XC-EI50/EI50CE
XC-EI30/EI30CE

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

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

*1: XC-EI50/EI50CE
*2: XC-EI30/EI30CE

Connection Diagram P98

Outline

Like the XC-EI50/EI50CE and XC-EI30/EI30CE, the XC-ES50/ES30 is 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

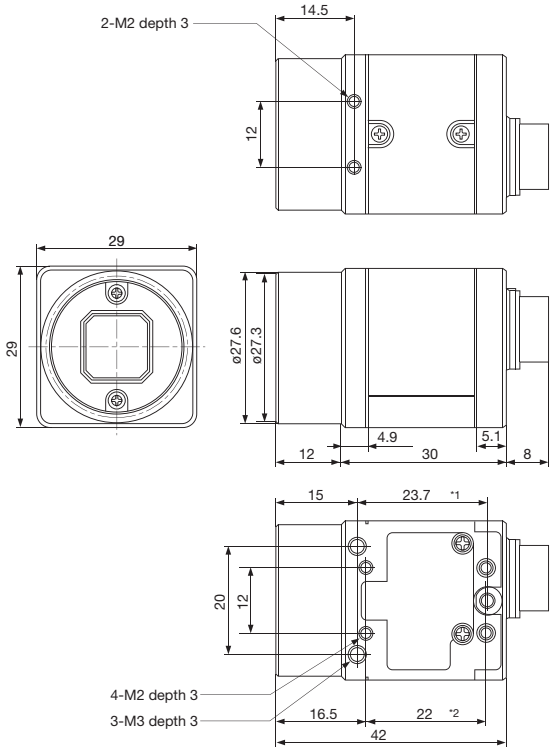
- XC-EI50/EI50CE: 1/2-type IT CCD
- XC-EI30/EI30CE: 1/3-type IT CCD
- Near-IR sensitivity
- High sensitivity: F1.4
  XC-EI50/EI50CE: 0.1 lx
  XC-EI30/EI30CE: 0.2 lx
- High S/N ratio: 60 dB
- Electronic shutter function (1/100 sec to 1/10,000 sec)
- External trigger shutter function (1/4 sec to 1/10,000 sec)
- 2:1 Interlaced/non-interlaced
- Frame/Field accumulation
- Restart/Reset function
- Sync system: Internal/external (HD/VD)
- High shock and vibration resistance

Accessories

- Compact camera adaptor
  - DC-700/700CE
- 12-pin camera cable (CE standard)
  - CCXC-12P02N (2 m)
  - CCXC-12P05N (5 m)
  - CCXC-12P10N (10 m)
  - CCXC-12P25N (25 m)
- Tripod adaptor
  - VCT-333I

Dimensions

Camera body of all XC-E models



Unit: mm

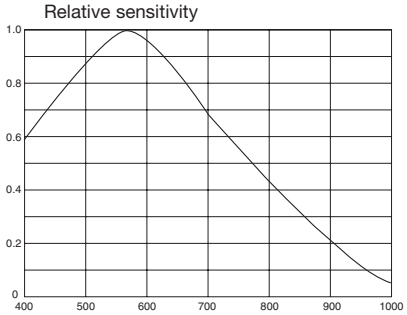
*1: M3 screw size
*2: M2 screw size

Notice

From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles.
For the new outside dimensions, see page 88.
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

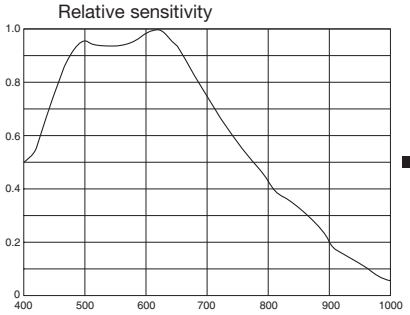
Spectral Sensitivity Characteristics

• XC-EI30
(Typical Values)



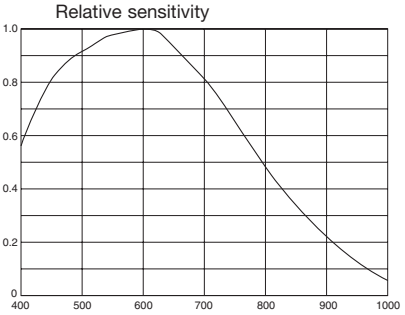
(Lens characteristics and light source characteristics excluded.)

• XC-EI50
(Typical Values)



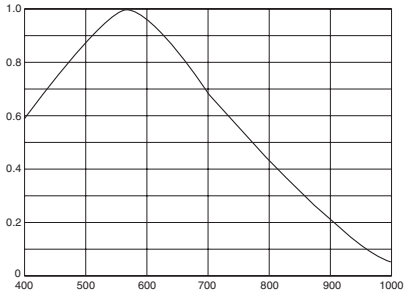
(Lens characteristics and light source characteristics excluded.)

• XC-EI50* On and after S/No.200001
(Typical Values)



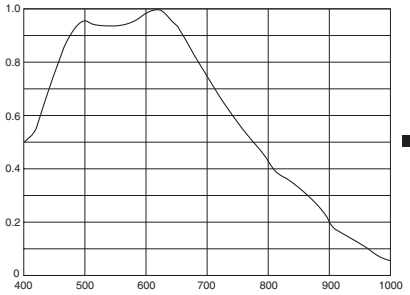
(Lens characteristics and light source characteristics excluded.)

• XC-EI30CE
(Typical Values)



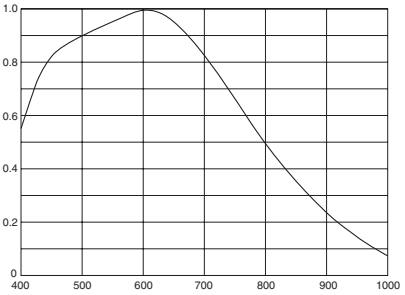
(Lens characteristics and light source characteristics excluded.)

• XC-EI50CE
(Typical Values)



(Lens characteristics and light source characteristics excluded.)

• XC-EI50CE* On and after S/No.500001
(Typical Values)



(Lens characteristics and light source characteristics excluded.)

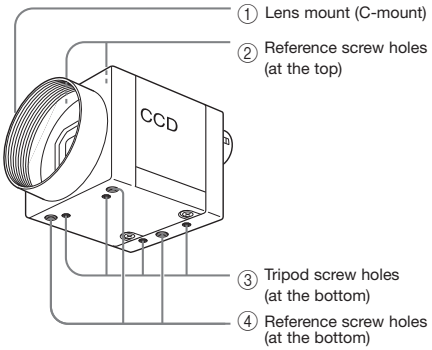
* The Special Sensitivity Characteristics are changed from the following serial number
・S/N XC-EI50 200001 XC-EI50CE 500001

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 Vp-p to 5 Vp-p)			
External sync frequency	±1% (in horizontal sync frequency)			
H 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 sec to 1/10,000 sec	1/120 sec to 1/8,000 sec	1/100 sec to 1/10,000 sec	1/120 sec to 1/8,000 sec
External trigger shutter*3	1/4 sec to 1/10,000 sec	1/4 sec to 1/8,000 sec	1/4 sec to 1/10,000 sec	1/4 sec to 1/8,000 sec
Power requirements	DC 12 V (9 V to16 V)			
Power consumption	1.6 W		1.4 W	
Dimension	29(W) × 29(H) × 30(D) mm (not including projecting parts)			
Mass	50 g			
Operating temperature	–5°C to +45°C			
Storage temperature	–30°C to +60°C			
Performance guarantee temperature	0°C to 40°C			
Operating humidity	20% to 80% (no condensation)			
Storage humidity	20% to 80% (no condensation)			
Vibration resistance	10 G (20 Hz 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 : Class B, CE : EN61326, AS/NZ : EN61326			
Supplied accessories	Lens mount cap (1), Operating instructions (1)			

The values for mass and dimension are approximate.
*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

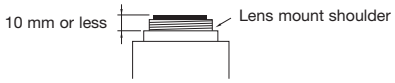
Location and Function of Parts and Controls



① **Lens mount section (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.

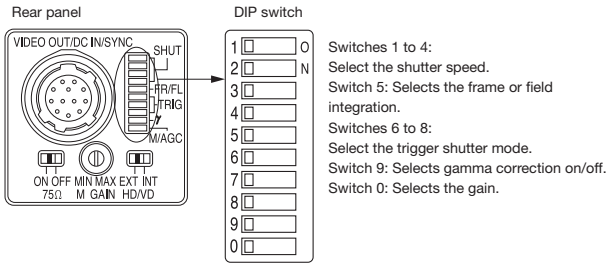


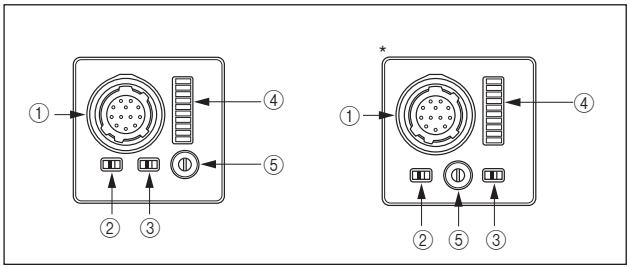
② **Reference screw holes (at the top)**
These screw holes help to lock the camera module.

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.

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 **75 Ω 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

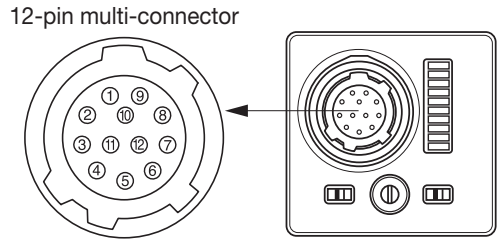
When setting DIP switch 5 to the frame integration, set the volume control switch 5 to the MAX side from the mechanical center (because of CCD characteristics).

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 1.9 mm width, 0.5 mm thickness and more than 0.45 mm length.

Factory Mode Settings of Rear Panel

No.	Switch	Factory-setting mode
②	75 Ω termination selector switch	ON
③	HD/VD input-output selector switch	EXT
④	Shutter speed/mode setting DIP switch	
	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 gamma correction on/off.	OFF
	Switch 0: Selects the gain.	Manual
⑤	Volume control switch	Mechanical center

Connector Pin Assignments



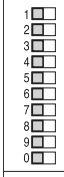
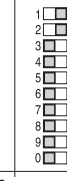
Pin No.	External HD/VD synchronization	Internal HD/VD synchronization
1	Ground	Ground
2	+12 V	+12 V
3	Ground	Ground
4	VIDEO output	VIDEO output
5	Ground	Ground
6	External HD input	Internal HD output
7	*1 External VD input	Internal VD output
8	Ground	Ground
9	–	–
10	*2 WEN output	*2 WEN output
11	TRIG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

*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

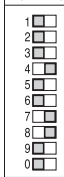
These modes are used to capture one image (one field) per trigger pulse. Set DIP switches 6, 7, and 8 on the rear panel to mode 1 or 2. (Refer to the table below.) When the trigger pulse width is 1/3 sec or more, the output signal is switched to a normal video signal. There are two modes for timing in which a video signal is obtained.

- **Mode 1 (Non-reset mode)**
  In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.
  – A video signal is synchronized with the external VD signal when an external HD/VD signal is input.
  – A video signal is synchronized 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.

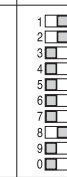
■ **Setting of external trigger shutter speed**

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)

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)

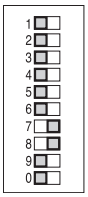
(Unit: second) (Unit: second)

* The external trigger shutter speed is set to 1/100 sec for XC-EI50/EI30 (EIA) and 1/120 sec for XC-EI50CE/EI30CE (CCIR).

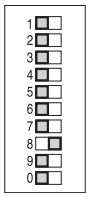
** The external trigger shutter speed is set to 1/10000 sec for XC-EI50/EI30 (EIA) and 1/8000 sec for XC-EI50CE/EI30CE (CCIR).

- **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 μs to 250 ms.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)

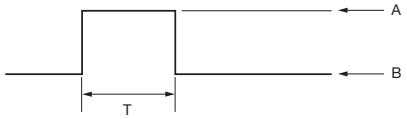


Exposure time = Trigger pulse width + 97 μs (EIA)
120 μs (CCIR)

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**

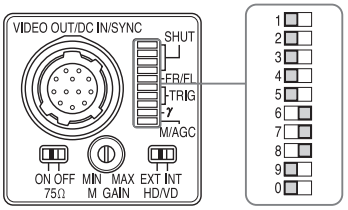


A: 4 V to 5.0 V
B: 0 V to 1.0 V
T: 2 μs to 1/4 sec

T: 2 μs to 1/4 sec, 100 μs to 1/4 sec 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.