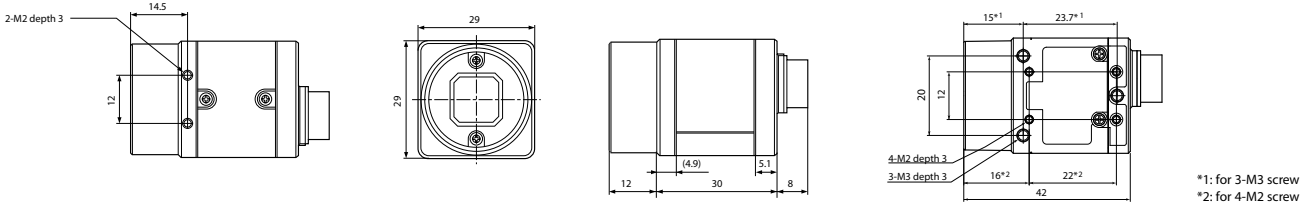
Spectral Sensitivity Characteristics

XC-HR70
(Typical values)



(Lens characteristics and light source characteristics excluded.)

Dimensions (mm)



*1: for 3-M3 screw
*2: for 4-M2 screw

Connection Diagram p73

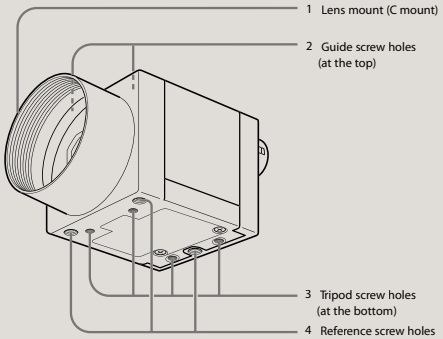
Accessories

Compact camera adaptor
- DC-700CE

Tripod adaptor
- VCT-333I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Location and Function of Parts and Controls

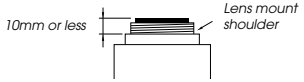


1. Lens mount (C mount)

Attach any C mount lens, suitable for XGA-compatible resolution or other optical equipment.

NOTE

Be sure that the lens does not project more than 10 mm from the lens= mount.



2. Guide screw holes (at the top)

These screw holes help to lock the camera module.

3. Tripod screw holes (at the bottom)

These four screw holes on the bottom are for installing the camera module on a tripod.
To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

4. Reference screw holes (at the bottom)

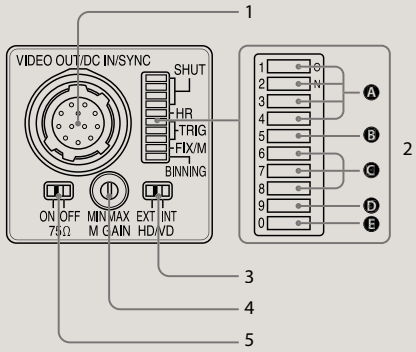
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-HR70
Image device	1/3 type progressive scan IT CCD
Effective picture elements (H) × (V)	1,034 × 779
Effective lines (H) × (V)	1,024 × 768
Image size (H) × (V)	XGA size: 1,024 × 768
Unit cell size (H) × (V)	4.65 µm × 4.65 µm
Lens moun	C mount
Sync system	Internal/External (auto)
External sync signal input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75 Ω)
External sync allowable frequency	±1% (in horizontal synchronous frequency)
Jitter	Less than 20 ns
Scanning system	Non-interlace Progressive scan
Output signal frequency	Binning: 2-line combined output 29.2 fps/ Normal: 1-line sequential output 58.4 fps
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced
CCD vertical drive frequency	23.23 kHz ±1%
CCD horizontal drive frequency	29.2 Hz (normal mode), 58.4 Hz (binning mode)
Horizontal resolution	800 TV lines
Sensitivity	400 lx F5.6 (γ=OFF, FIX GAIN (0 dB))
Minimum illumination	1 lx (F1.8, γ=OFF, GAIN +18 dB)
S/N ratio	56 dB (0 dB GAIN)
Gain	Manual (0 to 18 dB)/Fix (0 dB) (adjustable on the rear panel)
Gamma	OFF (fixed)
White clip	820 mV ±70 mV (F1.8, FIX GAIN (0 dB))
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/20,000 s
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 µs to 250 ms, Input impedance: 10 kΩ or more (H: +2 to 5.0 V, L: 0 to +0.6 V)
Partial scanning	R/R mode Binning off: max 120 frames/s (effective line: 152 lines) Binning on: max 180 frames/s (effective line: 89 lines)
	External trigger shutter mode (MODE 1) Binning off: max 120 frames/s (effective line: 153 lines) Binning on: max 180 frames/s (effective line: 90 lines)
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	2.0 W
Dimensions	29 (W) × 29 (H) × 30 (D) mm (not including projecting parts)
Mass	Approx. 50 g
Operating temperature	–5 to +45°C
Storage temperature	–30 to +60°C
Performance guarantee temperature	0 to +40°C
Operating humidity	20 to 80%
Storage humidity	20 to 95%
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction–x, y, z)
Shock resistance	70 G
MTBF	88,044 hours (Approx. 10.1 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1)

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1.VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals (HD/VD signals).

2.Shutter speed/Mode setting DIP switch

A. Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

B. Partial scan mode switch (bit 5)

The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make the external VD pulse rate and width settings.

C. Restart reset/External trigger shutter mode switch (bits 6 to 8)

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture imaging information on fast-moving objects at a precise moment in time. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

D. Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

E. Binning mode switch (bit 0)

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

3.HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module.

Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

NOTE:

Even when the switch is set to EXT, the camera module operates in internal synchronisation mode when no external HD signal is input. In this case, however, the camera module will not output internal sync signals.

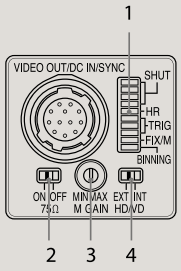
4.M Gain (Manual Gain) control knob

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

5.75Ω termination switch

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

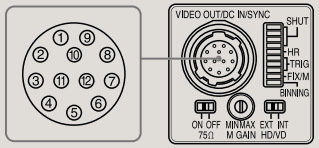
Factory Mode Settings of Rear Panel



No.	Switch	Factory setting mode
1	Shutter speed and mode setting DIP switches	All bits are OFF (left)
2	75Ω termination switch	ON
3	M GAIN control knob	— *
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output 1 (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output 1 (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—		WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	Reset (Ground)*

*Common ground for pins 7, 10, 11.

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

* The electronic shutter cannot be used in restart/reset mode. Partial scan can be used in restart/reset mode in external trigger shutter mode1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

Normal shutter speed settings

1/125	1/250	1/500	1/1000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/2000	**1/4000**	**1/10000**	**1/20000**
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/100			
1 2 3 4			

Unit: seconds

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scanning

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

NOTE

High-rate scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- The video signal is synchronised with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronised with an internal VD signal when no external HD*/VD signal is input.

*External or internal synchronisation is selected automatically depending on the presence or absence of external HD input.

Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

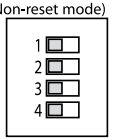
There are two ways to set the shutter speed.

Using trigger pulse width

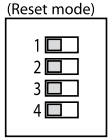
Set all DIP switches (1 to 4 on the rear panel) to OFF. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 µsec to 250 msec.

Exposure time = Trigger pulse width + 5 µsec

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



NOTE

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/2000	**1/4000**	**1/10000**	**1/25000**
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/50000	**1/100000**	**1/100**	
1 2 3 4	1 2 3 4	1 2 3 4	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

Restart reset

R/R
6 7 8

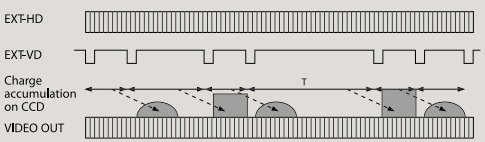
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



High Frame Rate Camera

XC-HR50
XC-HR57

Non-TV Output | Progressive Scan | 1/3 Type CCD *1 | 1/2 Type CCD *2 | Square Pixels | C Lens Mount | VS Output | VGA Output

*1: XC-HR50
*2: XC-HR57

1/60 sec 1N: Non-interface | Partial Scan | HD / VD External Sync | Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter

Double Scan | PS

Outline

The **XC-HR50** and **XC-HR57** are monochrome camera modules with full pixel read-out. The XC-HR50 incorporates a 1/3 type double scan CCD, and the XC-HR57 incorporates a 1/2 type double scan CCD.

Both cameras have VGA resolution (648 (H) × 494 (V)) output at 60 frames/sec, making them ideal for high-speed image capturing. Relying on high-density mounting technology, these cameras are the same size as other Sony cameras in the XC-HR Series and XC-E Series, which increases their mechanical compatibility.

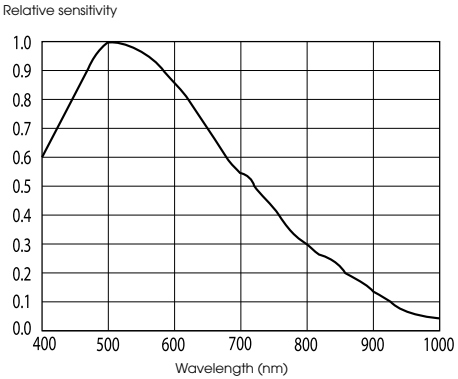
These compact (29 (W) × 29 (H) × 30 (D) mm) double-speed progressive scan cameras are also lightweight and have a short tact time.

Features

- **XC-HR50: 1/3 type PS CCD**
  XC-HR57: 1/2 type PS CCD
  - Double Scan CCD
  - The CCD has square pixels eliminating the need for aspect ratio conversion
  - VGA resolution (648 × 494 pixels) image capturing at a speed of 60 fps
- **Partial scanning (at restart/reset ON, Binning OFF)**
  Up to 240 fps. (Effective line: 102 lines)
- **Compact and lightweight**
  29 (W) × 29 (H) × 30 (D) mm, Approx. 50 g
- **External trigger shutter 1/4 to 1/100,000 s**
- **Electronic shutter 1/100 to 1/20,000 s**
- **Synchronisation internal/external (HD/VD)**
- **C mount system**
- **High shock and vibration tolerant**

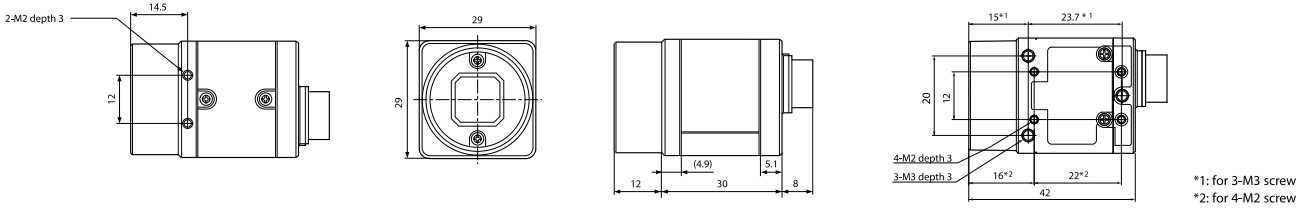
Spectral Sensitivity Characteristics

XC-HR50/HR57
(Typical values)



(Lens characteristics and light source characteristics excluded.)

Dimensions (mm)



*1: for 3-M3 screw
*2: for 4-M2 screw

Connection Diagram p73

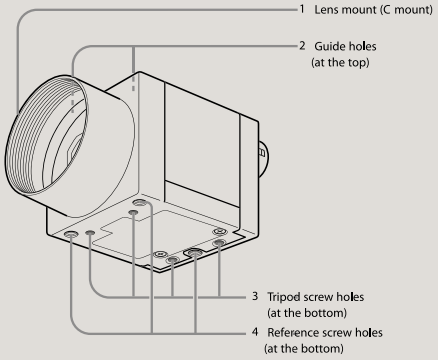
Accessories

Compact camera adaptor
- DC-700CE

Tripod adaptor
- VCT-333I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Location and Function of Parts and Controls

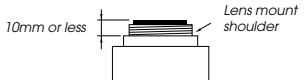


1. Lens mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

Be sure that the lens does not project more than 10 mm from the lens= mount.



2. Guide holes (at the top)

These screw holes help to lock the camera module.

3. Tripod screw holes (at the bottom)

These four screw holes on the bottom are for installing the camera module on a tripod.
To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

4. Reference screw holes (at the bottom)

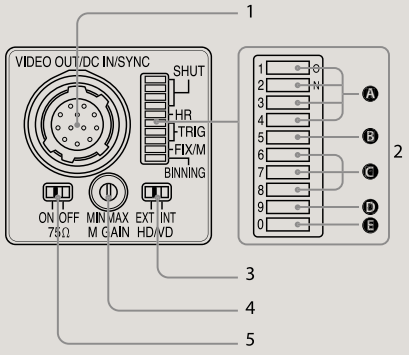
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-HR50	XC-HR57
Image device	1/3 type progressive scan IT CCD	1/2 type progressive scan IT CCD
Effective picture elements (H) × (V)	659 × 494	
Effective lines (H) × (V)	648 × 494	
Image size (H) × (V)	VGA size : 648 × 494	
Cell size (H) × (V)	7.4 µm × 7.4 µm	9.9 µm × 9.9 µm
Lens mount	C mount	
Sync system	Internal/External (auto)	
External sync signal input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)	
External sync allowable frequency	±1% (in horizontal sync frequency)	
Jitter	Less than 20 ns	
Scanning system	Non-interlace Progressive scan	
Output signal frequency	Binning: 2-line combined output 120 fps/ Normal: 1-line sequential output 60 fps	
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced	
CCD vertical drive frequency	31.468 kHz	
CCD horizontal drive frequency	59.94 MHz (normal mode), 119.88 Hz (binning mode)	
Horizontal resolution	500 TV lines	
Sensitivity	400 lx F5.6 (γ=OFF, FIX GAIN (0 dB))	
Minimum illumination	1 lx (F1.4, γ=OFF, GAIN +18 dB)	
S/N ratio	58 dB (0 dB GAIN)	
Gain	Manual (0 to 18 dB)/Fix (0 dB) (adjustable on the rear panel)	
Gamma	OFF (fixed)	
White clip	820 mV ±70 mV (F1.4, FIX GAIN (0 dB))	
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)	
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/15,000, 1/30,000 s	
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s	
External trigger	Polarity: +, Width: 2 µs to 250 ms, Input impedance: 10kΩ or more	
Partial scan	R/R mode Binning off: max 240 frames/s (effective line: 102 lines) Binning on: max 362 frames/s (effective line: 59 lines)	
	External trigger shutter mode (MODE 1) Binning off: max 240 fps (effective line: 100 lines) Binning on: max 362 fps (effective line: 57 lines)	
Power requirements	DC 12 V (+10.5 V to +15.0 V)	
Power consumption	1.8 W	
Dimensions	29 (W) × 29 (H) × 30 (D) mm (not including projecting parts)	
Mass	Approx. 50 g	
Operating temperature	–5 to +45°C	
Storage temperature	–30 to +60°C	
Performance guarantee temperature	0 to +40°C	
Operating humidity	20 to 80% (no condensation)	
Storage humidity	20 to 95% (no condensation)	
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction-x, y, z)	
Shock resistance	70 G	
MTBF	88,044 hours (Approx. 10.1 years)	
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326	
Supplied accessories	Lens mount cap (1), Operating instructions (1)	

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1.VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals (HD/VD signals).

2.Shutter speed/Mode setting DIP switch

A. Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

B. Partial scan mode switch (bit 5)

The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make the external VD pulse rate and width settings.

C. Restart reset/External trigger shutter mode switch (bits 6 to 8)

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture imaging information on fast-moving objects at a precise moment in time. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

D. Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

E. Binning mode switch (bit 0)

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

3.HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module.

Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

NOTE:

Even when the switch is set to EXT, the camera module operates in internal synchronisation mode when no external HD signal is input. In this case, however, the camera module will not output internal sync signals.

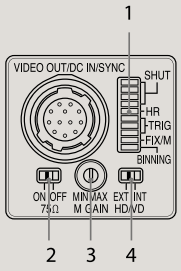
4.M Gain (Manual Gain) control knob

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

5.75Ω termination switch

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

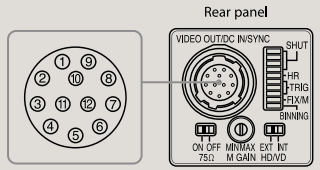
Factory Mode Settings of Rear Panel



No.	Switch	Factory setting mode
1	Shutter speed and mode setting DIP switches	All bits are OFF (left)
2	75Ω termination switch	ON
3	M GAIN control knob	— *
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output 1 (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output 1 (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—		WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	Reset (Ground)*

*Common ground for pins 7, 10, 11.

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

* The electronic shutter cannot be used in restart/reset mode. Partial scan can be used in restart/reset mode in external trigger shutter mode1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

Normal shutter speed settings

1/125	1/250	1/500	1/1000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/2000	**1/4000**	**1/10000**	**1/20000**
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/100			
1 2 3 4			

Unit: seconds

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scanning

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

NOTE

Partial scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- The video signal is synchronised with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronised with an internal VD signal when no external HD*/VD signal is input.

*External or internal synchronisation is selected automatically depending on the presence or absence of external HD input.

Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

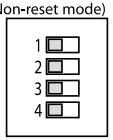
There are two ways to set the shutter speed.

Using trigger pulse width

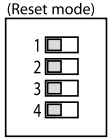
Set all DIP switches (1 to 4 on the rear panel) to OFF. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 µsec to 250 msec.

Exposure time = Trigger pulse width + 6 µsec

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



NOTE

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/2000	**1/4000**	**1/10000**	**1/25000**
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/50000	**1/100000**	**1/100**	
1 2 3 4	1 2 3 4	1 2 3 4	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

Restart reset

R/R
6 7 8

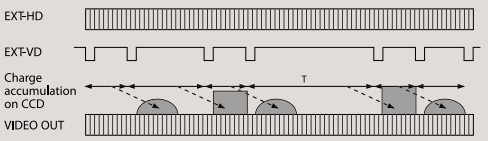
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



High Frame Rate Camera

XC-HR58

Non-TV Output | Progressive Scan | 1/2 Type CCD | Square Pixels | C Lens Mount | VS Output | SVGA Output | 1/50 sec 1N: Non-interface

Partial Scan | HD / VD External Sync | Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | Double Scan | PS

Outline

The **XC-HR58** is a monochrome camera module that incorporates 1/2 type double scan CCD with full pixel readout. With SVGA resolution (767 × 580) output at 50 frames/sec, this camera is ideal for high-speed image capturing.

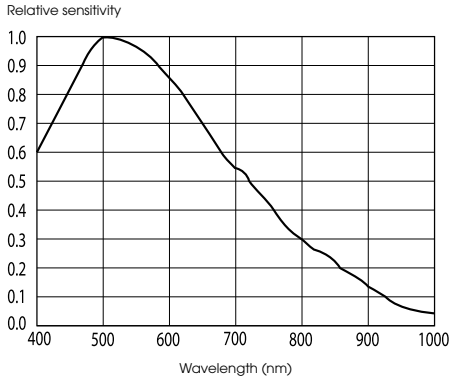
Relying on high-density mounting technology, this camera is the same size as other Sony cameras in the XC-HR Series and XC-E Series, which increases its mechanical compatibility. This compact (29 (W) × 29 (H) × 30 (D) mm) double-speed progressive scan camera is also lightweight and has a short tact time.

Features

- **1/2 type PS CCD**
  - Double Scan CCD
  - The CCD has square pixels eliminating the need for aspect ratio conversion
  - SXGA class resolution (767 × 580 pixels) image capturing at a speed of 50 frames/sec
- **Partial scanning (at restart/reset ON, Binning OFF)**
  Up to 200 fps. (Effective line: 90 lines)
- **Compact and lightweight**
  29 (W) × 29 (H) × 30 (D) mm, Approx. 50 g
- **External trigger shutter 1/4 to 1/100,000 s**
- **Electronic shutter 1/100 to 1/20,000 s**
- **Synchronisation internal/external (HD/VD)**
- **C mount system**
- **High shock and vibration tolerant**

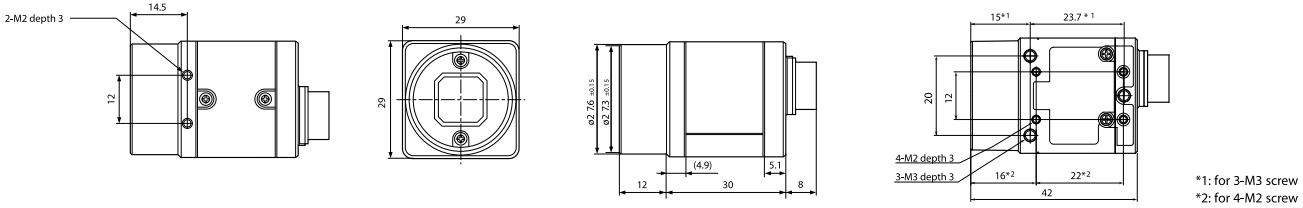
Spectral Sensitivity Characteristics

XC-HR58
(Typical values)



(Lens characteristics and light source characteristics excluded.)

Dimensions (mm)



*1: for 3-M3 screw
*2: for 4-M2 screw

Connection Diagram p73

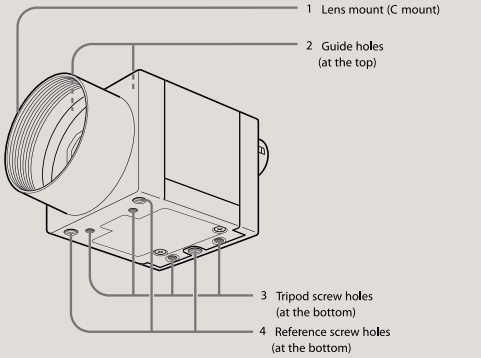
Accessories

Compact camera adaptor
- DC-700CE

Tripod adaptor
- VCT-333I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Location and Function of Parts and Controls

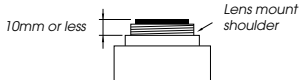


1. Lens mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

Be sure that the lens does not project more than 10 mm from the lens mount.



2. Guide holes (at the top)

These screw holes help to lock the camera module.

3. Tripod screw holes (at the bottom)

These four screw holes on the bottom are for installing the camera module on a tripod.
To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

4. Reference screw holes (at the bottom)

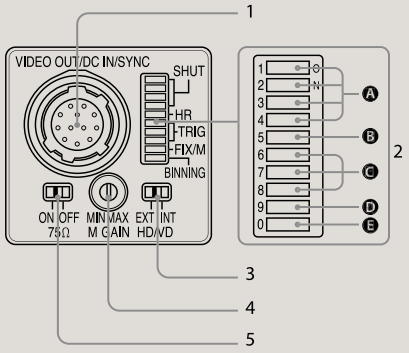
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-HR58
Image device	1/2 type progressive scan IT CCD
Effective picture elements (H) × (V)	782 × 582
Effective lines (H) × (V)	767 × 580
Image size (H) × (V)	SVGA class : 767 × 580
Cell size (H) × (V)	8.3 µm × 8.3 µm
Lens mount	C mount
Sync system	Internal/External (auto)
External sync signal input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)
External sync allowable frequency	±1% (in horizontal sync frequency)
Jitter	Less than 20 ns
Scanning system	Non-interlace Progressive scan
Output signal frequency	Binning: 2-line combined output 100 fps/ Normal: 1-line sequential output 50 fps
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced
CCD vertical drive frequency	31.250 kHz ±1%
CCD horizontal drive frequency	50 Hz (normal mode), 100 Hz (binning mode)
Horizontal resolution	600 TV lines
Sensitivity	400 lx F5.6 (γ=OFF, FIX GAIN (0 dB))
Minimum illumination	1 lx (F1.4, γ=OFF, GAIN +18 dB)
S/N ratio	56 dB (0 dB GAIN)
Gain	Manual (0 to 18 dB)/Fix (0 dB) (adjustable on the rear panel)
Gamma	OFF (fixed)
White clip	820 mV ±70 mV (F1.4, FIX GAIN (0 dB))
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/15,000, 1/30,000 s
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 µs to 250 ms, Input impedance: 10kΩ or more (H: +2 to 5.0V, L: 0 to +0.6V)
Partial scan	R/R mode Binning off: max 200 fps (effective line: 111 lines) Binning on: max 300 fps (effective line: 59 lines)
	External trigger shutter mode (MODE 1) Binning off: max 200 fps (effective line: 109 lines) Binning on: max 300 fps (effective line: 57 lines)
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	2.0 W
Dimensions	29 (W) × 29 (H) × 30 (D) mm (not including projecting parts)
Mass	Approx. 50 g
Operating temperature	–5 to +45°C
Storage temperature	–30 to +60°C
Performance guarantee temperature	0 to +40°C
Operating humidity	20 to 80% (no condensation)
Storage humidity	20 to 95% (no condensation)
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction–x, y, z)
Shock resistance	70 G
MTBF	88,044 hours (Approx. 10.1 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326:, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1)

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1.VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals (HD/VD signals).

2.Shutter speed/Mode setting DIP switch

A. Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

B. Partial scan mode switch (bit 5)

The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make the external VD pulse rate and width settings.

C. Restart reset/External trigger shutter mode switch (bits 6 to 8)

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture imaging information on fast-moving objects at a precise moment in time. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

D. Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

E. Binning mode switch (bit 0)

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

3.HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module.

Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

NOTE:

Even when the switch is set to EXT, the camera module operates in internal synchronisation mode when no external HD signal is input. In this case, however, the camera module will not output internal sync signals.

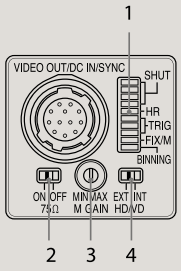
4.M Gain (Manual Gain) control knob

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

5.75Ω termination switch

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

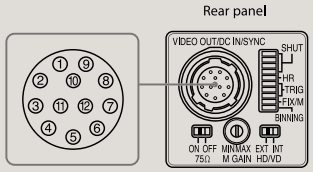
Factory Mode Settings of Rear Panel



No.	Switch	Factory setting mode
1	Shutter speed and mode setting DIP switches	All bits are OFF (left)
2	75Ω termination switch	ON
3	M GAIN control knob	— *
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output 1 (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output 1 (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—		WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	Reset (Ground)*

*Common ground for pins 7, 10, 11.

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

* The electronic shutter cannot be used in restart/reset mode. Partial scan can be used in restart/reset mode in external trigger shutter mode1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

Normal shutter speed settings

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/20000
1/100			

Unit: seconds

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scanning

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

NOTE

Partial scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- The video signal is synchronised with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronised with an internal VD signal when no external HD*/VD signal is input.

*External or internal synchronisation is selected automatically depending on the presence or absence of external HD input.

Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

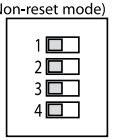
There are two ways to set the shutter speed.

Using trigger pulse width

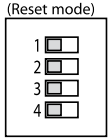
Set all DIP switches (1 to 4 on the rear panel) to OFF. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 µsec to 250 msec.

Exposure time = Trigger pulse width + 5 µsec

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



NOTE

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

Restart reset

R/R
6 7 8

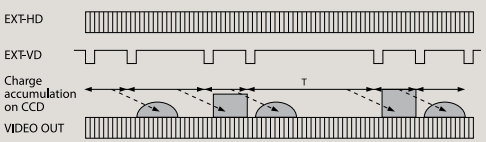
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



Progressive Scan Camera Module

XC-56

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | C Lens Mount | VS Output | VGA Output* | 1/30 sec 1N: Non-Interface

Partial Scan | HD / VD External Sync | Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | Ps

*When the image input board is connected

Outline

The **XC-56** is a monochrome camera module that incorporates a 1/3 type progressive scan CCD. The XC-56 has VGA-class resolution (647 (H) × 493 (V)) output at 30 frames/sec. and 60 frames/sec. by the binning function.

The body dimensions are 29(W) × 29 (H) × 30(D), which are the same as those of XC-HR Series. The pin assignment is compatible to the current XC-55.

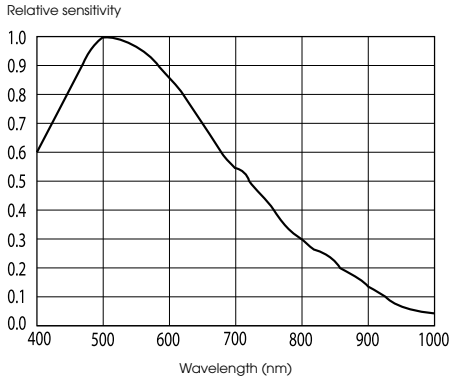
Features

- **1/3 type progressive scan CCD**
- **Non-TV format**
- **Square pixel/ Full pixel read-out**
- **VGA-class resolution image output, 30 frames/sec**
- **Partial scanning function**
- **External trigger shutter**
  - Restart/Reset
  - Mode 1 (Non-reset mode)
  - Mode 2 (Reset mode)
- **Various settings are available on the rear panel**

Spectral Sensitivity Characteristics

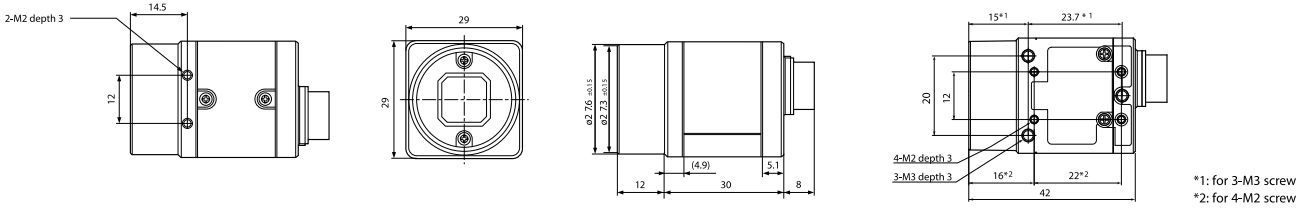
XC-HR56

(Typical values)



(Lens characteristics and light source characteristics excluded.)

Dimensions (mm)



*1: for 3-M3 screw
*2: for 4-M2 screw

Connection Diagram

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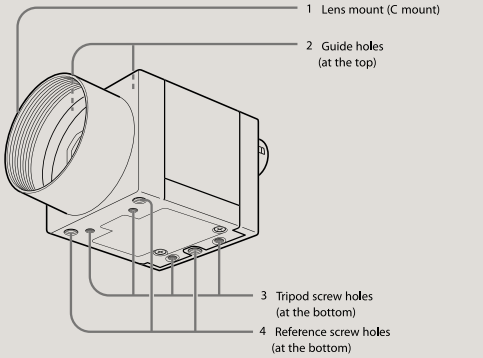
Accessories

Compact camera adaptor
- DC-700CE

Tripod adaptor
- VCT-333I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Location and Function of Parts and Controls

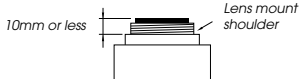


1. Lens mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

Be sure that the lens does not project more than 10 mm from the lens= mount.



2. Guide holes (at the top)

These screw holes help to lock the camera module.

3. Tripod screw holes (at the bottom)

These four screw holes on the bottom are for installing the camera module on a tripod.
To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

4. Reference screw holes (at the bottom)

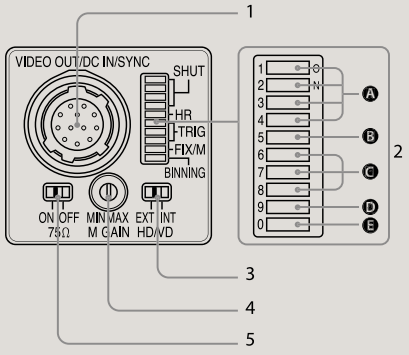
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-56
Image device	1/3 type progressive scan IT CCD
Effective picture elements (H) × (V)	659 × 494
Effective lines (H) × (V)	647 × 493
Output image size (H) × (V)	VGA class (647 × 494)
Cell size (H) × (V)	7.4 µm × 7.4 µm
Lens mount	C mount
Sync system	Internal/External (automatically switched according to input signal)
External synchronization input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)*
Allowable frequency deviation of external synchronization	±1% (in horizontal synchronous frequency)
H jitter	Less than 20 ns
Scan lines	525-line/236-line (Normal mode/ Binning mode)
Video output mode	Normal: 1 -line sequential output 29.97 fps / Binning: F2 -line sequential output 59.94 fps
Video output	1.0Vp-p, sync negative, 75Ω unbalanced
Horizontal frequency	15.734 kHz
Output signal frequency	29.97 Hz (Normal mode) 59.94 Hz (Binning mode)
Horizontal resolution	500TV lines
Sensitivity	400 lx F8 (γ= OFF, FIX GAIN (0 dB))
Minimum illumination	0.5 lx (F1.4, γ= OFF, GAIN +18 dB)
Video S/N ratio	58 dB (GAIN 0 dB)
Gain	Fixed/Manually adjustable
Gamma	OFF (γ =1) (fixed)
White clip	820 mV ± 70mV
Shutter mode	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/8,000, 1/15,000 s
External trigger shutter	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 µs to 250 ms, Input impedance: 10kΩ or more (H: +2 to 5.0V, L: 0 to +0.6V)
Partial scan	R/R mode Binning off: max: 120 fps (Effective line: 102) Binning on: max: 180 fps (Effective line: 59)
	External trigger Binning off: max: 120 fps (Effective line: 102) (mode 1) Binning on: max: 180 fps (Effective line: 159)
Pin assignment	Correspondence to EIAJ compliant 12PIN connector pin assignment Unavailable (No.8 pin: Trigger input (G), No.9 pin: Trigger input, No.10 pin: GRD, No.11pin: +12V) Pins No.10 and 11 are not connected inside the camera
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	1.5 W
Dimensions	29 (W) × 29 (H) × 30 (D) mm (not including projecting parts)
Mass	Approx. 50 g
Operating temperature	–5 to +45°C
Storage temperature	–30 to +60°C
Performance guarantee temperature	0 to +40°C
Operating humidity	20 to 80% (no condensation)
Storage humidity	20 to 95% (no condensation)
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction–x, y, z)
Shock resistance	70 G
MTBF	88,044 hours (Approx. 10.1 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1), Lens

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1.VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12 V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals (HD/VD signals).

2.Shutter speed/Mode setting DIP switch

A. Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

B. Partial scan mode switch (bit 5)

The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make pulse rate settings.

C. Restart reset/External trigger shutter mode switch (bits 6 to 8)

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture fast-moving objects at precise locations. The factory settings for these switches are for normal operation.

D. Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

E. Binning mode switch (bit 0)

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

3.HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module.

Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

NOTE:

Even when the switch is set to EXT, the camera module operates in internal synchronisation mode unless an external HD signal is input. In this case, however, the camera module will not output internal sync signals.

4.M Gain (Manual Gain) control knob

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain. The dimensions of the groove on the knob are 0.5 (W) X 1.9 (L) X 0.45 (D)mm.

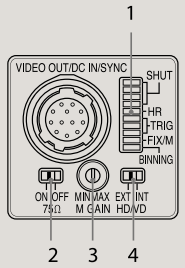
Use a screwdriver that is appropriate for these dimensions.

The knob can be rotated 260 degrees. Do not rotate the knob over the stopper on the limit point.

5.75Ω termination switch

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

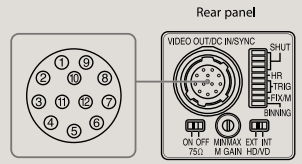
Factory Mode Settings of Rear Panel



No.	Switch	Factory setting mode
1	Shutter speed and mode setting DIP switches	All bits are OFF (left)
2	75Ω termination switch	ON
3	M GAIN control knob	— *
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	Trigger pulse input (Signal)
10	—	—	—	—
11	—	—	—	—
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)*

*Common ground for pins 7, 10, 11.

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

*1 The electronic shutter cannot be used in restart/reset mode.

*2 Partial scan can be used in restart/reset mode and in external trigger shutter mode 1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

Normal shutter speed settings

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/20000
1/100			

Unit: seconds

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture first-moving objects clearly.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2. When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scanning

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

NOTE

Partial scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- The video signal is synchronised with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronised with an internal VD signal when no external HD*/VD signal is input.

*External or internal synchronisation is selected automatically depending on the presence or absence of external HD input.

Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

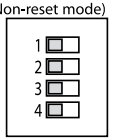
There are two ways to set the shutter speed.

Using trigger pulse width

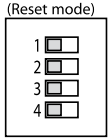
Set all DIP switches (1 to 4 on the rear panel) to OFF. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 µsec to 250 msec.

Exposure time = Trigger pulse width + 8 µsec

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



NOTE

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

Restart reset

R/R
6 7 8

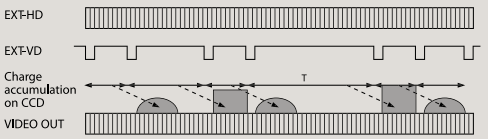
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



Progressive Scan Camera Module

XC-56BB

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | NF Lens Mount | VS Output | VGA Output* | 1/30 sec 1N: Non-interface

Partial Scan | HD / VD External Sync | Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | Remote Head

Ps

*When the image input board is connected

Outline

The **XC-56BB** is a small-sized head-detachable monochrome camera module that incorporates a 1/3 type progressive scan CCD.

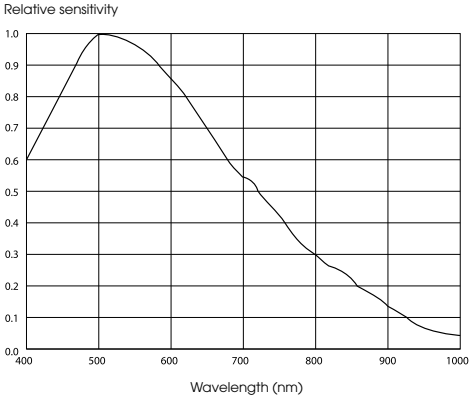
The XC-56BB has the same camera function as those of XC-56. The XC-56BB has VGA-class resolution output at 30 fps. The XC-56BB is a compact model succeeding to the XC-55BB with the dimensions of 22 (W) x 22 (H) x 30 (D) for the camera head and 29 (W) x 29 (W) x 67 (D) for the control part.

Features

- **Incorporating a 1/3 type progressive scan CCD**
- **Non-TV format**
- **Square pixel/Full pixel read-out**
- **VGA-class resolution image output, 30 frames/sec**
- **Partial scanning function**
- **External trigger shutter**
  - Restart/Reset
  - Mode 1 (Non-reset mode)
  - Mode 2 (Reset mode)
- **Various settings are available on the rear panel**
- **Cable length: 2m**

Spectral Sensitivity Characteristics

XC-56BB



(Lens characteristics and light source characteristics excluded.)

Accessories

Compact camera adaptor
- DC-700CE

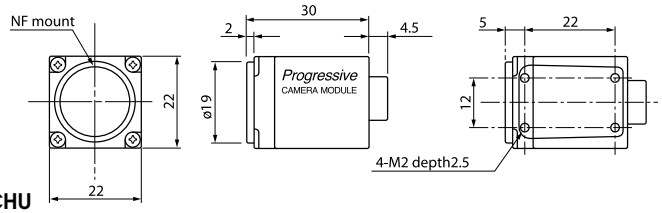
12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P10N (10 m)
- CCXC-12P05N (5 m)
- CCXC-12P25N (25 m)

C mount adaptor
- LO-999CMT

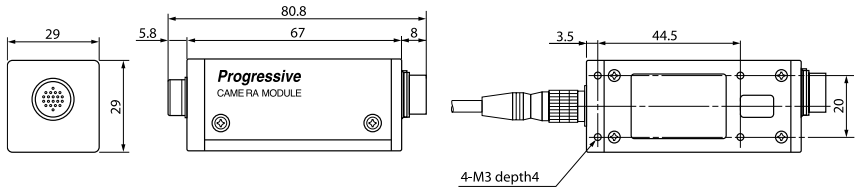
NF mount LENS
- VCL-03S12XM
- VCL-06S12XM
- VCL-12S12XM

Tripod adaptor
- VCT-333I (for CHU)
- VCT-55I (for CCU)

Dimensions (mm)



CHU

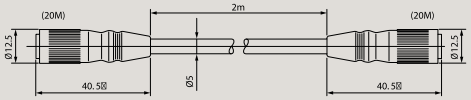


CCU

Connection Diagram p75

Supplied Accessories

Dedicated cable CCU and CHU



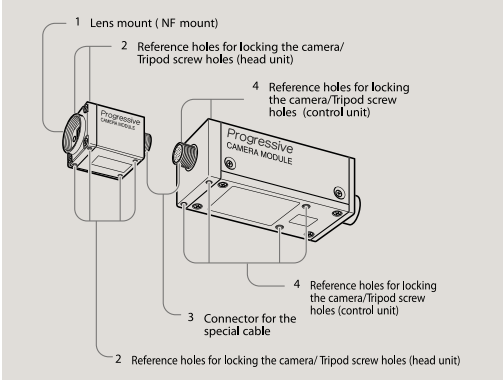
CHU (20pin-M)/CCU (20pin-M)

Specifications

	XC-56BB
Image device	1/3 type progressive scan IT CCD
Effective picture elements (H) × (V)	659 × 494
Effective lines (H) × (V)	647 × 493
Output image size (H) × (V)	VGA class (647 × 494)
Cell size (H) × (V)	7.4 µm × 7.4 µm
Lens mount	NF mount
Flange focal length	12.0 mm
Sync system	Internal/External (automatically switched according to input signal)
External synchronization input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)
Allowable frequency deviation of external synchronization	±1% (in horizontal synchronous frequency)
H jitter	Less than 20 ns
Scan lines	525-line/236-line (Normal mode/ Binning mode)
Video output mode	Normal: 1 -line sequential output 29.97 fps / Binning: F2 -line sequential output 59.94 fps
Video output	1.0Vp-p, sync negative, 75Ω unbalanced
Horizontal frequency	15.734 kHz
Output signal frequency	29.97 Hz (Normal mode)/59.94 Hz (Binning mode)
Horizontal resolution	500TV lines
Sensitivity	400 lx F8 (γ= OFF, FIX GAIN (0 dB))
Minimum illumination	0.5 lx (F1.4, γ= OFF, GAIN +18 dB)
Video S/N ratio	58 dB
Gain	Fixed/Manually adjustable
Gamma	OFF (γ =1) (fixed)
White clip	820 mV ± 70mV
Shutter mode	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/8,000, 1/15,000 s
External trigger shutter	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 µs to 250 ms, Input impedance: 10kΩ or more (H: +2 to 5.0V, L: 0 to +0.6V)
Partial scan	R/R mode Binning off: max: 120 fps (Effective line: 102) Binning on: max: 180 fps (Effective line: 59)
	External trigger Binning off: max: 120 fps (Effective line: 100) Binning on: max: 120 fps (Effective line: 105)
Pin assignment	Correspondence to EIAJ compliant 12PIN connector pin assignment Unavailable (No.8 pin: Trigger input (G), No.9 pin: Trigger input, No.10 pin: GRD, No.11pin: +12V) Pins No.10 and 11 are not connected inside the camera
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	2.2 W
Dimensions	CHU: 22(W) × 22(H) × 30(D) mm CCU: 29(W) × 29(H) × 67(D) mm (not including projecting parts)
Mass	CHU: Approx. 40 g CCU: Approx. 100 g
Operating temperature	–5 to +45°C
Storage temperature	–30 to +6°C
Performance guarantee temperature	0 to +40°C
Operating humidity	20 to 80% (no condensation)
Storage humidity	20 to 95% (no condensation)
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction – x, y, z)
Shock resistance	70 G
MTBF	73,800 hours (Approx. 8.4 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1), Dedicated cable (1), Ferrite core (1)

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Location and Function of Parts and Controls

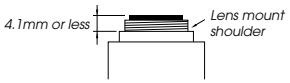


1. Lens mount (NF mount)

Install an NF mounted lens or optical device, e.g., the standard lens VCL-12S12XM. If you install a C mount lens on the XC-56BB, you will need the C mount adaptor LO-999CMT.

NOTE

For installing a C mount lens on the XC56BB



- *If you install a C mount lens on the XC56BB, you will need the C mount adaptor LO-999CMT (sold separately). Be sure that the lens does not project more than 4.1 mm from the lens mount.*
- *For setting the camera when using C mount adaptor, fix the lens mount (C mount) instead of fixing the camera head in order to avoid applying unnecessary forces to the camera head.*
- *Avoid using C mount adaptor in the places where vibrations or shocks are applied often. Doing so will damage the equipment or loosen the connection.*

2. Reference holes for locking the camera/Tripod screw holes (head unit)

You can attach a tripod to the reference holes (4) on the bottom. You will need a tripod adaptor VCT-333I to install the tripod.

There are two more reference holes on the front of the top surface.

NOTE

- *The XC-56BB head unit (CHU) must have the same serial number as the control unit (CCU).*
- *Do not connect or disconnect the supplied cable while the power is turned on, otherwise the camera may be damaged.*

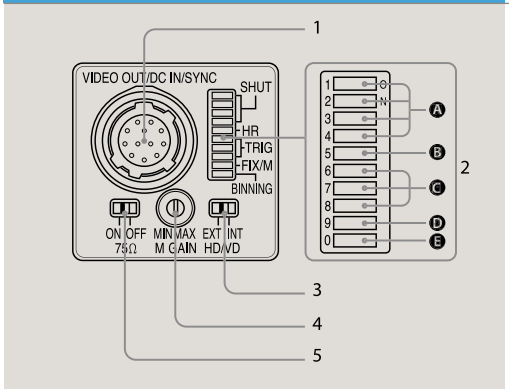
3. Connector for the special cable

Connect the head unit and the control unit with the supplied cable.

4. Reference holes for locking the camera /Tripod screw holes (control unit)

High-precision screw holes for locking the camera onto the lens mounted surface. Locking the camera minimises optical axis deviation. For details, see the Application Guide. You can attach a tripod to the reference holes on the bottom of the head unit. You will need a tripod adaptor VCT-55I to install the tripod. There are two more reference holes on the front of the top surface.

Rear Panel



NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1. VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12 V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals (HD/VD signals).

2. Shutter speed/Mode setting DIP switch

A. Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

B. Partial scan mode switch (bit 5)

The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use high-rate scan mode, you also need to make pulse rate settings.

C. Restart reset/External trigger shutter mode switch (bits 6 to 8)

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture fast-moving objects at precise locations. The factory settings for these switches are for normal operation.

D. Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

E. Binning mode switch (bit 0)

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

3. HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module. Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

NOTE:

Even when the switch is set to EXT, the camera module operates in internal synchronisation mode unless an external HD signal is input. In this case, however, the camera module will not output internal sync signals.

4. M Gain (Manual Gain) control knob

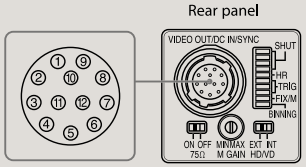
If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain. The dimensions of the groove on the knob are 0.5 (W) X 1.9 (L) X 0.45 (D)mm.

Use a screwdriver that is appropriate for these dimensions. The knob can be rotated 260 degrees. Do not rotate the knob over the stopper on the limit point.

5. 75Ω termination switch

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	Trigger pulse input (Signal)
10	—	—	—	—
11	—	—	—	—
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)*

*Common ground for pins 7, 10, 11.

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

*1 The electronic shutter cannot be used in restart/reset mode.

*2 Partial scan can be used in restart/reset mode and in external trigger shutter mode 1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

Normal shutter speed settings

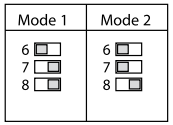
1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/20000
1/100			

Unit: seconds

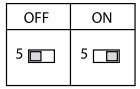
External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture first-moving objects clearly.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2. When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.



Partial scanning



(Partial mode is compatible with Mode 1 only.)

NOTE

High-rate scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- The video signal is synchronised with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronised with an internal VD signal when no external HD*/VD signal is input.

*External or internal synchronisation is selected automatically depending on the presence or absence of external HD input.

Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

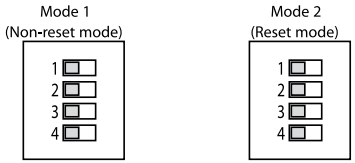
To Set the External Trigger Shutter

There are two ways to set the shutter speed.

Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to OFF. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 µsec to 250 msec.

Exposure time = Trigger pulse width + 8 µsec



NOTE

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

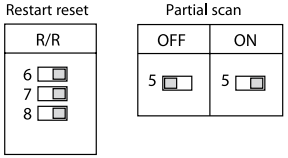
(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.

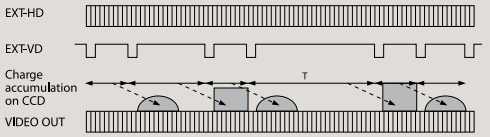
To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).



Long Exposure

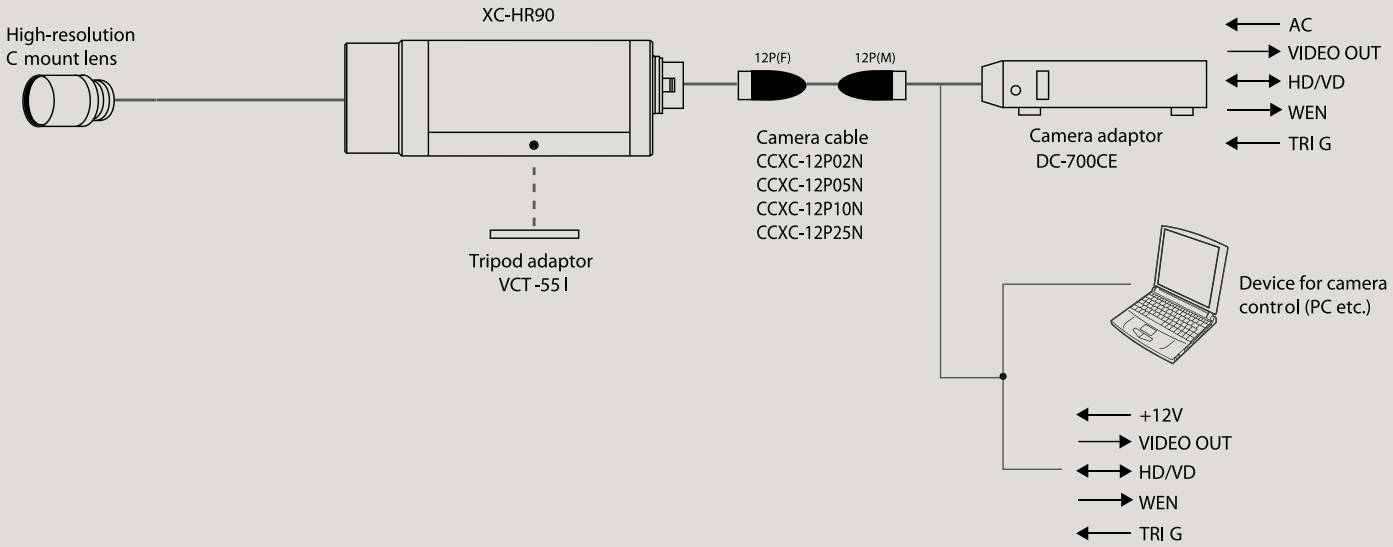
The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



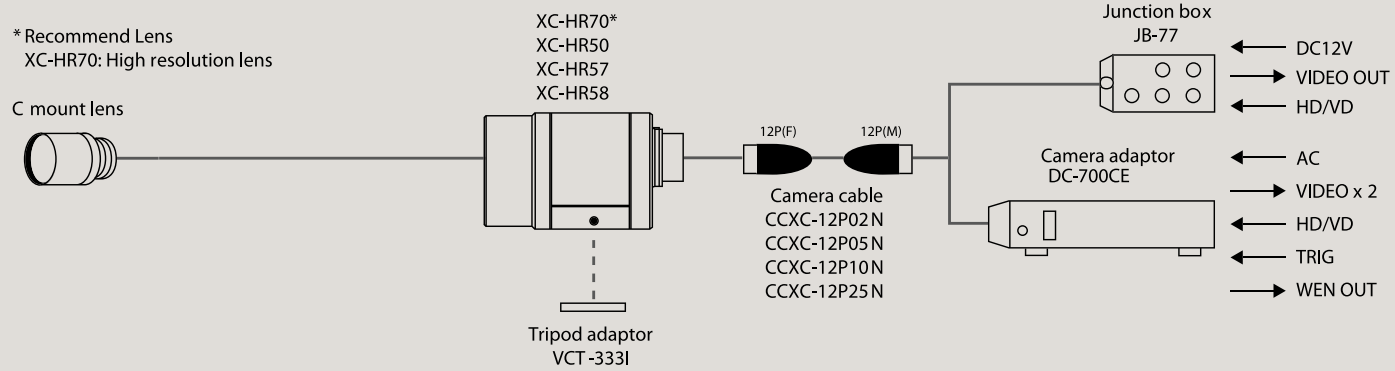
Connection Diagram

XC-HR90



Connection Diagram

XC-HR70 / XC-HR50 / XC-HR57 / XC-HR58



XC-HR series (XC-HR70/HR50/HR57/HR58	JB-77
Normal	●
Normal shutter	●
Restart/reset (R/R)	●
External trigger shutter	–
WEN OUT	–

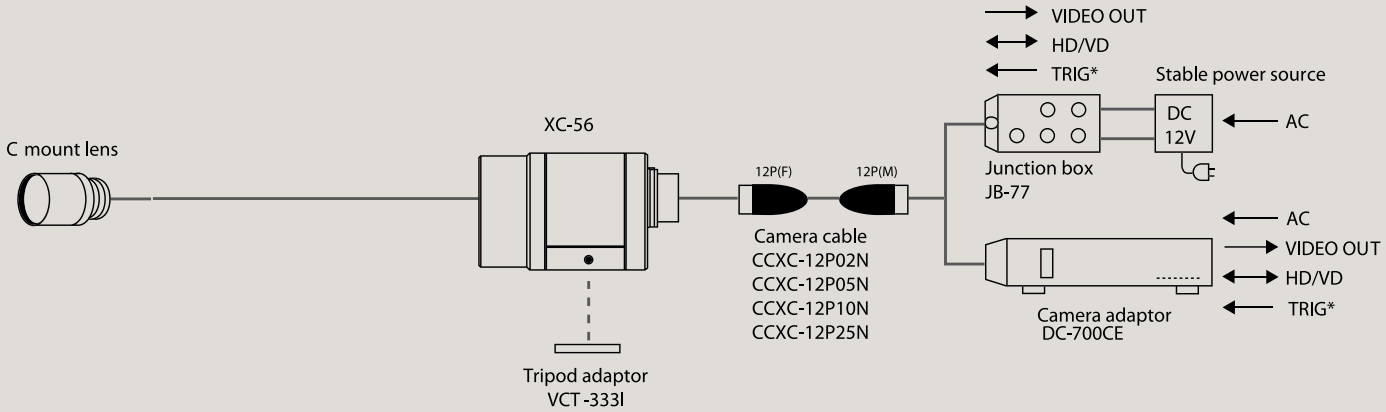
● Usable
– Not usable

NOTE

When using the JB-77, not all of the XC-HR series functions can be used. See the table on this page.

Connection Diagram

XC-56

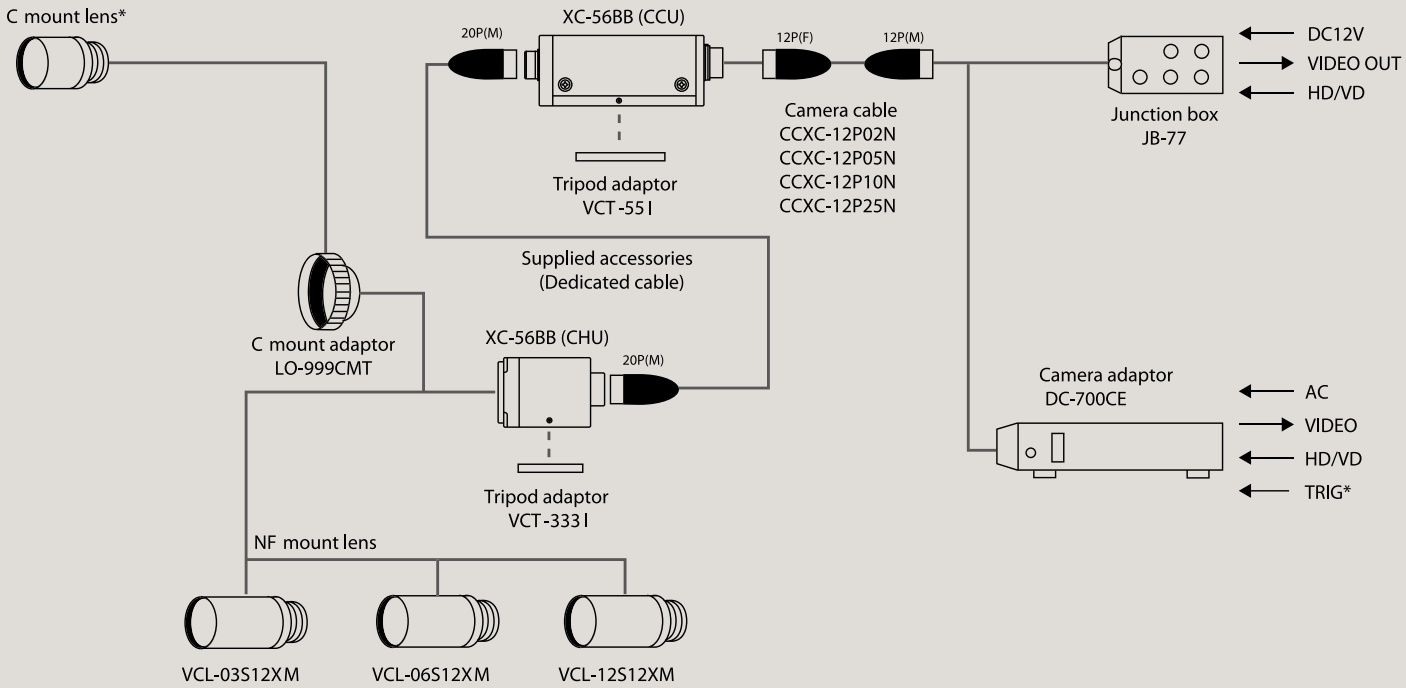


To operate the camera by inputting a trigger signal,

- Use Junction box JB-77 and commercial stabilised power supply, and input a trigger signal to CLOCK OUT connector of JB-77.
- Input a trigger signal to Video connector 2 of Camera adaptor DC-700CE.

Connection Diagram

XC-56BB



*To use the C mount lens, Screw the C mount adaptor into the lens mount of the camera.

NOTE

- *The XC-56BB head unit (CHU) must have the same serial number as the control unit (CCU).*
- *Do not connect or disconnect the supplied cable while the power is turned on, otherwise the camera may be damaged.*

To operate the camera by inputting a trigger signal,

- Use Junction box JB-77 and commercial stabilised power supply, and input a trigger signal to CLOCK OUT connector of JB-77.
- Input a trigger signal to Video connector 2 of Camera adaptor DC-700CE.

TV Format

XC-ST70/ST70CE	77
XC-ST50/ST50CE	77
XC-ST51/ST51CE	77
XC-ST30/ST30CE	77
XC-ES50/ES50CE	81
XC-ES51/ES51CE	81
XC-ES30/ES30CE	81
XC-EI50/EI50CE	85
XC-EI30/EI30CE	85
XC-EU50/EU50CE	89
XC-ES50L/ES50LCE	94
XC-555/555P	98
Connection Diagrams	*102*

Monochrome

XC-ST70/ST70CE XC-ST51/ST51CE XC-ST50/ST50CE XC-ST30/ST30CE

TV Format Output | 2/3 Type CCD *1 | 1/2 Type CCD *2 | 1/3 Type CCD *3 | C Lens Mount | VS Output | HD / VD External Sync

VS External Sync | Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter

*1: XC-ST70/ST70CE
*2: XC-ST50/ST50CE/ST51/ST51CE
*3: XC-ST30/ST30CE

Outline

The **XC-ST Series** cameras incorporate the latest CCD and signal processing technologies into a compact black and white camera module.

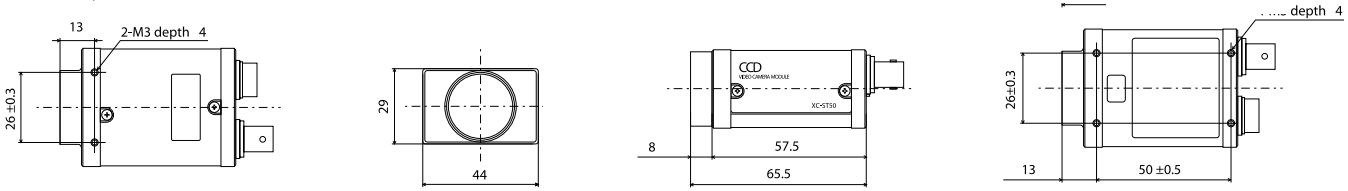
A new external trigger design allows the electronic shutter speed to be freely specified by the width of an external trigger pulse or by a switch setting on the rear panel of the camera. These cameras are also user-friendly, with all switch settings located on the rear panel. Moreover, the XC-ST Series have the exact same dimensions, simplifying space requirements and making it easy to interchange them if necessary. These features, along with high picture quality and high shock and vibration tolerance make the XC-ST Series cameras ideal for demanding machine vision applications.

Features

- **XC-ST70/ST70CE: 2/3 type IT CCD**
- **XC-ST51/ST51CE/ST50/ST50CE: 1/2 type IT CCD**
- **XC-ST30/ST30CE: 1/3 type IT CCD**
- **Small and lightweight:**
  44 (W) × 29 (H) × 57.5 (D) mm, Approx. 110 g
- **Flexible trigger shutter functions**
- **High sensitivity**
  XC-ST51/ST51CE: 0.2 lx (F1.4)
  XC-ST70/ST70CE/ST50/
  ST50CE/ST30/ST30CE: 0.3 lx (F1.4)
- **2:1 Interlaced/non-interlaced (during external sync input)**
- **High S/N ratio**
  60 dB (XC-ST70/ST50/ST51)
  58 dB (XC-ST30)
- **Electronic shutter function (1/100 to 1/10,000 s)**
- **Synchronisation: internal/external (HD/VD, VS)**
- **Frame/Field exposure**
- **Restart/Reset function**
- **High shock and vibration tolerant**

Dimensions (mm)

Camera body of all XC-ST models



Connection Diagram p102

Accessories

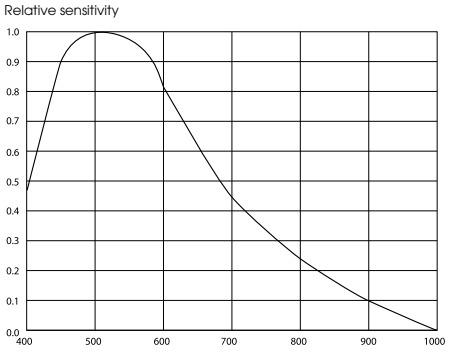
Compact camera adaptor
- DC-700CE

Tripod adaptor
- VCT-ST70I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

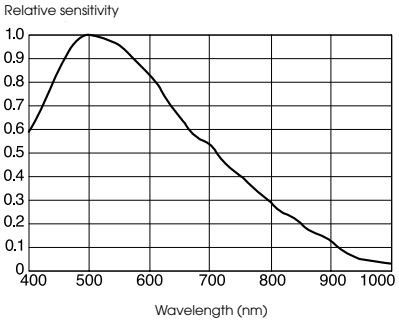
Spectral Sensitivity Characteristics

XC-ST70
(Typical Values)



(Lens characteristics and light source characteristics excluded.)

XC-ST50/XC-ST51/XC-ST30
(Typical Values)

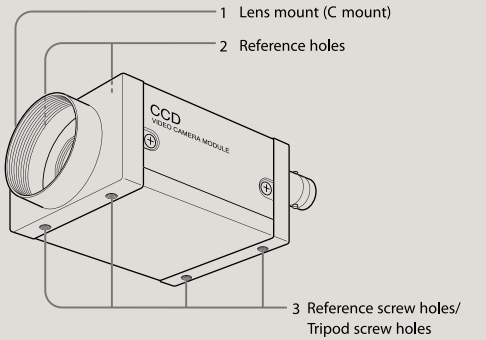


(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-ST70	XC-ST50	XC-ST51	XC-ST30	XC-ST70CE	XC-ST50CE	XC-ST51CE	XC-ST30CE
Image device	2/3 type IT CCD	1/2 type IT CCD		1/3 type IT CCD	2/3 type IT CCD	1/2 type IT CCD		1/3 type IT CCD
Signal system	EIA				CCIR			
Effective picture elements (H) × (V)	768 × 494				752 × 582			
Effective lines (H) × (V)	752 × 485				736 × 575			
Cell size (H) × (V)	11.6 µm × 13.5 µm	8.4 µm × 9.8 µm		6.35 µm × 7.4 µm	11.6 µm × 11.2 µm	8.6 µm × 8.3 µm		6.5 µm × 6.25 µm
Horizontal frequency	15.734 kHz				15.625 kHz			
Vertical frequency	59.94 Hz				50 Hz			
Lens mount	C mount							
Sync system	Internal/External							
External Sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)							
External Sync frequency	±1% (in horizontal sync frequency), VS							
Jitter	less than ± 20 nsec (external horizontal frequency)							
Scanning system	2:1 Interlaced							
Video output	1.0 Vp-p, negative, 75 Ω unbalanced							
Horizontal resolution	570 TV lines				560 TV lines			
Sensitivity	400 lx, F8(γ= ON, 0 dB)	400 lx, F11(γ= ON, 0 dB)		400 lx, F5.6(γ= ON, 0 dB)	400 lx, F8(γ= ON, 0 dB)	400 lx, F11(γ= ON, 0 dB)		400 lx, F5.6(γ= ON, 0 dB)
Minimum illumination	0.3 lx (F1.4, AGC ON)	0.2 lx(F1.4, AGC ON)		0.3 lx(F1.4, AGC ON)	0.3 lx (F1.4, AGC ON)	0.2 lx(F1.4, AGC ON)		0.3 lx(F1.4, AGC ON)
S/N ratio	60 dB			56 dB	58 dB			54 dB
Gain	AGC/Fixed/Manual (adjustable on the rear panel)							
Gamma	ON/OFF (adjustable on the rear panel)							
Normal shutter	1/100 to 1/10,000 s				1/120 to 1/10,000 s			
External trigger shutter	1/4 to 1/10,000 s				1/4 to 1/8,000 s			
Power requirements	DC12 V (+10.5 to 15 V)							
Power consumption	2.1 W	2.0 W		1.9 W	2.1 W	2.0 W		1.9 W
Dimensions	44 (W) × 29 (H) × 57.5 (D) mm (not including projecting parts)							
Mass	Approx. 105 g	Approx. 110 g			Approx. 105 g	Approx. 110 g		
Operating temperature/humidity	–5°C to +45°C / 20 to 80% (no condensation)							
Storage temperature/humidity	–30°C to +60°C / 20 to 95% (no condensation)							
Performance guarantee temperature	0 to +40°C							
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction–x, y, z)							
Shock resistance	70 G							
MTBF	70,600 hours (Approx. 8.1 years)							
Regulatory compliance	UL6500, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326							
Supplied accessories	Lens mount cap (1), Operating instructions (1)							

Location and Function of Parts and Controls

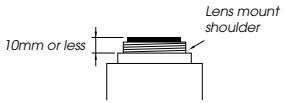


1. Lens Mount (C mount)

Attach any C mount lens or other optical equipment.

NOTE

The lens must not project more than 10 mm from the lens mount.



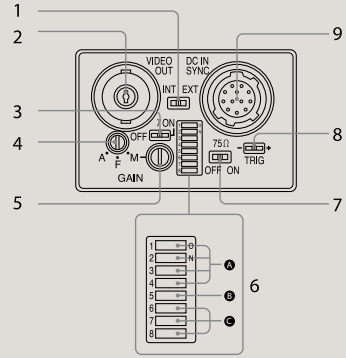
2. Reference holes (at the top)

These precision screw holes are for locking the camera module.
Locking the camera module using these holes secures the optical axis alignment.

3. Reference screw holes/Tripod screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment. You can install the camera on a tripod. To install on a tripod, you will need to install the VCT-ST70I tripod adaptor using the reference holes on the bottom of the camera.

Rear Panel



1. HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module. Set the switch to EXT to input HD/VD signals from an external unit. (Factory setting: EXT).

2. VIDEO OUT (Video signal output) connector (BNC)

You can use this connector for video signal output from the camera module.

3. γ compensation ON/OFF switch

Turn on this switch for g compensation.
(Factory setting: OFF)

4. GAIN switch

This switch selects AGC (A), fixed gain (F), or manual gain control (M). (Factory setting: F).

5. Manual gain control

Adjust the gain using this control. GAIN switch 4 must have been set to M (Manual).

6. Shutter speed/Mode setting DIP switch

A. **Shutter speed (bits 1-4)**
Set an appropriate shutter speed. (Factory setting: Shutter off)

B. **High-rate scan mode switch (bit 5)**
Factory setting: FRAME

C. **Restart reset/External trigger shutter mode switch (bits 6 to 8)**
Factory setting: Normal

NOTE

Do not use any other settings for Restart reset/External trigger shutter mode except those shown on the next page. Using other settings may cause the camera to malfunction.

If you set the External trigger shutter mode, set 0 in bits 1 – 4.

7. 75Ω termination switch

This switch selects AGC (A), fixed gain (F), or manual gain control (M). (Factory setting: F).

8. TRIG polarity switch

Adjust the gain using this control. GAIN switch 4 must have been set to M (Manual).

9. DC IN/SYNC (DC power input/sync signal I/O) connector (12-pin)

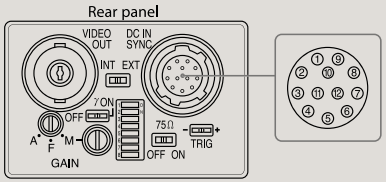
Connect a CCXC-12P05N camera cable to this connector the +12 V DC power supply and the video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals.

Factory Mode Settings of Rear Panel

No.	Switch		Factory setting mode
1	HD/VD signal input/output switch		EXT
3	γ compensation ON/OFF switch		OFF
4	GAIN switch		F
5	Manual gain control		– 1)
6	Shutter speed/ Mode setting DIP switches	Shutter speed (bits 1 – 4)	Shutter OFF
		Potential accumulation mode (bit 5)	FRAME
		Restart reset/External trigger shutter mode switch (bits 6 – 8)	Normal
8	75Ω termination switch		ON
9	TRIG polarity switch		+

1. This unit is shipped from the factory with the GAIN switch being set to F (fix), so the Manual gain control knob is not operative unless the switch setting is changed. When the GAIN switch is set to M (manual), you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



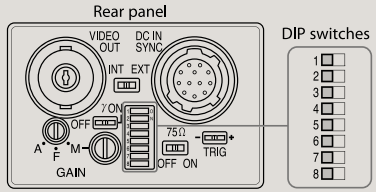
Pin No.	Camera sync output	External mode (VS)	External mode (VS)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	—	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	—	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	VS input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—	—
9	—	—	—	—	—
10	—	—	—	—	WEN output (Signal)
11	—	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	VS input (Ground)	Reset (Ground)	Reset (Ground)*

*Common ground for pins 7,10, and 11

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

DIP Switches on the Rear Panel



Switches 1 to 4: Shutter speed
Switch 5: Potential accumulation mode
Switches 6 to 8: Restart reset/External trigger shutter mode switch

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal shutter speed settings

Shutter OFF	1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	Flickerless* 1/100 (EIA) 1/120 (CCIR)	

(Unit: second)

*If you set the mode to flickerless, the positions of DIP switches 1 to 3 are optional.

NOTE

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

There are two modes for the timing in which video signals are obtained.

- **Mode 1 (Non-reset mode)**
  In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.
  - The video signal is synchronised with the external VD signal when an external HD/VD signal is input.
  - The video signal is synchronised with an internal VD signal when no external HD/VD signal is input.
- **Mode 2 (Reset mode)**
  In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

- **Using the DIP switches on the rear panel**
  For shutter speeds, see the following table.

Mode 1 (Non-reset mode)

1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)

(Unit: second)

Mode 2 (Reset mode)

1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)

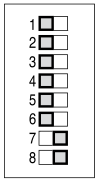
(Unit: second)

NOTE

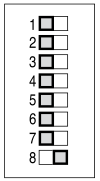
The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

- **Using trigger pulse width**
  Set all DIP switches (1 to 4 on the rear panel) to 0. You can obtain an arbitrary shutter speed by setting the trigger pulse width within the range of 2 msec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



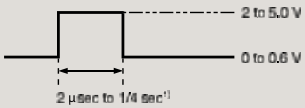
Exposure time = Trigger pulse width + 97 µsec (EIA)
Trigger pulse width + 120 µsec (CCIR)

NOTE

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.
If you input another trigger pulse before the video signal output for the previous trigger pulse is completely output, an incorrect video signal will be output.

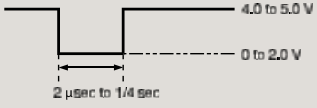
Specifications of trigger pulse

When using a trigger pulse like shown below, set the TRIG polarity selector switch on the rear panel to + :



1. If you set the trigger pulse with the DIP switches, use the 100 µsec to 1/4 sec pulse width

When using a trigger pulse like shown below, set the TRIG polarity selector switch on the rear panel to - :

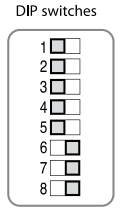


- Input impedance: 10kΩ or more.
- The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

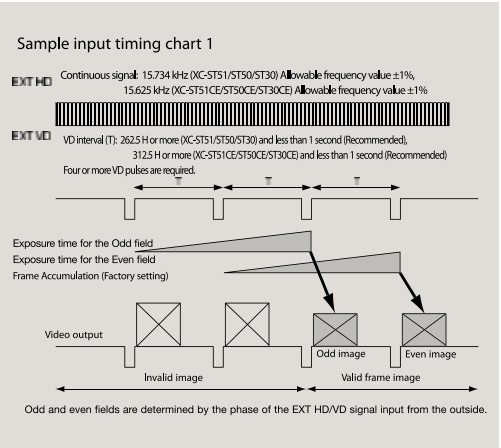
To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting Restart/Reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below. The Reset/Restart mode is especially effective for frame image output with long exposure or a strobe light.



Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.



Monochrome

XC-ES50/ES50CE XC-ES30/ES30CE
XC-ES51/ES51CE

TV Format Output | 1/2 Type CCD *1 | 1/3 Type CCD *2 | C Lens Mount | VS Output | HD / VD External Sync

Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter

*1: XC-ES50/ES50CE/ES51/ES51CE
*2: XC-ES30/ES30CE

Outline

The **XC-ES Series** is a small-sized lightweight monochrome camera module designed as an input device for image processing, realised through the newest high-density packaging.

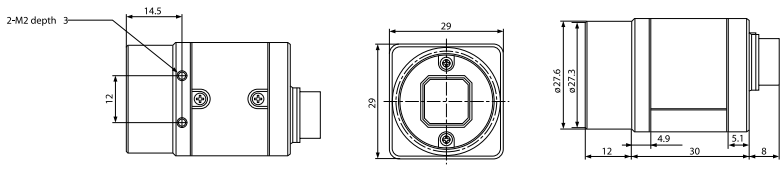
The downsized main body allows to set the XC-ES Series easily at the places where it is difficult to set the existing devices.

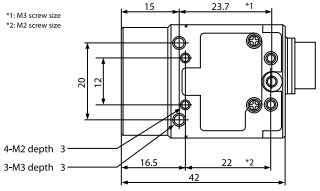
Features

- **XC-ES50/ES50CE: 1/2 type IT CCD**
- **XC-ES51/ES51CE: 1/2 type IT CCD High sensitivity**
- **XC-ES30/ES30CE: 1/3 type IT CCD**
- **Flexible trigger shutter functions**
  XC-ES50/ES51/ES30 : 1/4 to 1/10,000 s
  XC-ES50CE/ES51CE/ES30CE: 1/4 to 1/8,000 s
- **Electronic shutter function**
  XC-ES50/ES51/ES30: 1/100 to 1/10,000 s
  XC-ES50CE/ES51CE/ES30CE: 1/120 to 1/10,000 s
- **High S/N ratio: 60 dB**
- **2:1 Interlaced/non-interlaced**
- **Frame/Field accumulation**
- **Restart/Reset function**
- **Sync system: internal/external (HD/VD)**
- **High shock and vibration resistance**

Dimensions (mm)

Camera body of all XC-ST models





Connection Diagram p103

Notice

From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles. The outside dimensions will be changed from the following serial numbers.
XC-ES50/XC-ES30: 250001
XC-ES50CE/ES30CE: 550001
XC-ES51:150001
XC-ES51CE:450001

Accessories

Compact camera adaptor
- DC-700CE

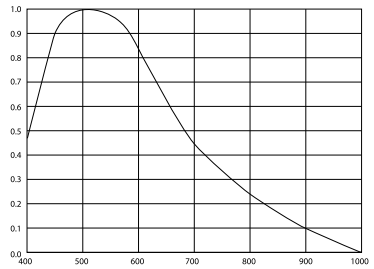
Tripod adaptor
- VCT-333I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

XC-ES50/XC-ES51/XC-ES30
(Typical Values)

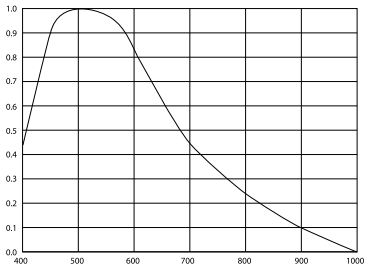
Relative sensitivity



Wavelength (nm)

XC-ES50CE/XC-ES51CE/XC-ES30CE
(Typical Values)

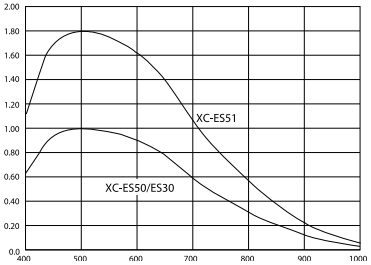
Relative sensitivity



Wavelength (nm)

XC-ES50/XC-ES51/XC-ES30
(Comparison sensitivity)

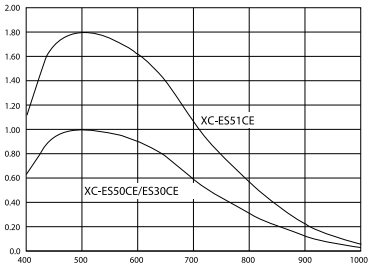
Relative sensitivity



Wavelength (nm)

XC-ES50CE/XC-ES51CE/XC-ES30CE
(Comparison sensitivity)

Relative sensitivity



Wavelength (nm)

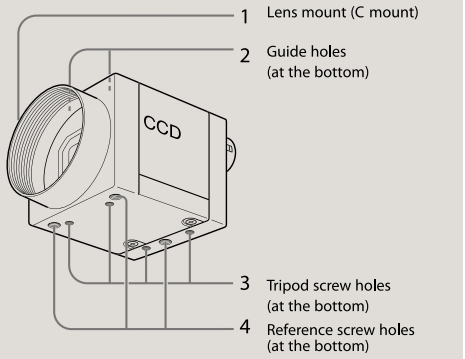
(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-ES50	XC-ES51	XC-ES30	XC-ES50CE	XC-ES51CE	XC-ES30CE
Image device	1/2 type IT CCD		1/3 type IT CCD	1/2 type IT CCD		1/3 type IT CCD
Signal system	EIA			CCIR		
Effective picture elements (H) × (V)	768 × 494			752 × 582		
Effective lines (H) × (V)	752 × 485			736 × 575		
Cell size (H) × (V)	8.4 µm × 9.8 µm		6.35 µm × 7.4 µm	8.6 µm × 8.3 µm		6.5 µm × 6.25 µm
Horizontal frequency	15.734 kHz			15.625 kHz		
Vertical frequency	59.94 Hz			50 Hz		
Lens mount	C mount					
Sync system	Internal/External (auto)					
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)					
External sync frequency	±1% (in horizontal sync frequency)					
Jitter	less than ±20 nsec					
Scanning system	525 lines 2:1 Interlaced (Automatic switching according to input signal)					
Video output	1.0 Vp-p, negative, 75 Ω unbalanced					
Horizontal resolution	570 TV lines			560 TV lines		
Sensitivity	400 lx F5.6	400 lx F8	400 lx F4	400 lx F5.6	400 lx F8	400 lx F4
	(γ =ON, MIN GAIN, No IR cut filter)					
Minimum illumination*2	0.3 lx	0.2 lx	0.3 lx	0.3 lx	0.2 lx	0.3 lx
S/N ratio	60 dB					
Gain	AGC/Manual (Adjustable on the rear panel)					
Gamma	ON/OFF (Adjustable on the rear panel)					
Normal shutter	1/100 to 1/10,000 s			1/120 to 1/10,000 s		
External trigger shutter*3	1/4 to 1/10,000 s			1/4 to 1/8,000 s		
Power requirements	DC 12 V (+9 to16 V)					
Power consumtion	1.6 W		1.4 W	1.6 W		1.4 W
Dimension	29 (W) × 29 (H) × 30 (D) mm (not including projecting parts)					
Mass	Approx. 50 g					
Operating temperature/humidity	–5°C to +45°C / 20 to 80% (no condensation)					
Storage temperature/humidity	–20°C to +60°C / 20 to 95% (no condensation)					
Performance guarantee temperature	0 to +40°C					
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction–x, y, z)					
Shock resistance	70 G					
MTBF	126,469 hours (Approx. 14.4 years)					
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326					
Supplied accessories	Lens mount cap (1), Operating instructions (1)					

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.
*2 F1.4, AGC ON, without IR cut filter.
*3 Using DIP switch on the rear panel or Using trigger pulse width.

Location and Function of Parts and Controls

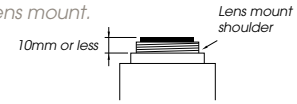


1. Lens Mount (C mount)

Attach any C-mount lens or other optical equipment.

NOTE

Be sure that the lens does not project more than 10 mm from the lens mount.



2. Guide holes (at the top)

These screw holes help to lock the camera module.

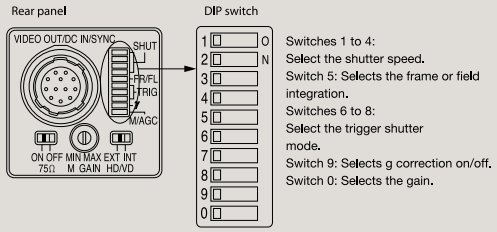
3. Tripod screw holes (at the bottom)

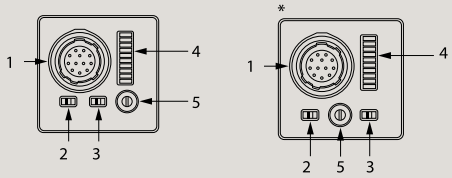
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

4. Reference screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Rear Panel





*The rear panel is different for the serial numbers shown below.
XC-ES50/ES30 : 200001
XC-ES50CE/ES30CE : 500001

1. 12-pin multi-connector

DC IN/HD/VD (DC power/sync signal input) VIDEO OUT terminal.

2. 75Ω termination selector switch

3. HD/VD input-output selector switch

4. Shutter speed/mode setting DIP switch

5. Volume control switch

This switch can be changed in the range of Switch 0 to 18 dB when the GAIN switch is set to "M".

*During factory setting, this switch is adjusted to the mechanical center.

NOTE

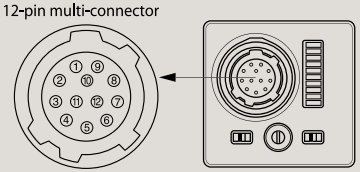
When setting DIP switch 5 to the frame integration, set the volume control switch 8 to the MAX side from the mechanical center (because of CCD characteristics).

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

Factory Mode Settings of Rear Panel

No.	Switch		Factory setting mode
2	75Ω termination selector switch		ON
3	HD/VD signal input/output switch		EXT
4	Shutter speed/ Mode setting DIP switches	Switches 1 to 4: Select the shutter speed.	OFF
		Switch 5: Selects the frame or field integration.	FRAME
		Switches 6 to 8: Select the trigger shutter mode	Normal
		Switch 9: Selects correction on/off	OFF
		Switch 0: Selects the gain	Manual
5	Volume control switch		Mechanical center

Connector Pin Assignments



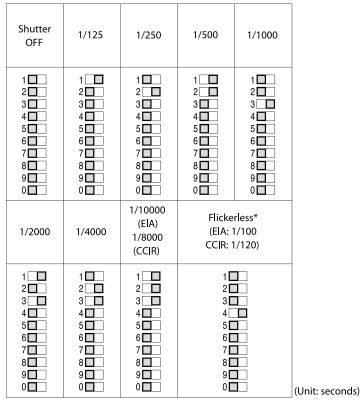
Pin No.	External HD/VD synchronisation	Internal HD/VD synchronisation
1	GND	GND
2	+12 V	+12 V
3	GND	GND
4	VIDEO output	VIDEO output
5	GND	GND
6	External HD input	Internal HD output
7	External VD input *1	Internal VD output
8	GND	GND
9	—	—
10	WEN output *2	WEN output *2
11	TRIG input	TRIG input
12	GND	GND

*1 An input VD signal is required when the restart/reset mode is used.
*2 A WEN output signal is valid only in the external trigger shutter mode.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to clearly capture a high-speed moving object.

Setting of normal shutter speed



(Unit: seconds)

*In the flickerless mode, the normal shutter speed is 1/100 sec for XC-ES50/ES30 and XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30 CE and XC-EI50CE/EI30CE (CCIR).

NOTE

It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)

External Trigger Shutter

These modes are used to capture one image (one field) per trigger pulse. Set DIP switches 6, 7, and 8 on the rear panel to mode 1 or 2. (Refer to the table below.)

When the trigger pulse width is 1/3 sec or more, the output signal is switched to a normal video signal.

There are two modes for timing in which a video signal is obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

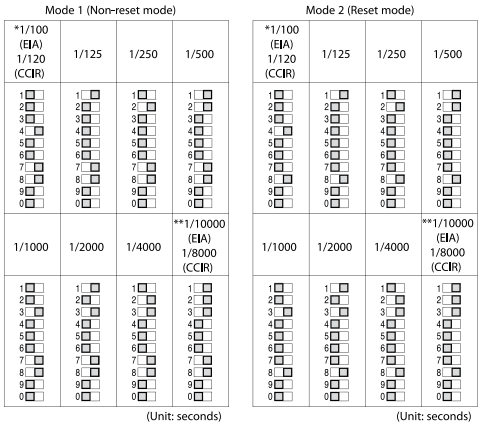
- A video signal is synchronised with the external VD signal when an external HD/VD signal is input.
- A video signal is synchronised with an internal VD signal when no external HD/VD signal is input.

Mode 2 (Reset mode)

In this mode, an internal video signal is output from a trigger pulse after a certain period of time.

Setting of external trigger shutter speed

There are two ways to set the shutter speed.

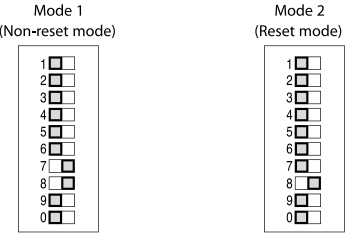


(Unit: seconds) (Unit: seconds)

* The external trigger shutter speed is set to 1/100 sec for XC-ES50/ES51/ES30 (EIA) and 1/120 sec for XC-ES50CE/ES51CE/ES30CE (CCIR).
** The external trigger shutter speed is set to 1/10000 sec for XC-ES50/ES51/ES30 (EIA) and 1/8000 sec for XC-ES50CE/ES51CE/ES30CE (CCIR).

Using trigger pulse width

- Set DIP switches 1 to 4 on the rear panel to 0.
- An arbitrary shutter speed can be obtained by setting the trigger pulse width to the range of 2 msec to 250 msec.



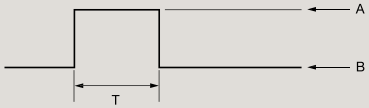
Exposure time = Trigger pulse width + 97 µsec (EIA)
Trigger pulse width + 120 µsec (CCIR)

NOTE

1 It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)

2 After a trigger pulse is input, a new trigger pulse must not be input before the video signal obtained by the trigger pulse has been output.

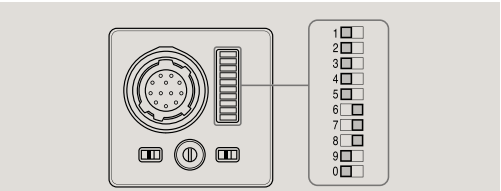
Specifications of trigger pulse



T: 2 ms to 1/4 s, 100 µs to 1/4 s when setting the shutter speed using DIP switch
* Input impedance: 10 kW or more
* The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

The information on one screen can be extracted at any time by inputting a restart/reset signal (HD/VD) from the outside. To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of a camera as shown in the table below. The setting is especially effective for the following operation.



Monochrome

XC-EI50/EI50CE
XC-EI30/EI30CE

TV Format Output | 1/2 Type CCD *1 | 1/3 Type CCD *2 | C Lens Mount | VS Output | HD / VD External Sync

Normal Shutter | Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | Near - IR Sensitivity

*1: XC-E150/E150CE
*2: XC-E130/E130CE

Outline

Like the XC-ES Series, the **XC-EI Series** are compact and lightweight and offers near-infrared sensitivity.

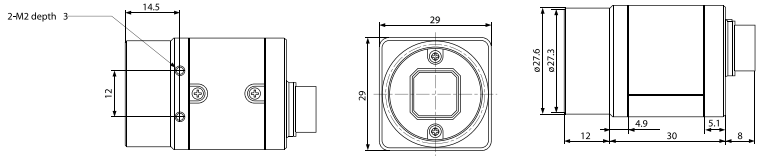
Extremely sharp images can be obtained when used under red LED illumination or in near-infrared light, such as in funduscopes.

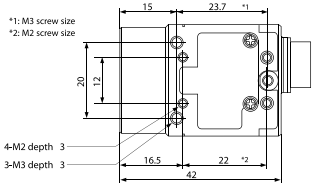
Features

- **XC-EI50/EI50CE: 1/2 type interline CCD**
- **XC-EI30/EI30CE: 1/3 type interline CCD**
- **Near-IR sensitivity**
- **High sensitivity: F1.4**
  XC-EI50/EI50CE: 0.1 lx
  XC-EI30/EI30CE: 0.2 lx
- **Electronic shutter function (1/100 to 1/10,000 s)**
- **External trigger shutter function (1/4 to 1/10,000 s)**
- **2:1 Interlaced/non-interlaced**
- **Frame/Field accumulation**
- **Restart/Reset function**
- **Sync system: internal/external (HD/VD)**
- **High shock and vibration resistance**

Dimensions (mm)

Camera body of all XC-E models





Connection Diagram p103

Notice

From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles. The outside dimensions will be changed from the following serial numbers.
XC-ES50/XC-ES30: 250001
XC-ES50CE/ES30CE: 550001
XC-ES51:150001
XC-ES51CE:450001

Accessories

Compact camera adaptor
- DC-700CE

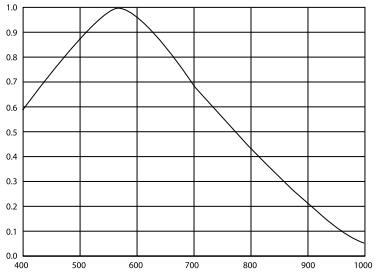
Tripod adaptor
- VCT-333I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

XC-EI30
(Typical Values)

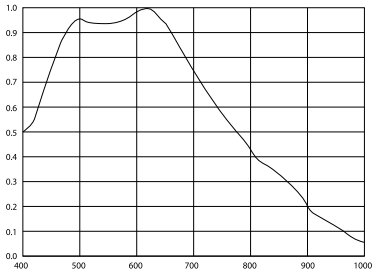
Relative sensitivity



Wavelength (nm)

XC-EI50
(Typical Values)

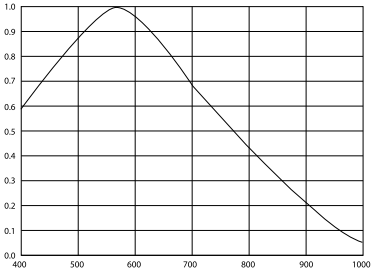
Relative sensitivity



Wavelength (nm)

XC-EI30CE
(Typical Values)

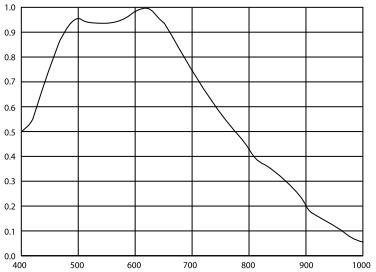
Relative sensitivity



Wavelength (nm)

XC-EI50
(Typical Values)

Relative sensitivity



Wavelength (nm)

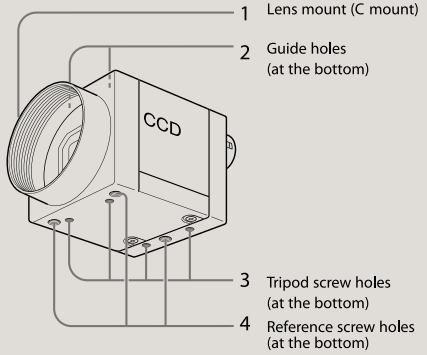
(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-EI50	XC-EI50CE	XC-EI30	XC-EI30CE
Image device	1/2 type IT CCD		1/3 type IT CCD	
Signal system	EIA	CCIR	EIA	CCIR
Effective picture elements (H) × (V)	768 × 494	752 × 582	768 × 494	752 × 582
Effective lines (H) × (V)	752 × 485	736 × 575	752 × 485	736 × 575
Cell size (H) × (V)	8.4 µm × 9.4 µm	8.6 µm × 8.3 µm	6.35 µm × 7.4 µm	6.5 µm × 6.25 µm
Horizontal frequency	15.734 kHz	15.625 kHz	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz	59.94 Hz	50 Hz
Lens mount	C mount			
Sync system	Internal/External (auto)			
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)			
External sync frequency	±1% (in horizontal sync frequency)			
Jitter	less than ±20 nsec			
Scanning system	525 lines 2:1 Interlaced (automatic switching according to input signal)			
Video output	1.0 Vp-p, negative, 75 Ω unbalanced			
Horizontal resolution	570 TV lines	560 TV lines	570 TV lines	560 TV lines
Sensitivity	400 lx F11 (γ=ON, MIN GAIN, without IR cut filter)		400 lx F8 (γ=ON, MIN GAIN, without IR cut filter)	
Minimum illumination*2	0.1 lx		0.2 lx	
S/N ratio	60 dB			
Gain	AGC/Manual (adjustable on the rear panel)			
Gamma	ON/OFF (adjustable on the rear panel)			
Normal shutter	1/100 to 1/10,000 s	1/120 to 1/10,000 s	1/100 to 1/10,000 s	1/120 to 1/10,000 s
External trigger shutter*3	1/4 to 1/10,000 s	1/4 to 1/8,000 s	1/4 to 1/10,000 s	1/4 to 1/8,000 s
Power requirements	DC 12 V (+9 to16 V)			
Power consumtion	1.6 W		1.4 W	
Dimension	29(W) × 29(H) × 30(D) mm (not including projecting parts)			
Mass	Approx. 50 g			
Operating temperature/humidity	–5°C to +45°C / 20 to 80% (no condensation)			
Storage temperature/humidity	–20°C to +60°C / 20 to 95% (no condensation)			
Performance guarantee temperature	0 to +40°C			
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction–x, y, z)			
Shock resistance	70 G			
MTBF	126,469 hours (Approx. 14.4 years)			
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326			
Supplied accessories	Lens mount cap (1), Operating instructions (1)			

*1 Automatic switching in response to the presence of an input signal when the VS switch on the rear panel is set to EXT.
*2 F1.4, AGC ON, without IR cut filter.
*3 Using DIP switch on the rear panel or Using trigger pulse width.

Location and Function of Parts and Controls

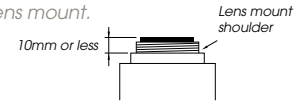


1. Lens Mount (C mount)

A commercial C mount lens or other optical equipment.

NOTE

Be sure that the lens does not project more than 10 mm from the lens mount.



2. Guide holes (at the top)

These screw holes help to lock the camera module.

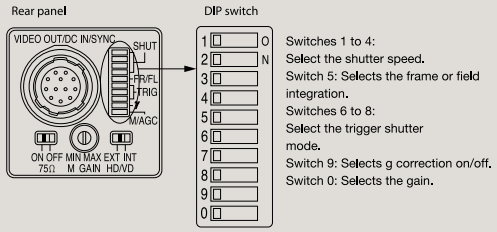
3. Tripod screw holes (at the bottom)

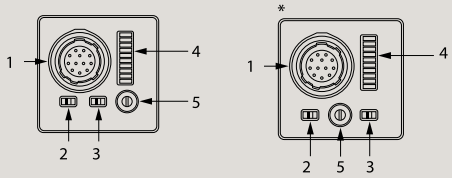
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

4. Reference screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Rear Panel





*The rear panel is different for the serial numbers shown below.
XC-ES50/ES30 : 200001
XC-ES50CE/ES30CE : 500001

1. 12-pin multi-connector

DC IN/HD/VD (DC power/sync signal input) VIDEO OUT terminal.

2. 75Ω termination selector switch

3. HD/VD input-output selector switch

4. Shutter speed/mode setting DIP switch

5. Volume control switch

This switch can be changed in the range of Switch 0 to 18 dB when the GAIN switch is set to "M".

*During factory setting, this switch is adjusted to the mechanical center.

NOTE

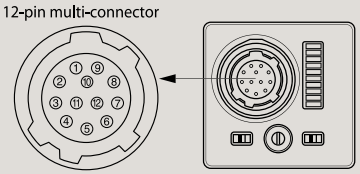
When setting DIP switch 5 to the frame integration, set the volume control switch 8 to the MAX side from the mechanical center (because of CCD characteristics).

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

Factory Mode Settings of Rear Panel

No.	Switch		Factory setting mode
2	75Ω termination selector switch		ON
3	HD/VD signal input/output switch		EXT
4	Shutter speed/ Mode setting DIP switches	Switches 1 to 4: Select the shutter speed.	OFF
		Switch 5: Selects the frame or field integration.	FRAME
		Switches 6 to 8: Select the trigger shutter mode	Normal
		Switch 9: Selects correction on/off	OFF
		Switch 0: Selects the gain	Manual
5	Volume control switch		Mechanical center

Connector Pin Assignments



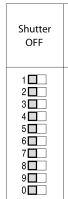
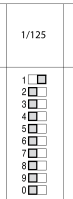
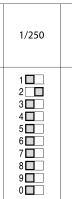
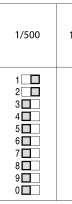
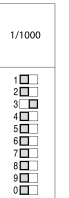
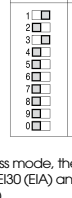
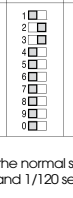
Pin No.	External HD/VD synchronisation	Internal HD/VD synchronisation
1	GND	GND
2	+12 V	+12 V
3	GND	GND
4	VIDEO output	VIDEO output
5	GND	GND
6	External HD input	Internal HD output
7	External VD input *1	Internal VD output
8	GND	GND
9	—	—
10	WEN output *2	WEN output *2
11	TRIG input	TRIG input
12	GND	GND

*1 An input VD signal is required when the restart/reset mode is used.
*2 A WEN output signal is valid only in the external trigger shutter mode.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to clearly capture a high-speed moving object.

Setting of normal shutter speed

Shutter OFF	1/125	1/250	1/500	1/1000
				
1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)	Flickerless* (EIA: 1/100 CCIR: 1/120)	
				

(Unit: seconds)

*In the flickerless mode, the normal shutter speed is 1/100 sec for XC-ES50/ES30 and XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30 CE and XC-EI50CE/EI30CE (CCIR).

NOTE

It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)

External Trigger Shutter

These modes are used to capture one image (one field) per trigger pulse. Set DIP switches 6, 7, and 8 on the rear panel to mode 1 or 2. (Refer to the table below.)

When the trigger pulse width is 1/3 sec or more, the output signal is switched to a normal video signal.

There are two modes for timing in which a video signal is obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- A video signal is synchronised with the external VD signal when an external HD/VD signal is input.
- A video signal is synchronised with an internal VD signal when no external HD/VD signal is input.

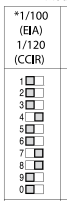
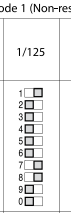
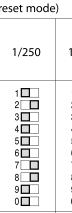
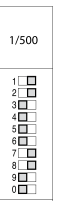
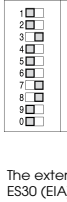
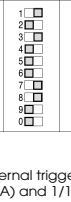
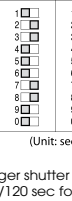
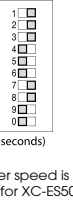
Mode 2 (Reset mode)

In this mode, an internal video signal is output from a trigger pulse after a certain period of time.

Setting of external trigger shutter speed

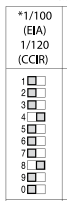
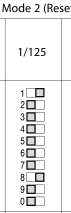
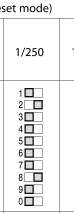
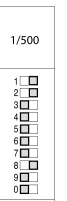
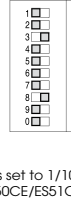
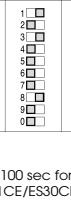
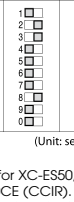
There are two ways to set the shutter speed.

Mode 1 (Non-reset mode)

*1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: seconds)

Mode 2 (Reset mode)

*1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)
			

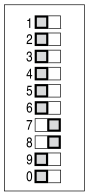
(Unit: seconds)

* The external trigger shutter speed is set to 1/100 sec for XC-ES50/ES51/ES30 (EIA) and 1/120 sec for XC-ES50CE/ES51CE/ES30CE (CCIR).
** The external trigger shutter speed is set to 1/10000 sec for XC-ES50/ES51/ES30 (EIA) and 1/8000 sec for XC-ES50CE/ES51CE/ES30CE (CCIR).

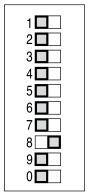
Using trigger pulse width

- Set DIP switches 1 to 4 on the rear panel to 0.
- An arbitrary shutter speed can be obtained by setting the trigger pulse width to the range of 2 msec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



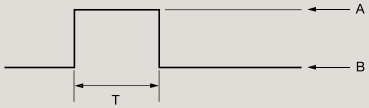
Exposure time = Trigger pulse width + 97 µsec (EIA)
Trigger pulse width + 120 µsec (CCIR)

NOTE

1 It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)

2 After a trigger pulse is input, a new trigger pulse must not be input before the video signal obtained by the trigger pulse has been output.

Specifications of trigger pulse

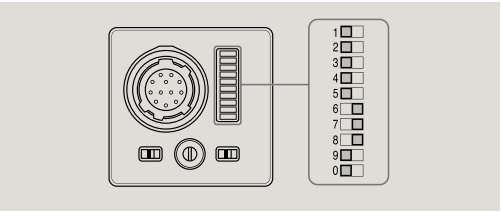


A: 4 to 5.0 V
B: 0 to 1.0 V
T: 2 µs to 1/4 s

T: 2 µs to 1/4 s, 100 µs to 1/4 s when setting the shutter speed using DIP switch
* Input impedance: 10 kΩ or more
* The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

The information on one screen can be extracted at any time by inputting a restart/reset signal (HD/VD) from the outside. To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of a camera as shown in the table below. The setting is especially effective for the following operation.



Monochrome

XC-EU50/EU50CE

TV Format Output | 1/2 Type CCD | C Lens Mount | VS Output | HD / VD External Sync | Normal Shutter

Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | Near - IR Sensitivity

Outline

The **XC-EU50/EU50CE** is a monochrome video camera module with a 1/2 type CCD for industrial use.

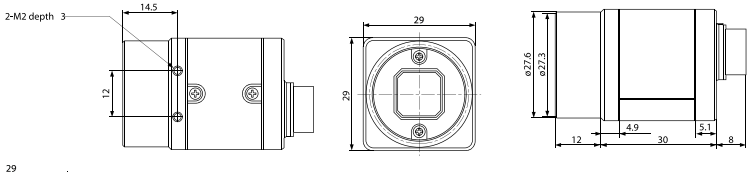
With its sensitivity around the near ultraviolet range (around 365 nm), utilised the feature of the shorter wavelength range characteristics and very detailed data can be detected. Small scratches, dust or blemishes hardly visible to the naked eye can be captured as a clear image by combining the camera with a light source that has a wavelength of about 360 nm. This model inherited compact size, rear panel mode switches from the XC-E series and is ideal for use in industrial applications.

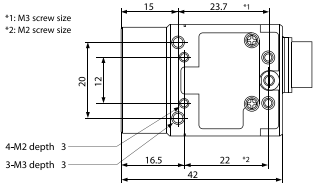
Features

- **XC-EU50/EU50CE: 1/2 type interline CCD**
- **Near-UV sensitivity**
- **High S/N ratio: 60 dB**
- **Electronic shutter function (1/100 to 1/10,000 s)**
- **External trigger shutter function (1/4 to 1/10,000 s)**
- **2:1 Interlaced/non-interlaced**
- **Sync system: internal/external (HD/VD)**
- **Frame/field accumulation**
- **Restart/Reset function**
- **High shock and vibration resistance**

Dimensions (mm)

Camera body of all XC-E models





Connection Diagram p103

Notice

From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles. The outside dimensions will be changed from the following serial numbers.
XC-ES50/XC-ES30: 250001
XC-ES50CE/ES30CE: 550001
XC-ES51:150001
XC-ES51CE:450001

Accessories

Compact camera adaptor
- DC-700CE

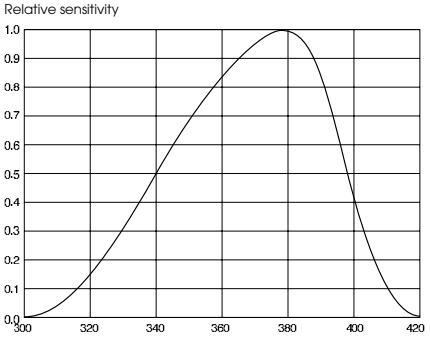
Tripod adaptor
- VCT-333I

12-pin camera cable (CE standard)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

XC-EU50/XC-EU50CE

(Typical Values)



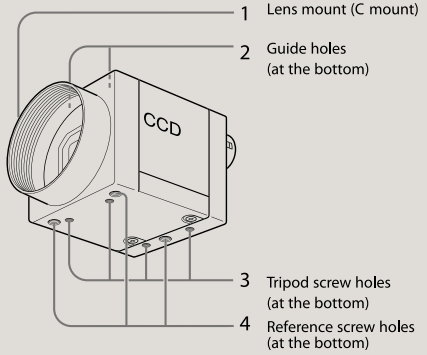
(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-EU50	XC-EU50CE
Image device	1/2 type IT CCD	
Signal system	EIA	CCIR
Effective picture elements (H) × (V)	768 × 494	752 × 582
Effective lines (H) × (V)	752 × 485	736 × 575
Cell size (H) × (V)	8.4 µm × 9.8 µm	8.6 µm × 8.3 µm
Horizontal frequency	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz
Lens mount	C mount	
Sync system	Internal/External (auto)	
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)	
External sync frequency	±1 % (automatic switching)	
Jitter	less than ±20 nsec (external horizontal frequency)	
Scanning system	2:1 Interlaced	
Video output	1.0 Vp-p, negative, 75 Ω unbalanced	
Horizontal resolution	570 TV lines	560 TV lines
S/N ratio	60 dB	
Gain	AGC/Manual (adjustable on the rear panel)	
Gamma	ON/OFF (adjustable on the rear panel)	
Normal shutter	1/100 to 1/10,000 s	1/120 to 1/10,000 s
External trigger shutter	1/4 to 1/10,000 s	1/4 to 1/8,000 s
Power requirements	DC 12 V (+9 to16 V)	
Power consumtion	1.6 W	
Dimension	29 (W) × 29 (H) × 30 (D) mm (not including projecting parts)	
Mass	Approx. 50 g	
Operating temperature/humidity	–5°C to +45°C / 20 to 80% (no condensation)	
Storage temperature/humidity	–30°C to +60°C / 20 to 95% (no condensation)	
Performance guarantee temperature	0 to +40°C	
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction–x, y, z)	
Shock resistance	70 G	
MTBF	126,469 hours (Approx. 14.4 years)	
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326	
Supplied accessories	Lens mount cap (1), Operating instructions (1)	

*1 Automatic switching in response to the presence of an input signal when the VS switch on the rear panel is set to EXT.

Location and Function of Parts and Controls

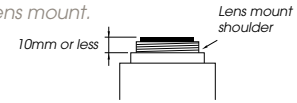


1. Lens Mount (C mount)

Attach any C mount lens or other optical equipment for Near UV.

NOTE

Be sure that the lens does not project more than 10 mm from the lens mount.



2. Guide holes (at the top)

These screw holes help to lock the camera module.

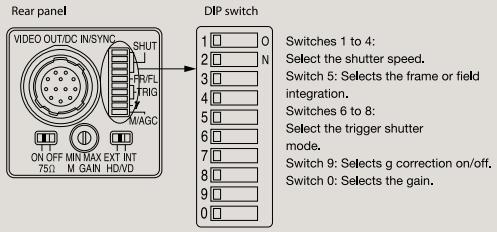
3. Tripod screw holes (at the bottom)

These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

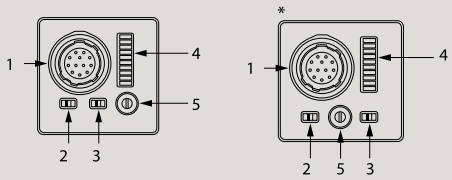
4. Reference screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Rear Panel



Switches 1 to 4:
Select the shutter speed.
Switch 5: Selects the frame or field integration.
Switches 6 to 8:
Select the trigger shutter mode.
Switch 9: Selects g correction on/off.
Switch 0: Selects the gain.



*The rear panel is different for the serial numbers shown below.
XC-ES50/ES30 : 200001
XC-ES50CE/ES30CE : 500001

NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1. 12-pin multi-connector

DC IN/HD/VD (DC power/sync signal input)
VIDEO OUT terminal.

2. 75Ω termination selector switch

3. HD/VD input-output selector switch

4. Shutter speed/mode setting DIP switch

5. Volume control switch

This switch can be changed in the range of Switch 0 to 18 dB when the GAIN switch is set to "M".

*During factory setting, this switch is adjusted to the mechanical center.

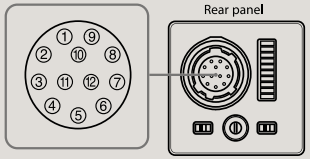
NOTE

When setting DIP switch 5 to the frame integration, set the volume control switch 8 to the MAX side from the mechanical center (because of CCD characteristics).

Factory Mode Settings of Rear Panel

No.	Switch		Factory setting mode
2	75Ω termination selector switch		ON
3	HD/VD signal input/output switch		EXT
4	Shutter speed/ Mode setting DIP switches	Switches 1 to 4: Select the shutter speed.	OFF
		Switch 5: Selects the frame or field integration.	FRAME
		Switches 6 to 8: Select the trigger shutter mode	Normal
		Switch 9: Selects correction on/off	OFF
		Switch 0: Selects the gain	Manual
5	Volume control switch		Mechanical center

Connector Pin Assignments



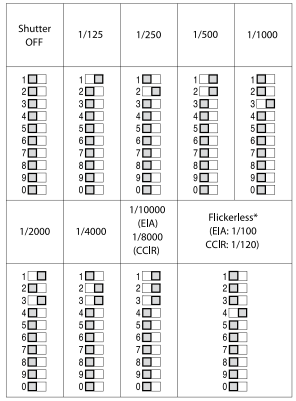
Pin No.	Camera sync output	External Sync (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to clearly capture a high-speed moving object.

Setting of normal shutter speed

Using the DIP switches on the rear panel.



(Unit: seconds)

*If you set the mode to flickerless, the positions of DIP switches 1 to 3 are optional.

NOTE

The positions of DIP switches 6 and 7 are optional.

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

External Trigger Shutter

By inputting an external trigger pulse, the camera is able to capture fast-moving objects clearly.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2 (See the table below).

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

There are two modes for timing in which a video signal is obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- A video signal is synchronised with the external VD signal when an external HD/VD signal is input.
- A video signal is synchronised with an internal VD signal when no external HD/VD signal is input.

Mode 2 (Reset mode)

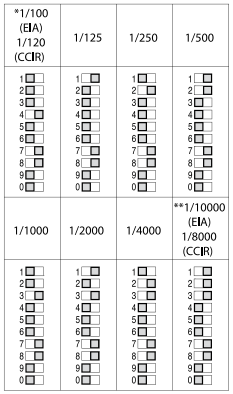
In this mode, an internal video signal is output from a trigger pulse after a certain period of time.

Setting of external trigger shutter speed

You can set the shutter speed with the DIP switches or using the trigger pulse width.

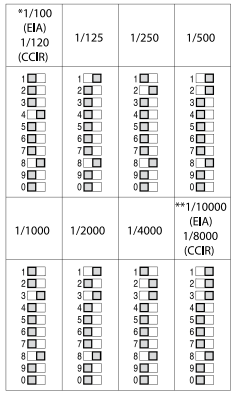
Using the DIP switches on the rear panel

Mode 1 (Non-reset mode)



(Unit: seconds)

Mode 2 (Reset mode)



(Unit: seconds)

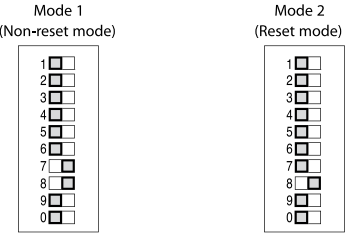
* If 1/100 (EIA) or 1/120 (CCIR) has been set, the position of DIP switches 1 to 3 are optional

NOTE

The positions of DIP switches 5, 9 and 0 are optional.

Setting the external shutter speed with the trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to 0. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 sec to 250 msec.



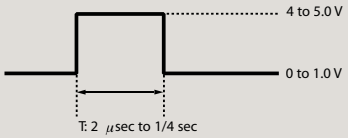
Exposure time = Trigger pulse width + 97 µsec (EIA)
Trigger pulse width + 120 µsec (CCIR)

NOTE

1 The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

2 If you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely, an incorrect video signal will be output.

Specifications of trigger pulse



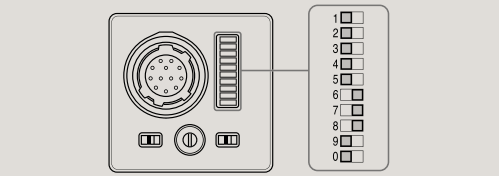
T: If you set the trigger pulse with the DIP switches, use the 100 µs to 1/4 sec pulse width.

- Input impedance; 10 kΩ or more.
- The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting a restart/reset signal (HD/VD). To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of the camera as shown in the figure below. The setting is especially effective for the operation explained below.



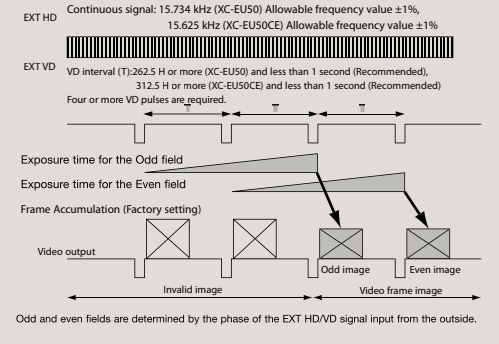
Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in a highly sensitive image. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe a moving object. Extend the VD interval (T) period between external VD pulses.

NOTE

Some white spots may appear after a long exposure.

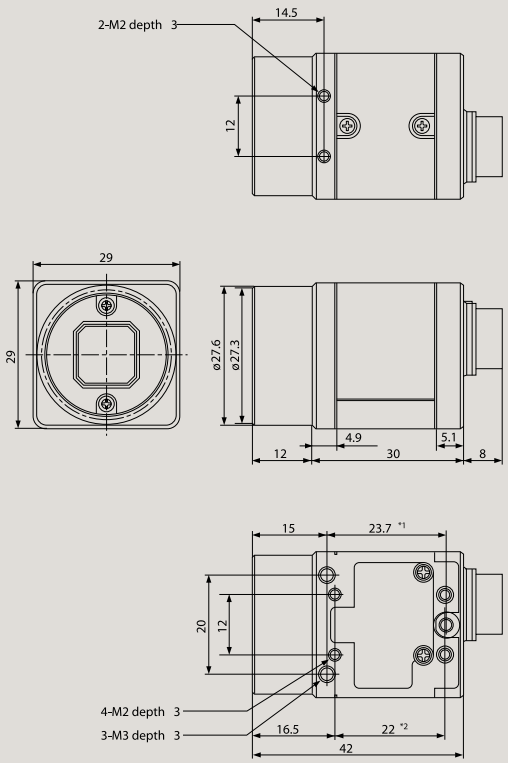
Sample input timing chart 1



Odd and even fields are determined by the phase of the EXT HD/VD signal input from the outside.

Information of XC-E Series Console Modification From Janurary 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles.

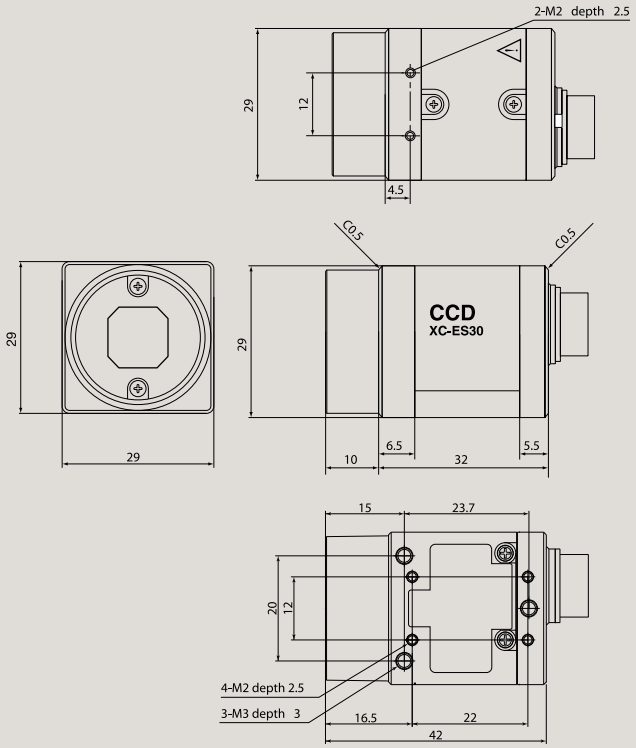
New Dimensions



Unit: mm

*1: M3 screw size
*2: M2 screw size

Old Dimensions



Unit: mm

The oustide dimensions will be changed from the following serial number.

XC-ES50/ES30	: 250001
XC-ES50CE/ES30CE	: 550001
XC-ES51	: 150001
XC-ES51CE	: 450001
XC-EI50/EI30	: 250001
XC-EI50CE/EI30CE	: 550001
XC-EU50	: 250001
XC-EU50CE	: 550001

Monochrome

XC-ES50L/ES50LCE

TV Format Output | 1/2 Type CCD | C Lens Mount | VS Output | HD / VD External Sync | Normal Shutter

Restart Reset | Long Exposure | Mode 1 (Non-Reset mode) External Trigger Shutter | Mode 2 (Non-Reset mode) External Trigger Shutter | L Type

Outline

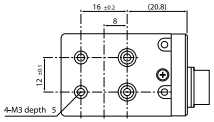
The **XC-ES50L/ES50LCE** is a monochrome video camera module with a 1/2 type CCD for industrial use.

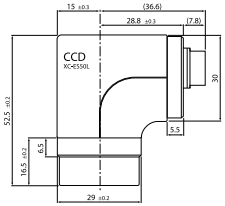
Like the XC-ES50/ES50CE, this model provides various mode switches on the rear panel, making it ideal for use in combination with other industrial equipment.

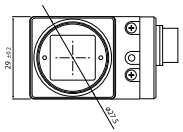
Features

- **XC-ES50L/ES50LCE: 1/2 type interline CCD**
- **High S/N ratio: 60 dB**
- **Electronic shutter function (1/100 to 1/10,000 s)**
- **External trigger shutter function (1/4 to 1/10,000 s)**
- **2:1 Interlaced/non-interlaced**
- **Frame/field accumulation**
- **IR cut filter**
- **Sync system: internal/external (HD/VD)**
- **High shock and vibration resistance**

Dimensions (mm)







Connection Diagram p104

Accessories

Compact camera adaptor

- DC-700CE

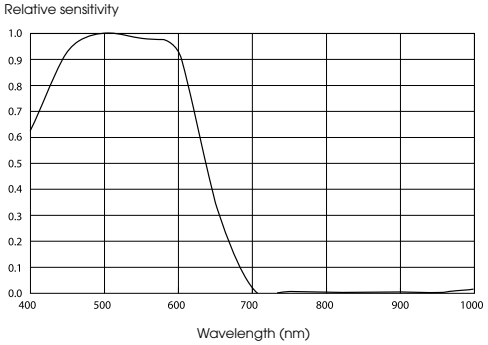
12-pin camera cable (CE standard)

- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

Spectral Sensitivity Characteristics

XC-ES50L/XC-ES50LCE

(Typical Values)



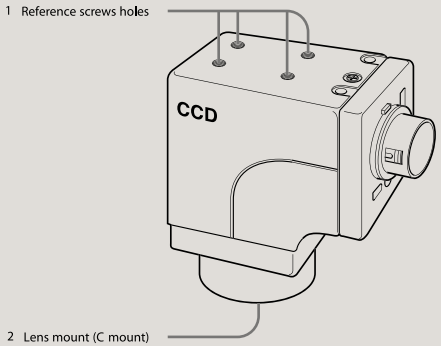
(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-ES50L	XC-ES50LCE
Image device	1/2 type IT CCD	
Signal system	EIA	CCIR
Effective picture elements (H) × (V)	768 × 494	752 × 582
Effective lines (H) × (V)	752 × 485	736 × 575
Cell size (H) × (V)	8.4 µm × 9.8 µm	8.6 µm × 8.3 µm
Horizontal frequency	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz
Lens mount	C mount	
Sync system	Internal/External (auto)	
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)	
External sync frequency	±1 % (in horizontal sync frequency)	
Jitter	less than ±20 nsec	
Scanning system	525 lines 2:1 Interlaced (Automatic switching according to input signal)	625 lines 2:1 Interlaced (Automatic switching according to input signal)
Video output	1.0 Vp-p, negative, 75 Ω unbalanced	
Horizontal resolution	570 TV lines	560 TV lines
Sensitivity	400 lx F4 (γ=ON, MIN GAIN, IR cut filter)	
Minimum illumination	3.0 lx	
S/N ratio	60 dB	
Gain	AGC/Manual (adjustable on the rear panel)	
Gamma	ON/OFF (adjustable on the rear panel)	
Normal shutter	1/100 to 1/10,000 s	1/120 to 1/10,000 s
External trigger shutter*2	1/4 to 1/10,000 s	1/4 to 1/8,000 s
Power requirements	DC 12 V (+9 to16 V)	
Power consumtion	1.6 W	
Dimension	29 (W) × 42.5 (H) × 43.8 (D) mm (not including projecting parts)	
Mass	Approx. 110 g	
Operating temperature/humidity	–5°C to +45°C / 20 to 80% (no condensation)	
Storage temperature/humidity	–20°C to +60°C / 20 to 95% (no condensation)	
Performance guarantee temperature	0 to +40°C	
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction–x, y, z)	
Shock resistance	70 G	
MTBF	126,469 hours (Approx. 14.4 years)	
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326	
Supplied accessories	Lens mount cap (1), Operating instructions (1)	

*1 Automatic switching in response to the presence of an input signal when the VS switch on the rear panel is set to EXT.
*2 Using DIP switch on the rear panel or Using trigger pulse width.

Location and Function of Parts and Controls



1. Reference screw holes

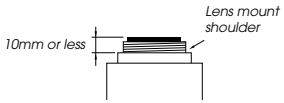
These precision screw holes are for locking the camera module

2. Lens mount (C mount)

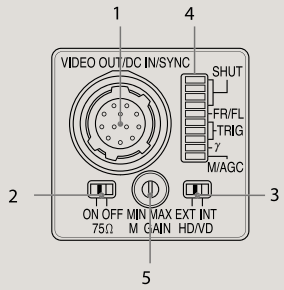
Attach any C mount lens or other optical equipment.

NOTE

The lens must not project more than 10mm from the lens mount.



Rear Panel



NOTE

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

1. Video out/DC IN/SYNC (video output/DC power input/sync signal I/O) connector (12-pin)

Connect a CCXC-12P05N camera cable to this connector for the +12V DC power supply and the video signal output from the camera module.
When a sync signal generator is connected to this connector, the camera module is synchronised with the external sync signals (HD/VD signals).

2. 75Ω termination switch

Turn this to OFF when not terminated.
(Factory setting: ON)

3. HD/VD signal input/output switch

Set the switch to INT to output HD/VD signals from the camera module.Set the switch to EXT to input HD/VD signals from an external unit. (Factory setting: EXT)

4. Shutter speed/Mode setting DIP switch

Shutter speed (bits 1 to 4)
Set an appropriate shutter speed. (Factory setting: OFF)

Potential accumulation mode (bit 5):
(Factory setting: FRAME)

Restart reset/External trigger shutter mode switch (bits 6-8):
(Factory setting: Normal)

γ compensation ON/OFF switch (bit 9):
Turn on this switch to enable the g compensation (Factory setting: OFF)

GAIN switch (bit 0):
This switch selects MGC (manual adjustment) or AGC (automatic adjustment). (Factory setting: MGC)

5. Manual GAIN (M GAIN) control knob

If you have selected MGC with the GAIN switch (DIP switch 2), this knob adjusts the gain. (Factory setting: twelve o'clock position)

NOTE

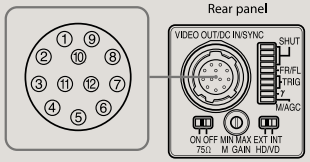
If you have selected FRAME using the Potential accumulation mode (DIP switch 2), set this knob to MAX. (This is due to requirement CCD.)

Factory Mode Settings of Rear Panel

No.	Switch		Factory setting mode
2	75Ω termination selector switch		ON
3	HD/VD signal input/output switch		EXT
4	Shutter speed/ Mode setting DIP switches	Switches 1 to 4: Select the shutter speed.	OFF
		Switch 5: Selects the frame or field integration.	FRAME
		Switches 6 to 8: Select the trigger shutter mode	Normal
		Switch 9: Selects correction on/off	OFF
		Switch 0: Selects the gain	Manual
5	Volume control switch		Mechanical center

*When the GAIN switch is set to "MGC" (Manual), you can change the gain level in a range from 0 to 18 dB.

Connector Pin Assignments



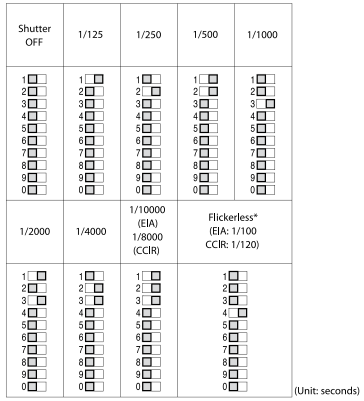
Pin No.	Camera sync output	External Sync (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to clearly capture a high-speed moving object.

Setting of normal shutter speed

Using the DIP switches on the rear panel.



*If you set the mode to flickerless, the positions of DIP switches 1 to 3 are optional.

NOTE

The positions of DIP switches 6 and 7 are optional.

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

External Trigger Shutter

By inputting an external trigger pulse, the camera is able to capture fast-moving objects clearly.

Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2 (See the table below).

When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

There are two modes for timing in which a video signal is obtained.

Mode 1 (Non-reset mode)

In this mode, a video signal synchronised with a VD signal is output after a trigger pulse is input.

- A video signal is synchronised with the external VD signal when an external HD/VD signal is input.
- A video signal is synchronised with an internal VD signal when no external HD/VD signal is input.

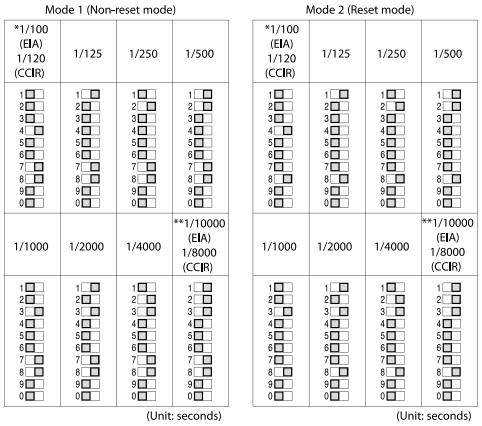
Mode 2 (Reset mode)

In this mode, an internal video signal is output from a trigger pulse after a certain period of time.

Setting of external trigger shutter speed

You can set the shutter speed with the DIP switches or using the trigger pulse width.

Using the DIP switches on the rear panel



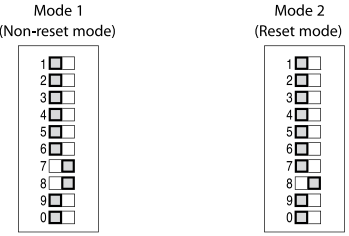
* If 1/100 (EIA) or 1/120 (CCIR) has been set, the position of DIP switches 1 to 3 are optional.

NOTE

The positions of DIP switches 5, 9 and 0 are optional.

Setting the external shutter speed with the trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to 0. You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 sec to 250 msec.



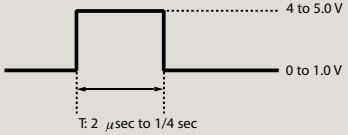
Exposure time = Trigger pulse width + 97 µsec (EIA)
Trigger pulse width + 120 µsec (CCIR)

NOTE

1 The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

2 An image is not output correctly when the next trigger is input before the image for the previous trigger is output.

Specifications of trigger pulse

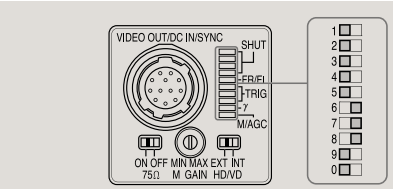


T: If you set the trigger pulse with the DIP switches, use the 100 µs to 1/4 sec pulse width.
- Input impedance; 10 kΩ or more.
- The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting a restart/reset signal (HD/VD). To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of the camera as shown in the figure below. The setting is especially effective for the operation explained below.

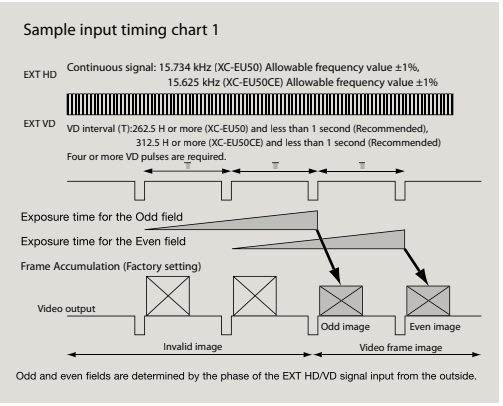


Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in a highly sensitive image. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe a moving object. Extend the VD interval (T) period between external VD pulses.

NOTE

Some white spots may appear after a long exposure.



Colour

XC-505/505P

TV Format Output | 1/3 Type CCD | NF Lens Mount | VBS Output | Y/C Output | HD / VD External Sync | Normal Shutter | CCD Iris | ATW White Balance | Fixed White Balance | Manual White Balance | RS232C Control

Outline

The **XC-505/505P** is a small colour video camera module that incorporates a 1/3-type IT CCD.

Compared to Sony's popular XC-555 camera, the XC-505 and XC-505P are equipped with several new features including one-push white balance, noise reduction (2D/3D), a built-in colour bar, DTL function and RS-232C support.

Features

- **Small size and lightweight:** 22 (H) × 22 (W) × 64 (D) mm, 51g
- **High-sensitivity Super HAD II CCD**
- **Simple configuration via DIP switch**
- **Five white balance adjustment settings**
- **Electronic shutter with a wide range of operating speeds**
- **Function setting via RS-232C transmissions**

Accessories

Camera adaptor
- DC-700
- DC-700CE

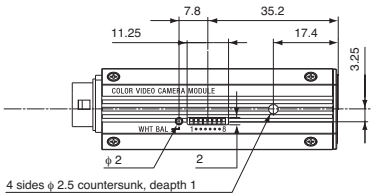
Cable (12-pin)
- CCXC-12P02N (2 m)
- CCXC-12P05N (5 m)
- CCXC-12P10N (10 m)
- CCXC-12P25N (25 m)

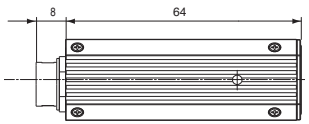
NF mount LENS
- VCL-12S12XM
- VCL-06S12XM
- VCL-03S12XM

C mount adaptor
- LO-999CMT

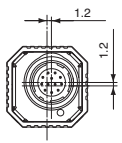
Angle case kit
- XCK-L555

Dimensions (mm)

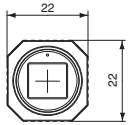




Rear



Front



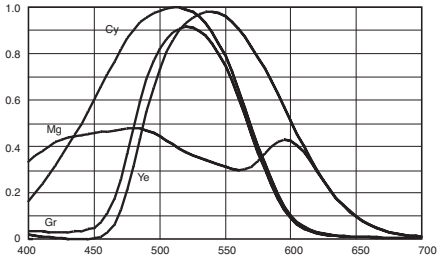
Connection Diagram p105

Spectral Sensitivity Characteristics

XC-505

(Typical Values)

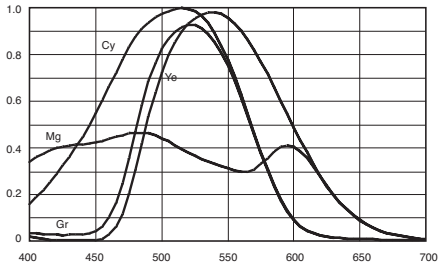
Relative sensitivity



XC-505P

(Typical Values)

Relative sensitivity



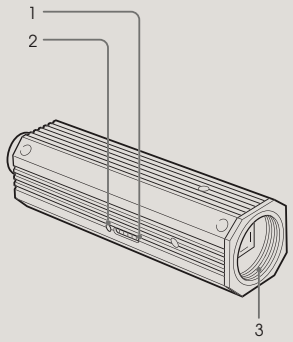
Wavelength (nm)

(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-505	XC-505P
Image device	Super HAD II 1/3-type IT CCD	
Colour filter	Complementary colour mosaic	
Effective picture elements (H) x (V)	768 x 494 pixels	752 x 582 pixels
Scanning system	525 lines, 2:1 interlace, 30 frames/sec	625 lines, 2:1 interlace, 25 frames/sec
Lens mount	NF mount	
Sync system	Internal/External (automatic switching)	
Horizontal resolution	470 TV lines	460 TV lines
Minimum illumination	1.5 lx at F1.4 AGC: max (18 dB)	
Sensitivity	2000 lx at F11 AGC: OFF (0 dB)	
S/N ratio	48 dB (standard) AGC: OFF (0 dB)	46 dB (standard) AGC: OFF (0 dB)
Shutter speed	1/60 sec (OFF) (NTSC), 1/1000 sec, CCD IRIS, and FLICKERLESS (1/100) (selectable)	1/50 sec (OFF) (PAL), 1/1000 sec, CCD IRIS, and FLICKERLESS (1/100) (selectable)
White balance	3200K, 5600K, One Push WB, ATW (auto tracing white balance), and MAN (manual) (selectable)	
Gain control	AGC/Fixed (0 dB)	
Video output	VBS or Y/C (switch – selectable) VBS: 1 Vp-p, 75 ohms, sync negative Y: 1 Vp-p, 75 ohms C: C level depends on the composite video out signal	
External synchronous input	HD/VD, VS, VBS (no genlock)	
Output connect	DC IN/SYNC/VIDEO: multi 12-pin	
Operating temperature	0°C to 40°C (32°F to 104°F)	
Storage temperature	-30°C to +60°C (-22°F to +140°F)	
Operating humidity	20% to 80% (no condensation permissible)	
Storage humidity	20% to 90% (no condensation permissible)	
Power requirement	DC 10.5 V to 15 V	
Power consumption	1.5 W	
Vibration resistance	10 G (20 Hz to 200 Hz)	
Shock resistance	70 G	
Dimensions (W x H x D)	22 x 22 x 64 mm (7/8 x 7/8 x 2 5/8 inches)	
Mass	51 g (2 oz.)	
Supplied Accessories	Lens mount cap (1), Tripod adaptor (1 set), Operating instructions (1)	

Location and Function of Parts and Controls



1. Dip switches for setting functions

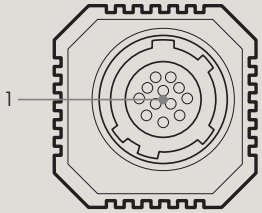
These switches are used to adjust white balance and shutter speed; and to flip AGC (ON/OFF) and output signals (Y/C or VBS).

2. One Push WB switch

One Push white balance functions when the white balance adjustment mode is set to One Push WB. The white balance is automatically adjusted when this switch is pressed, and the color balance is retained after adjustment.

3. NF mount

Rear Panel



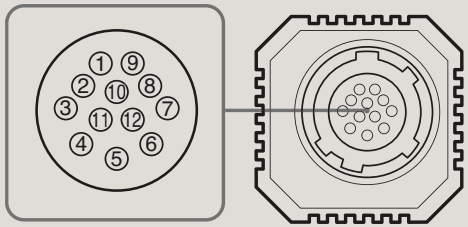
1. DC IN/SYNC/VIDEO connector (multi 12-pin)

This connector inputs DC 12 V power and outputs the video signal when the CCXC-12P02N/12P05N/12P10N/12P25N camera cable is connected.

If the unit is connected to devices that originate a synchronized signal, the external synchronous signal (VS, VBS, HD/VD) can be used to move the color camera module.

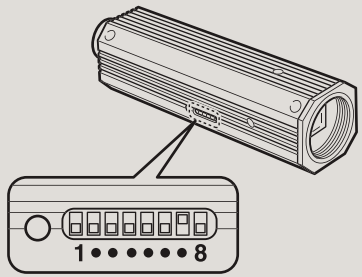
VBS signals input as external synchronized signals perform the same functions as VS signals. (Burst signals are not locked and are free running.)

Connector Pin Assignments



Signal / Pin No.	Sync signal types		
	External Sync signal		Internal Sync signal
	HD,VD	VS/VBS Input	
1	GND	GND	GND
2	+12V	+12V	+12V
3	VBS/Y Output (GND)	VBS/Y Output (GND)	VBS/Y Output (GND)
4	VBS/Y Output (signal)	VBS/Y Output (signal)	VBS/Y Output (signal)
5	HD Input (GND)	–	–
6	HD Input (signal)	–	–
7	VD Input (signal)	VS/VBS Input (signal)	–
	GND (–/C)	GND (–/C)	GND (–/C)
9	–/C Output (signal)	–/C Output (signal)	–/C Output (signal)
10	RS-232C (TXD)		
11	RS-232C (RXD)		
12	VD Input (GND)	VD Input (GND)	GND
	RS-232C (GND)		

Mode Setting



By flipping the DIP switches located on the side of this camera, you can adjust the following functions.

NOTE

Each switch is assigned to a function. The switches that should be set to adjust a certain function (white balance, shutter speed), to switch the AGC (ON/OFF), or to switch the output signals (Y/C or VBS) are specified and indicated by shading in the illustrations of the corresponding descriptions of the function. The switches that are not shaded are not related to these functions.

To adjust the white balance

Select the white balance setting according to the lighting conditions. To adjust the white balance, use bitXX (the shaded switches).

	Lighting condition	DIP switch setting
3200K (fixed)	For indoor shooting under incandescent light	1 · · · · · · 8
5600K (fixed)	For outdoor shooting on sunny days.	1 · · · · · · 8
One Push WB (One Push white balance)	The white balance is automatically adjusted when the One Push WB switch is pressed, and the color balance is retained after adjustment.	1 · · · · · · 8
ATW (auto tracing white balance)	The white balance is adjusted according to the color temperature transition of the subject. This mode is suitable for shooting with variable lighting (factory setting).	1 · · · · · · 8
MAN (manual)	Manual white balance is adjusted using the DIP switches in combination with the One Push WB switch.	
	Red hues are subdued with each press of the One Push WB switch.	1 · · · · · · 8
	Red hues are enhanced with each press of the One Push WB switch.	1 · · · · · · 8
	Blue hues are subdued with each press of the One Push WB switch.	1 · · · · · · 8
	Blue hues are enhanced with each press of the One Push WB switch.	1 · · · · · · 8

NOTE

The correct white balance is obtained when a white subject is shot on the whole detection area.

The correct color reproduction may not be obtained during a normal scene shooting.

To adjust the shutter speed

Set the shutter speed switches to select the desired shutter speed. Using the CCD IRIS function, set the CCD IRIS mode. To adjust the shutter speed, use the shaded switches.

	Lighting condition	DIP switch setting
OFF	1/60 sec. (XC-505) 1/50 sec. (XC-505P) (factory setting)	1 · · · · · · 8
1/1000	1/1,000 sec.	1 · · · · · · 8
CCD IRIS	Set the CCD IRIS mode.	1 · · · · · · 8
FLICKERLESS	1/100 sec.	1 · · · · · · 8

AGC (Auto Gain Control) ON/OFF

To switch the ACG on or off, use the shaded switches.

	Gain	DIP switch setting
ON	Auto gain control (factory setting)	1 · · · · · · 8
OFF	0 dB	1 · · · · · · 8

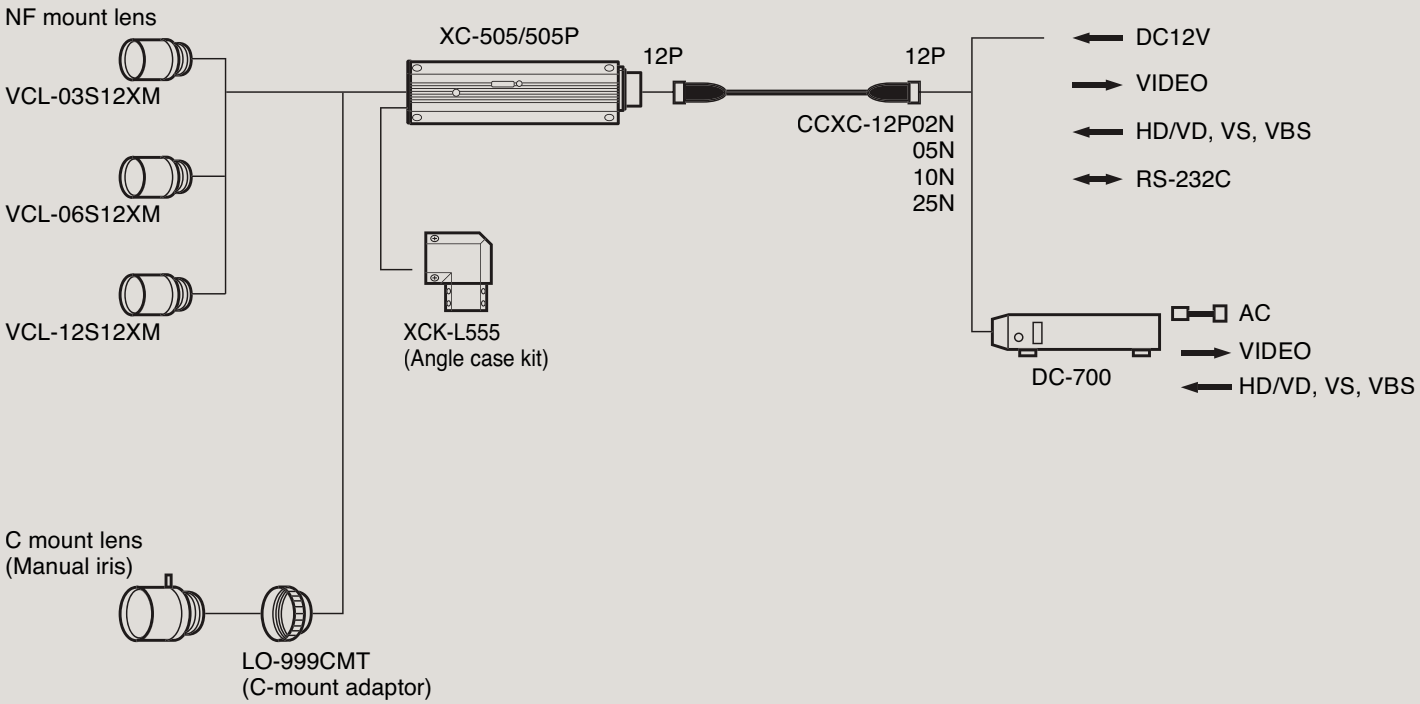
To Switch the Output Signals (Y/C/VBS)

Select the camera output signal.
To switch the output signals (Y/C or VBS), use the shaded switch.

	Output signal	DIP switch setting
VBS	Select this position to output the VBS signal from the DC IN/VIDEO (factory setting).	1 · · · · · · 8
Y/C	Select this position to output the Y/C separated signal from the DC IN/ VIDEO connector.	1 · · · · · · 8

Connection Diagram

XC-ST Series



XC-ST Series	JB-77
Normal	●
Normal shutter	●
Restart/Reset (R/R)	●
External trigger shutter	–
WEN OUT	–

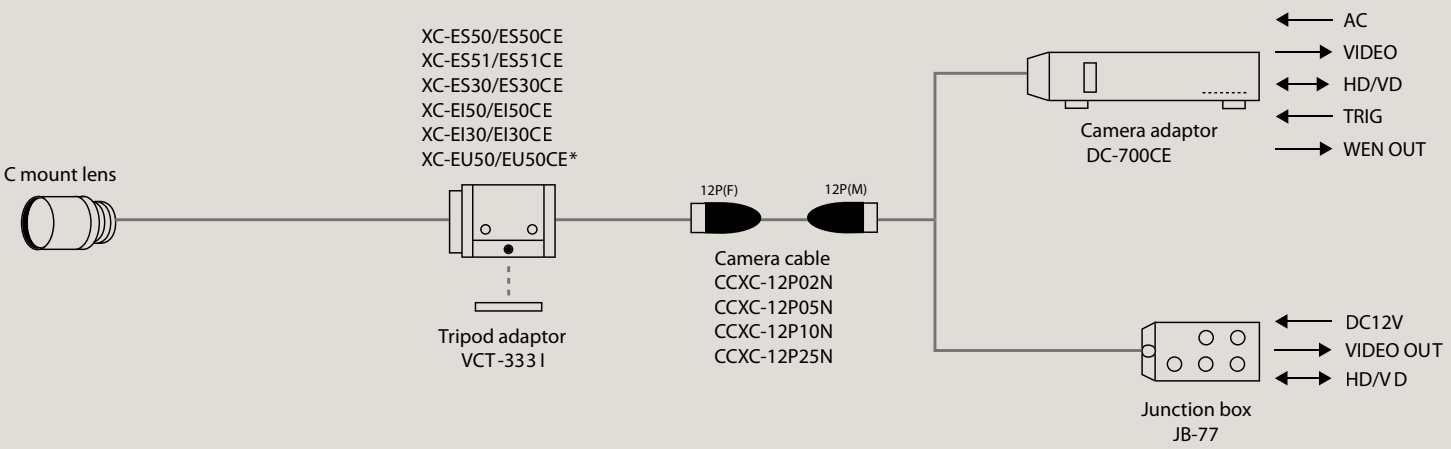
● Usable
– Not usable

NOTE

When using the JB-77, not all of the XC-ST series functions can be used. See the table on this page.

Connection Diagram

XC-E Series



*Recommended lens for XC-EU50/EU50CE : Near UV Lens

XC-E Series	JB-77
Normal	●
Normal shutter	●
Restart/Reset (R/R)	●
External trigger shutter	–
WEN OUT	–

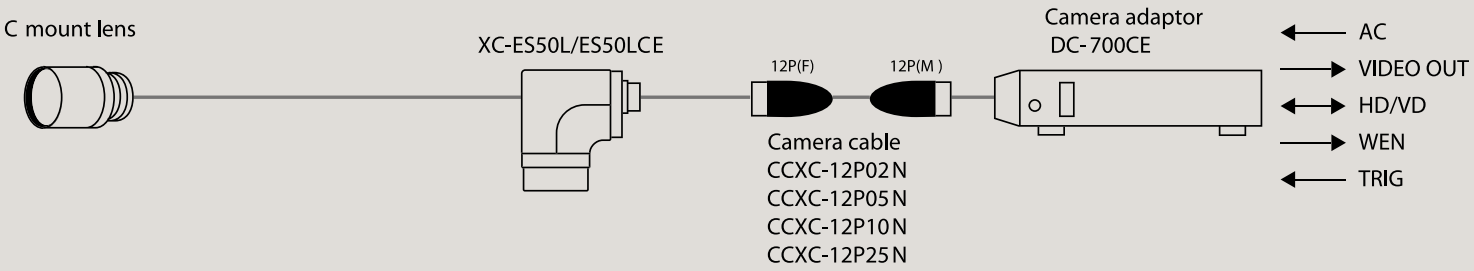
● Usable
– Not usable

NOTE

When using the JB-77, not all of the XC-E series functions can be used. See the table on this page.

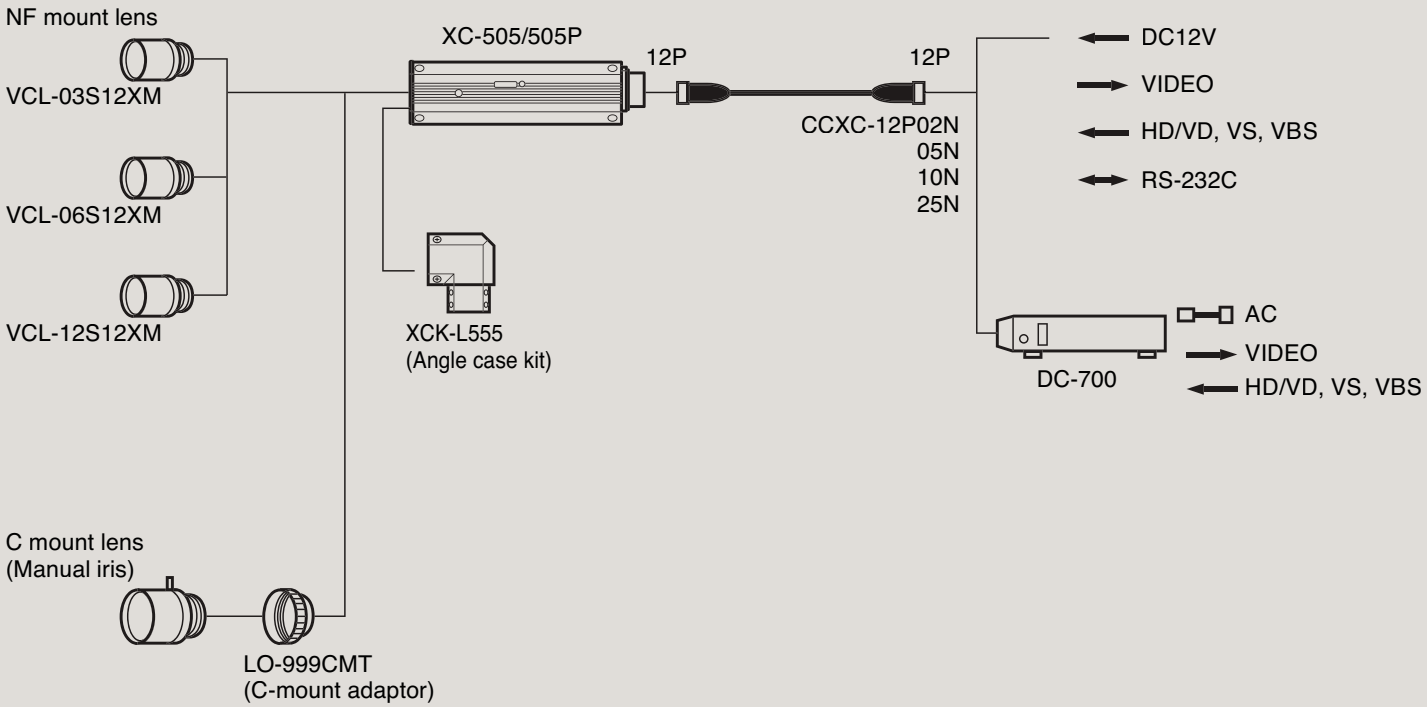
Connection Diagram

XC-ES50L/XC-ES50LCE



Connection Diagram

XC-505/505P



XC Accessories

DC-700CE	107
NF Mount Lens	110
Lens Accessories	110
Cables	111
Connectors	111
Junction Box	111
Tripod Adaptor	112

Camera Adaptor

DC-700CE

Outline

The **DC-700CE** is a compact, lightweight camera adaptor for XC Series cameras.

In line with the size reduction of XC Series cameras, it is smaller and lighter than the conventional power adaptors (DC-77RR and DC-777). It is compatible with all of the XC Series cameras and accessories, includes VIDEO OUT 2, TRIG IN, and WEN OUT connections.

Features

- **Compact, lightweight**
- **External sync input/output**
- **Trigger input/WEN output**
- **Built-in high-performance switching power supply**

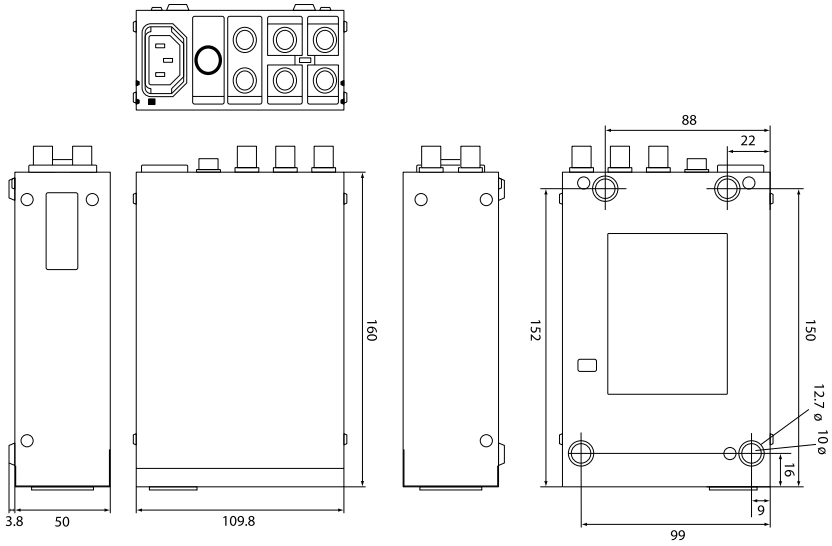
Specifications

	DC-700CE
Region	Europe
Signal system	CCIR/PAL
Power requirements	AC 100 to 240 V
Voltage	50/60 Hz
Output voltage	DC 13 V 1.3A
Power consumption	22 W
Operating temperature/humidity	-5 to 45 °C /10 to 90% (no condensation)
Storage temperature/humidity	-30 to 60 °C /10 to 90% (no condensation)
Input terminals	WEN terminal BNC type (1) TRIG terminal BNC type (1) HD terminal BNC type (1) VD/SYNC terminal BNC type (1) VIDEO1 terminal BNC type (1) VIDEO2 terminal BNC type (1) CAMERA terminal 12-pin (1)
Mass	700 g
Dimensions (mm)	110 (W) x 53 (H) x 160 (D)
Supplied accessories	Power cord (1), Operating instructions (1), AC plug adaptor (1) (Included with DC-700(J))
Regulatory compliance	FCC Class A, CE: EN61326 & EN60065, AS/NZ: EN61326, Demko: EN60065

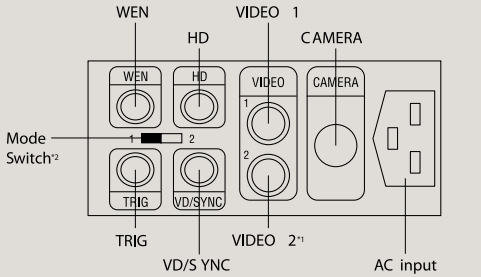
NOTE

The above products comply safety standards for each district.
Select the product suitable to the district to use.

Dimensions (mm)



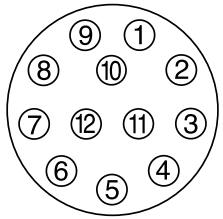
Rear Panel



*1 Two video outputs may not be available for some types of cameras. This becomes TRIG input terminal when using, XC-56, XC-56B, XC-55, XC-55BB.
*2 Set the switch to 2 only when using XC-999.

Connector Pin Assignments

Pin No.	Signal
1	GND
2	+13V
3	GND
4	VIDEO 1
5	GND
6	HD
7	VD/SYNC
8	GND
9	VIDEO 2*
10	WEN
11	TRIG
12	GND



*1 This becomes TRIG input terminal when using XC-55, XC-55BB, XC-56, XC-56BB.
*2 The production of underlined models is discontinued.

Comparative Tables

Comparison with DC-77RFR and DC-777 Camera Adaptors

Pin No.	DC-700CE	DC-77RR	DC-777
Video Output	2 video outputs*1	2 video outputs*2 (both identical)	1 video outputs
S-video output	X	X	O
External sync input	O	O	O
Loop-through output	X	O	X
Clock output	X	O	X
WEN output	O	X	X
TRIG input	O	X	X

*1 Separate video signals are output from pin no. 4 and pin no 9 (for XC-7500/8500CE).
*2 Video output from pin no. 4 is output from two BNC connectors via two buffer amps.
*The production of underlined models is discontinued.

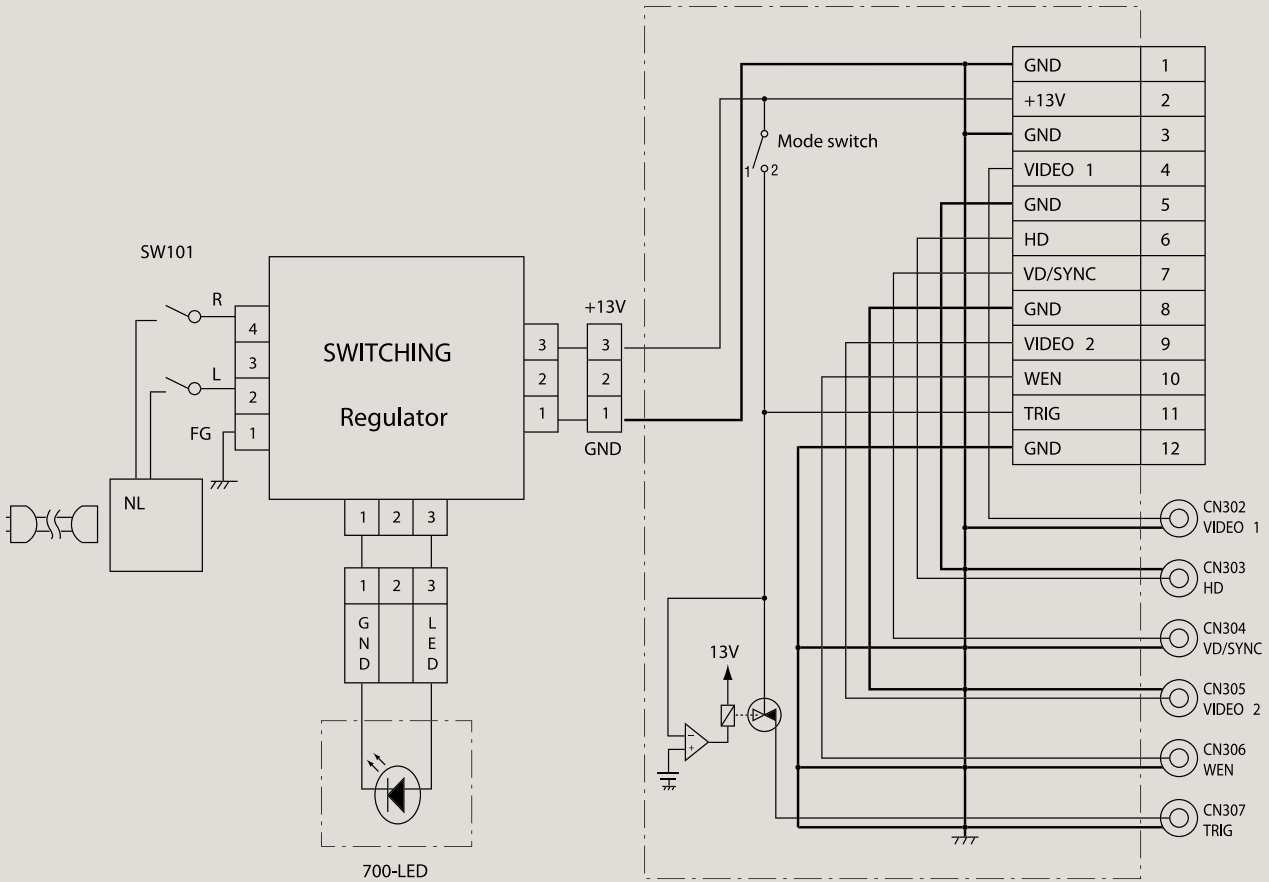
NOTE

DC-700CE do not support connecting to RS-232C of XC-HR90 or XC-555.

XC Series Camera Input/Output Chart for DC-700CE

	VIDEO 1	VIDEO 2	HD	VD/SYNC	WEN	TRIG	Note
12-pin connector pin no.	No.4	No.9	No.6	No.7	No.10	No.11	
XCD-V60/V60CR/SX90/ SX90CR/U100/U100CR	Strobo OUT	GPIO Out 2	GPIO Out 1	GPIO IN 2	GPIO IN 1	O	
XCL-5005/5005CR	X	X	X	X	GND/DVAL Exposure	O	
XCL-U1000/U1000C	X	X	X	X	Exposure OUT	O	
XC-HR90	O	X	HD	VD	O	O	
XC-HR70	O	X	HD	VD	O	O	
XC-HR50/HR57	O	X	HD	VD	O	O	
XC-HR58	O	X	HD	VD	O	O	
XC-56/56BB	O	TRIG*	HD	VD	X	X*	TRIG assigned to No.9
XC-ST Series	O	X	HD	VD/VS	O	O	
XC-E Series	O	X	HD	VD	O	O	
XC-555	VBS/Y*	C*	HD	VD/VS/VBS	X	X	VBS, Y/C available

Block Diagram

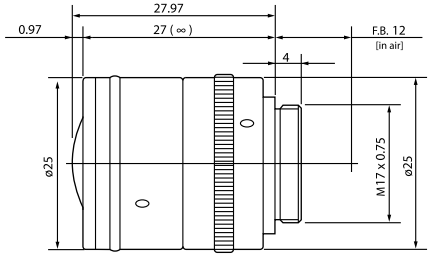


NF Mount Lens (Fixed Focus)

NF Mount Lens (Fixed Focus)

VCL-03S12XM

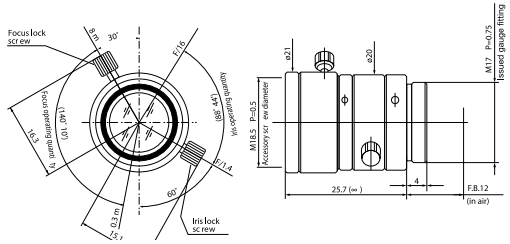
Focal Length	3.5 mm
Aperture (F-number)	F1.8 to F16
Minumum object distance (MOD)	300 mm
Mass	40 g



NF Mount Lens (Fixed Focus)

VCL-06S12XM

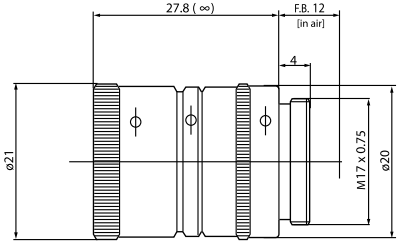
Focal Length	6 mm
Aperture (F-number)	F1.4 to F16
Minumum object distance (MOD)	298 mm
Mass	25 g



NF Mount Lens (Fixed Focus)

VCL-12S12XM

Focal Length	12 mm
Aperture (F-number)	F1.4 to F16
Minumum object distance (MOD)	298 mm
Mass	25 g



MOD: Minimum object distance from the edge of the lens body to the photo subject.

NOTE

All dimensions shown are in mm

Lens Accessories

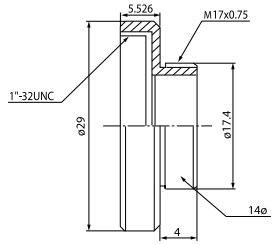
C Mount adaptor

LO-999CMT

C mount adaptor

When a C mount type lens is attached, a C mount adaptor (LO-999CMT) is required.

Mass	12 g



Be sure that the lens does not project more than 4.1 mm from the lens mount.

For setting the camera when using C mount adaptor, fix the lens mount (C mount) instead of fixing the camera head in order to avoid applying unnecessary forces to the camera head.

Avoid using C mount adaptor in the places where vibrations or shocks are applied often. Doing so will damage the equipment or loosen the connection.

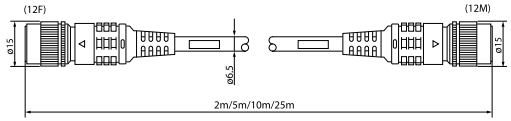
Cables

Camera cable (for XC series)

CCXC-12P02N (2m)
CCXC-12P05N (5m)
CCXC-12P10N (10m)
CCXC-12P25N (25m)

(Aspect of connector: straight)

This 12-pin camera cable is used for connecting an XC camera to a DC-700CE camera adaptor or JB-77 junction box.

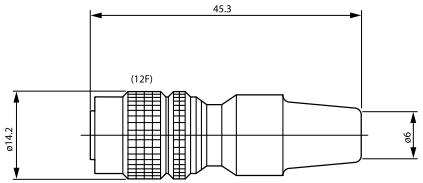


- **Camera connection (12-pin/female) <> DC-700CE (JB-77) connection (12-pin/male)**
- **Shielded**

Connectors

Connectors

PC-XC12



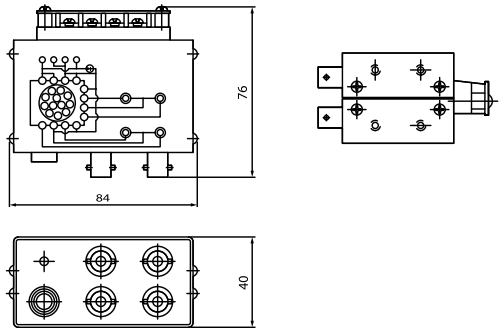
- **12-pin/female**

Junction Box

Junction box

JB-77

This junction box enables simple conversion from 12-pin camera cable to BNC. Also, 12V DC can be supplied from general-purpose power supply to the junction box's power terminal.



- **Camera cable connection (12-pin x 1)**
- **Video OUT (BNC x 1)**
- **Clock OUT (BNC x 1)**
- **VD IN/OUT (BNC x 1)**
- **HD IN/OUT (BNC x 1)**

NOTE

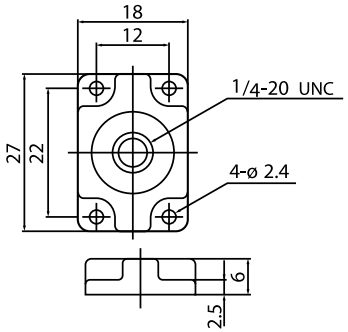
All dimensions shown are in mm

Tripod Adaptor

Use these adaptors to mount a camera on a tripod. Use the included screws to attach the adaptor to the camera.
The adaptors are threaded for commercially available tripods.

Tripod Adaptor

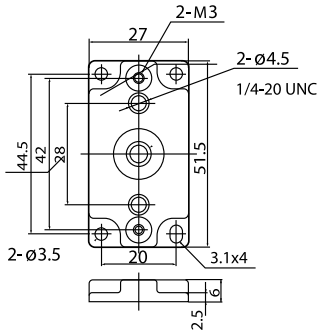
VCT-333I



- **Material: ABS resin**
- **Insulated type**

Tripod Adaptor

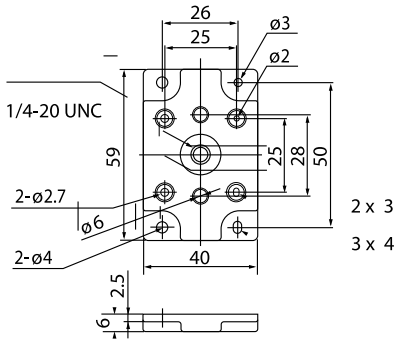
VCT-55I



- **Material: ABS resin**
- **Insulated type**

Tripod Adaptor

VCT-ST70I



- **Material: ABS resin**
- **Insulated type**

NOTE

All dimensions shown are in mm

3-CCD Colour Video Cameras

DXC-C33/C33P	114
DXC-390/390P	119
DXC-990/990P	124
Connection Diagram	*131*

3-CCD Colour Video Cameras

DXC-C33/C33P

1/3 Type 3-CCD | DSP | RS-232C Interface | Automatic Exposure | Frame Memory | AV Output

Outline

Ideal for use in space-limited locations, the DXC-C33/C33P incorporates one of the smallest/lightest camera head unit featuring three 1/3 type CCDs. In spite of its compact (32 (W) x 38 (H) x 40 (D) mm, and lightweight (48 g) camera head unit, this model inherits superb picture quality of the DXC Series.

Its horizontal resolution is 850 TV lines and the minimum illumination is 2000 lux at F8. Also,various features such as DynaLatitude™, Partial Enhance are provided to this model. First for the DXC Series and also first for 3-CDD small head cameras, the DXC-C33/C33P is equipped with a DV output terminal. Thanks to the DV output terminal, video signals can be recorded to i.LINK™ interface-equipped VTR with no quality deterioration.

With the excellent features and medical approval, the DXC-C33/C33P is the right choice for medical fields, and also for demanding applications such as research and industrial fields.

Features

Small camera head

The DXC-C33/C33P can be installed in space-limited locations. The size of the camera head unit (CHU) is one of the smallest of all the 1/3 type 3-CCD cameras.

High picture quality

The DXC-C33/C33P can clearly capture detailed images of objects. Adoption of three 1/3 type CCDs allows the camera to realise 2000 lux at F8, S/N ratio of 62 dB (NTSC) or 61 dB (PAL) and achieve a horizontal resolution of 850 TV lines.

800 TV lines picture

Simulated picture

850 TV lines picture

Connection Diagram p131

iDV out

DV output terminal allows image recording into i.LINK interface-equipped VTR with no quality deterioration.This feature is first introduced to small head 3-CCD cameras.

DSR-70A/70AP and DXC-C33/C33P

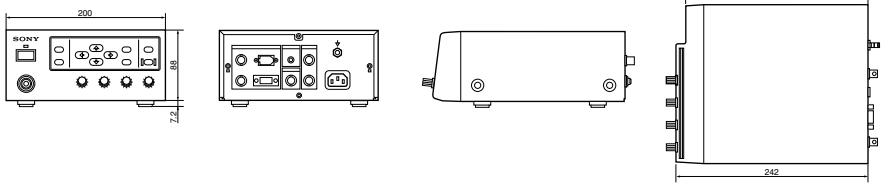
* i.LINK stands for IEEE-1394-1995 standards and their revisions.

i is the logo for products that implement i.LINK.

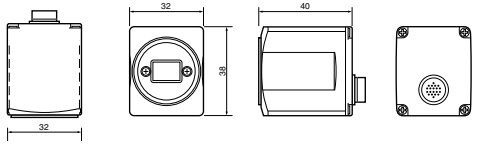
Note: Sony VAIO computers are checked with Sony DV products, but not with DVCAM, concerning the i.LINK interconnection. Some VAIO application software may not work with DVCAM.

Dimensions (mm)

DXC-C33/C33P CCU



DXC-C33/C33P CHU



Features

10 bit DSP

The DXC-C33/C33P can capture superior pictures by adopting full Digital Signal Processing (DSP) of 10 bits.

DynaLatitude™

This function automatically adjusts contrast corresponding to the brightness signal level of the entire image. Clear images can be captured if both bright and dark areas exist within an image.

OFF ON

Simulated picture

Frame memory

Built-in frame memory can provide a freeze image and a remarkably enhanced image in sensitivity by long-time exposure function. Images captured by long-time exposure function can be output continuously.

Gain: 18 dB Long Exp: 32 frames

Partial Enhance

This function allows a particular colour to be selected, and its hue, saturation and detail altered. In addition, the detail produced by the high resolution of the camera can be softened or emphasised in certain parts of the image by the Partial Enhance function.

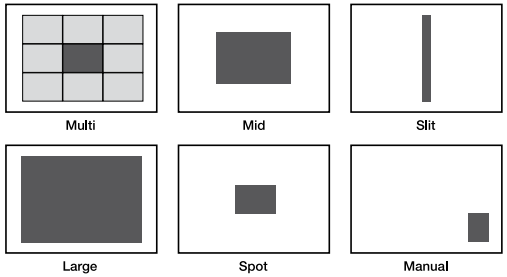
OFF ON

User-friendly control panel

The front panel is easy to use with smartly arranged knob switches and good-sized switches.

Two AE areas preset

AE (Automatic Exposure) function is very useful to determine the best area for incoming light metering. Users can select and set up two of the six different AE modes and can easily switch them at front panel.



RS-232C interface

Easy control and operation of the camera by an external computer is possible.

External synchronisation (HD/VD, VBS)

External synchronisation allows for multiple camera operation.

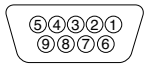
Specifications

DXC-C33/C33P	
Pick-up device	1/3 type IT (Interline transfer) CCD (x3)
Effective picture elements	NTSC: 768 (H) x 494 (V) PAL: 752 (H) x 582 (V)
Sensing Area	4.8 (H) x 3.6 (V) mm
Scanning System	NTSC: 2:1 interlaced, 525 lines PAL: 2:1 interlaced, 625 lines
Horizontal Frequency	NTSC: 15,734 kHz PAL: 15,625 kHz
Vertical Frequency	NTSC: 59.94 kHz PAL: 50 kHz
Sync. System	Internal or external with VBS, HD/VD
Phase Control	H/S phase control
Horizontal Resolution	850 TV lines
Lens Mount	C mount
Flange back	17.526 mm in air
Sensitivity	F8.0 at 200 lux (3200 K)
Minimum Illumination	4 lux (F2, GAIN: HYPER)
S/N ratio	NTSC: 62 dB (Typical) PAL: 61 dB (Typical)
Gain	STEP/AGC/HYPER selectable STEP:0 to 24 dB by 1 dB step AGC:0 to 24 dB (Limit value:6 dB, 12 dB,18 dB,24 dB selectable) HYPER: 30 dB
Electronic shutter	8.0 to 1/100,000 s
Lens	Manual Iris
AE area	Multi/Large/Medium/Spot/Slit/ Manual selectable
AE level	Variable
AE speed	Fast/Mid/Slow selectable
AE detect	Average/Peak selectable
Contrast effect	Manual/DynaLatitude/DCC+ selectable
Knee point	High/Normal/Low selectable (Contrast Effect: Manual)
Black stretch	Variable (Contrast Effect:Manual)
Gamma	ON/OFF (Variable at ON)
Pedestal	Master and R/B Manual adjustable
Black balance	ABB
White balance	AWB/ATW NORMAL/ATW WIDE/MANUAL/3200 K/5600 K selectableAWB or ATW R/B Paint, MANUAL R/B Gain

DXC-C33/C33P	
ATW area	NORMAL/MANU selectable
ATW speed	FAST/NORMAL/SLOW selectable
Detail level	ALL/TARGET/OFF (Variable at ALL or TARGET)
Detail frequency	HIGH/MID/LOW selectable
Linear matrix	ALL/TARGET/OFF
Linear matrix mode	STANDARD/R Enhance/G Enhance/ B Enhance/Manual selectable
Partial enhance	ALL/IN/OUT selectable
CCD integration mode	FIELD/FRAME selectable
Shading compensation	OFF/ON (Manual control)
Trigger polarity	Positive edge trigger/Negative edge trigger selectable
Baud rate	19200/9600/4800/2400/1200 selectable
Sync	RGB/G/OFF selectable
Strobe	Slave
User file	A/B switchable (Two pattern memories)
Scene file	STANDARD/MICROSCOPE/ FULL AUTO/STROBE/FILE A or B
Output signal	i.LINK (DV):IEEE1394 BasedVBS:1.0 Vp-p,75 Ω, sync negative RGB:0.7 Vp-p,75 Ω,sync switchable SYNC:2 Vp-p,75 ΩY:1.0 Vp-p,75 Ω C:NTSC 0.286 Vp-p,75 Ω,without sync PAL 0.3 Vp-p,75 Ω,without sync
Operating temperature	-5 to 45°C
Storage temperature	-20 to 60°C
Power supply	100 to 240 V AC,50/60 Hz
Power consumption	Max.18 W
Dimensions	CHU:32 (W) x 38 (H) x 40 (D) mm CCU:200 (W) x 88 (H) x 242 (D) mm
Mass	CHU:48 g CCU:2.5 kg
Connectors	DV OUT (6-pin jack)RGB/SYNC (9-pin D-sub) VIDEO OUT (BNC)S-VIDEO (4-pin mini DIN) FS/ TRIG IN (Stereo Mini jack) REMOTE (8-pin mini DIN) AC Inlet Camera (20-pin)
Supplied accessories	Tripod adaptor AC power cable Lens cap Panel sheet for RM-C950 Operation instruction manual

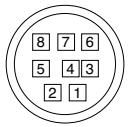
Pin Assignment

9-pin D-sub connector



Pin No.	D-sub VIDEO: VBS D-sub SYNC: C.SYNC	D-sub VIDEO: VBS D-sub SYNC: WEN	D-sub VIDEO: Y/C D-sub SYNC: C.SYNC	D-sub VIDEO: VBS D-sub SYNC: C.SYNC
1	VBS OUT (G)	VBS OUT (G)	Y/C OUT (G)	Y/C OUT (G)
2	RGB OUT (G)	RGB OUT (G)	RGB OUT (G)	RGB OUT (G)
3	R OUT (X)	R OUT (X)	R OUT (X)	R OUT (X)
4	G OUT (X)	G OUT (X)	G OUT (X)	G OUT (X)
5	B OUT (X)	B OUT (X)	B OUT (X)	B OUT (X)
6	VBS OUT (X)	VBS OUT (X)	Y OUT (X)	Y OUT (X)
7	C.SYNC OUT (X)	WEN OUT (X)	C.SYNC OUT (X)	WEN OUT (X)
8	C.SYNC OUT (G)	WEN OUT (G)	C.SYNC OUT (G)	WEN OUT (G)
9	(X)	(X)	C OUT (X)	C OUT (X)

MINI DIN 8-pin connector



Pin No.	D-sub VIDEO: VBS D-sub SYNC: C.SYNC
1	INTER CONNECT
2	INTER CONNECT
3	DATA OUT
4	DC OUT (G)
5	DATA IN
6	NC
7	DC OUT (+)
8	NC

Optional Accessories

VMC-IL4615/IL4635

Cable
- i.LINK Cable (1.5/3.5 m) for connecting DXC-C33/C33Pto DVCAMSeries

CCMC-9DS

Cable
- CCMC-9DS: 5 m, 9-pin D-sub <--> BNCs(R/G/B/SYNC) and DIN 4-pin (Y/C)

RM-C950

Cable
- 5 m, 9-pin D-sub <--> 9-pin D-sub

VCL-08WM/16WM/25WM

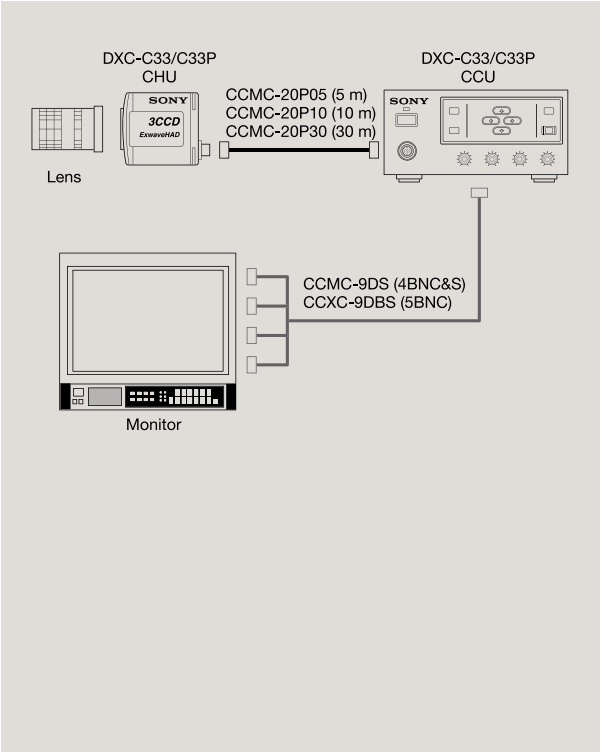
Lens
- 1/3 type C mount
- Focal length: 8 mm (VCL-08WM) / 16 mm (VCL-16WM) / 25 mm (VCL-25WM)
- F number:1: 2.2
- Iris: F2.2 to F16

RM-C950

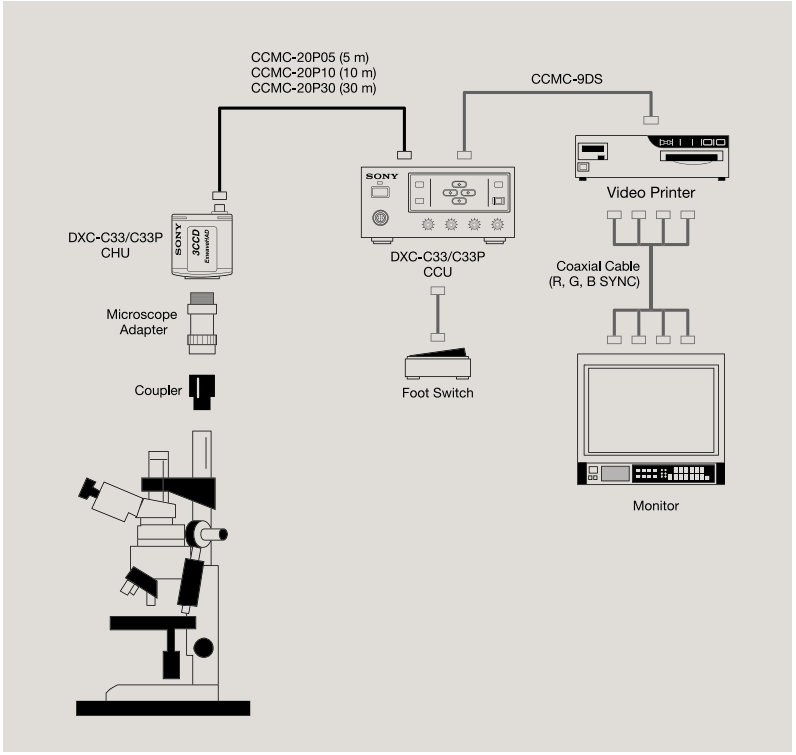
Remote control unit
- Full remote control of the camera functions
- Easy control of functions such as Gain, Detail, Master Pedestal and Red and Blue Gain by turning knobs on the unit
- Power is supplied through the DXC-C33/C33P connected to the camera adaptor
- Original sheet panel is supplied
- Dimensions (W x H x D): 212 x 41 x 132 mm
- Mass:Approx. 400 g
- Power requirements: DC 12 V

Applications

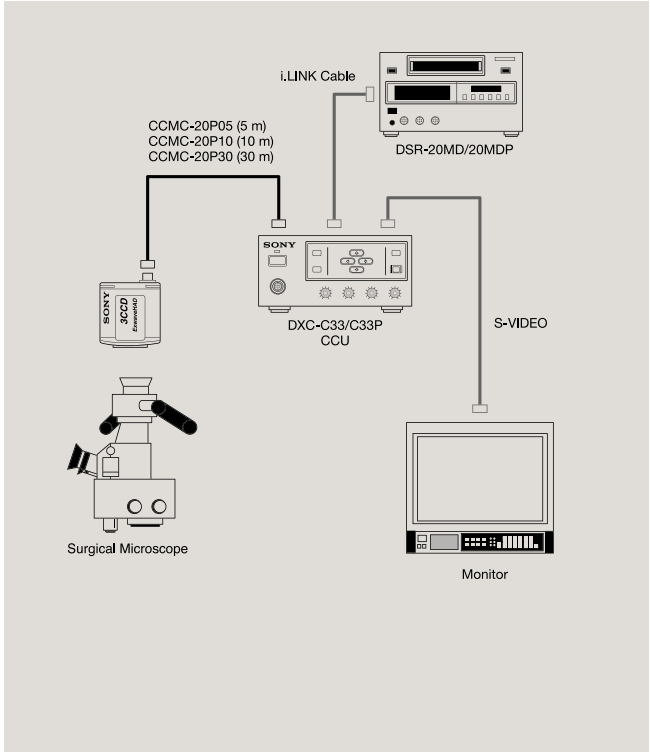
Basic



Microscope



Surgical Microscope



3-CCD Colour Video Cameras

DXC-390/390P

1/3 Type 3-CCD | DSP | C Lens Mount | Automatic Exposure | White Balance | RS-232C Interface | Genlock

Outline

The Sony DXC-390/390P is a 1/3 type DSP 3-CCD colour video camera which incorporates Exwave HAD™ technology– a new Sony technology that greatly improves camera sensitivity (F8 at 2000 lx) while reducing smear.

Using a C mount lens and providing a resolution of 800 TV lines and high S/N ratio, the DXC-390/390P is ideal for applications such as microscopy, industrial inspection, and remote camera systems, where picture accuracy and detail are important. Incorporating new 10 bit DSP technology, a user friendly on-screen menu allows for simple control of various features including DynaLatitude™, Partial Enhance, and a wide selection of Automatic Exposure (AE) modes.

Moreover, the DXC-390/390P is very compact (56 (W) x 50 (H) x 128 (D)) and lightweight (370 g), making it easy to install.

Features

High picture quality

Incorporating three 1/3 type IT CCDs, the DXC-390/390P produces a high resolution of 800 TV lines and a high S/N ratio of 62 dB (NTSC), 61 dB (PAL). Featuring Sony's new Exwave HAD™ the DXC-390/390P provides excellent sensitivity and low smear levels. Moreover, the DXC-390/390P incorporates DSP (Digital Signal Processor) technology, resulting in images with higher picture quality and colour accuracy.

DSP (Digital Signal Processing)

The DXC-390/390P incorporates new Sony 10 bit DSP technology. DSP enables a variety of enhancement features and increases picture reliability. The DXC-390/390P has several DSP functions for powerful picture controls.

Picture contrast controls

DynaLatitude™

Automatically adjusts contrast corresponding to the brightness signal level of the entire image. Clear images can be captured if both bright and dark areas exist within the image.

DCC+ (Dynamic Contrast Control Plus)

Avoids hue factor distortion that can occur when subjects are very bright. DCC+ also automatically adjusts the knee point according to the contrast of the image.

Black Stretch

Black stretch/compress enhances the gradation of dark areas by stretching or compressing the range of the brightness signal in these areas.

Picture enhance controls

Digital Detail

Adjusts the sharpness of the object outline with minimal noise. This feature also enables horizontal detail frequency control.

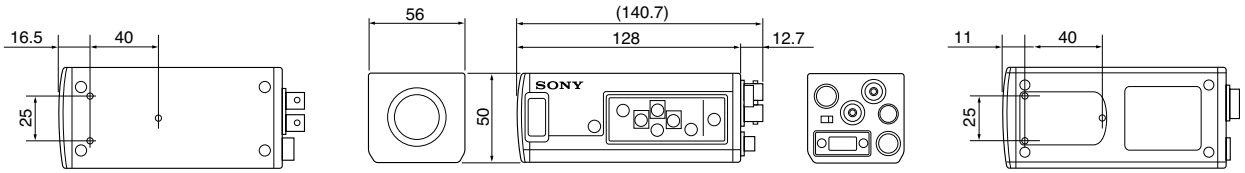
Linear Matrix

Enhances colour reproduction by adjusting the colour saturation and hue.

Partial Enhance

Enhances or softens a specific colour by altering its hue, saturation and detail.

Dimensions (mm)



Features

On-screen menu

The on-screen menu feature allows for quick and easy picture adjustments while viewing the image. All camera control functions are accessible from the side panel of the camera or through the optional RM-C950.

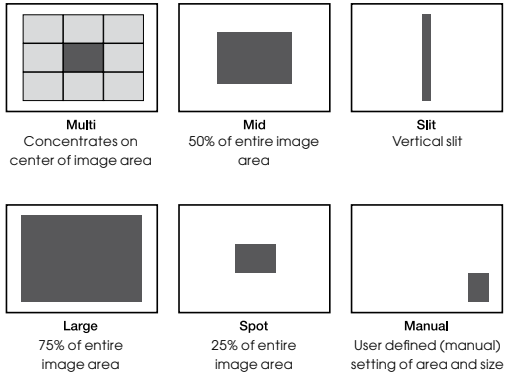
AE (Automatic Exposure)

AE automatically controls the level of brightness by varying the exposure times. This is done by combining the CCD IRIS function, AGC (Automatic Gain Control), and Auto Iris function of the lens. The DXC-390/390P is equipped with a number of convenient AE modes.

AE Level
Adjusts the standard brightness level by up to +/- one F-stop in a lens iris.

AE Speed
Selectable AE (Auto Exposure) conversion speed to suit applications under varying lighting conditions.

AE Area
AE Area is a light metering system that includes six different modes.



Multi
Concentrates on center of image area

Mid
50% of entire image area

Slit
Vertical slit

Large
75% of entire image area

Spot
25% of entire image area

Manual
User defined (manual) setting of area and size

Electronic shutter functions

Variable speeds
A variable speed electronic shutter is built into the CCD imager, making it possible to capture blur-free, clear images of high speed moving objects. The DXC-390/390P features 10 different shutter speeds (OFF to 1/100,000), including flickerless mode.

Long term exposure
The shutter speed can be manually selected from 1 to 255 frames (field mode) or 2 to 256 frames (frame mode) in one-frame steps or from 0.1 to 8.0 seconds.

Clear Scan™
The Clear Scan feature eliminates the horizontal bands that appear across the screen when shooting a computer display. This is achieved by matching the camera shutter speed with the display scanning frequency.

CCD IRIS
When the level of incoming light exceeds the auto iris adjustment range, the CCD IRIS function automatically reduces the exposure in a range equivalent to 10 F-stops.

Other features

Compact and lightweight
56 (W) x 50 (H) x 128 (D) mm, 370 g

C mount
Extensive choice of lens

Scene Files and User Files
Allows user to set two custom parameters in the menu for instant recall

Hyper Gain (+30 dB)
Useful to capture images in dark conditions

Colour Shading compensation
Allows for verification of colour on microscope

RGB, Y/C and composite video outputs
RS-232C controllable
Easy control and operation of camera by external computer

White Balance modes
(AWB, ATW-Normal/Wide, MANU, Preset 3200K/5600K)

Extended Genlock (VBS Genlock and HD/VD in/out)
Allows for synchronisation of signals with frame grabber boards

Synchronisation capabilities (Strobe function, WEN output)
Realises full vertical resolution of fast moving objects

Rear Panel

1. TRIG IN connector (BNC)

External trigger signals input when the camera is in strobe mode.

2. DC IN/VBS OUT connector (12-pin)

Connects to the CMA-D2/CE camera adaptor. DC power input and video signal output.

3. MENU LOCK switch

Mechanical switch protects user settings. If switch is ON, buttons on side panel are disabled.

4. RGB/SYNC connector (D-sub 9-pin)

RGB signals and their respective sync signals are output. CCMC-9DS/CCXC- 9DBS cables are used.

5. VIDEO OUT connector (BNC)

Outputs composite video signals from the camera.

6. LENS connector (6-pin)

Connects to general video servo auto iris lenses or the optional VCL610WEA/VCL-614WEA zoom lenses.

7. REMOTE connector (mini-DIN 8-pin)

Connects to the optional RM-C950 remote control unit.

Optional Accessories

CMA-D3/D3CE - Camera Adaptor

- Supplies DC power and transmits video/sync signal between the adaptor and the DXC-390/P with CCZ-A cable and CCMC-3MZ cable
- Connects with optional RM-C950 remote control unit
- AC IN/DC IN
- Composite, Y/C or RGB video signal output
- Dimensions: 210 (W) x 44 (H) x 210 (D) mm
- Max. cable length: 100 m with CCDC-100A cable

CMA-D2/D2CE - Camera Adaptor

- Supplies DC power and transmits video/sync signal between the adaptor and the DXC-390/P with CCMC 12-pin multi-core cable
- Dimensions: 210 (W) x 50 (H) x 200 (D) mm
- Max. cable length: 25 m with CCMC-12P25 cable

RM-C950 - Remote Control Unit

- Full remote control of the DXC-390/P camera functions and lens zoom/focus/iris functions via RS-232C
- Dimensions: 212 (W) x 41 (H) x 132 (D) mm

VCL-610WEA - Mount Lens

VCL-614WEA - Mount Lens

Pin No.	VCL-610WEA	VCL-614WEA
Mount	1/3 type C mount	1/3 type C mount
Focal length	6.5 to 65 mm	5.5 to 77 mm
Zoom ratio	10x	14x
Zoom control	Remote	Manual/Remote switchable
Iris control	Remote	Manual/Remote switchable
Maximum aperture ratio	1.4	1.4
Minimum object distance	1.2 m	1.0 m
Macro	No	Yes
Filter thread	M 52, P=0.75 mm	M 62, P=0.75 mm
Mass	500 g	900 g

Specifications

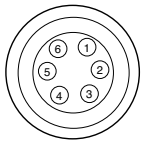
	DXC-390/390P
Pick-up device	1/3 type IT (Interline Transfer) CCD
Effective picture elements	NTSC: 768(H) x 494(V), PAL: 752(H) x 582(V)
Sensing area	6.00(H) x 4.96(V) mm
Scanning system	NTSC: 2:1 interlaced, 525 lines, PAL: 2:1 interlaced, 625 lines
Horizontal frequency	NTSC: 15.734 kHz, PAL: 15.625 kHz
Vertical frequency	NTSC: 60 Hz, PAL: 50 Hz
Sync system	Internal or External with VBS, HD/VD
Phase control	H/ SC phase control
Horizontal resolution	800 TV lines
Sensitivity	F8.0 at 2000 lx
Minimum illumination	4 lx (F2, GAIN: HYPER)
S/N ratio	NTSC: 62 dB, PAL: 61 dB
Gain	STEP/ AGC/ HYPER selectable
Electronic shutter	OFF / STEP / VARIABLE / CCD IRIS selectable
Lens	Remote (Auto or Manual) / Video selectable
AE area	Multi / Large / Medium / Spot / Slit / Manual selectable
AE level	Variable
AE speed	Fast / Mid / Slow selectable
AE detect	Average / Peak selectable
Contrast Effect	Manual / DynaLatitude/ DCC+ selectable
Knee Point	High/ Normal / Low selectable (Contrast Effect: Manual)
Black stretch	Variable (Contrast Effect: Manual)
Gamma	ON / OFF Variable
Pedestal	Master and R/B Manual adjustable
Black balance	ABB
White balance	AWB / ATW NORMAL / ATW WIDE/MANUAL / 3200K/ 5600K selectable AWB or ATW R/B Paint, MANUAL R/B Gain
ATW area	NORMAL / MANU selectable
ATW speed	FAST / NORMAL / SLOW selectable
Detail level	ON / OFF (Variable at ON)
Detail Frequency	HIGH/ MID/ LOW selectable
Linear matrix	ON / OFF
Linear matrix MODE	STANDARD / R Enhance / G Enhance / B Enhance / Manual selectable
Partial Enhance	ALL / IN / OUT selectable
CCD integration mode	FIELD / FRAME selectable
Shading Compensation	OFF / ON (Manual control)
Trigger Polarity	Positive edge trigger / Negative edge / trigger selectable
Baud rate	19200 / 9600/ 4800 / 2400 / 1200 selectable
Sync	RGB / G/ OFF selectable
Strobe	ON / OFF
User File	A/B switchable (Two pattern memories)
Scene File	STANDARD / MICROSCOPE / FULL AUTO / STROBE / FILE A or B
Output signal	VBS / RGB / SYNC/Y/C
Operating temperature	-5°C to 45°C
Storage temperature	-20°C to 60°C
Power requirements	DC 10.5 V to 15.0 V
Power consumption	Approx. 7.6 W
Dimensions	56(W) x 50(H) x 128(D) mm (Excluding projecting parts)
Mass	Approx. 370 g
Connectors	Lens (6 pin), RGB/SYNC (9 pin D-sub), DC IN/VBS (12 pin), VIDEO OUT (BNC), TRIGGER IN (BNC), REMOTE (8 pin mini DIN)
Supplied accessories	Lens cap (1), Tripod adaptor (1), Operation manual (1), Panel sheet for RM-C950

Optional accessories

Lens	VCL-610WEA/614WEA, VCL-08WM/16WM/25WM
Remote control unit	RM-C950
Camera adaptor	CMA-D2/ CE, CMA-D3/ CE
Microscope adaptor	MVA-15
Microscope coupler	MVAC-33-N/33-O/33-SM
Camera cable	CCDC-5/10/25/50A/100A, CCMC-12P02/05/10/25, CCXC-9DBS, CCMC-9DS, CCMC-3MZ, CCZ-A2/A5/A10/A25/A50/A100

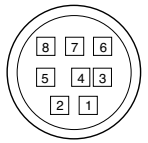
DXC-390/390P Connector Pin Assignments

6-pin



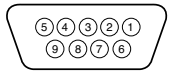
1	FOCUS CONTROL
2	ZOOM CONTROL
3	DC OUT (G)
4	IRIS CLOSE
5	IRIS CONROL/VIDEO OUT
6	DC OUT (+)

8-pin



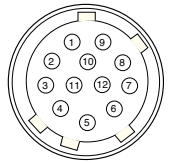
1	INTER CONNECT
2	INTER CONNECT
3	DATA OUT
4	DC OUT (G)
5	DATA IN
6	NC
7	DATA OUT (+)
8	CMA DATA

9-pin



1	VBS/Y OUT (G)
2	RGB OUT (G)
3	R OUT (X)
4	G OUT (X)
5	B OUT (X)
6	VBS/Y OUT (X)
7	C.SYNC/WEN OUT (X)
8	C.SYNC/WEN OUT (G)
9	-/C OUT (X)

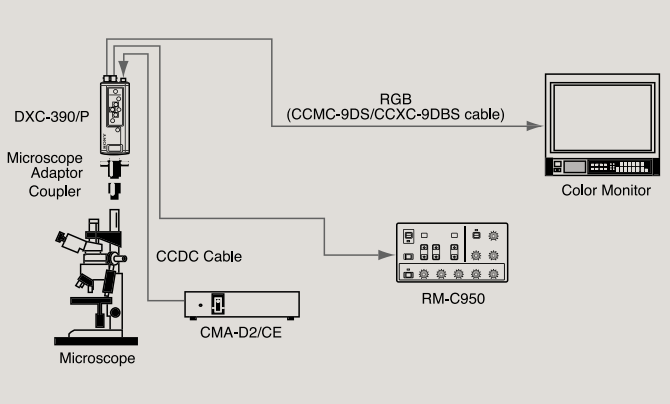
12-pin



1	DC IN (G)
2	DC IN (+)
3	VBS/Y OUT (G)
4	VBS/Y OUT (X)
5	HD IN/OUT (G)
6	HD IN/OUT (X)
7	VBS/VD IN C.SYNC/VD OUT (X)
8	-/C OUT (G)
9	-/C OUT (X)
10	DC IN (G)
11	DC IN (+)
12	VBS/VD IN C.SYNC/VD OUT (G)

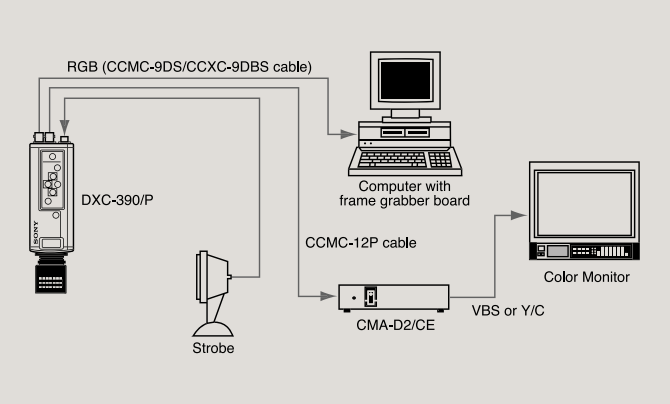
Applications

Microscopy



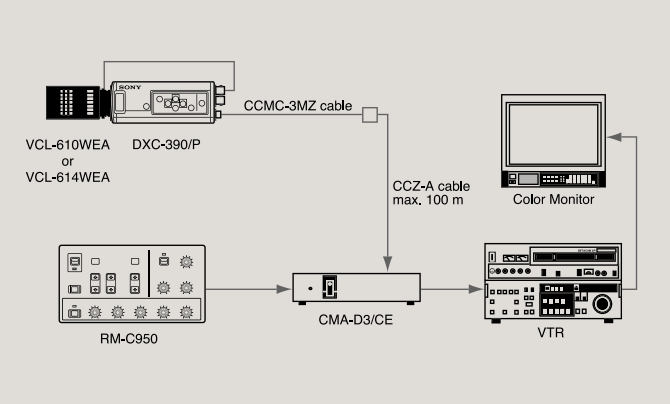
Useful DXC-390/390P functions include:
- DynaLatitude
- Digital Detail
- Partial Enhance
- Color Shading Compensation
- Flange Back Adjustment

Industrial Inspection



Useful DXC-390/390P functions include:
- Strobe trigger function
- WEN output
- RGB sync
- RS-232C Interface
- Extended Genlock (VBS GENLOCK and HD/VD In/Out)

Remote Camera System



Useful DXC-390/390P functions include:
- Motorized remote control lens
- Selectable AE speed
- User-defined AE area
- Video servo auto iris lens

3-CCD Colour Video Cameras

DXC-990/990P

1/3 Type 3-CCD | DSP | Bayonet Mount | Automatic Exposure | White Balance | Genlock | RS-232C Interface | Strobe Trigger Function

Outline

The Sony DXC-990/990P is a 1/2 type DSP 3-CCD colour video camera which incorporates Exwave HAD™ technology – a new Sony technology that greatly improves camera sensitivity (F11 at 2000 lx) while reducing smear.

The DXC-990/990P not only inherits all of the advanced functions of its predecessor, the DXC-950/950P, but also includes improved technology and innovative features for versatile operation in the same body size. Allowing use of a high quality Bayonet mount lens, and providing a resolution of 850 TV lines and high S/N ratio, the DXC-990/990P is ideal for applications such as microscopy, industrial inspection and remote camera systems where picture accuracy and detail are important.

Incorporating new 10 bit DSP technology, a user friendly on-screen menu allows for simple control of various features including a DynaLatitude™ function, Partial Enhance, and a wide selection of Automatic Exposure (AE) modes.

Features

Superior Picture Quality – New Exwave HAD™ CCDs

The DXC-990/990P incorporates newly developed 1/2 type IT (Interline Transfer) Exwave HAD™ technology. Inheriting the unique sensing technology of the DXC-950/950P, the DXC-990/990P attains a high sensitivity of F11 at 2000 lx while the improved HAD sensor structure drastically reduces smear level. This permits pictures of the highest quality to be captured in difficult lighting conditions. With the high packing density of these CCD image sensors and their accurate spacial offsetting, a remarkably high horizontal resolution of 850 TV lines is achieved. The combination of Exwave HAD™ technology, improved electronic circuitry and advanced video processing results in an excellent signal-to-noise ratio of 63 dB (NTSC) and 62 dB (PAL).

Picture Contrast Controls

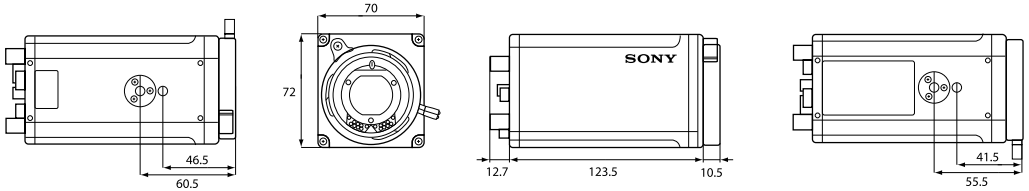
DynaLatitude™

Automatically adjusts contrast corresponding to the brightest signal level of the entire image. Clear images can be captured if both bright and dark areas exist within the image.

OFF **ON**

Simulated picture

Dimensions



Features

DCC+ (Dynamic Contrast Control Plus)

Avoids hue factor distortion that can occur when subjects are very bright. DCC+ also automatically adjusts the knee point according to the contrast of the image.

OFF ON

Simulated picture

Black Stretch

Black stretch/compress enhances the gradation of the dark area by stretching or compressing the range of the image.

Knee Control

By adjusting the knee, a knee point and knee slope are set so that the highlighted areas of the picture can be clearly reproduced. High/Normal/Low switchable.

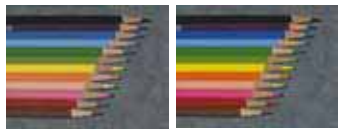
DSP (Digital Signal Processing)

The DXC-990/990P incorporates new Sony 10 bit DSP technology. DSP enables a variety of enhancement features and increases picture reliability that cannot be achieved with analog signal processing. The DXC-990/990P has several DSP functions for powerful picture controls.

Picture Enhancement Controls)

Digital Detail
Adjusts the sharpness of the object outline with minimal noise. This feature also enables horizontal detail frequency control.

Linear Matrix
Provides sophisticated electronic adjustment for accurate colour reproduction by adjusting colour saturation and hue.



OFF STANDARD

R.ENHANCE G.ENHANCE B.ENHANCE

Partial Enhance

Allows a particular colour to be selected, and its hue, saturation and detail altered. In addition, the detail produced by the high resolution of the camera can be softened or emphasised in certain parts of the image by the Partial Enhance function.

OFF ON

On-Screen Menu

The on-screen menu feature allows for quick and easy picture adjustments while viewing the image. All camera control functions are accessible from the side panel of the camera or through the optional RM-C950.

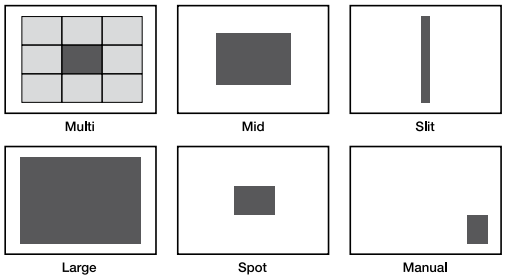
AE (Automatic Exposure)

AE automatically controls the level of brightness by varying the exposure times. This is done by combining the CCD IRIS® function, AGC (Automatic Gain Control), and Auto Iris function of the lens. The DXC-990/990P is equipped with a number of convenient AE modes.

AE Level
Adjusts the standard brightness level by up to + / - 0.5 F-stop in a lens iris.

AE Speed
Selectable AE conversion speed to suit applications under varying lighting conditions.

AE Area
AE Area is a light metering system that includes six different modes.



Electronic Shutter Functions

Variable speeds
A variable speed electronic shutter is built into the CCD imager, making it possible to capture blur-free, clear images of high speed moving objects. The DXC-990/990P features 11 different shutter speeds (OFF to 1/100,000), including flickerless mode.

Clear Scan™
The Clear Scan feature eliminates the horizontal bands that appear across the screen when shooting a computer display. This is achieved by matching the camera shutter speed with the display scanning frequency.

CCD IRIS
When the level of incoming light exceeds the auto iris adjustment range, the CCD IRIS function automatically reduces the exposure in a range equivalent to 10 F-stops.

Other Features

Bayonet mount

The DXC-990/990P is designed to accept high quality bayonet mount lenses so that it can adapt various kinds of professional lenses. The strong points of bayonet mount lenses include higher sensitivity and lower colour shading compared with C mount lenses. A hot-shoe connection is also provided to eliminate the need for a lens-to-camera interconnecting cable, providing easy remote control of zoom, focus and iris function.

Scene Files and User Files

Scene Files: The preset files are set to accommodate four different situations (Standard/ Microscope/Full Auto/Strobe). Copying the settings between two files is also possible (File A/B). User Files: Allows user to set two custom parameters in the menu for instant recall.

Hyper Gain (+30 dB)

High sensitivity mode used for shooting objects in very low light conditions.

GAIN (0 dB) GAIN (18 dB) HYPER GAIN

Colour Shading compensation

Allows for verification of colour on microscope.

RGB, component, Y/C and composite video outputs

RS-232C controllable

Easy control and operation of the camera by an external computer is possible.

Field or Frame integration mode

The DXC-990/990P has the ability to switch between Field or Frame CCD integration modes. Field integration is effective for capturing moving objects, while Frame integration is good for capturing a still image.

White Balance modes

AWB, ATW-Normal/Wide, MANU, Preset 3200K/5600K

Extended Genlock (VBS Genlock and HD/VD in/out)

Allows for synchronisation of signals with frame grabber boards.

Synchronisation capabilities (Strobe function, WEN output)

Realises full vertical resolution of fast moving objects.

Optional Accessories

Models	VCL-707BXM	VCL-714BXEA	VCL-717BXEA	YH12x4.8 KTS (by Canon)	YH18x6.7 KTS (by Canon)
Mount	Bayonet	Bayonet	Bayonet	Bayonet	Bayonet
Focal length	7.5-52.5 mm	7.5-105 mm	7-119 mm	4.8-58 mm	6.7-121 mm
Zoom ratio	7x	14x	17x	12x	18x
Zoom control	Manual	Remote	Remote	Remote	Remote
Focus control	Manual	Remote	Remote	Remote	Remote
Iris control	Manual	Remote	Remote	Remote	Remote
Maximum Object Distance	1 : 1.6	1 : 1.4	1 : 1.4	1 : 1.5 (4.8-44.6 mm) 1 : 1.95 (58 mm)	1 : 1.4 (6.7-91 mm) 1 : 1.85 (121 mm)
Minimum Object Distance	0.3 mm	1.1 mm	1.0 mm	0.4 mm	0.9 mm
Macro	Not applicable	Applicable	Applicable	Applicable	Applicable
Filter size	M58 x 0.75 mm	M72 x 0.75 mm	M86 x 1.0 mm	105 mm P1.0	82 mm P0.75
Mass	560 g	1.13 kg	1.7 kg	1.73 kg	1.4 kg
Dimensions	60 (dia.) x 125 (L) mm	110 (dia.) x 185.9 (L) mm	107 (W) x 117 (H) x 181.5 (D) mm	162.2 (W) x 101 (H) x 211.7 (L) mm	114.5 (W) x 93 (H) x 117.8 (L) mm
Notes	–	Zoom/Focus/Iris functions can be remotely controlled from the RM-C950.			

MVA-41ACMA-D3/D3CE

1/2 type 3-CCD Microscope Adaptor

MVAC-33 Series

Coupler
MVAC-33-N

MVAC-33-O

MVAC-33-SM

LO-32BMT

2/3-inch Lens Mount Adaptor

CCMC-12P02/12P05/12P10/12P25

12-pin Multi Cable (2/5/10/25 m)

CCDC-5/10/25/50A/100A

DC Cable (5/10/25/50/100 m)

CMA-D2/D2CE/D2MD/D2MDCE

Camera Adaptor
- Supplies DC power and transmits video/sync signal between the adaptor and the DXC-990/990P with CCMC 12-pin multi-core cable
- Complies with medical safety standard (CMA-D2MD/D2MDCE Only)
- Dimensions: 210 (W) x 50 (H) x 200 (D) mm
- Max. cable length: 25 m with CCMC-12P25 cable

CMA-D3/D3CE

Camera Adaptor
- Supplies DC power and transmits video/sync signal between the adaptor and the DXC-990/990P with CCZ-A cable and CCMC-3MZ cable.
- Connects with optional RM-C950 remote control unit
- AC IN/DC IN
- Composite, Y/C, RGB or component video signal output
- Dimensions: 210 (W) x 44 (H) x 210 (D) mm
- Max. cable length: 100 m with CCZ-A100 cable

RM-C950

Remote Control Unit
- Full remote control of the DXC-990/990P camera functions and lens zoom/focus/iris functions via RS-232C
- Dimensions: 212 (W) x 41 (H) x 132 (D) mm

CCXC-9DD

9-pin D-sub Cable
(5m, 9-pin D-sub <--> 9-pin D-sub)

CCXC-9DBS

9-pin D-sub Cable
(5m, 9-pin D-sub <--> BNCs (R/G/B/SYNC/VBS))

CCMC-9DS

9-pin D-sub Cable
(5m, 9-pin D-sub <--> BNCs (R/G/B/SYNC), DIN 4-pin (Y/C))

CCMC-3MZ

Camera Cable
(3m, for CMA-D3/D3CE connection, Capable of connecting to the CCZ-A2/A5/A25/A50/A100 cables, CCZZ-1E interconnection adaptor is supplied)

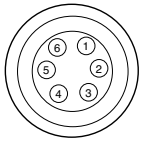
Specifications

	DXC-990/990P
Pick-up device	1/2 type IT (Interline Transfer) Exwave HAD CCD
Effective picture elements	DXC-990: 768 (H) x 494 (V) DXC-990P: 752 (H) x 582 (V)
Sensing area	6.4 x 4.8 mm
Scanning system	1/2 type interlined
Horizontal frequency	15.734 kHz
Vertical frequency	59.94 Hz
Sync system	Internal or external with VBS, HD/VD
Horizontal resolution	850 TV lines
Sensitivity	F11 (2000lx)
Minimum illumination	1lux (F1.4, GAIN: HYPER)
S/N ratio	63 dB (NTSC) / 62 dB (PAL)
Gain	STEP / AGC (0-24 dB) / HYPER
Shutter speed	0.5 - 1/100,000 s
Lens mount	Bayonet mount
AE area	Multi / Large / Medium / Spot / Slit / Manual
AE level	Variable
AE speed	Fast / Mid / Slow selectable
AE detect	Average / Peak selectable
Contrast effect	Manual / DynaLatitude / DCC+ selectable
Knee point	High / Normal / Low selectable
Black stretch	Variable
Gamma	On / Off
Pedestal	Master, R/B manual adjustable
Black balance	ABB
White balance	AWB / ATW normal / ATW wide / Manual / 3200K / 5600K selectable AWB or ATW R/B paint, manual R/G gain
ATW area	Normal / Manual
ATW speed	Slow / Mid / Fast
Detail level	On (Variable) / Off
Detail frequency	High / Mid / Low
Linear matrix	On / Off
Linear matrix mode	STANDARD / R Enhance / G Enhance / B Enhance / Manual Selectable
Partial enhance	All / In / Out
CCD integration mode	Field / Frame
Shading compensation	On / Off (manual)
Trigger polarity	Positive edge trigger / Negative edge trigger selectable
Baud rate	19200 / 9600 / 4800 / 2400 / 1200 selectable
Sync	RGB / G / OFF
Trigger	On / Off
User file	A / B
Scene file	Standard / Microscope / Full Auto / Strobe / File AorB
Output signals	VBS, RGB/SYNC, Y/C, Y/R-Y/B-Y
Serial data	RS-232C
Operational temperature	-5°C to 45°C
Storage temperature	-20°C to 60°C
Power requirements	DC 10.5 V to 15.0 V
Power consumption	Approx. 8.0 W
Dimensions	70 x 72 x 123.5
Mass	630 g
Connectors	RGB/SYNC (9pin D-sub), DC IN/VBS (12pin), VIDEO OUT (BNC), TRIGGER IN (BNC), REMOTE (8 pin mini DIN), GEN LOCK IN (BNC), LENS (6pin)
Supplied accessories	Lens mount cap, Stopper mount, Operation instruction manual, Panel sheet for RM-950

Optional accessories

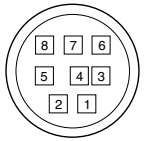
Camera adaptor	CMA-D2 / D2CE / D2MD / D2MDCE, CMA-D3 / D3CE
Camera cable	CCMC-12P02 / 12P05 / 12P10 / 12P25, CCDC-5 / 10 / 25 / 50A / 100A, CCXC-9DD, CCXC-9DBS, CCMC-9DS, CCMC-3MZ
Remote control unit	RM-C950
Microscope adaptor	MVA-41A
Microscope coupler	MVAC-33 Series (MVAC-33-N/33-O/33-SM)
Lens mount adaptor	LO-32BMT
Lens	VCL-707BXM / 714BXEA / 717BXEA, YH12X4.8 KTS / YH18X6.7 KTS (by Canon)

DXC-990/990P Connector Pin Assignments



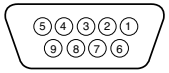
6-pin

Menu	Lens: Remote
1	NC
2	NC
3	DC OUT (G)
4	INTERNAL CONNECT
5	IRIS CONTROL
6	DC OUT (+)



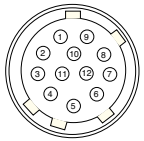
8-pin

Menu	Lens: Remote
1	INTER CONNECT
2	INTER CONNECT
3	DATA OUT
4	DC OUT (G)
5	DATA IN
6	NC
7	DATA OUT (+)
8	CMA DATA



9-pin

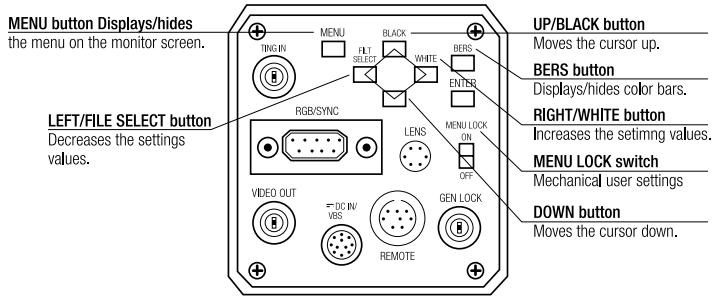
Menu	D-sub OUT:RGB D-sub VIDEO:VBS D-sub SYNC:C.SYNC	D-sub OUT:RGB D-sub VIDEO:VBS D-sub SYNC:WEN	D-sub OUT:Y/C D-sub VIDEO:VBS D-sub SYNC:C.SYNC	D-sub OUT:RGB D-sub VIDEO:Y/C D-sub SYNC:WEN	D-sub OUT:Y/CR/CB D-sub OUT:Y/C D-sub SYNC:WEN	When using the CMA-D3/CE
1	VBS OUT (G)	VBS OUT (G)	Y/C OUT (G)	VBS OUT (G)	Y/C OUT (G)	- (G)
2	RGB OUT (G)	RGB OUT (G)	RGB OUT (G)	RGB OUT (G)	RGB OUT (G)	VBS/Y/C OUT (G)
3	R OUT (X)	R OUT (X)	R OUT (X)	R OUT (X)	CR OUT (X)	VBS OUT (X)
4	G OUT (X)	G OUT (X)	G OUT (X)	G OUT (X)	Y OUT (X)	Y OUT (X)
5	B OUT (X)	B OUT (X)	B OUT (X)	B OUT (X)	CB OUT (X)	C OUT (X)
6	VBS OUT (X)	VBS OUT (X)	Y OUT (X)	Y OUT (X)	Y OUT (X)	– (X)
7	C.SYNC OUT (X)	WEN OUT (X)	C.SYNC OUT (X)	WEN OUT (X)	WEN OUT (X)	WEN OUT (X)
8	C.SYNC OUT (G)	WEN OUT (G)	C.SYNC OUT (G)	WEN OUT (G)	WEN OUT (G)	WEN OUT (G)
9	– (X)	– (X)	– (X)	C OUT (X)	C OUT (X)	– (X)



12-pin

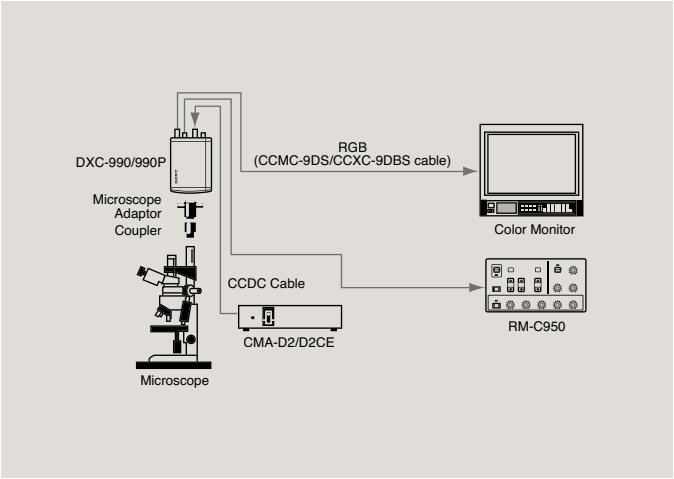
Menu	D-sub VIDEO:VBS 12pin connector:IN	D-sub VIDEO:VBS 12pin connector: C.SYNC	D-sub VIDEO:VBS 12pin connector:HD/VD	D-sub VIDEO:Y/C 12pin connector:IN	D-sub VIDEO:Y/C 12pin connector:C.SYNC	D-sub VIDEO:Y/C 12pin connector:HD/VD
1	DC IN (G)	DC IN (G)	DC IN (G)	DC IN (G)	DC IN (G)	DC IN (G)
2	DC IN (+)	DC IN (+)	DC IN (+)	DC IN (+)	DC IN (+)	DC IN (+)
3	VBS OUT (G)	VBS OUT (G)	VBS OUT (G)	VBS OUT (G)	VBS OUT (G)	VBS OUT (G)
4	VBS OUT (X)	VBS OUT (X)	VBS OUT (X)	Y OUT (X)	Y OUT (X)	Y OUT (X)
5	-/HD IN (G)	- (G)	HD OUT (G)	-/HD IN (G)	- (G)	HD OUT (G)
6	-/HD IN (X)	- (X)	HD OUT (X)	-/HD IN (X)	- (X)	HD OUT (X)
7	VBS/VD IN (X)	C.SYNC OUT (X)	VD OUT (X)	VBS/VD IN (X)	C.SYNC OUT (X)	VD OUT (X)
8	- (G)	- (G)	- (G)	C OUT (G)	C OUT (G)	C OUT (G)
9	- (X)	- (X)	- (X)	C OUT (X)	C OUT (X)	C OUT (X)
10	DC IN (G)	DC IN (G)	DC IN (G)	DC IN (G)	DC IN (G)	DC IN (G)
11	DC IN (+)	DC IN (+)	DC IN (+)	DC IN (+)	DC IN (+)	DC IN (+)
12	VBS/VD IN (G)	C.SYNC OUT (G)	VD OUT (G)	VBS/VD IN (G)	C.SYNC OUT (G)	VD OUT (G)

Rear Panel



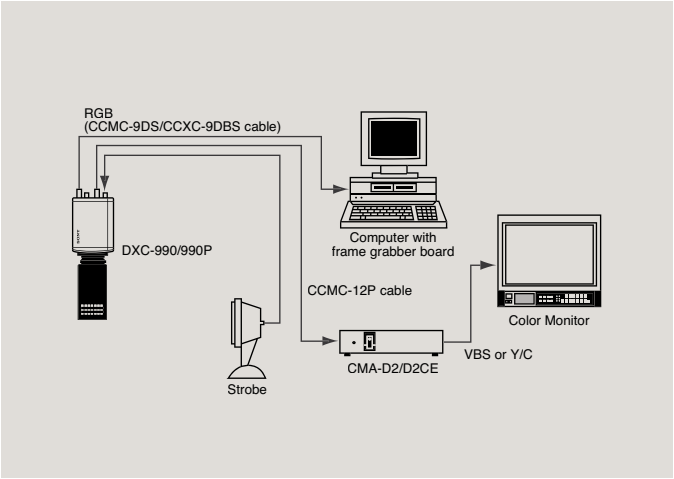
Applications

Microscopy



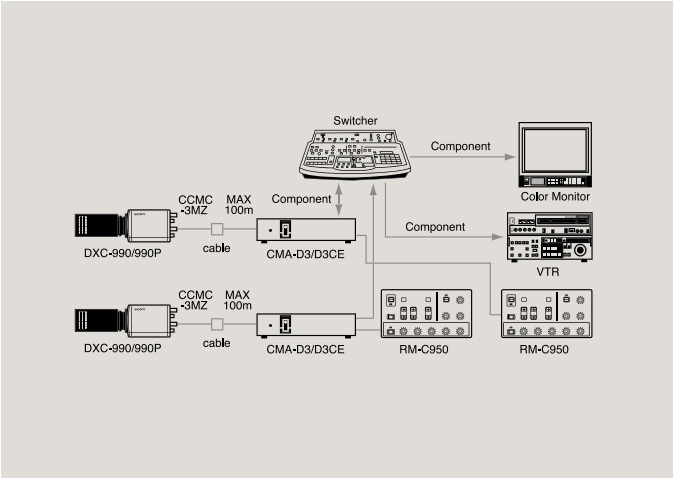
Useful DXC-990/990P functions include:
- DynaLatitude
- Digital Detail
- Partial Enhance
- Colour Shading Compensation

Industrial Inspection



Useful DXC-990/990P functions include:
- Strobe trigger function,
- WEN output
- RGB sync
- RS-232C Interface
- Extended Genlock (VBS GENLOCK and HD/VD In/Out)

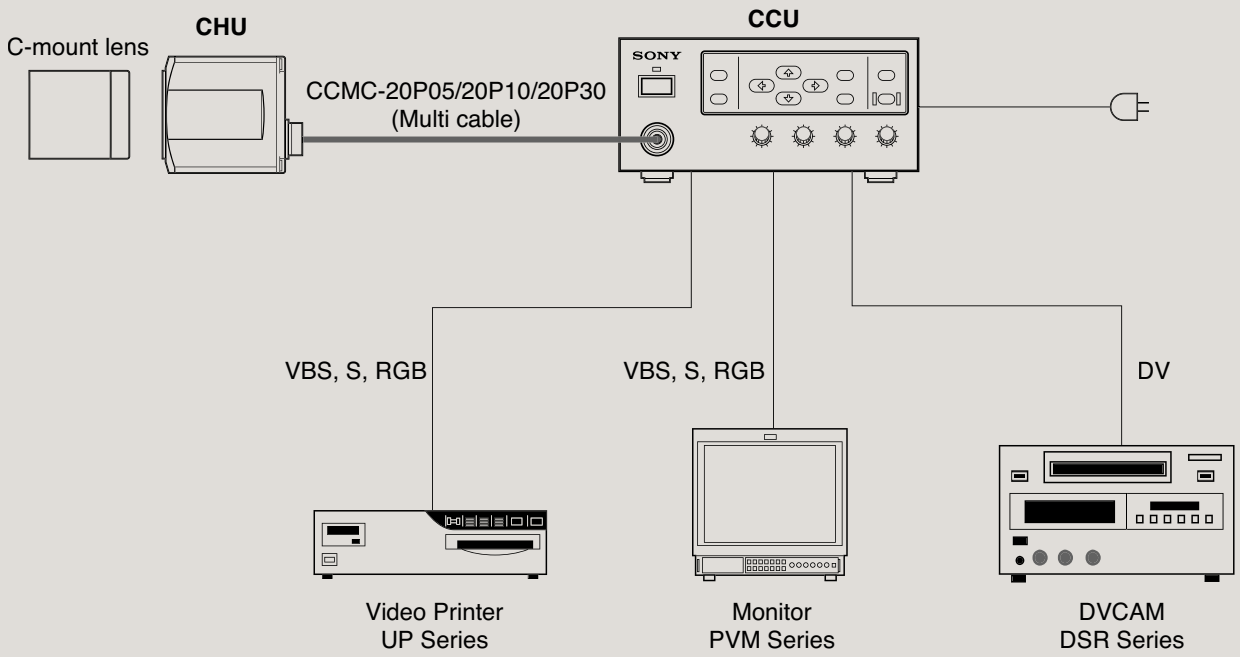
Remote Camera System



Useful DXC-990/990P functions include:
- Motorised remote control lens
- Selectable AE speed
- User-defined AE area

Connection Diagram

DXC-C33/C33P



Discontinued Models

Monochrome Camera Function Chart 3
Colour Camera Function Chart 6

Monochrome Camera	
XCL-V500	`09
XCL-X700	`09
XCD-V50	`09
XCI-SX1	`09
XCI-V3	`09
XCL-5000	`09
XCD-SX910UV	`08
XCD-SX910	`08
XCD-X710	`08
XCD-V50	`08
XC-55BB	`04
XC-55	`04
XCD-SX900UV	`04
XC-HR300	`04
XC-7500	`04
XC-8500CE	`04
XCD-X700	`04
XCD-SX900	`04
XC-73	`01
XC-73CE	`01
XC-73L	`01
XC-75	`01
XC-75CE	`01
XC-75L	`01
XCH-1125	`99
XC-77	`99
XC-77CE	`99
XC-77BB	`99
XC-77BBCE	`99
XC-77RR	`99
XC-77RRCE	`99
XC-37	`93
XC-38	`93
XC-39	`93
XC-57	`93
XC-57CE	`93

Colour Camera	
XC-555/555P	`10
XCD-V50CR	`09
DFW-SX910	`08
DFW-X710	`08
XCD-SX910CR	`08
XCD-X710CR	`08
XCD-V50CR	`08
DFW-X700	`04
DFW-SX900	`04
XC-003	`04
XC-003P	`04
DFW-V500	`04
DFW-VL500	`04
EVI-D30	`04
EVI-D31	`04
XC-777A	`02
XC-777AP	`02
XC-999	`02
XC-999P	`02
CCM-DS250	`01
DFW-V300	`01
EVI-G20	`01
EVI-G21	`01
EVI-R10	`01
EVI-R11	`01
EVI-R50	`01
EVI-R51	`01
XC-333	`00
XC-333P	`00
XC-711	`00
XC-711P	`00
XC-711RR	`00
CCM-PC5	`99
XC-009	`99
XC-009P	`99
XC-007	`98
XC-007P	`98
XC-117	`93
XC-117P	`93

Card Camera (Monochrome/Colour)	
CCB-M25	`04
CCB-M27B	`04
CCB-M35A	`04
CCB-ME37	`04
CCB-ME47	`04
CCB-M25CE	`02
CCB-M27BCE	`02
CCB-M35ACE	`02
CCB-M37	`02
CCB-M37CE	`02
CCB-ME37CE	`02
CCB-MS37CE	`02
CCB-GC7YC	`02
CCB-ME47CE	`01
CCB-GC7YCP	`01
CCB-GL5	`99
CCB-GL5P	`99
CCB-GL5YC	`98
CCB-GL5YCP	`98

Discontinued Models

Camera Block

FCB-EX78B	'07
FCB-EX78BP	'07
FCB-EX780B	'07
FCB-EX780BP	'07
FCB-S3000	'07
FCB-S3000P	'07
FCB-IX45A	'06
FCB-IX45AP	'06
FCB-IX47A	'06
FCB-IX47AP	'06
FCB-EX45M	'06
FCB-EX45MCE	'06
FCB-EX45B	'06
FCB-EX45BP	'06
FCB-EX48B	'06
FCB-EX48BP	'06
FCB-EX480B	'06
FCB-EX480BP	'06
FCB-IX10A	'05
FCB-IX10AP	'05
FCB-EX45A	'04
FCB-EX45AP	'04
FCB-EX48A	'04
FCB-EX48AP	'04
FCB-EX480A	'04
FCB-EX480AP	'04
FCB-EX780S	'04
FCB-EX780SP	'04
FCB-IX10	'03
FCB-IX10P	'03
FCB-IX47	'03
FCB-IX47P	'03
FCB-EX48L	'03
FCB-EX48LP	'03
FCB-EX480L	'03
FCB-EX480LP	'03
FCB-EX480X	'03
FCB-EX480XP	'03
EVI-400	'02
EVI-400DR	'02
EVI-401	'02
EVI-401DR	'02
FCB-EX470L	'02
FCB-EX470LP	'02
EVI-330	'01
EVI-330T	'01
EVI-331	'01
EVI-331T	'01
EVI-370	'01
EVI-370D	'01
EVI-370DG	'01
EVI-371	'01
EVI-371D	'01
EVI-371DG	'01
CCB-EX37	'00
CCB-EX37P	'00
FCB-EX47L	'00
FCB-EX47LP	'00
FCB-IX470	'00
FCB-IX470P	'00
EVI-310	'99
EVI-311	'99
EVI-370G	'99
EVI-371G	'99
EVI-330V	'98
EVI-331V	'98
EVI-900	'98
EVI-901	'98
EVI-130	'97
EVI-131	'97
EVI-110	'96
EVI-111	'96
XCB-009	'96
XCB-009P	'96
EVI-100	'93
EVI-101	'93
EVI-1011	'93
EVI-1011P	'93
EVI-200	'93
EVI-201	'93

Cable

CCXC-T20P02	'05
CCXC-6P05	'04
CCXC-9DD	'04
CCXC-9DB	'04
CCE-50R	'04
CCE-50M	'02
CCE-150R	'02
CCXC-12P02S	'00
CCXC-12P05S	'00
CCXC-12P05U	'00
CCXC-12P05D	'00
CCXC-12P05L	'00
CCXC-12P05R	'00
CCXC-12P10S	'00
CCXC-12P25S	'00
CCXC-T20P05	'00
CCXC-T20P10	'00
CCXC-20P20	'00
CCXC-H12P05	'00
CCXC-H20P05	'00
CCXC-20P20	'99
CCXC-12P02	'98
CCXC-12P05	'98
CCXC-12P10	'98
CCXC-12P25	'98

Lens

VCL-08YM	'08
VCL-12YM	'08
VCL-16Y-M	'08
VCL-25Y-M	'08
VCL-50Y-M	'08
VCL-12SXM	'06
LO-75D	'05
VCL-08WM	'05
VCL-16WM	'05
VCL-25WM	'05
50MM MACRO LENS	'05
LO-77ERK	'05
LO-999ERK	'05
VCL-0637W	'04
VCL-M45YM	'02
25MM HD LENS	'02
LO-37ND	'02
LO-37IR	'02
VCL-707BXM	'99
VCL-714BXEA	'99
CCL-06Z	'99
CCL-M05XE	'99
CCL-M07XE	'99
CCL-C04XE	'98
CCL-C08XE	'98
CCL-M03XE	'98
LO-C35	'98
LO-G35	'98
VCL-25BXM	'97
VCL-08SBYA	'93
VCL-16SBY	'93
VCL-25BY	'93
42MM Whole Mirror Lens	'93
Variable Focusing Lens	'93
LO-37CMT	'93
LO-39CMT	'93

Discontinued Models

Others

PC-XC04	`07
DFWS-77	`04
CMA-87	`04
PC-XC06	`04
VCT-37	`04
VCT-75I	`04
PSB-915IA	`04
CMA-999	`02
CMA-999P	`02
PC-XC03	`02
LO-GC7	`02
XCK-L777	`02
DFWA-400	`01
MVA-15	`01
DC-777	`00
DC-777CE	`00
DC-77RR	`00
DC-77RRCE	`00
FK-63	`00
FK-69	`00
IF-51	`00
DVBK-1/A	`00
LDI-100B	`00
LDI-D100B	`00
LDI-D50B	`00
XCM-003	`00
XCM-009	`00
XCM-7500	`00
XCM-7573	`00
XCM-8500	`00
FK-57	`99
LMD-1040XC	`99
MSI-1125	`99
MVA-40	`99
MVA-41A	`99
SEU-2092	`99
VCT-77RR	`99
YP-186XC	`95
CBK-117	`93
CBK-38GL	`93
DC-37	`93
DC-38	`93
DC-39	`93
VCT-57I	`93
XCM-37	`93
XCM-38	`93
XCM-39	`93
XCM-57	`93
XCM-117	`93
VK-120A	