

FOR MACHINE VISION AND OTHER INDUSTRIAL APPLICATIONS

Hitachi Black and white CCD camera

KP-M1/KP-M1EK

CCD

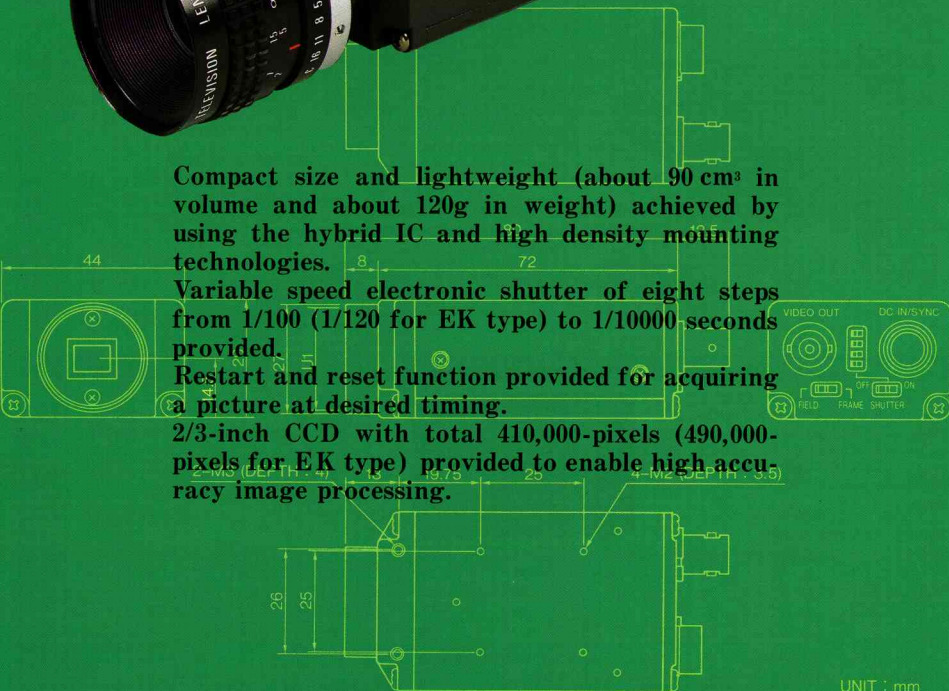


Compact size and lightweight (about 90 cm³ in volume and about 120g in weight) achieved by using the hybrid IC and high density mounting technologies.

Variable speed electronic shutter of eight steps from 1/100 (1/120 for EK type) to 1/10000-seconds provided.

Restart and reset function provided for acquiring a picture at desired timing.

2/3-inch CCD with total 410,000-pixels (490,000-pixels for EK type) provided to enable high accuracy image processing.



UNIT : mm

Extremely compact and lightweight



The Hitachi KP-M1 is a black and white camera which uses the latest high grade 2/3-inch image size CCD. Though the KP-M1 is a compact and lightweight camera, it features high sensitivity and high resolution. As the KP-M1 is provided with a variety of functions including the multiple step electronic shutter function, the restart and reset function, the selectable integration mode, the HD/VD external sync operation, and the non-interface scan capability, it is most suitable for use with a microscope or an image processing equipment.



Compact and lightweight

The KP-M1 is small in size and light in weight, while the camera is provided with multiple functions and delivers high performance. The video signal can be obtained only by supplying 12V DC.

High resolution

The KP-M1 uses the latest high grade CCD which has 410,000 pixels and 768 (H) x 493 (V) effective pixels [CCIR : Number of pixels is 490,000 and number of effective pixels is 756 (H) x 581 (V)]. The camera features horizontal resolution of 570 (560 for CCIR) TV lines and vertical resolution of 485 (575 for CCIR) TV lines.

2/3-inch image size

The image size is 2/3 inches, which is most popular among cameras for industrial application. As the standard C type lens mounting is provided, the camera can be installed on a microscope.

Multiple step electronic shutter function

The multiple step electronic shutter function is provided. The eight-step shutter speed can be selected from 1/100 (1/120 for CCIR) to 1/10000.

Internal/external sync, interface/non-interface capabilities

The sync system and the scanning system are automatically selected when an external sync signal is supplied.

Restart and reset function

Since the restart and reset operation can be made by an external trigger signal and a picture can be obtained at desired timing, the camera is suitable for use with an image processing equipment.

Frame and field integration modes

An integration mode can be switched between the frame mode and the field mode, an appropriate picture can be obtained by a combination of the scanning system, the electronic shutter and the restart and reset function.

Resistant to vibrations

The camera uses aluminum die castings and the camera is designed by taking consideration of vibration-resistant performance.

Shutter function

The shutter speed of the KP-M1 can be selected in eight steps from 1/100 (CCIR: 1/120) to 1/10000 seconds with the switch on the rear. To select the speed, set the SHUTTER ON/OFF switch to ON, then set the speed with the shutter speed select switch.



Shutter speed select switch

SHUTTER ON/OFF switch

Setting of shutter speed

Position									
Speed (second)	1/100(EIA) 1/120(CCIR)	1/125	1/250	1/500	1/1000	1/2000	1/4000	1/10000	Normal 1/60(EIA) 1/50(CCIR)

Integration mode		Frame Integration mode		Field Integration mode		
		Interlace	Non-interlace	Interlace	Non-interlace	
Scanning system						
Relationship between integration time and VIDEO OUT	Integration time					
	VD					
	VIDEO OUT					
Vertical resolution (TV lines)		485 (575)	242 (287)	350 (415)	242 (287)	
Restart and reset (asynchronous)	Shutter OFF	R.R. pulse interval: 8 fields or more				
		R.R. pulse interval: 4 fields or more				
	Shutter ON	R.R. pulse interval: 8 fields or more				
		R.R. pulse interval: 4 fields or more				

To perform the restart·reset operation of non-interlaced scanning, some modifications are required.

●Field/frame integration

Since the scanning line is read one by one in the frame integration mode, the highest vertical resolution can be obtained in the normal shutter mode. Since the scanning line is read two by two in the field integration mode, sensitivity is almost double in shutter operation in comparison with that in the frame storage mode. The mode is set to the frame integration mode at the factory.

●Gamma correction mode

Gamma can be switched between 1.0 and 0.45 with an internal switch. Gamma is set to 1.0 at the factory.

●AGC

Gain can be switched between NORM (normal) and AGC. Gain is set to NORM at the factory.

●Video output signal

The video signal (1Vp-p/75 ohms) is fed from the VIDEO OUT terminal (BNC) and the DC IN/SYNC terminal (12-pin). However, since the video signal is fed to the terminals from one output amplifier, use either of the terminals.

Camera input signal

Internal sync/2:1 interlace

When an external sync signal is not fed in, the camera is automatically operated in the internal sync (2:1 interlace) mode. The mode is automatically switched between the internal sync mode and the external sync mode.

External Sync (VS, VBS or SYNC)

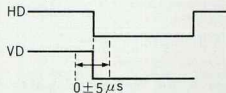
When the external sync signal of the composite video signal (VS) or the composite sync signal (SYNC) is fed in, the camera is operated in the external sync (2:1 interlace) mode.

External sync (HD/VD)

When HD/VD (5.0Vp-p/High) is fed in to the HD/VD input terminal, the camera is operated in the external sync mode.

HD: $fH = 15,734\text{Hz} \pm 1\%$ (EIA)
 $fH = 15,625\text{Hz} \pm 1\%$ (CCIR)
 VD: $fV = 59,94\text{Hz}$ [$fV = fH \div 262.5$] (EIA)
 $fV = 50\text{Hz}$ [$fV = fH \div 312.5$] (CCIR)

HD/VD phase



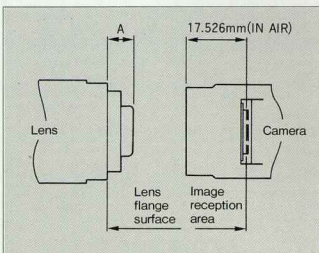
Non-interlace operation

When VD is fed in on the non-interlace condition, the camera is operated in the non-interlace mode.

HD: $fH = 15,734\text{KHz} \pm 1\%$ (EIA)
 $fH = 15,625\text{KHz} \pm 1\%$ (CCIR)
 VD: $fV = fH \div (260 \sim 1023)$ (Hz)
 $fV = fH \div (310 \sim 1023)$ (Hz) (CCIR)

Lens mount

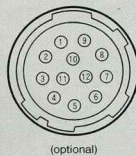
The lens mount is of the C mount system, and the flangeback is 17.526mm. Use a lens or an optical system of which length (A) between the flange face of the lens and the end of the screwed section is 8mm or less.



Connection of DC IN/SYNC (DC input/sync signal) terminal

Use the 12-pin connector for supply of 12V DC, output of a video signal and input of an external sync signal.

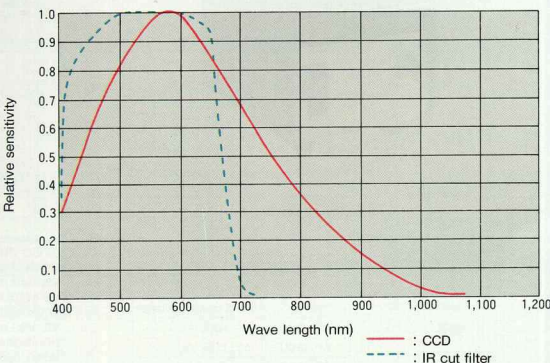
Pin locations of 12-pin connector
(on camera side)



Pin No.	Internal sync	External sync		
		HD·VD	VBS/VS/SYNC	Restart and reset
1	GND	GND	GND	GND
2	+12V	+12V	+12V	+12V
3	Video output (GND)	Video output (GND)	Video output (GND)	Video output (GND)
4	Video output (signal)	Video output (signal)	Video output (signal)	Video output (signal)
5	—	HD input (GND)	—	HD input (GND)
6	—	HD input (signal)	—	HD input (signal)
7	—	VD input (signal)	VBS/VS/SYNC input (signal)	Reset trigger input (signal)
8	—	—	—	—
9	—	—	—	—
10	GND	GND	GND	GND
11	+12V	+12V	+12V	+12V
12	—	VD input (GND)	VBS/VS/SYNC input (GND)	Reset trigger input (GND)

Spectral response characteristics

The KP-M1 is provided with an IR (infrared) cut filter as standard. Normal spectral response characteristics are shown by the dotted line in the figure. However, by removing the IR cut filter is removed, the spectral response can be extended up to the near infrared region.

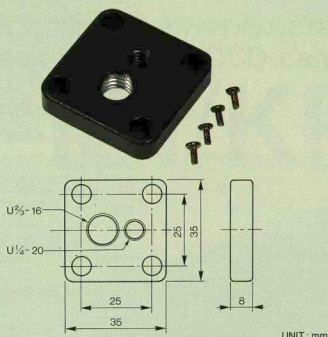


The IR cut filter can be removed by unscrewing the two front screws.

Options

Tripod adaptor TA-M1

When using the camera fixed on the tripod, mount this tripod adaptor on the bottom of the camera. Use the four supplied screws M2x5.



UNIT: mm

DC IN/SYNC plug

Connect this plug to the DC IN/SYNC of the camera.

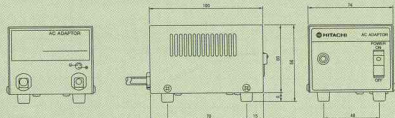


HR10A-10P-12S (01)

[Made by Hirose Electric Co.,Ltd.]

AC adaptor AP-130

When operating the camera by a commercial AC power source, use this AC adaptor to supply 12V DC to the camera through the junction box JU-M1 (connected to DC IN).



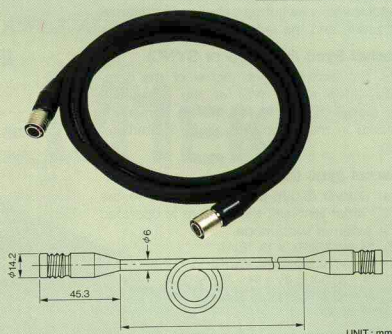
Name	Input power voltage
AP-130J	100V AC
AP-130U	117V AC
AP-130E	220V AC
AP-130K	240V AC

UNIT: mm

Camera cable

Connect this cable to the DC IN/SYNC Connector of the camera.

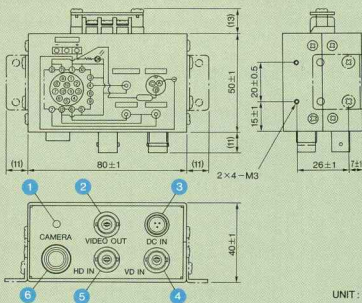
Name	Length
C-201KS	2m
C-501KS	5m
C-102KS	10m



UNIT: mm

Junction box JU-M1

Connect this junction box to the camera using the camera cable.



UNIT: mm

- 1 Pilot lamp
- 2 VIDEO OUT (video output) [BNC connector]
- 3 DC IN [3 pin]

Connect the AC adaptor AP-130, and 12V DC is supplied.

- 4 VD IN [BNC connector]

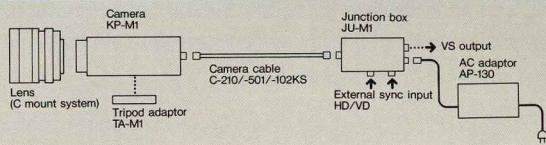
When operating the camera by external sync, feed in the VD, VS, VBS or SYNC signal.

- 5 HD IN [BNC connector]

When operating the camera by external sync, feed in the HD signal.

- 6 CAMERA (12-pin) [Multi connector]

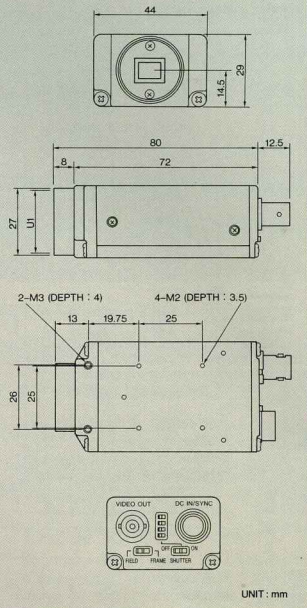
System Configuration



Specifications

		KP-M1	KP-M1 _{EX}
Signal system		EIA system	CCIR system
Pickup device		Interline transfer CCD	Interline transfer CCD
Number of effective pixels :		768 (H) × 493 (V)	756 (H) × 581 (V)
Sensing area		8.8 × 6.6mm (2/3-inch size)	
Pixel pitch		11.0 (H) × 13.0 (V) μm	11.0 (H) × 11.0 (V) μm
Lens mount		C mount	
Flange focal distance		17.526mm	
Scanning frequency		15.734kHz (H), 59.94kHz (V)	15.625kHz (H), 50Hz (V)
Sync system		Internal sync/external sync (automatic switching)	
Scanning system	2:1 interlaced	525 (H), 2fH/525 (V)	625 (H), 2fH/625 (V)
	Non-interlaced (Only in external sync mode)	260 to 1023 (H), 1fH/260 to 1023 (V)	310 to 1023 (H), 1fH/310 to 1023 (V)
External sync input		HD/VD: 2 to 6Vp-p or SYNC: 0.3Vp-p (min. 0.25Vp-p) (VS or VBS also possible) Input impedance: 1k ohms Frequency deviation: ±1% Polarity: Negative	
Number of horizontal lines within range where the ext. sync can be lock in.	2:1 interlaced:	521 to 2047 lines/2fields (61 to 15Hz)	621 to 2047 lines/2fields (51 to 15Hz)
	Non-interlaced:	260 to 1023 lines/1field (61 to 15Hz)	310 to 1023 lines/1field (51 to 15Hz)
Video output		VS: 1.0Vp-p/75 ohms (DC cut output)	
Sensitivity	Standard	400 lux, f4 (3200K)	
	Minimum	0.5 lux, f1.4 (AGC: ON, gamma: 0.45 without IR cut filter)	
Horizontal/vertical resolution		570/485 TV lines	
S/N		56dB	
Shutter speed		1/10000, 1/4000, 1/2000, 1/1000, 1/500, 1/250, 1/125, 1/120 (CCIR), 1/100 (EIA), OFF (normal exposure) Above settings are possible by external switch. Set to OFF at factory.	
AGC		Normal gain/AGC (selectable by internal switch)	
Gamma		Gamma=1.0/0.45 (selectable by internal switch) (set to 1.0 at factory)	
Integration mode		Field or frame integration: Selectable by external switch (set to frame integration mode at factory)	
Restart and reset operation		ON/OFF selectable by internal switch (set to OFF at factory) Input: 5Vp-p/1 k ohms	
White clip		Clip level: 1.0Vp-p (excluding SYNC)	
Ambient temperature and humidity	Full specifications	0 to 40°C (32 to 104°F), RH 50 to 70%	
	Operating	-10 to 50°C (14 to 122°F), RH 90% or less	
	Storage	-20 to 60°C (-4 to 140°F), RH 70% or less	
Resistance to vibration		9G (10 to 55Hz), 7G (11 to 200Hz)	
Resistance to shock		70G	
Supply voltage		12V DC ±1V	
Current consumption		210mA approx.	
Dimensions		44 (W) × 29 (H) × 72 (D)mm (1.7 × 1.1 × 2.8 in)	
Weight		120g (4.2 oz) approx.	
Composition	Camera head (with IR cut filter).....	1	
	Operation manual.....	1	

Dimensions



Note

- The products and their specifications herein described are subject to change without notice. When placing an order of the products, please make sure whether the information of this material is the latest.
- Hitachi Denshi, Ltd. warrants that these products meet the standard warranty conditions of Hitachi Denshi, Ltd.
- Hitachi Denshi, Ltd. carries out inspection and other quality control of the products within the range required to provide this warranty.
- It is recommended that to maintain your video product or system in good working order you are advised to discuss with the vendor an appropriate maintenance package to meet your requirements.

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