Hitachi Denshi America Ltd

Industrial Video Systems
Camera Reference Catalog 9-04

The Company

Hitachi Denshi Ltd. is a subsidiary of the **Hitachi Group**, and is a manufacturer of information related systems. **Hitachi Denshi** provides dynamic and innovated integration of technologies from the fields of imaging, video, data, communications, and measurement. Formed in 1963, and headquartered in Woodbury, New York, **Hitachi Denshi America Ltd.** is a supplier of television cameras and related video equipment to the broadcast, industrial, medical, scientific, and telecommunications markets.

Quality Commitment

Hitachi Denshi America Ltd. specializes in miniaturized solid state cameras that are used in a wide variety of applications. From single units to OEM quantities, **Hitachi** is committed to manufacturing cameras to the highest quality standards. All of the cameras in the product line are manufactured under quality control certification in accordance with the ISO 9002 international standards. This assures the end user of a quality product that works properly "out of the box". All **Hitachi** cameras carry a one year parts and labor warranty as a further assurance of quality.


Tokyo Head Office


Hitachi Denshi America, Ltd.

Hitachi Denshi America Ltd.
Headquarters, Woodbury, NY

Technical Support

Hitachi Denshi America Ltd. provides technical and engineering support for their entire product line. Technical support is available from each regional office, as well as the headquarters staff, to assist the end user with application and specialized engineering support in integrating cameras into each specific vision application. Further, **Hitachi Denshi's** system engineering expertise can be marshaled to provide factory automation systems such as automated inspection systems for the production line, medical systems which make use of compact, high performance cameras, electronic conferencing systems, and video information transmission systems. Working together with other manufacturers and vendors of related video equipment, **Hitachi** can provide the information and equipment necessary to perform the desired tasks.

Camera Selection

To aid in selecting the right camera for your application, **Hitachi** has put together the following product guide. By determining the factors important to your application, such as color or monochrome, camera size and weight, resolution, sensitivity, and type of output, along with any special requirements such as high speed capture or extended integration, you can use the product descriptions and specifications to find a camera suited to your needs. In the rare instance where you may have needs not addressed by the current product line, contact **Hitachi** engineering support to aid you with defining the needs for your specific camera project. Due to the ongoing development of new products for the changing marketplace, **Hitachi** may have a camera in the design or development stages that will meet your requirements. For OEM quantities, **Hitachi** will work closely with your engineers to develop a product designed specifically to your needs. In addition to cameras, **Hitachi** can provide standard and custom cables, power supplies, camera adaptors, lenses and optical filters necessary to integrate the camera into the vision system.

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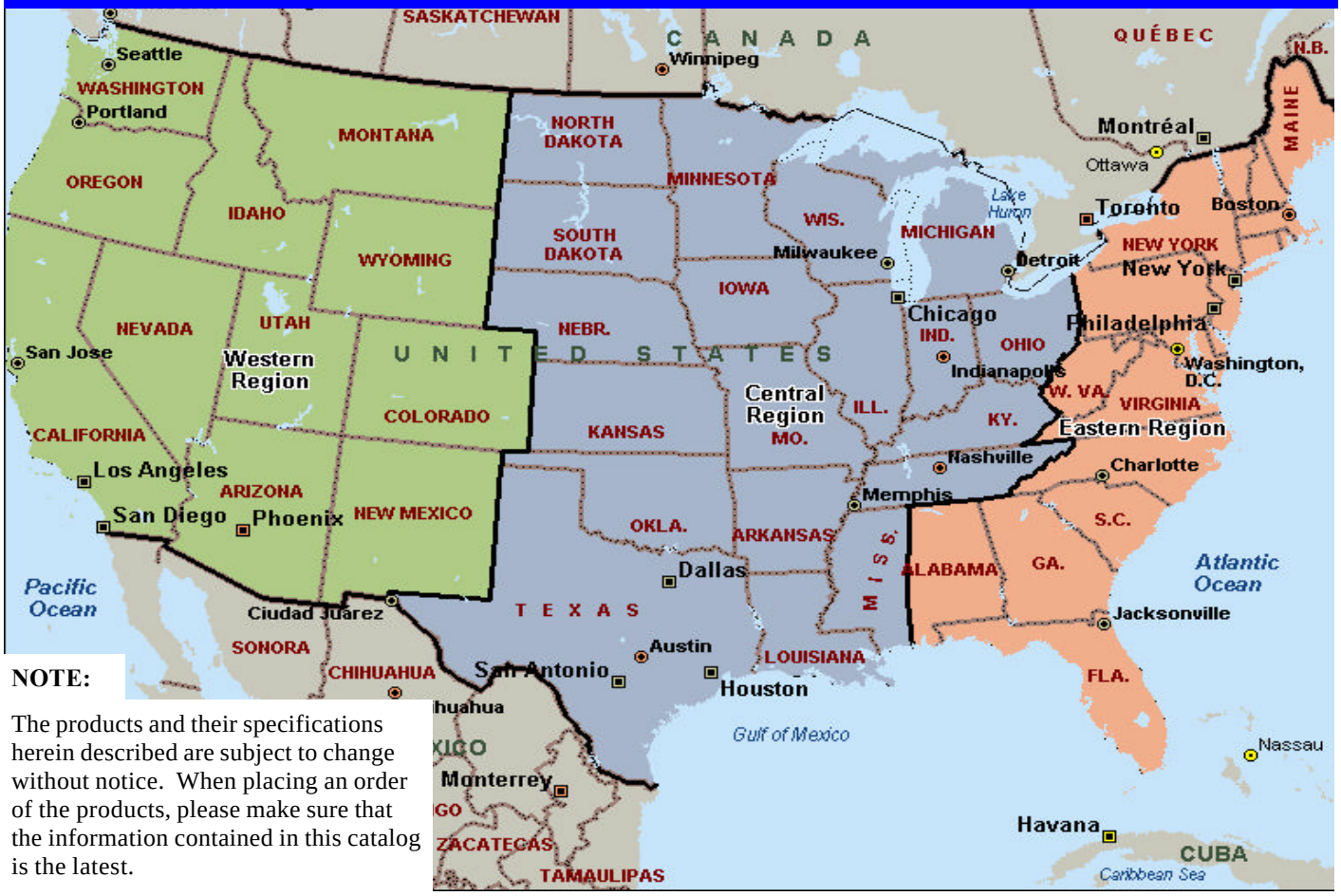
CERTIFICATE No. JMI-0062
ISO 9002/BS 5750Pt2
EN 29002/JIS Z9902

The **Hitachi Denshi** products described in this brochure are manufactured at a factory which has received quality control system certification in accordance with the ISO international standards.

Hitachi Denshi America Ltd



NOTE:

The products and their specifications herein described are subject to change without notice. When placing an order of the products, please make sure that the information contained in this catalog is the latest.

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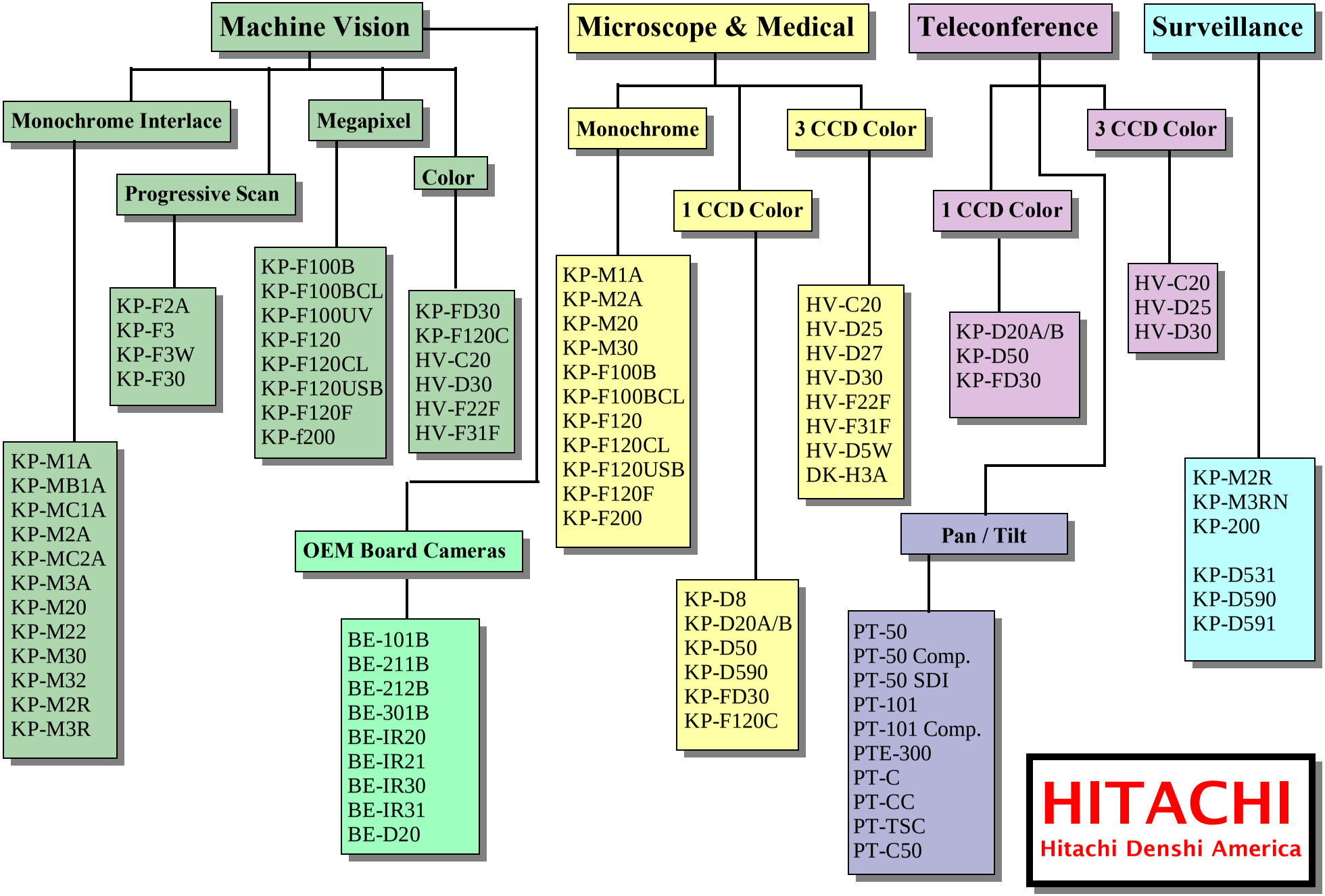
HITACHI Family of Cameras



Monochrome Interlace Scan
KP-M1A, KP-M2A, KP-M3A Series

KP-M1A, M2A, M3A

- **Compact and Lightweight**
- **Choice of Image Format: 2/3", 1/2", 1/3"**
- **Choice of Camera Body Design**
- **High Resolution**
- **High Sensitivity**
- **Multiple Step Electronic Shutter**
- **Internal or External Sync Modes**
- **Field or Frame Integration Modes**
- **Field-on-Demand Mode**

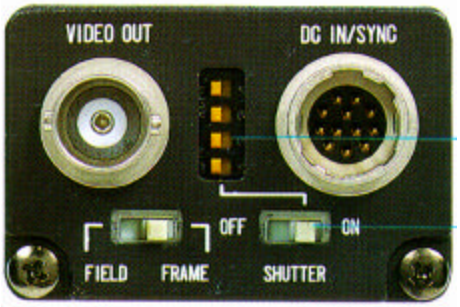
Specifications

	KP-M1A	KP-M2A	KP-M3A
Imager:	2/3"	1/2"	1/3"
	Interline transfer CCD		
Pixels:	768x494	768x494	768x494
Cell Size:	11.64x13.5	8.4x9.8	6.35x7.4
Resolution:	570 TV lines		
Std. Illum.	400 lux at F8.0		
Min. Illum.	0.3 lux at f1.4		
S/N:	56 db		
Gamma:	0.45 or 1.0 selectable		
Integration:	Field or Frame Selection		
Trigger:	Field-on-Demand or Asynchronous Reset		
Sync:	Internal / External		
AGC:	On / Off		
Shutter:	1/60 - 1/10000		
Output:	RS-170 1.0 V p-p		
Power:	12 volts DC		
Size: (W x H x D)	44 x 29 x 72 mm		
Weight:	120 grams		
Lens:	C - Mount		

The **KP-M** series of black and white cameras with their compact size and light weight, are ideal for machine vision and other industrial applications. Aluminum die castings provide for a rugged camera that is resistant to vibration. The use of high grade image sensors provide excellent resolution and sensitivity. Standard features include multiple step electronic shutter, field-on-demand, asynchronous re-set, and internal or external sync. For improved vertical resolution, the cameras offer the choice of field or frame integration. Switches are provided for gamma correction and AGC. All connections can be made through the use of the standard 12 pin Hirose connector, in addition a BNC connector is provided for video output. Additional versions of the camera include, the **KP-MC1A** (side view), and the **KP-MB1A** (compact head separated type). The field-on-demand feature found on the **KP-M1A, KP-M2A and KP-M3A**, allows an image to be output immediately after a trigger pulse. All versions are available in EIA or CCIR formats.

The **KP-MB series** offers a compact head that can be separated up to 1 meter from the camera body.

The **KP-MC series** has the imager rotated by 90 degrees from normal to allow mounting where front to back depth is critical.



KP-M Series Rear Panel

Frame Grabbers:

For interface of the camera to a particular frame grabber, contact the local Hitachi representative.

Ultra Compact Monochrome Interlace Scan
KP-M20 / KP-M30

The **KP-M20** and **KP-M30** are ultra compact monochrome cameras that feature high sensitivity, high resolution, and high performance. External switches permit easy selection of the various modes of operation for the cameras, while the ultra compact size enables use in situations where space is limited. A single 12 pin Hirose connector provides all camera input and output signals as well as power. An aluminum die cast body provides a solid and rugged platform with improved anti-vibration performance that is ideal for use in extreme conditions. Standard features include a multi step electronic shutter for imaging fast moving objects, field or frame integration for improved sensitivity or vertical resolution, and a selectable gain mode for improved sensitivity in low light.

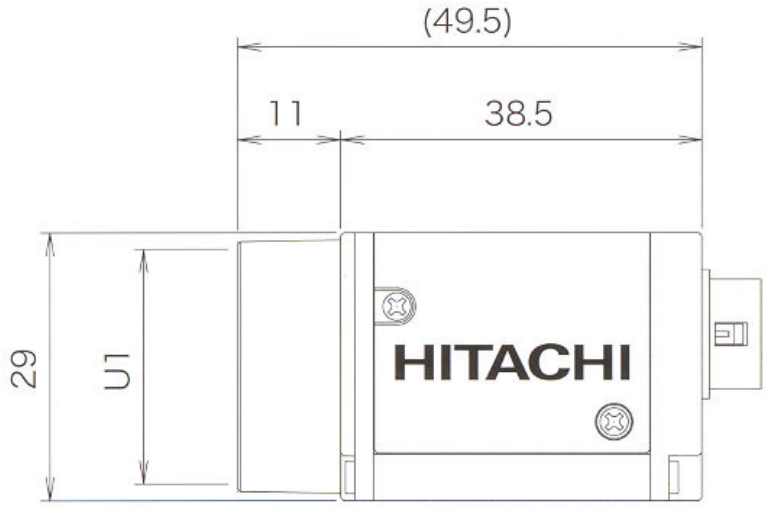
KP-M20, KP-M30

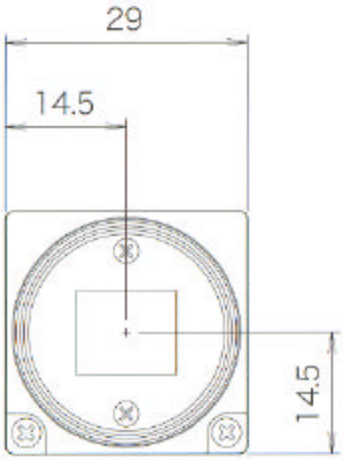
- **Ultra Compact and Lightweight**
- **Choice of 1/2" or 1/3" Format CCD**
- **High Resolution**
- **High Sensitivity**
- **Multi-step Electronic Shutter**
- **Internal or External Sync Modes**
- **Frame or Field Integration Modes**
- **External Mode Selection Switches**
- **Single Cable Connection**

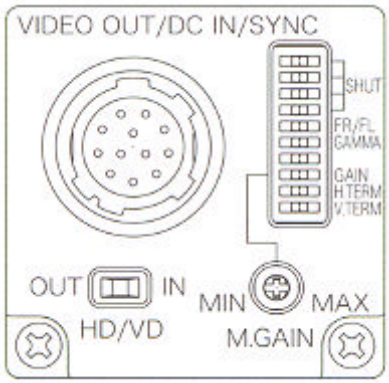
Specifications

	KP-M20	KP-M30
Imager:	1/2"	1/3"
	Interline transfer CCD	
Pixels:	768x494	768x494
Cell Size:	8.4 x 9.8	6.35 x 7.4
Resolution:	570 TV lines	
Min. Illum.	0.3 lux at f1.4	
S/N:	60 db	
Gamma:	0.45 or 1.0 selectable	
Integration:	Field or Frame selectable	
Sync:	Internal or External	
	Auto selection	
Gain:	AGC / Manual / Fixed	
Shutter:	1/60 - 1/10000	
Output:	RS-170 1.0 V p-p	
Power:	12 volts DC	
Size: (W x H x D)	29 x 29 x 38.5 mm	
Weight:	55 grams	
Lens:	C - Mount	

Dimensions and Rear View







DIP Switch Selection

1 ~ 4 : Select the shutter speed.
5 : Select the frame or field integration
6 : Select γ correction ON / OFF
7 : NC
8 : Select the gain
9 : HD 75 Ω terminal select switch.
0 : VD 75 Ω terminal select switch.

Monochrome Interlace Scan
KP-M22 / KP-M32

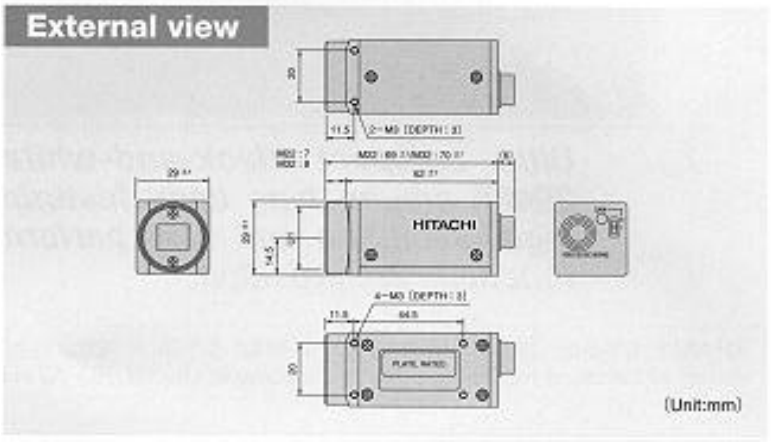
KP-M22, KP-M32

- **Compact and Lightweight**
- **Choice of 1/2" or 1/3" Format CCD**
- **High Resolution**
- **High Sensitivity**
- **Multi-step Electronic Shutter**
- **Internal or External Sync Modes**
- **Frame or Field Integration Modes**
- **Field-on-Demand Mode**
- **Single Cable Connection**

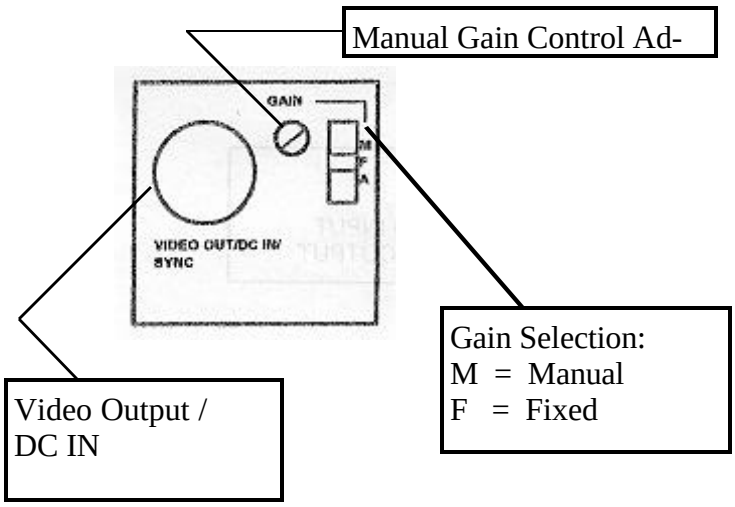
The **KP-M22** and **KP-M32** are compact monochrome cameras that feature high sensitivity, high resolution, and high performance. Similar in performance and capabilities to the **KP-M1A**, **KP-M2A**, and **KP-M3A** series of cameras, the **KP-M22** and **KP-M32** feature a 29mm square body for use in applications where space is limited. A single 12 pin Hirose connector provides all camera input and output signals as well as power. An aluminum die cast body provides a solid and rugged platform with improved anti-vibration performance that is ideal for use in extreme conditions. Standard features include a multi step electronic shutter for imaging fast moving objects, field or frame integration for improved sensitivity or vertical resolution, and a field-on-demand mode ideal for capturing images at a desired timing.

Specifications

	KP-M22	KP-M32
Imager:	1/2"	1/3"
	Interline transfer CCD	
Pixels:	768x494	768x494
Cell Size:	8.4 x 9.8	6.35 x 7.4
Resolution:	570 TV lines	
Min. Illum.	0.3 lux at f1.4	
S/N:	56 db	
Gamma:	0.45 or 1.0 selectable	
Integration:	Field or Frame selectable	
Sync:	Internal or External	
	Auto selection	
Trigger:	Field-on-Demand	
Gain:	AGC / Manual / Fixed	
Shutter:	1/60 - 1/10000	
Output:	RS-170 1.0 V p-p	
Power:	12 volts DC	
Size: (W x H x D)	29 x 29 x 62 mm	
Weight:	100 grams	
Lens:	C - Mount	



KP-M22 / KP-M32 Rear



Near Infrared Camera
KP-M2R, KP-M3R

Near Infared Camera
KP-M2R, KP-M3R

- **Near IR Sensitivity Above 900 nm**
- **Peak Sensitivity at 510 nm**
- **Compact Rugged Design**
- **High Resolution**
- **Multiple Step Electronic Shutter**
- **Internal or External Sync Modes**
- **Frame or Field Integration**
- **Field-on-Demand Mode**

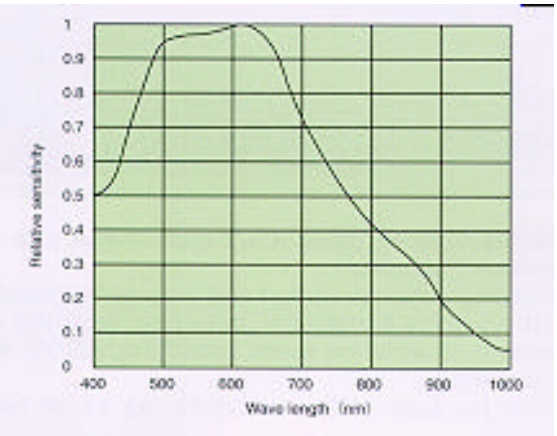
The **KP-M2R** is 1/2 inch CCD monochrome camera, while the **KP-M3R** is a 1/3 inch format CCD camera. Both are useful into the near infrared spectrum. Peak sensitivity of the camera occurs at 640 nanometers compared with a conventional camera whose peak sensitivity occurs at 510 nanometers. Useful sensitivity of the **KP-M2R and KP-M3R** extends above 900 nanometers, making it useful for applications ranging from microscopy to image processing systems. A high horizontal resolution of 570 TV lines and a S/N of 56 db provide detailed images with low noise, in a compact rugged package. Standard features include a multiple step electronic shutter, internal or external synchronization, field or frame integration mode, and a field-on-demand function. Using the field-on-demand feature the timing and length of an exposure can be accurately controlled. The field-on-demand can function in the one trigger, two trigger, fixed shutter, and external shutter modes of operation, allowing easy integration into machine vision systems.

Specifications

	KP-M2R	KP-M3R
Imager:	Interline transfer CCD	
Sensing Area:	6.45 x 4.84 mm	4.8 x 3.6 mm
Pixels:	768x494	768 x 494
Cell Size:	8.4 x 9.8	6.35 x 7.4
Resolution:	570 TV lines	
Sensitivity:	200Lux f4.0 3200K	
Min. Illum.	0.3 lux at f1.4	
S/N:	56 db	
Gamma:	0.45 or 1.0 selectable	
Integration:	Field or Frame Selection	
AGC:	On / Off	
Shutter:	1/60 - 1/10000	
Sync:	Internal / External HD / VD drive	
Output:	RS-170 1.0 V p-p	
Power:	12 volts DC 180ma	
Size: (W x H x D)	44 x 29 x 72 mm	
Weight:	120 grams	
Lens:	C - Mount	

KP-M2R, KP-M3R Spectral Response

The graph below shows the relative spectral response characteristics of the **KP-M2R, and KP-M3R.** The vertical axis indicates relative sensitivity, while the horizontal axis indicates wavelength in nanometers.

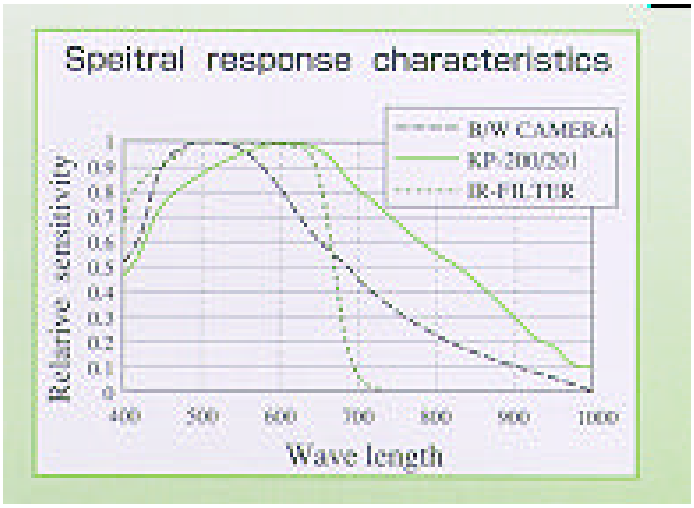


Near Infrared Camera
KP-200

KP-200

Designed for use in surveillance systems and other low light applications the **KP-200** can work in light levels as low as 0.0002 lux. Featuring a spectral response with a peak sensitivity of 640 nm and useable sensitivity above 1000 nm, the camera is also suited for use in the Near IR region. For ease of operation the camera has an auto electronic shutter (AES), AGC mode, and an output for an auto iris lens, allowing use under a wide range of light conditions.

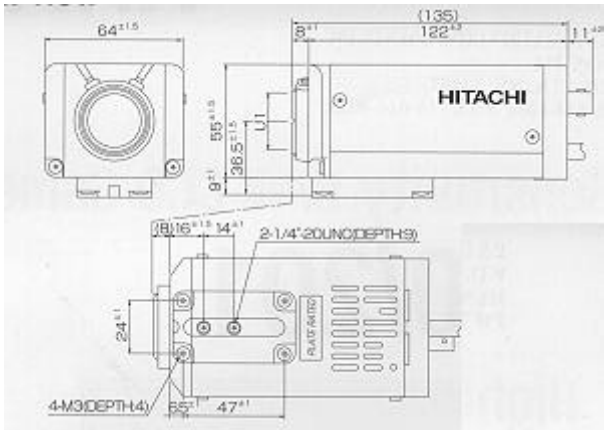
- **High Sensitivity**
- **Peak Sensitivity of 640 nm**
- **Useable Sensitivity above 1000 nm**
- **High Resolution**
- **Auto Electronic Shutter (AES)**
- **AGC**
- **Multiple Step Electronic shutter**
- **Internal or Optional External Sync**
- **Output for Auto Iris Lens**



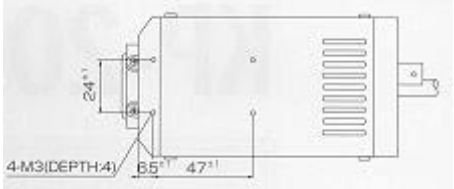
KP-200 Spectral Response

Specifications

Imager: 1/2 inch Interline transfer CCD
Sensing Area: 6.45 x 4.84 mm
Pixels: 768x494
Cell Size: 8.4 x 9.8
Resolution: 570 TV lines
Sensitivity: 200Lux f4.0 3200K
Min. Illum. 0.0002 lux at f1.4
S/N: 48 db
Gamma: 0.45 or 1.0 selectable
AGC: On / Off
Shutter: Auto Electronic Shutter (AES)
Fixed Shutter: 1/60 - 1/100,000
Sync: Internal / Optional External
Output: RS-170 1.0 V p-p
Power: 12 volts DC 180ma
Size: (W x H x D) 64 x 55 x 122 mm
Weight: 450 grams
Lens: C / CS- Mount



External View



Near Infrared Camera
KP-F2A

Near Infared Progressive Scan Camera KP-F2A

- **Peak Sensitivity of 760 nm**
- **Useable Sensitivity Above 1000 nm**
- **30 Frames per Second KP-F2A**
- **High Resolution**
- **Internal or External Sync Mode**
- **Fixed Gain or AGC**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand**

Specifications

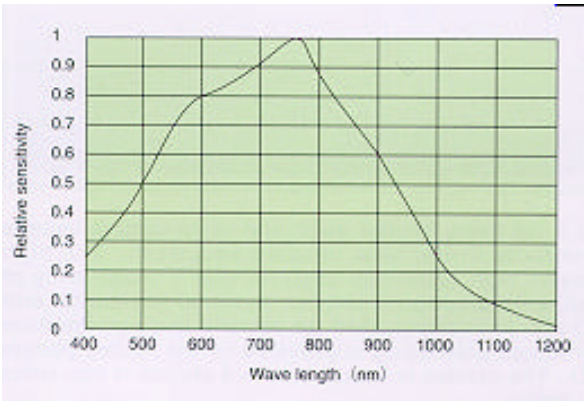
Imager:	1/3 inch Frame Transfer CCD
Pixels:	658 x 496
Cell Size:	7.4 x 7.4
Resolution:	500 TV lines Horizontal
	485 TV lines Vertical
Sensitivity:	30 lux f4.0 3200 K
Min. Illum:	0.3lux at f1.4
S/N:	50 db
Gain:	Fixed or AGC
Sync:	Internal or External
Gamma:	0.45 or 1.0 Selectable
Shutter:	1/30 - 1/10,000 second
Trigger:	Field-on-Demand
Output:	Single 30 fps 1.0 Vp-p
Power:	12 Volts DC
Size: (W x H x D)	44 x 44 x 110 mm
Weight:	200 grams
Lens:	C-Mount

The **KP-F2A** features a 1/3 inch progressive scan microlens IT CCD that has a spectral response that extends into the near infared region. Peak sensitivity occurs at approximately 760 nanometers, while useful sensitivity extends above 1000 nanometers. The use of progressive scanning provides improved vertical resolution and reduces horizontal smear in moving objects. The use of square pixels can reduce processing time in vision systems. Designed for use in the medical, microscope, and machine vision markets, the **KP-F2A** extends the range of imaging into the near IR region. A multiple step electronic shutter with a range up 1/10,000 second can be selected to “stop action” on moving objects. With the field-on-demand function, the start of an exposure and the length of the exposure can be accurately controlled. The video is immediately output at the end of the exposure. The **KP-F2A** has a single progressive scan output at 30fps.

The **KP-F2B** has been discontinued.

KP-F2A Spectral Response

The graph below shows the relative spectral response characteristics of the **KP-F2.** The vertical axis indicates relative sensitivity, while the horizontal axis indicates wavelength in nanometers.



Analog Progressive Scan
KP-F3 / KP-F3W

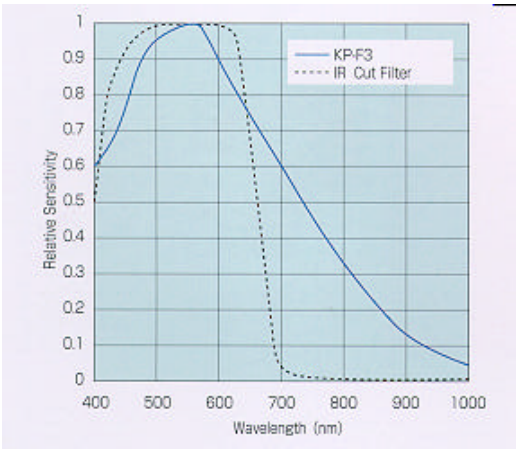
1/3 Inch Compact Progressive Scan Camera KP-F3, KP-F3W

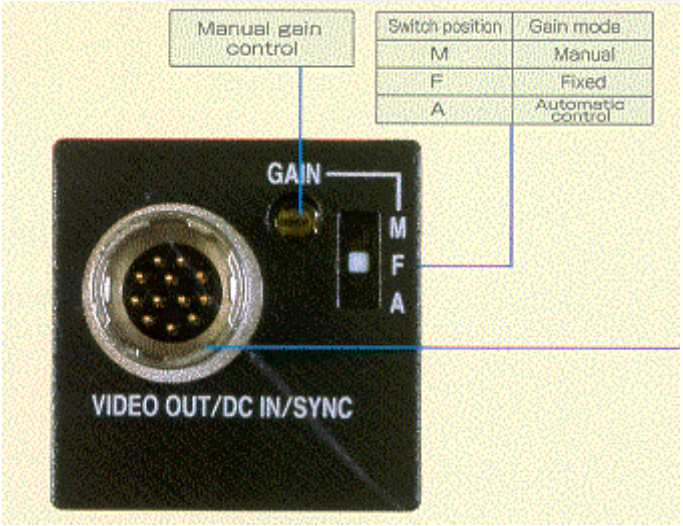
- **Compact Rugged Design**
- **Single Output Connection**
- **Single Speed 30 Frames / Second KP-F3**
- **Dual Speed 60 Frames / Second KP-F3W**
- **Progressive or Interlaced Operation**
- **Multiple Step Electronic Shutter**
- **Internal or External Sync Modes**
- **Fixed / Manual / Auto Gain Mode**
- **Field / Frame-on-Demand Mode**

Specifications

Imager:	1/3 inch Interline type Progressive Scan CCD
Pixels:	647 x 485
Cell Size:	7.4 x 7.4
Aspect Ratio:	4 : 3
Scan Mode:	Progressive / Interlace
Resolution:	500 TV lines
Min. Illum:	0.2 lux at f1.4
S / N:	56 db
Gamma:	0.45 or 1.0 selectable
Gain:	Manual, Fixed, or AGC
Shutter:	8 steps 1/30 - 1/8000
Sync:	Internal / External
Trigger:	Frame/Field-on-Demand 2 modes
Output:	**KP-F3** 30 F/s **KP-F3W** 60 F/s 1.0 Volts p-p
Power:	12 volts DC 1.4 watts
Size: (W x H x D)	29 x 29 x62 mm
Weight:	100 grams

Designed for use in factory automation and industrial vision systems, the **KP-F3** and **KP-F3W** feature compact size, square pixels, and progressive scan to provide high vertical resolution of moving objects. Featuring a single output connection, the **KP-F3** can operate at 30 frames per second, while the **KP-F3W** can operate at 60 frames per second. The cameras are able to operate in the progressive or interlaced scan mode, determined by switch setting, and feature 500 lines of horizontal resolution. Standard features include an eight step electronic shutter, internal or external sync modes, fixed, manual or automatic gain control, and selectable gamma. A frame/field-on-demand function is available for capturing moving objects at a desired timing. In the one trigger mode of operation, the rising edge of the trigger pulse starts the exposure, the durration of the trigger pulse controls the integration time, and the falling edge of the trigger pulse resets vertical sync and delivers the triggered image. The camera can also be operated in a fixed shutter mode.





Ultra Compact Analog Progressive Scan KP-F30

1/3 Inch Ultra Compact Progressive Scan Camera KP-F30

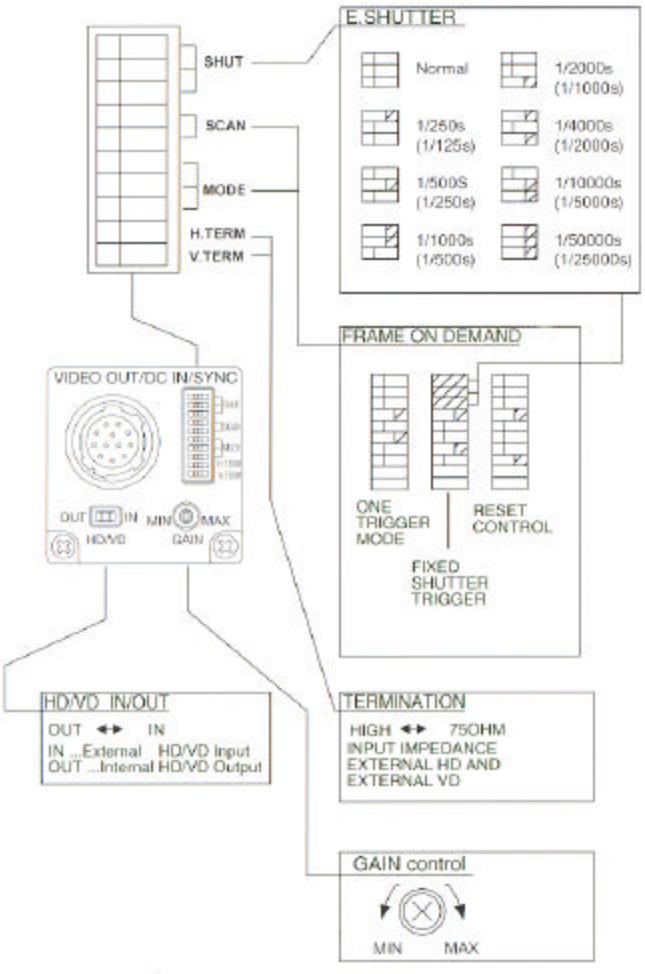
- **Ultra Compact Rugged Design**
- **Single Output Connection**
- **Dual Speed 60 Frames / Second**
- **Multiple Step Electronic Shutter**
- **Internal or External Sync Modes**
- **Fixed / Manual / Auto Gain Mode**
- **Frame-on-Demand Mode**
- **External Mode Selection Switches**

Specifications

Imager: 1/3 inch Interline type Progressive Scan CCD
Pixels: 659 x 494
Cell Size: 7.4 x 7.4
Aspect Ratio: 4 : 3
Scan Mode: Progressive
Resolution: 500 TV lines
Min. Illum: 0.7 lux at f1.4
S / N: 50 db
Gamma: 1.0
Gain: Manual, Fixed, or AGC
Shutter: 8 steps 1/30 - 1/50000
Sync: Internal / External
Trigger: Frame-on-Demand 3 modes
One Trigger, Fixed Shutter, Reset Control
Output: 60 F/s 1.0 Volts p-p
Power: 12 volts DC 2.1 watts
Size: (W x H x D) 29 x 29 x 38.5 mm
Weight: 55 grams
Lens: C-Mount

Designed for use in factory automation and industrial vision systems, the **KP-F30** features an ultra compact size, square pixels, and progressive scan to provide high vertical resolution of moving objects. Featuring a single output connection, the **KP-F30** can operate at 60 frames per second, with 500 lines of horizontal resolution. Standard features include external switch selection for all modes of operation, with an eight step electronic shutter featuring a maximum speed of 1/50,000 second, internal or external sync modes, and fixed, manual or automatic gain control. A frame-on-demand function is available for capturing moving objects at a desired timing. In the one trigger mode of operation, the rising edge of the trigger pulse starts the exposure, the durration of the trigger pulse controls the integration time, and the falling edge of the trigger pulse resets vertical sync and delivers the triggered image. The camera can also be operated in a fixed shutter mode or a reset control mode.

Arrangement of Switches



Mega Pixel Progressive Scan
KP-F100B

2/3 Inch 1392 x 1040 Pixel, Digital Output KP-F100B

- **1.45 Million Pixels**
- **Progressive Scan with Square Pixels**
- **10 bit Single Channel Digital Output**
- **15 F/s normal, 60 F/s in 4 times accelerated mode**
- **RS-644 (LVDS) Digital Output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Internal or External Sync Mode**
- **RS-232C Remote Control**

The **KP-F100B** is a monochrome high resolution progressive scan camera featuring an LVDS output with 10 bit digital video. A separate input is provided for RS-232C remote control. The trigger control lines, external drives and power use the standard 12 pin Hirose connector. Designed for machine vision and image processing systems, the camera is capable of producing 15 frames at full vertical resolution, or 60 frames per second in the 4 times accelerated mode of operation of progressively scanned video, from the 1.45 million pixel CCD array. Square pixels make for an easy interface with vision and measurement systems. A frame on demand function allows images captured by use of an external trigger to be output immediately. An analog and a LVDS output are provided. The LVDS digital output allows direct interface with image processing systems, eliminating the A/D converter in the image processor. A multi step electronic shutter along with external H and V drive inputs, provide for ease of use in systems applications.

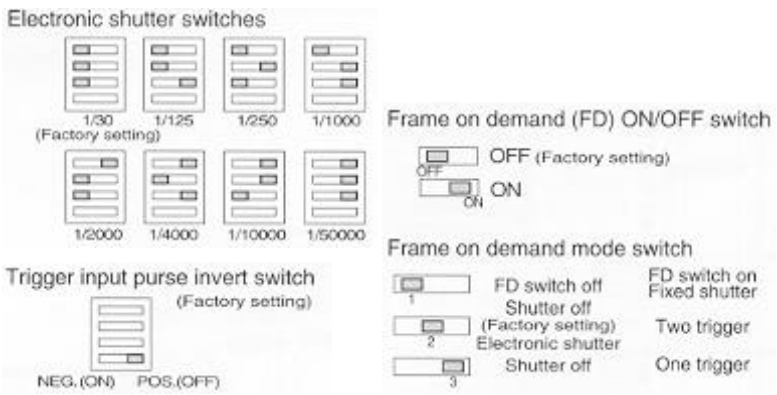
Specifications

Imager:	2/3 inch Interline type Progressive Scan CCD
Pixels	1392 x 1040
Cell Size:	6.45 x 6.45
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	50 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 3 modes
Output:	Analog 1.0 V p-p 75 ohms RS-644 (LVDS) output 10 bit single c. 20.2 MHz
Remote:	RS-232C
Power:	12 volts DC 300 ma
Size:	(W x H x D) 44 x 44 x78 mm
Weight:	200 Grams
Lens:	C-Mount

Signal connections to D. OUT (26 pin)

Pin No.	Signal	Pin No..	Signal	Pin No.	Signal
1	DATA0-H	10	DATA4-L	19	DATA9-H
2	DATA0-L	11	DATA5-H	20	DATA9-L
3	DATA1-H	12	DATA5-L	21	VD-H
4	DATA1-L	13	DATA6-H	22	VD-L
5	DATA2-H	14	DATA6-L	23	HD-H
6	DATA2-L	15	DATA7-H	24	HD-L
7	DATA3-H	16	DATA7-L	25	CLK-H
8	DATA3-L	17	DATA8-H	26	CLK-L
9	DATA4-H	18	DATA8-L	Shield	GND

Rear Panel Switches



Mega Pixel Progressive Scan KP-F100BCL

2/3 Inch 1392 x 1040 Pixel, Digital Output KP-F100BCL

- **1.45 Million Pixels**
- **Progressive Scan with Square Pixels**
- **10 bit Single Channel Digital Output**
- **15 F/s normal, 60 F/s in 4 times accelerated mode**
- **CameraLink Output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Internal or External Sync Mode**
- **RS-232C Remote Control**

The **KP-F100BCL** is a monochrome high resolution progressive scan camera featuring a CameraLink output that includes 10 bit digital video, RS-232C remote control and trigger control lines. Designed for machine vision and image processing systems, the camera is capable of producing 15 frames at full vertical resolution, or 60 frames per second in the 4 times accelerated mode of operation of progressively scanned video, from the 1.45 million pixel CCD array. Square pixels make for an easy interface with vision and measurement systems. A frame on demand function allows images captured by use of an external trigger to be output immediately. An analog and a CameraLink output are provided. The CameraLink output allows direct interface with image processing systems, eliminating the A/D converter in the image processor. A multi step electronic shutter along with external H and V drive inputs, provide for ease of use in systems applications. The **KP-F100BCL** also features an RS-232C remote control port for control of all camera functions.

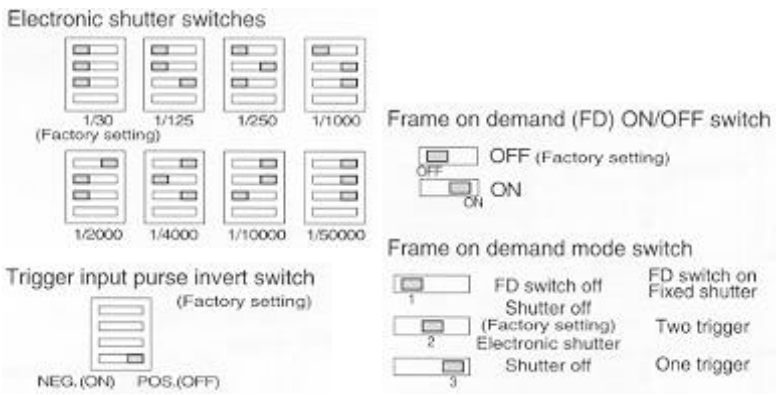
Specifications

Imager:	2/3 inch Interline type Progressive Scan CCD
Pixels	1392 x 1040
Cell Size:	6.45 x 6.45
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	50 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 3 modes
Output:	Analog 1.0 V p-p 75 ohms CameraLink output 10 bit single c. 20.2 MHz
Remote:	RS-232C
Power:	12 volts DC 300 ma
Size:	(W x H x D) 44 x 44 x78 mm
Weight:	200 Grams
Lens:	C-Mount

CameraLink Output

Pin No.	Signal	Pin No.	Signal
1	GND	14	GND
2	TXOUT 0 (−)	15	TXOUT 0 (+)
3	TXOUT 1 (−)	16	TXOUT 1 (+)
4	TXOUT 2 (−)	17	TXOUT 2 (+)
5	TXCLKOUT (−)	18	TXCLKOUT (+)
6	TXOUT 3 (−)	19	TXOUT 3 (+)
7	RX (+)	20	RX (−)
8	TX (−)	21	TX (+)
9	TRIG·A/VD (−) [CC1 (−)]	22	TRIG·A/VD (+) [CC1 (+)]
10	TRIG·B (+) [CC2 (+)]	23	TRIG·B (−) [CC2 (−)]
11	EXT·HD (−) [CC3 (−)]	24	EXT·HD (+) [CC3 (+)]
12	NC [CC4 (+)]	25	NC [CC4 (−)]
13	GND	26	GND

Rear Panel Switches



Mega Pixel Digital Progressive Scan KP-F100UV

1/2” Inch 1392 x 1040 Pixel, Digital Output KP-F100UV

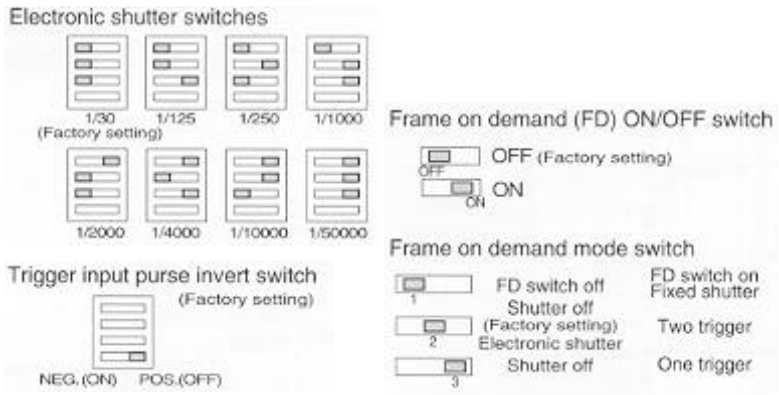
- **Spectral Response from 230nm to 1000nm**
- **1.45 Million Pixels**
- **Progressive Scan with Square Pixels**
- **10 bit Single Channel Digital Output**
- **7.5 F/s normal, 30 F/s in 4 times accelerated mode**
- **LVDS or CameraLink Output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Internal or External Sync Mode**
- **RS-232C Remote Control**

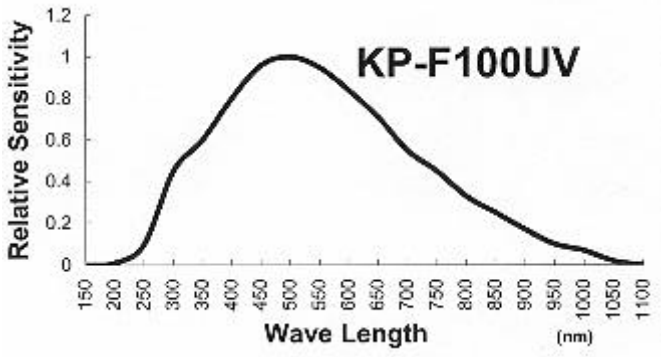
The **KP-F100UV** is a monochrome high resolution progressive scan camera featuring a LVDS or CameraLink output that includes 10 bit digital video, RS-232C remote control and trigger control lines. With a spectral response that extends down to 230nm, the **KP-F100UV** is able to capture minute surface imperfections when used with Ultraviolet illumination. Designed for machine vision and image processing systems, the camera is capable of producing 7.5 frames at full vertical resolution, or 30 frames per second in the 4 times accelerated mode of operation of progressively scanned video, from the 1.45 million pixel CCD array. Square pixels make for an easy interface with vision and measurement systems. A frame on demand function allows images captured by use of an external trigger to be output immediately. An analog and a LVDS or CameraLink output are provided. The Camera Link output allows direct interface with image processing systems, eliminating the A/D converter in the image processor. A multi step electronic shutter along with external H and V drive inputs, provide for ease of use in systems applications. The **KP-F100UV** also features an RS-232C remote control port for control of all camera functions.

Specifications

Imager:	1/2 inch Interline type Progressive Scan CCD
Pixels	1392 x 1040
Cell Size:	4.65 x 4.65
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	50 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 3 modes
Output:	Analog 1.0 V p-p 75 ohms LVDS or CameraLink output 10 bit single c. 20.2 MHz
Remote:	RS-232C
Power:	12 volts DC 300 ma
Size:	(W x H x D) 44 x 44 x78 mm
Weight:	200 Grams
Lens:	C-Mount

Rear Panel Switches





Mega Pixel Progressive Scan KP-F100UVCL

1/2” Inch 1392 x 1040 Pixel, Digital Output KP-F100UVCL

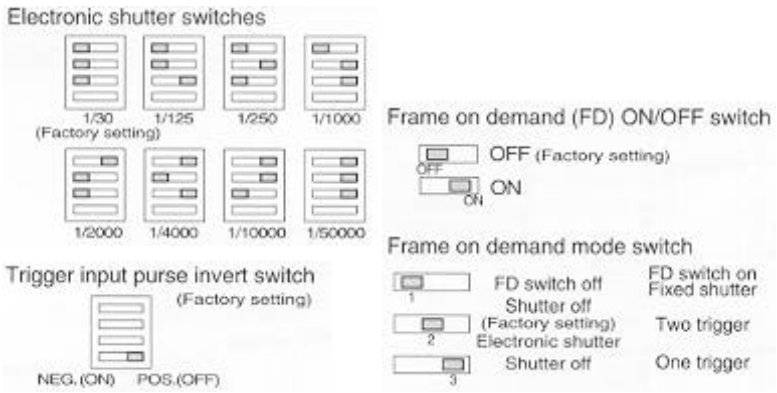
- **Spectral Response from 230nm to 1000nm**
- **1.45 Million Pixels**
- **Progressive Scan with Square Pixels**
- **10 bit Single Channel Digital Output**
- **7.5 F/s normal, 30 F/s in 4 times accelerated mode**
- **CameraLink Output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Internal or External Sync Mode**
- **RS-232C Remote Control**

The **KP-F100UVCL** is a monochrome high resolution progressive scan camera featuring a CameraLink output that includes 10 bit digital video, RS-232C remote control and trigger control lines. With a spectral response that extends down to 230nm, the **KP-F100UVCL** is able to capture minute surface imperfections when used with Ultraviolet illumination. Designed for machine vision and image processing systems, the camera is capable of producing 7.5 frames at full vertical resolution, or 30 frames per second in the 4 times accelerated mode of operation of progressively scanned video, from the 1.45 million pixel CCD array. Square pixels make for an easy interface with vision and measurement systems. A frame on demand function allows images captured by use of an external trigger to be output immediately. An analog and a LVDS or CameraLink output are provided. The CameraLink output allows direct interface with image processing systems, eliminating the A/D converter in the image processor. A multi step electronic shutter along with external H and V drive inputs, provide for ease of use in systems applications. The **KP-F100UVCL** also features RS-232C remote control through the CameraLink interface for control of all camera functions.

Specifications

Imager:	1/2 inch Interline type Progressive Scan CCD
Pixels	1392 x 1040
Cell Size:	4.65 x 4.65
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	50 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 3 modes
Output:	Analog 1.0 V p-p 75 ohms CameraLink output 10 bit single c. 20.2 MHz
Remote:	RS-232C
Power:	12 volts DC 300 ma
Size:	(W x H x D) 44 x 44 x78 mm
Weight:	200 Grams
Lens:	C-Mount

Rear Panel Switches

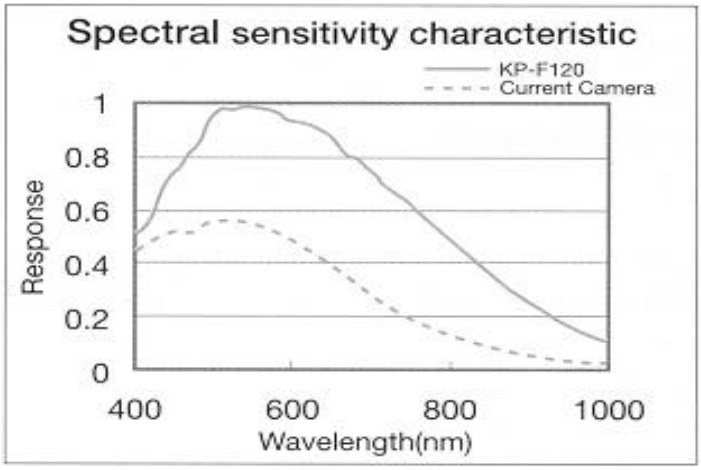


Near IR Progressive Scan KP-F120

LVDS, CameraLink, USB 2.0, IEEE-1394, RGB Color Outputs Available

1.45 Million Pixel Digital Output KP-F120

- **Near IR Sensitivity**
- **Spectral Response Extends above 1000 nm**
- **2/3 inch 1.45 Million Pixel CCD**
- **1392 (H) x 1040 (V) Pixels**
- **Frame rates of 30, 60 or 120 Frames / second**
- **Progressive Scan with Square Pixels**
- **Dual Channel 10 bit RS-644 (LVDS) Output**
- **Optional CameraLink, USB2.0, or IEEE-1394 outputs**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Partial Scan Mode**
- **RS-232C Remote Control**
- **C-Mount Optics**
- **Compact Size**



Featuring a 2/3 inch 1.45 Million Pixel Progressive Scan CCD, the **KP-F120** combines high resolution and high sensitivity with good spectral response. Useable in the Near IR range, the spectral response extends above 1000 nm. Providing a standard aspect ratio of 4 : 3 the CCD features square pixels. Through the use of advanced IC technology, the camera is able to provide a multitude of features in a compact size. The dual channel 10 bit RS-644 (LVDS) digital output makes for ease of interface with standard frame grabbers. For use in high performance machine vision systems, the camera features a Frame-on-Demand mode that allows an image to be captured and output immediately following the use of a trigger pulse. For even higher frame rates the **KP-F120** features a partial scan mode where the scan can start at the top or the center of the frame and continue for the chosen number of lines (16H to 512H). For ease of use, the **KP-F120** has an RS-232C remote control port that allows remote control of all camera operating functions. The camera is also available with a CameraLink output, as the **KP-F120-CL**.

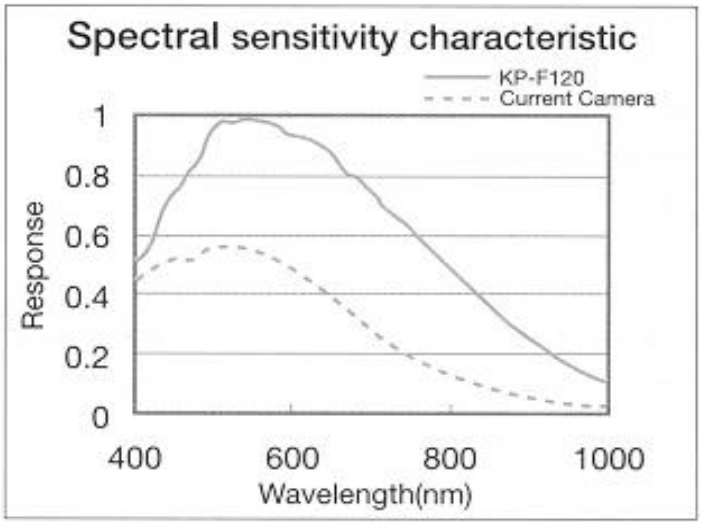
Specifications

Imager:	2/3 inch Interline type Progressive Scan CCD
Pixels:	1392 x 1040
Cell Size:	6.45 x 6.45
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	54 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 4 modes
Partial Scan:	Upper or Middle 16H, 32H, 64H, 128H, 256H, 512H
Output:	Analog: 1.0 V p-p 75 ohms Digital: RS-644 (LVDS) 10 bit dual ch. Optional CameraLink, USB 2.0 or IEEE-1394 Outputs
Power:	12 volts DC 500 ma
Size:	(W x H x D) 58 x 58 x 48 mm
Weight:	200 Grams
Lens:	C-Mount

Mega Pixel Near IR Progressive Scan KP-F120CL

1.45 Million Pixel Digital Output KP-F120CL

- **Near IR Sensitivity**
- **Spectral Response Extends above 1000 nm**
- **2/3 inch 1.45 Million Pixel CCD**
- **1392 (H) x 1040 (V) Pixels**
- **30, 60, or 120 frames / second**
- **Progressive Scan with Square Pixels**
- **CameraLink output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Partial Scan Mode**
- **RS-232C Remote Control**
- **C-Mount Optics**
- **Compact Size**



Featuring a 2/3 inch 1.45 Million Pixel Progressive Scan CCD, the **KP-F120CL** combines high resolution and high sensitivity with good spectral response. Useable in the Near IR range, the spectral response extends above 1000 nm. Providing a standard aspect ratio of 4 : 3 the CCD features square pixels. Through the use of advanced IC technology, the camera is able to provide a multitude of features in a compact size. The CameraLink digital output makes for ease of interface with standard frame grabbers. For use in high performance machine vision systems, the camera features a Frame-on-Demand mode that allows an image to be captured and output immediately following the use of a trigger pulse. For even higher frame rates the **KP-F120CL** features a partial scan mode where the scan can start at the top or the center of the frame and continue for the chosen number of lines (16H to 512H). For ease of use, the **KP-F120CL** features RS-232C remote control through the CameraLink interface, allowing remote control of all camera operating functions. The camera is also available with LVDS, USB 2.0 or IEEE-1394 or RGB color outputs.

Specifications

Imager:	2/3 inch Interline type Progressive Scan CCD
Pixels:	1392 x 1040
Cell Size:	6.45 x 6.45
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	54 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 4 modes
Partial Scan:	Upper or Middle 16H, 32H, 64H, 128H, 256H, 512H
Output:	Analog: 1.0 V p-p 75 ohms Digital: CameraLink Output 10 bit dual ch.
Power:	12 volts DC 500 ma
Size:	(W x H x D) 58 x 58 x 48 mm
Weight:	200 Grams

Mega Pixel Near IR Progressive Scan
KP-F120USB

1.45 Million Pixel Digital Output
KP-F120USB

- **Near IR Sensitivity**
- **Spectral Response Extends above 1000 nm**
- **2/3 inch 1.45 Million Pixel CCD**
- **1392 (H) x 1040 (V) Pixels**
- **15, 60, or 120 frames / second**
- **Progressive Scan with Square Pixels**
- **USB 2.0 output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Partial Scan Mode**
- **Remote Control via USB 2.0 port**
- **C-Mount Optics**
- **Compact Size**

KP-F120USB includes USB2.0 driver and demo software.

Requirement: Pentium 4, 1.4 GHz or higher (Pentium 4, 2.0 GHz or higher is recommended.

Video adapter: 24 or 32 bits, color, 1024 x 768 min.

Memory: 256 MB, (512 MB or more recommended).

USB2.0 Host: NEC ìPD720100A

System: Microsoft Windows 2000 (SP2 or later), Microsoft Windows XP (SP1 or later)

KP-F120USB SDK: A software development kit is available for those wishing to write custom software.

Featuring a 2/3 inch 1.45 Million Pixel Progressive Scan CCD, the **KP-F120USB** combines high resolution and high sensitivity with good spectral response. Useable in the Near IR range, the spectral response extends above 1000 nm. Providing a standard aspect ratio of 4 : 3 the CCD features square pixels. Through the use of advanced IC technology, the camera is able to provide a multitude of features in a compact size. The USB 2.0 digital output makes for ease of interface with a personal computer. For use in high performance machine vision systems, the camera features a Frame-on-Demand mode that allows an image to be captured and output immediately following the use of a trigger pulse. For even higher frame rates the **KP-F120USB** features a partial scan mode where the scan can start at the top or the center of the frame and continue for the chosen number of lines (16H to 512H). For ease of use, the **KP-F120USB** features remote control through the USB 2.0 interface, allowing remote control of all camera operating functions. The camera is also available with LVDS, CameraLink or IEEE-1394 or RGB color outputs.

USB2.0 Rear

Specifications

Imager:	2/3 inch Interline type Progressive Scan CCD
Pixels:	1392 x 1040
Cell Size:	6.45 x 6.45
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	54 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 4 modes
Partial Scan:	Upper or Middle 16H, 32H, 64H, 128H, 256H, 512H
Output:	Digital: USB 2.0
Power:	12 volts DC 500 ma
Size:	(W x H x D) 58 x 58 x 48 mm
Weight:	200 Grams
Lens:	C-Mount

Mega Pixel Near IR Progressive Scan
KP-F120F

1.45 Million Pixel Digital Output
KP-F120F

- **Near IR Sensitivity**
- **Spectral Response Extends above 1000 nm**
- **2/3 inch 1.45 Million Pixel CCD**
- **1392 (H) x 1040 (V) Pixels**
- **15, 60, or 120 frames / second**
- **Progressive Scan with Square Pixels**
- **IEEE-1394 output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Partial Scan Mode**
- **Remote Control via IEEE-1394 port**
- **C-Mount Optics**
- **Compact Size**

KP-F120F includes IEEE-1394 driver and demo software.

Requirement: Intel Celeron 533 MHz or more.

Memory: 256 MB or more.

System: Microsoft Windows 98SE, ME, 2000, XP.

Interface: OHCI IEEE-1394 Interface PCI Board.
OHCI IEEE-1394 Interface PC Card.

Display Adapter: 24 bit RGB color or more.

KP-120F SDK: A software development kit is available for those wishing to write custom software.

Featuring a 2/3 inch 1.45 Million Pixel Progressive Scan CCD, the **KP-F120F** combines high resolution and high sensitivity with good spectral response. Useable in the Near IR range, the spectral response extends above 1000 nm. Providing a standard aspect ratio of 4 : 3 the CCD features square pixels. Through the use of advanced IC technology, the camera is able to provide a multitude of features in a compact size. The IEEE-1394 digital output makes for ease of interface with a personal computer. For use in high performance machine vision systems, the camera features a Frame-on-Demand mode that allows an image to be captured and output immediately following the use of a trigger pulse. For even higher frame rates the **KP-F120F** features a partial scan mode where the scan can start at the top or the center of the frame and continue for the chosen number of lines (16H to 512H). For ease of use, the **KP-F120F** features remote control through the IEEE-1394 interface, allowing remote control of all camera operating functions. The camera is also available with CameraLink, LVDS, or USB 2.0 or RGB color outputs.

IEEE-1394 Rear

Specifications

Imager:	2/3 inch Interline type Progressive Scan CCD
Pixels:	1392 x 1040
Cell Size:	6.45 x 6.45
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	54 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 4 modes
Partial Scan:	Upper or Middle 16H, 32H, 64H, 128H, 256H, 512H
Output:	Digital: IEEE-1394
Power:	12 volts DC 500 ma
Size:	(W x H x D) 58 x 58 x 48 mm
Weight:	200 Grams
Lens:	C-Mount

Mega Pixel Near IR Progressive Scan KP-F120C

Color

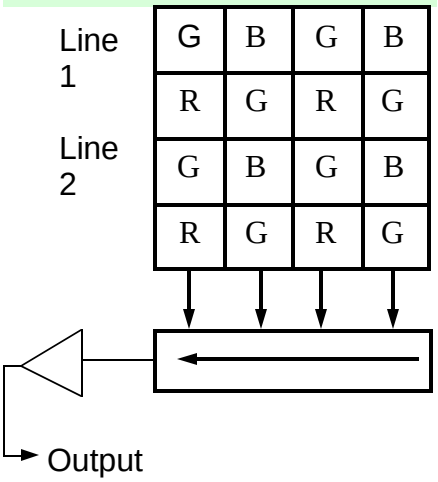
1.45 Million Pixel Digital Output KP-F120C

- **Near IR Sensitivity**
- **Spectral Response Extends above 1000 nm**
- **2/3 inch 1.45 Million Pixel CCD**
- **1392 (H) x 1040 (V) Pixels**
- **15, 60, or 120 frames / second**
- **Progressive Scan with Square Pixels**
- **RS-644 (LVDS) 8 bit single channel output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Partial Scan Mode**
- **Remote Control via RS-232C port**
- **C-Mount Optics**
- **Compact Size**

Featuring a 2/3 inch 1.45 Million Pixel Progressive Scan CCD, the **KP-F120C** combines high resolution and high sensitivity with good spectral response. Useable in the Near IR range, the spectral response extends above 1000 nm. Providing a standard aspect ratio of 4 : 3 the CCD features square pixels. Through the use of advanced IC technology, the camera is able to provide a multitude of features in a compact size. The LVDS 8 bit digital output makes for ease of interface with a majority of frame grabbers. For use in high performance machine vision systems, the camera features a Frame-on-Demand mode that allows an image to be captured and output immediately following the use of a trigger pulse. For even higher frame rates the **KP-F120C** features a partial scan mode where the scan can start at the top or the center of the frame and continue for the chosen number of lines (16H to 512H). For ease of use, the **KP-F120C** features an RS 232C remote control port, allowing remote control of all camera operating functions. The camera is also available with CameraLink, LVDS, USB 2.0 or IEEE-1394 outputs.

The KP-F120C outputs raw Bayer Filter Color Data that is combined in the frame grabber to produce a color image. Below is a partial diagram showing the output structure of the CCD with the Bayer Filter.

KP-F120C
Bayer Filter Structure



Specifications

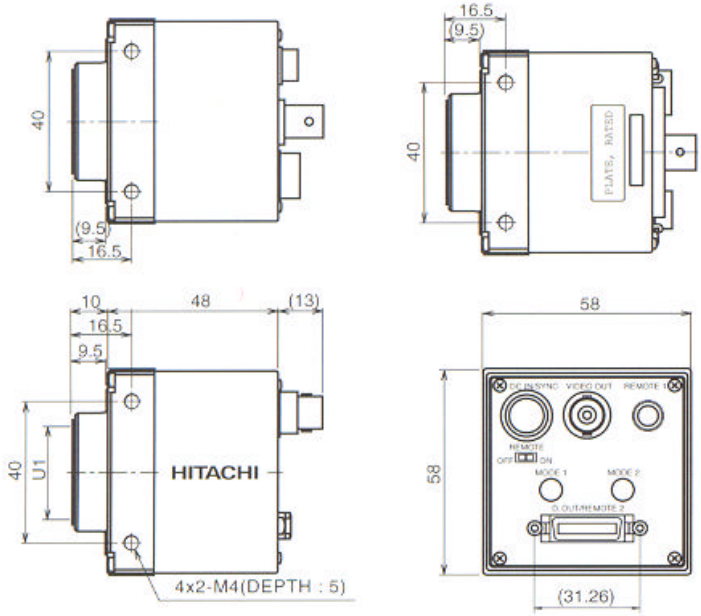
Imager:	2/3 inch Interline type Progressive Scan CCD
Pixels:	1392 x 1040
Cell Size:	6.45 x 6.45
Aspect Ratio:	4 : 3
Sensitivity:	400 lux at f4.0 3200K
S/N:	54 db
Gamma:	0.45 or 1.0 (Analog Out)
AGC:	On / Off (Analog Out)
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 4 modes
Partial Scan:	Upper or Middle 16H, 32H, 64H, 128H, 256H, 512H
Output:	Digital: LVDS 8 bit single channel
Power:	12 volts DC 500 ma
Size:	(W x H x D) 58 x 58 x 48 mm
Weight:	200 Grams
Lens:	C-Mount

2.01 Mega Pixel Progressive Scan KP-F200CL

2.01 Million Pixel Digital Output KP-F200CL

- **1/2 inch 2.01 Million Pixel CCD**
- **1628 (H) x 1236 (V) Pixels**
- **24, 48, or 96 frames / second**
- **Progressive Scan with Square Pixels**
- **CameraLink output**
- **Multiple Step Electronic Shutter**
- **Frame-on-Demand Mode**
- **Partial Scan Mode**
- **RS-232C Remote Control**
- **C-Mount Optics**
- **Compact Size**

Dimensions



Featuring a 1/2 inch 2.01 Million Pixel Progressive Scan CCD, the **KP-F200CL** combines high resolution and a host of versatile functions in a compact light weight package. Providing a standard aspect ratio of 4 : 3 the CCD features square pixels. The CameraLink digital output makes for ease of interface with standard frame grabbers. For use in high performance machine vision systems, the camera features a Frame-on-Demand mode that allows an image to be captured and output immediately following the use of a trigger pulse. For even higher frame rates the **KP-F200CL** features a partial scan mode where the scan can start at the top or the center of the frame and continue for a selected number of lines (16H to 512H). For ease of use, the **KP-F200CL** features RS-232C remote control through the CameraLink interface, allowing remote control of all camera operating functions. Two rotary control switches, one for camera mode operation, and one for camera gain, along with a slide switch for remote ON/OFF selection, allow the camera to be easily configured to the specific imaging application. The camera is also available with LVDS, or IEEE-1394 digital outputs.

Specifications

Imager:	1/2 inch Interline type Progressive Scan CCD
Pixels:	1628 x 1236
Cell Size:	4.4 x 4.4
Aspect Ratio:	4 : 3
Sensitivity:	
S/N:	
Gamma:	1.0
Shutter:	1/30 - 1/50000, eight steps
Sync:	Internal / External
Trigger:	Frame on Demand - 3 modes
Partial Scan:	Upper or Middle 16H, 32H, 64H, 128H, 256H, 512H
Output:	Digital: CameraLink Output 10 bit dual ch.
Power:	12 volts DC 450 ma
Size:	(W x H x D) 58 x 58 x 48 mm
Weight:	220 Grams
Lens:	C-Mount

Hitachi Board Cameras

Hitachi Denshi America Ltd.

1/2 Inch IT CCD BE-101B

The **BE-101B** is a compact and lightweight monochrome board camera designed for OEM imaging applications. The camera has excellent sensitivity and resolution, in a small package size. For greater size reduction, the camera features a piggy-back board design, to reduce the footprint of the camera by 50%. Standard features include internal or external sync, electronic shutter, field or frame integration, along with selectable gamma and AGC. A source of power and optics are all that is needed to complete the package. Special modification requests are accepted dependent upon quantities ordered.

Specifications

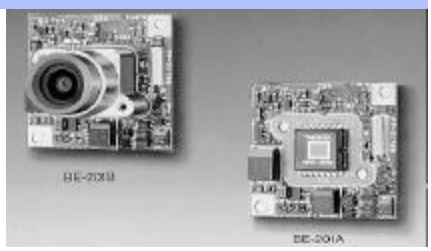
Imager: 1/2 inch Interline transfer CCD
Pixels: 768 x 494
Cell Size: 8.4 x 9.8
Resolution: 570 TV lines
Min. Illum: 0.25 lux at f1.4
S/N: 50 db
Gamma: 0.45 or 1.0 selectable
Integration: Field or Frame selection
AGC: On / Off
Shutter: 1/60 - 1/10000
Output: RS-170 1.0 V p-p
Power: 12 volts DC
Size: (W x H x D) 45 x 45 x 20 mm
Weight: 25 grams

1/2 Inch FT CCD Near Infared Sensitive BE-IR20 / 21

The **BE-IR20/21** are compact and lightweight monochrome board cameras with extended sensitivity and spectral response above 1000 nanometers, allowing use in the near IR range. The cameras are an excellent choice for OEM applications requiring extended spectral response in a very small package. The cameras require only a DC source of power and the optics needed for the application. The **BE-IR20** is an internal sync model, while the **BE-IR21** is for use with external sync. Standard features include selectable gamma and AGC, along with a multiple speed electronic shutter, and field or frame integration.

Specifications

Imager: 1/2 inch Interline transfer CCD
Pixels: 768 x 494
Cell Size: 8.4 x 9.8
Resolution: 570 TV lines
Min. Illum: 0.3 lux at f1.4
S/N: 56 db
Gamma: 0.45 or 1.0 selectable
Gain: Normal, or AGC
Shutter: AES, 1/60 - 1/10000 8 step
Output: RS-170 1.0 V p-p
Power: 9 volts DC
Size: (W x H x D) 34 x 34 x 20 mm
Weight: 60 grams



1/4 Inch IT CCD BE-211B

The **BE-211B** is Hitachi's most compact board camera, designed for observation and image processing OEM applications. The "B" version of the camera is provided with a lens mount. A 2.5 mm, 3.8 mm, or a 6.0 mm lens can be ordered as an option. Only a DC source of power is required for operation. Standard features include an automatic electronic shutter, selectable gamma, AGC, and field or frame integration.

Specifications

Imager: 1/4 inch Interline transfer CCD
Pixels: 510 x 492
Cell Size: 7.15 x 5.55
Resolution: 380 TV lines
Min. Illum: 0.5 lux at f1.4
S/N: 46 db
Gamma: 0.45 or 1.0 selectable
AGC: Max. 18 db
Shutter: AES
Output: RS-170 1.0 V p-p
Power: 9.0 volts DC
Size: (W x H x D) 25 x 25 x 16 mm
Weight: 22 grams

Additional Models

BE-212B The **BE-212B** is the same as the **BE-211B** with the addition of external H and V drives.

BE-301B The **BE-301B** features a 1/3 inch CCD and is similar to the **BE-211B**. Instead of a stacked two board arrangement, the **BE-301B** uses a single circuit board measuring 32 x 32 mm. The **BE-301B** has the same features and specifications as the **BE-211B**, with the exception of the CCD size.

OEM Products As a manufacturer of OEM cameras, **Hitachi** recognizes the need for product design to suit unique and individual applications. **Hitachi** will work closely with your designers and applications engineers to produce a camera for that specific need, on a quantity OEM basis. With over 40 years in the camera business, and a wide range of OEM products in a variety of markets, **Hitachi** has the expertise to design and manufacture a product in a timely manner to meet the exacting requirements of the OEM market. Should a modification to an existing camera prove to be cost effective, **Hitachi** will offer that as an alternative, if desired. Private labeling and packaging is available for all quantity OEM products. Additional help can be provided with custom cable requirements, mechanical configurations, lenses and optical filters. For additional information contact **Hitachi** at 516-921-7200.

Board Camera Chart

Hitachi Denshi America Ltd.

	BE-101B	BE-201A/B	BE-211A/B	BE-212A/B	BE-301A/B	BE-IR20 BE-IR30	BE-IR21 BE-IR31
CCD	1/2 inch	1/4 inch	1/4inch	1/4inch	1/3inch	1/2inch 1/3 inch	1/2inch 1/3 inch
No. of Boards	2	1	2	2	1	2	2
Board Size	45 x 45 x 20	32 x 32 x 11	25 x 25 x 16	25 x 25 x 16	32 x 32 x 11	32 x 32 x 20	32 x 32 x 20
Lens Mount	C- Mt. Option	Microlens Mt. B version	Microlens Mt. B version	Microlens Mt. B version	Microlens Mt. B version	C-Mt. Option	C-Mt. Option
Internal Sync	Yes	Yes	Yes	No	Yes	Yes	No
External H/V Drives	Yes	No	No	Yes	No	No	Yes
Resolution	570	380	380	380	380	570	570
Pixels	768 x 494	510 x 492	510 x 492	510 x 492	510 x 492	768 x 494	768 x 494
Pixel Pitch	8.4 x 9.8	7.15 x 5.55	7.15 x 5.55	7.15 x 5.55	9.6 x 7.5	8.4 x 9.8 6.35 x 7.4	8.4 x 9.8 6.35 x 7.4
S/N	56	46db	46db	46db	46db	56db	56db
Min. Illum.	0.3lux f1.4	0.5lux f1.4	0.5lux f1.4	0.5lux f1.4	0.5lux f1.4	0.3lux f1.4	0.3lux f1.4
Gamma	0.45 / 1	0.45 / 1	0.45 / 1	0.45 / 1	0.45 / 1	0.45 / 1	0.45 / 1
AGC	On / Off	On / Off	On / Off	On / Off	On / Off	On / Off	On / Off
Max AGC	18db	18db	18db	18db	18db	32db	32db
Shutter (AES)	On / Off	AES On / Off	AES On / Off	AES On / Off	AES On / Off	AES On / Off	AES On / Off
Fixed Shutter 8 Steps	1/60 - 1/10,000	1/60 – 1/10000	1/60 – 1/10000	1/60 – 1/10000	1/60 – 1/10000	1/60 – 1/10000	1/60 – 1/10000
Field / Frame Integration	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power	12 volts DC	9 volts DC	9 volts DC	9 volts DC	9 volts DC	9 volts DC	9 volts DC
Output	RS170A	RS-170	RS-170	RS-170	RS-170	RS-170	RS-170
Availability	Current	Discontinued	A Version Discontinued	A Version Discontinued	A Version Discontinued	Current	Current

The BE-101B is a two board camera with a new sensor and more pixels. Size 45 x 45 x 20 mm.

The **BE-IR30** and **BE-IR31** have the same features and performance as the BE-IR20 and BE-IR21, with the exception of the CCD size. The **BE-IR30** and **BE-IR31** feature a 1/3 inch format CCD.

Note: *Zero ohm jumper resistors are inserted or removed on the circuit boards to change the gamma setting, AGC mode, AES mode, field / frame integration mode, and fixed shutter speeds. For OEM quantity orders, the customer should specify their requirements. Changing these jumpers in the field requires soldering or unsoldering* ***very*** *small chip components.*

Compact DSP Color Camera
KP-D8

1/3 Inch Compact Color Camera KP-D8

- **Compact Self Contained Color Camera**
- **Digital Signal Processing (DSP)**
- **Auto Electronic Shutter (AES)**
- **Auto Tracking White Balance (ATW)**
- **2 H Enhancer for Sharp Picture Quality**
- **Composite and Y/C Outputs**
- **Output for Auto Iris Lens**
- **Positive / Negative Picture Polarity**
- **RS-232C Remote Control Interface**

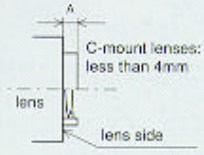
The **KP-D8** is a very small compact self contained single CCD color camera, featuring a 1/3 inch microlens CCD. The camera achieves high resolution and high sensitivity by means of its 410,000 pixel CCD. Digital signal processing enables functions such as a 2H enhancer, aperture correction, and two modes of shutter control. A fixed shutter can be selected in four steps, or AES control can be selected to maintain optimum video output level, when using a lens without an auto iris. Three modes of auto white balance can be selected. In the ATW mode, the camera will track and maintain white balance over a wide range of color temperatures. Remote control of all camera functions is available via a RS-232C interface. The camera needs only a 12 volt DC supply to function. A single Hirose connector is provided for power, camera output, and serial data for remote control. A seperate connector is provided for auto iris control.

Tripod adaptor
TA-D8

■Special mount lenses
(Recommended lenses)

Iris	Type desig.	Spec.	Angle of view(Hor.)
Manual	TF812	8mm f1.2	32°
	TF316	3.7mm f1.6	72°
	TF1214	12mm f1.4	22°
Automatic	HS720JX(XE) w/3-pin plug	7mm f2.0	38°

Various C-mount lenses can be used by using the supplied C-mount conversion adaptor LA-D8.
A CS-mount lens cannot be used.



● **Note on lens selection**
Observe the length (A) illustrated at left for the C-mount lens mounting. In case a lens having the lens mounting section in excess of the above length, the inside of the camera can be damaged.

Specifications

Imager:	1/3 inch interline transfer CCD with microlens
Pixels:	768 x 494
Cell Size:	6.35 x 7.4
Resolution:	470 TV lines
Min. Ilum:	2.0 lux at f1.2 (R2 version)
S/N:	48 db
Gamma:	0.45 or 1.0 selectable
AGC:	On / Off selectable
Shutter:	4 steps 1/60 - 1/4000
AES:	Off / On 1/60 - 1/20,000
White Balance:	ATW / Preset
Outputs:	RS-170 1.0 V p-p & Y/C
Power:	12 volts DC
Size:	(W x H x D) 22 x 22 x 86 mm
Weight:	80 grams
Lens:	Special mount (NF) 17 mm metric screw

High Performance DSP Color Cameras
KP-D20A / B

Compact DSP Color Camera
KP-D20 A / B

- **1/3 inch (KP-D20A) or 1/2 inch (KP-D20B)**
- **High Quality Optical Path**
- **480 TV Lines of Resolution**
- **50 db S/N**
- **0.3 lux Minimum Sensitivity (KP-D20B)**
- **Digital Signal Processing (DSP)**
- **On Screen Menu System**
- **Auto Tracking White Balance (ATW)**
- **Auto Electronic Shutter (AES)**
- **Backlight Correction**
- **2 H Enhancer for Sharp Picture Quality**
- **Digital Zoom**
- **RS-232C Remote Control Port**
- **Composite and Y/C outputs**
- **Output for Auto Iris Lens**

The **KP-D20 A** and **KP-D20B** are compact color cameras featuring 3rd generation digital signal processing (DSP). The **KP-D20A** has a 1/3 inch format CCD with a minimum sensitivity of 0.8 lux, while the **KP-D20B** features a 1/2 inch format CCD with a minimum sensitivity of 0.3 lux. Both cameras feature 480 TV Lines of resolution and are designed with a high quality optical path making them ideal for use in microscopy and high precision image processing systems. Designed for use with CS or C Mount lenses with an adaptor allow easy interfacing with the optics of the vision system. An On Screen Menu system allows for easy selection and adjustment of all camera parameters. Digital adjustments are also provided for video level, black level, chroma level, and enhancement level. Once set, the parameters are maintained in an EEPROM until overwritten. Standard features include three choices for white balance (ATW, Auto, Manual), Multiple Step Electronic Shutter or AES, Backlight Correction, a 2 H Enhancer for improving the sharpness of the picture, and a digital zoom feature. A composite and a Y/C output are available to match the requirements of the vision system.

Specifications

	KP-D20A	KP-D20B
Imager:	1/3 inch KP-D20A	1/2 inch KP– D20B
	Interline transfer CCD with microlens	
Pixels:	768 x 494	
Cell Size:	6.35 x 7.4	8.4 x 9.8
Resolution:	480 TV lines	
Min. Ilum:	0.8 lux at f1.2	0.3 lux at f1.2
S/N:	50 db	
DSP:	10 bit	
Gamma:	0.45 or 1.0 selectable	
AGC:	On / Off selectable max gain	
Shutter:	10 steps 1/60 - 1/30,000	
AES:	Off / On	
White Balance:	ATW / Auto / Manual	
Polarity:	Positive or Negative Picture Polarity	
Backlight:	9 Area Backlight Compensation	
Outputs:	RS-170 1.0 V p-p & Y/C	
Digital Zoom:	4 X	
Power:	12 volts DC approx. 300 ma	
Size:	(W x H x D) 44 x 44 x 49 mm	
Weight:	130 grams	
Lens:	CS or C Mount with Adaptor	

DSP Color Cameras
KP-D50

Designed to produce high quality and stability in image processing, teleconference and microscopy systems, the **KP-D50** rely heavily on DSP. Digital signal processing makes possible additional features along with offering improvements to conventional functions. A menu system allows the user to select different modes of white balance, AES, amount of AGC, backlight correction, contrast correction, negative or positive outputs, along with a number of other operational parameters. A 2H contour corrector provides for sharp pictures without added noise. A RS-232 port allows remote control of all camera functions by a PC. Additionally, the **KP-D50** features a Y/C output, and has a D-Sub 9 connector with RGB, and sync outputs, and HD and VD inputs.

1/2 Inch DSP Color KP-D50

- **470 TV Lines of Resolution**
- **50 db SN**
- **Digital Signal Processing (DSP)**
- **Auto Tracking White Balance (ATW)**
- **Auto Electronic Shutter (AES)**
- **Backlight Compensation**
- **2 H Enhancer with Contour Compensation**
- **On Screen Menu System**
- **Positive or Negative Picture Polarity**
- **Composite, Y/C and RGB Outputs**
- **Output for Auto Iris Lens**

KP-D50 D-sub Connector

●RGB or Y/C can be selected by switch.

Pin No.	RGB mode	Y/C mode	Impedance
1	GND	GND	—
2	GND	GND	—
3	R OUT	VIDEO OUT	75Ω
4	G(SYNC＊) OUT	Y OUT	75Ω
5	B OUT	C OUT	75Ω
6	VIDEO OUT	VIDEO OUT	75Ω
7	SYNC OUT	SYNC OUT	75Ω
8	HD (IN)	HD (IN)	75Ω
9	VD (IN)	VD (IN)	75Ω

＊The sync signal of the G signal can be turned on or off by switch.

●D-sub connector pin arrangement.

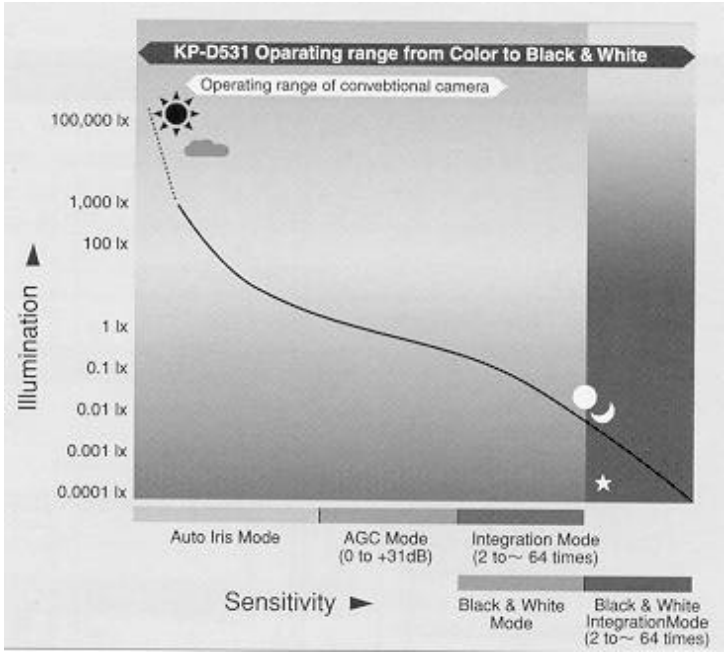
Specifications

Imager:	1/2 inch IT Microlens CCD
Pixels:	768 x 494
Cell Size:	8.4 x 9.8
Resolution:	470 TV lines
Min. Illum:	2.0 lux at f1.2
S/N:	50 db
AGC:	Off / On adjustable limit
Shutter:	1/60 - 1/10000 or AES
White Bal:	ATW / Manual / Preset
Backlight Correction:	Auto/ Manual/ Off
DSP:	9 bits
Enhancer:	2H with contour compensation
External Sync:	HD / VD
Outputs:	VBS, Y/C , or RGB
Size: (W x H x D)	64 x 55 x 122
Power:	12 volts DC KP-D50
Weight:	400 g
Lens:	C or CS Mount

High Sensitivity DSP Color Camera
KP-D531

1/2 Inch High Sensitivity DSP Color KP-D531

- **Illumination Range of 0.02 to 100,000 lux**
- **Extended Integration Time of 2 to 64 Times**
- **Auto-Change Integration Mode**
- **Digital Signal processing (DSP)**
- **Thermoelectric Cooling for the CCD**
- **Digital Noise Reduction DNR**
- **Auto Tracking White Balance (ATW)**
- **Auto Electronic Shutter (AES)**
- **Backlight Correction**
- **On Screen Menu System**
- **Positive or Negative Picture Polarity**
- **RS-232C Remote Control for all Functions**
- **Electronic Zoom, with Pan / Tilt Function**



The **KP-D531** features an auto-change integration mode for use in low light observation, at levels down to 0 .02 lux. With auto-change integration, the IR cut filter is removed and the camera is switched to a monochrome mode to improve sensitivity. By using a combination of CCD exposure time and field memory, sensitivity is increased by 64 times compared with a conventional single CCD camera. Thermoelectric cooling is used on the CCD to reduce the effects of dark current noise at long exposure times. Digital signal processing is employed, and enables new functions such as noise reduction, backlight compensation, automatic sensitivity switching, auto change integration, positive or negative output, and a 2H enhancer for a sharp picture. Automatic color tracking can maintain proper color balance with changing light levels and color temperature. A four times electronic zoom with pan and tilt feature is standard, and allows magnification of the picture even when a standard lens is used.

Specifications

Imager: 1/2 inch IT CCD with microlens
Pixels: 768 x 494
Cell Size: 8.4 x 9.8
Resolution: 480 TV lines
Illum. Range: 0.02 - 100,000 lux at f1.2
S/N: 50 db
Auto-Change Integration Mode:
Color 0.2 lux, Monochrome 0.02 lux
Integration: Selectable up to 64 times
Backlight Correction: Auto / Manual
Gain: Manual / AGC
Shutter: 1/60 - 1/30000 or AES
Noise Reduction: On / Off
ATW Range: 2500K to 8000K
Electronic Zoom: 4 times with pan / tilt
Character Gen: 24 alphanumeric
Signal Process: 9 bit DSP
Power: 117Vac
Output: VBS
Size: (W x H x D) 64 x 63 x 122 mm
Weight: 600 grams
Lens: C / CS mount ES type

High Sensitivity DSP Color Camera
KP-D590

High Sensitivity 1/2 Inch Color KP-D590

The **KP-D590** is a DSP camera designed for low light observation, at levels down to 0 .001 lux. Ideal for use in fluorescence and darkfield imaging systems, the camera uses a combination of CCD exposure time and field memory, to improve sensitivity as compared with a conventional single CCD camera. A maximum integration time of 8 seconds is available, allowing use in extremely low light situations. Thermoelectric cooling is used on the CCD to reduce the effects of dark current noise at long exposure times. Digital signal processing is employed, and enables new functions such as digital noise reduction, backlight compensation, automatic sensitivity switching, positive or negative output, and a 2H enhancer for a sharp picture. White balance modes include memory, auto tracking white, and manual, where the user can adjust red and blue gains. A four times electronic zoom with pan and tilt feature is standard, and allows magnification of the picture even when a standard lens is used.

Remote Control Unit RC-C590

The **RC-C590** is a dedicated remote control unit supplied with the **KP-D590** camera. Ideal for use in microscopy systems the **RC-C590** allows remote control of the camera's automatic gain control (AGC), digital noise reduction (DNR), and long term integration functions. Long term integration can be remotely adjusted in 16 steps, allowing the user to control the scene exposure, without going to the menu on the rear of the camera, and possibly disturbing the camera position. When AGC is selected to ON, the cameras gain limit can be adjusted using the camera menu. For use in low light levels the auto mode of integration can be selected. When selected, the camera will integrate up to the maximum amount set by the manual integration switch. In the auto mode the maximum integration time is limited to two seconds. When AGC and the auto mode of integration are both selected, gain is first added to the limit set in the camera. The integration function is then used as required to produce a proper video output signal. In the manual mode of integration, the maximum integration time is eight seconds. A dedicated nine foot remote cable is provided on the **RC-C590** for connection to the **KP-D590** camera. The unit receives its power directly from the camera.

Specifications KP-D590

Imager: 1/2 inch IT CCD with microlens
Pixels: 768 x 494
Cell Size: 8.4 x 9.8
Resolution: 480 TV lines
Illum. Range: 0.001 - 100,000 lux at f1.2
S/N: 50 db
Backlight Correction: Auto / Manual
Integration: Selectable up to 8 seconds
Gain: Manual / AGC
Shutter: 1/60 - 1/10000
Noise Reduction: On / Off
ATW Range: 2500K to 8000K
Electronic Zoom: 4 times with pan / tilt
Signal Process: 9 bit DSP
Power: 12Vdc
Output: VBS, Y/C
Size: (W x H x D) 64 x 68 x 160 mm
Weight: 600 grams

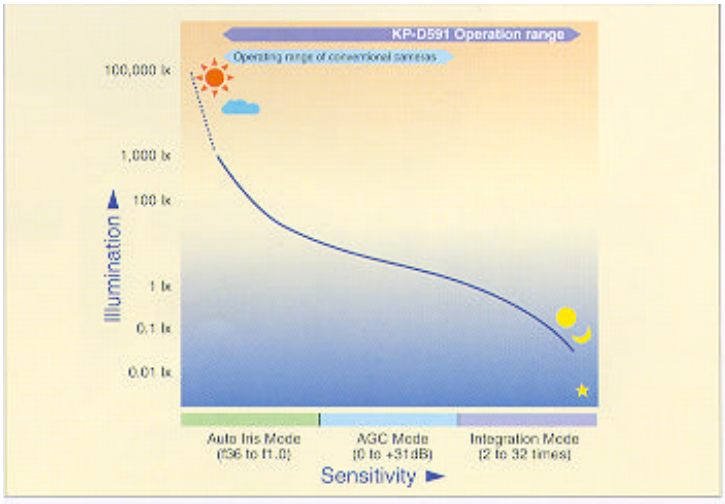
Specifications RC-C590

DNR: On / Off
AGC: On / Off
Integration Mode: Auto / Manual
Integration Steps:16 steps, norm (0.16)
0.03, 0.06, 0.12, 0.25, 0.5, 1.0, 1.3, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0 sec.
Cable: Captive, 9 foot

High Sensitivity DSP Color Camera
KP-D591

1/2 Inch High Sensitivity DSP
KP-D591

- **Illumination Range of 0.01 to 100,000 lux**
- **Extended Integration Time of 2 to 64 Times**
- **Digital Signal processing (DSP)**
- **Thermoelectric Cooling for the CCD**
- **Digital Noise Reduction DNR**
- **Auto Tracking White Balance (ATW)**
- **Auto Electronic Shutter (AES)**
- **Backlight Correction**
- **On Screen Menu System**
- **Positive or Negative Picture Polarity**
- **RS-232C Remote Control for all Functions**
- **Electronic Zoom, with Pan / Tilt Function**



The **KP-D591** is designed for low light observation, at levels down to 0 .01 lux. By using a combination of CCD exposure time and field memory, sensitivity is increased by 64 times compared with a conventional single CCD camera. Thermoelectric cooling is used on the CCD to reduce the effects of dark current noise at long exposure times. Digital signal processing is employed, and enables new functions such as noise reduction, backlight compensation, automatic sensitivity switching, positive or negative output, and a 2H enhancer for a sharp picture. Automatic color tracking can maintain proper color balance with changing light levels and color temperature. A four times electronic zoom with pan and tilt feature is standard, and allows magnification of the picture even when a standard lens is used.

Specifications

Imager:	1/2 inch IT CCD with microlens
Pixels:	768 x 494
Cell Size:	8.4 x 9.8
Resolution:	480 TV lines
Illum. Range:	0.01 - 100,000 lux at f1.2
S/N:	50 db
Backlight Correction:	Auto / Manual
Integration:	Selectable up to 64 times
Gain:	Manual / AGC
Shutter:	1/60 - 1/30000 or AES
Noise Reduction:	On / Off
ATW Range:	2500K to 8000K
Electronic Zoom:	4 times with pan / tilt
Character Gen:	24 alphanumeric
Signal Process:	9 bit DSP
Power:	117Vac
Output:	VBS
Size:	(W x H x D) 64 x 63 x 122 mm
Weight:	740 grams
Lens:	C / CS mount ES type

VGA Progressive Scan RGB Color Camera KP-FD30

1/2 Inch VGA Progressive Scan RGB color Camera KP-FD30

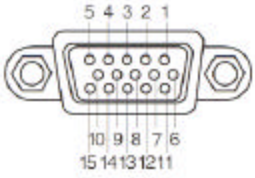
- **Primary Color Filter**
- **60 frames / second Progressive Scan Output**
- **HD 15 pin VGA output connector**
- **Frame / Field-On-Demand Mode**
- **Digital Signal processing (DSP)**
- **NTSC mode with VBS, Y/C, & RGB outputs**
- **Auto Tracking White Balance (ATW)**
- **Auto Level Control (ALC)**
- **Auto Electronic Shutter (AES)**
- **On Screen Menu System**
- **RS-232C Remote Control for all Functions**
- **Output for Auto Iris Lens**

Designed around a progressive scan CCD with a primary RGB color filter, the **KP-FD30** produces high quality images for use in image processing systems, copy stands, microscopy and medical applications. The **KP-FD30** can output progressive scan VGA images at 60 frames per second from the standard 15 pin HD connector allowing the camera to be connected directly to a computer monitor, and NTSC images with 440 TV lines of resolution at 30 frames per second for traditional equipment. The NTSC output can be selected as composite, Y/C, or RGB. Incorporating advanced features such as ATW to maintain proper color temperature with changing light levels, ALC to maintain proper output levels by controlling the lens iris, AES and AGC, and a Frame / Field-on-Demand mode featuring a one trigger and fixed shutter mode of operation, the camera can be configured to the requirements of the imaging task. The camera is also available with a IEEE-1394 output as the **KP-FD30F**, with a USB 2.0 output as the **KP-FD30USB**, or with a CameraLink output as the **KP-FD30CL**.

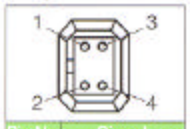
High-Density 15pin connector plug:KEC-15p(Housing)

Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	R/C OUT	6	VIDEO GND	11	GND
2	G/Y OUT	7	VIDEO GND	12	RXD
3	B/VBS OUT	8	VIDEO GND	13	HD IN/HD OUT/SYNC OUT
4	WE OUT	9	UNREG +12 V IN	14	VD IN/VD OUT
5	GND	10	TRIG IN	15	TXD

(Pin contact JK-SP2140)(Cover JK-C151C)



Lens connector
(Plug:E4-191J-100)



Pin No.	Signal
1	Damp ⊖
2	Damp ⊕
3	Drive ⊕
4	Drive ⊖

VIDEO optionally

12V IN connector
(Plug:R03-P3F)

Pin No.	Signal
A	GND
B	+12 V IN
C	N.C.

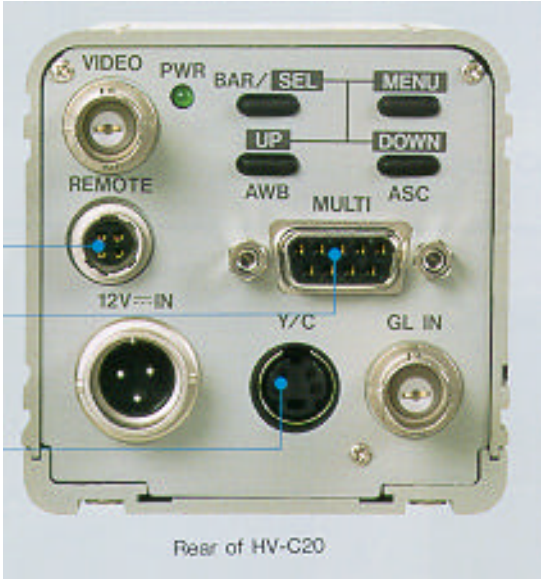
Specifications

Imager:	1/2 inch Progressive CCD
Pixels:	659 x 494
Cell Size:	9.9 x 9.9
Resolution:	Progressive: VGA 640 x 480 NTSC: 440 TV lines
Min. Illum:	10.0 lux at f1.4
S/N:	50 db
AGC:	Off / On adjustable limit
Shutter:	1/60 - 1/10000, AES, Variable
ALC:	AES, Lens Iris, AGC Selectable Area
White Bal:	ATW / Manual / Preset
DSP:	9 bits
Enhancer:	5H enhancer processing
External Sync:	HD / VD
Trigger:	Frame/Field-on-Demand
Outputs:	Progressive: RGB VGA NTSC: VBS, Y/C, RGB
Size: (W x H x D)	58 x 58 x 48
Power:	12 volts DC, 360ma
Weight:	220 g
Lens:	C or CS Mount

3 CCD Color Camera
HV-C20

1/2 Inch 3 CCD HV-C20

- **700 TV Lines of resolution**
- **Auto Tracking White Balance**
- **Auto Electronic Shutter**
- **Auto Shading Compensation**
- **Back Light Compensation**
- **Auto Knee**
- **Contrast Correction**
- **Lock Scan Mode**
- **Field or Frame Integration**
- **Long Term Integration**
- **Composite, Y/C and RGB outputs**
- **Genlock**
- **RS-232C Remote Control of all Functions**



Rear of HV-C20

Superb image quality is achieved in a compact 3 CCD camera using C-Mount optics, by a breakthrough in prism design. Designed for video conference, distance learning, microscopy, and machine vision markets, the **HV-C20** has a wide array of features. A full auto mode can be selected that will allow the camera to operate over a wide range of illumination and color temperatures. Auto shading compensates for shading characteristics of C-Mount lenses. Auto knee, BLC, AES, detail, and contrast are available through the extensive menu system. A RS-232 interface allows access to all menu functions from a PC. For machine vision, the **HV-C20** has external trigger inputs and a field on demand mode. For electroluminance microscopy, the camera features long term integration up to 8 seconds. Also available, the **HV-C20M,** which provides a high quality optical path for precision imaging.

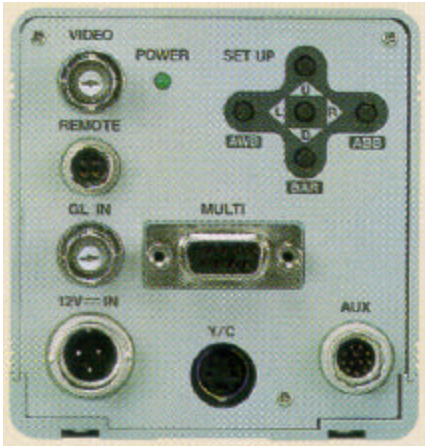
Specifications

Imager:	3 1/2 inch IT Microlens CCD's
Pixels:	768 x 494 (3)
Cell Size:	8.4 x 9.8
Resolution:	700 TV lines
Min. Illum:	5.5 lux at f1.8
S/N:	60 db
AGC:	Off / On selectable limit
Shutter:	1/60 - 1/10000 or AES
Lock Scan:	1/60.38 - 1/10168 in 1H steps
Gamma:	0.45 or 1.0 selectable
White Bal:	ATW / Manual / Preset
Auto Shading:	On / Off
Auto Knee:	On / Off
BLC:	Off / On selectable area
Contrast:	On / Off
Integration:	Field / Frame
Long term Integration:	1/30 to 8 sec
External Trigger:	4 modes
Outputs:	VBS, RGB, Y/C HD/ VD
Sync:	Internal / external / genlock
Power:	12 volts DC
Size: (W x H x D)	65 x 65 x130 mm
Weight:	600 grams

3 CCD DSP Color Camera
HV-D25

1/2 Inch 3 CCD DSP Color Camera
HV-D25

- **800 TV Lines of Resolution**
- **Digital Signal Processing**
- **3 Application Files for Storage of Setup Menus**
- **6 Vector Color Correction**
- **Adjustable Chroma Level**
- **Digital Noise Reduction**
- **Auto Tracking White Balance Mode**
- **Auto Level Control**
- **Auto Electronic Shutter**
- **Lock Scan Shutter Mode**
- **Auto Knee**
- **Field or Frame Integration**
- **Composite, Y/C, RGB or Y/R-Y/B-Y outputs**
- **Genlock**
- **RS-232C Remote Control for all Functions**



Advanced digital signal processing is combined with a high quality imaging block to provide exceptional video performance in a compact package. Designed for use on remote pan/tilt systems, graphic stands, or medical applications, the **HV-D25** features ease of use through selectable automatic functions for white balance, gain, shading and electronic shutter. For maximum flexibility, a full menu system allows adjustment of all camera parameters. Three application files allow storage and recall of all selected items. An extensive detail menu allows adjustment of detail gain and selection of detail frequency in addition to providing dynamic chroma detail to preserve highlights in high color areas. A six vector color corrector, DNR and gate signals for iris and white balance add to the cameras versatility. Full control of the camera is provided via RS-232C.

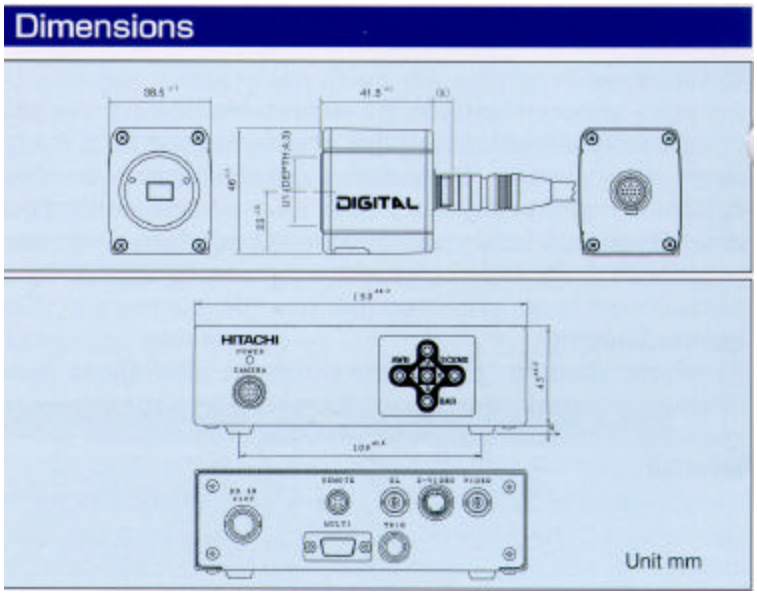
Specifications

Imager:	3 1/2 inch IT Microlens CCD's
Pixels:	768 x 494 (3)
Resolution:	800 TV Lines
Sensitivity:	2000 lux f8.0
S/N:	63db
Gain:	0 - 20 db or auto level (ALC)
Shutter:	1/60 - 1/10000 or AES
Lock Scan:	1/60.38 - 1/251.5 1H steps
Gamma:	0.35 or 1.0 selectable
White Bal:	ATW / Memory / Preset
Masking:	6 vector, saturation and hue
Auto Knee:	On / Off
Contrast:	Off / Normal / High
Integration:	Field / Frame 1/60 - 8 sec.
DNR:	Off / Mode 1 / Mode 2
Genlock:	VBS, BB, or H and V drive
Color Bars:	SMPTE
Outputs:	VBS, Y/C, Y/R-Y/B-Y, RGB
Remote:	RS-232C
Lens Mount:	C-Mount
Power:	12 volts DC
Size:	(W x H x D) 80 x 83 x 134 mm
Weight:	950 grams

3 CCD Remote Head DSP Color Camera HV-D27

1/2" Remote Head 3CCD Color Camera HV-D27

- **Remote Head 2 Piece Design**
- **800 TV Lines of Resolution**
- **Digital Signal Processing**
- **3 Application Files for Storage of Setup Menus**
- **6 Vector Color Correction**
- **Adjustable Chroma Level**
- **Digital Noise Reduction**
- **Auto Tracking White Balance Mode**
- **Auto Level Control**
- **Auto Electronic Shutter**
- **Auto Knee**
- **Field or Frame Integration**
- **Composite, Y/C, RGB or Y/R-Y/B-Y outputs**
- **Genlock**
- **RS-232C Remote Control for all Functions**



The **HV-D27** is a two piece color camera featuring a compact lightweight camera head with 3 one half inch CCD's. Designed for microscopy, medical imaging, and other areas requiring a very small head, the camera provides excellent performance with a full complement of features. A full menu system for selecting and setting camera operational parameters is available, once selections are made they can be stored to one of three scene files. Front panel selection at the CCU allows easy recall of a particular scene file. Digital Signal Processing (DSP) is used to provide stability as well as additional features such as six vector color correction, ultra gain, selectable light metering and long term integration. Complete control of all camera parameters is available through the RS-232C port on the camera. Cable lengths between the camera head and CCU can be up to 20 meters.

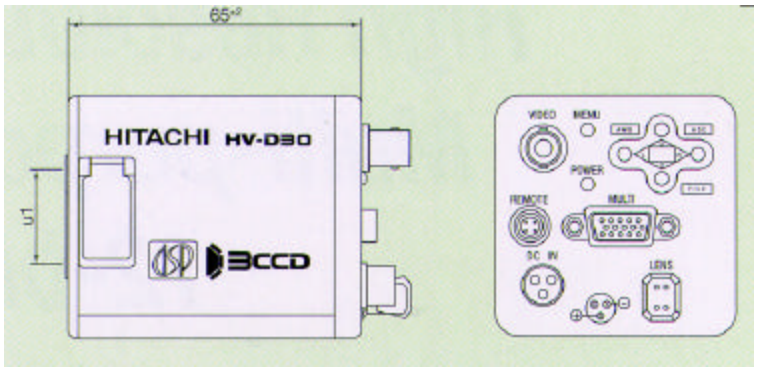
Specifications

Imager:	3 1/2 inch IT Microlens CCD's
Pixels:	768 x 494 (3)
Resolution:	800 TV Lines
Sensitivity:	2000 lux f8.0
S/N:	62db
Gain:	0 - 20 db or auto level (ALC)
Shutter:	1/60 - 1/10000 or AES
Lock Scan:	1/60.38 - 1/251.5 1H steps
Gamma:	0.35 or 1.0 selectable
White Bal:	ATW / Memory / Preset
Masking:	6 vector saturation and hue
Auto Knee:	On / Off
Contrast:	Off / Normal / High
Integration:	Field / Frame 1/60 - 8 sec.
DNR:	Off / Mode 1 / Mode 2
Genlock:	VBS, BB, or H and V drive
Color Bars:	SMPTE
Outputs:	VBS, Y/C, Y/R-Y/B-Y, RGB
Remote:	RS-232C
Lens Mount:	C-Mount
Power:	12 volts DC approx. 10.5 Watts
Size:	(W x H x D) 38.5 x 46 x 48 mm Head
	150 x 45 x 170 mm CCU
Weight:	90 grams Head
	930 grams CCU

3 CCD High Performance DSP Color Camera HV-D30

1/3" Compact 3CCD Color Camera HV-D30

- **800 TV Lines of Resolution**
- **Digital Signal Processing**
- **4 Scene Files for Storage of Setup Menus**
- **6 Vector Color Correction**
- **Adjustable Chroma Level**
- **Digital Noise Reduction**
- **Auto Tracking White Balance Mode**
- **Auto Level Control**
- **Auto Electronic Shutter**
- **Auto Knee**
- **Field or Frame Integration**
- **Long Term Integration 1/30 to 8 seconds**
- **Composite, Y/C, RGB or Y/R-Y/B-Y outputs**
- **Genlock**
- **RS-232C Remote Control for all Functions**



HV-D30 Side and Rear Views

Featuring a 3rd generation DSP circuit with 3 million gates, the HV-D30 provides exceptional performance in a compact size. A 12 bit A/D is used to convert the analog output of the CCD's to the digital signal for processing by the DSP. 800 TV lines of resolution and a 64 db signal to noise ratio result in outstanding picture quality. Automatic shading compensation is provided to compensate for unwanted color shifts caused by interaction of the C-mount lens and prism assembly. Automatic gain control and auto tracking white balance modes can be selected so the camera can operate properly under a wide range of illumination levels and color temperature levels. A six vector color corrector is provided and allows adjustment of the hue and saturation of the 3 primary and 3 secondary colors. A wide selection of detail functions is provided, including a flesh tone detail circuit. Four scene files are provided for setup, storage and recall of all camera parameters. An RS-232C port allows complete control of all camera functions from a remote location.

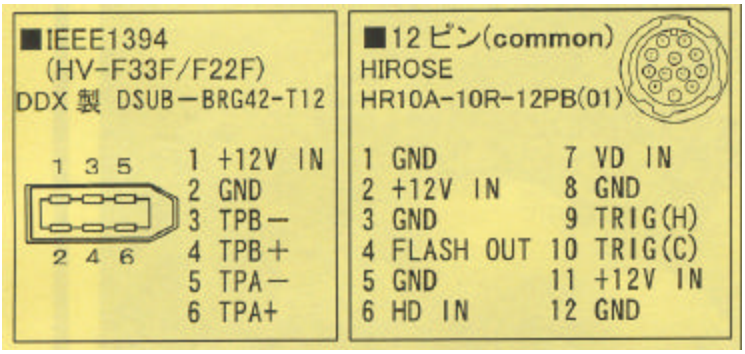
Specifications

Imager:	3 1/3 inch IT Microlens CCD's
Pixels:	768 x 494 (3)
Resolution:	800 TV Lines
Sensitivity:	2000 lux f9.5
S/N:	64db
Shading:	Automatic Compensation
Gain:	0 - 24 db or auto level (ALC)
Shutter:	1/60 - 1/100,000 or AES
Lock Scan:	1/60.38 - 1/100,000 1H steps
Gamma:	0.35 or 1.0 selectable
White Bal:	ATW / Memory / Preset
Masking:	6 vector saturation and hue
Auto Knee:	On / Off
Contrast:	Off / Normal / High
Integration:	Field / Frame 1/60 - 8 sec.
DNR:	Off / Mode 1 / Mode 2
Trigger:	Field-on-Demand Mode
Genlock:	VBS, BB, or H and V drive
Color Bars:	SMPTE
Outputs:	VBS, Y/C, Y/R-Y/B-Y, RGB
Remote:	RS-232C
Lens Mount:	C-Mount
Power:	12 volts DC approx. 4 Watts
Size:	(W x H x D) 65 x 65 x 80 mm
Weight:	400 grams

3 CCD Progressive Scan XGA Color Camera HV-F31F

1/3" Progressive Scan XGA 3CCD Color Camera HV-F31F

- **1/3 inch Progressive Scan 3 CCD**
- **XGA (1024 x 768) resolution**
- **15 frames per second**
- **IEEE-1394 IIDC (Ver. 1.30) Output**
- **Digital Signal Processing**
- **4 Scene Files for Storage of Setup Menus**
- **6 Vector Color Correction**
- **Adjustable Chroma Level**
- **Auto Tracking White Balance Mode**
- **Auto Level Control**
- **Auto Electronic Shutter**
- **Auto Knee**
- **Auto Shading Correction**
- **Long Term Integration 1/30 to 4 seconds**
- **Outputs: XGA (YUV, 15 fps or RGB, 7.5 fps)**
  SVGA (YUV, 30 fps or RGB , 15 fps)
- **Internal or External Sync Mode**
- **Frame-on-Demand Mode**
- **RS-232C Remote Control for all Functions**



Incorporating 3 1/3 inch 800,000 pixel progressive scan CCD's the **HV-F31F** produces excellent image quality with high vertical resolution for use in medical, microscopy, and other image processing applications. The IEEE-1394 interface allows easy connection with a computer permitting resolution in the XGA or SVGA ranges. The frame rate, bits per pixel and resolution are related and can be selected to best meet the imaging requirements. Featuring a 3rd generation DSP, the **KP-F31F** incorporates ATW, ASC, AES, ALC, auto knee, flare correction, 6 vector color correction, and 4 scene files for the setup and storage of all camera operational parameters. The camera also features a long integration mode for use in low light levels, and a frame-on-demand mode for use in vision systems. In the frame-on-demand mode, a strobe signal is output at the end of the trigger pulse. An industry standard 12 pin Hirose connector is used for external sync, trigger input, and strobe output signals. Power can be input through the 12 pin Hirose or through the IEEE-1394 connector.

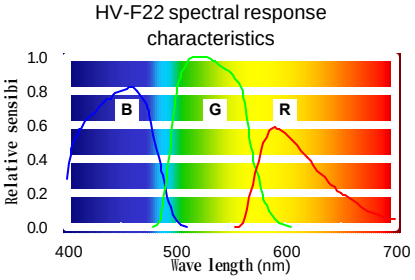
Specifications

Imager:	3 1/3 inch Progressive CCD's
Pixels:	1024 x 768 (3)
Resolution:	XGA 1024 x 768, or SVGA 800 x600
Sensitivity:	2000 lux f5.6
Shading:	Automatic Compensation
Gain:	0 - 12 db or auto level (ALC)
Shutter:	1/30 - 1/100,000 or AES
Lock Scan:	1/30 - 1/100,000 1H steps
Gamma:	0.45 or 1.0 selectable
White Bal:	ATW / Memory / Preset
Masking:	6 vector saturation and hue
Auto Knee:	On / Off
Contrast:	Off / Normal / High
Integration:	1/30 - 4 sec
Trigger:	Frame-on-Demand Mode, 1 Trig.
Sync:	Internal / External H and V drive
Outputs:	IEEE-1394 IIDC (Ver. 1.30)
	Selectable Positive or Negative Image
Remote:	RS-232C
Lens Mount:	C-Mount
Power:	12 volts DC approx. 8 Watts
Size:	(W x H x D) 65 x 65 x 130 mm
Weight:	600 grams

3 CCD Progressive Scan SXGA Color Camera HV-F22F

1/2" Progressive Scan SXGA 3CCD Color Camera HV-F22F

- **1/2 inch Progressive Scan 3 CCD**
- **SXGA (1360 x 1024) resolution**
- **7.5 frames per second**
- **IEEE-1394 IIDC (Ver. 1.30) Output**
- **Digital Signal Processing**
- **4 Scene Files for Storage of Setup Menus**
- **6 Vector Color Correction**
- **Adjustable Chroma Level**
- **Auto Tracking White Balance Mode**
- **Auto Level Control**
- **Auto Electronic Shutter**
- **Auto Knee**
- **Auto Shading Correction**
- **Long Term Integration 1/30 to 4 seconds**
- **Outputs:**
  - **SXGA 1280 x 960 (YUV or RGB 7.5 fps)**
  - **SXGA 1360 x 1024 (YUV or RGB 7.5 fps)**
  - **VGA 640 x 480 (YUV or RGB 30 fps)**
- **Internal or External Sync Mode**
- **Frame-on-Demand Mode**
- **RS-232C Remote Control for all Functions**



Incorporating 3 1/2 inch 1.45 million pixel progressive scan CCD's the **HV-F22F** produces excellent image quality with high vertical resolution for use in medical, microscopy, and other image processing applications. The IEEE-1394 interface allows easy connection with a computer permitting resolution in the SXGA or VGA ranges. The frame rate, bits per pixel and resolution are related and can be selected to best meet the imaging requirements. Featuring a 3rd generation DSP, the **KP-F22F** incorporates ATW, ASC, AES, ALC, auto knee, flare correction, 6 vector color correction, and 4 scene files for the setup and storage of all camera operational parameters. The camera also features a long integration mode for use in low light levels, and a frame-on-demand mode for use in vision systems. In the frame-on-demand mode, a strobe signal is output at the end of the trigger pulse. An industry standard 12 pin Hirose connector is used for external sync, trigger input, and strobe output signals. Power can be input through the 12 pin Hirose or through the IEEE-1394 connector.

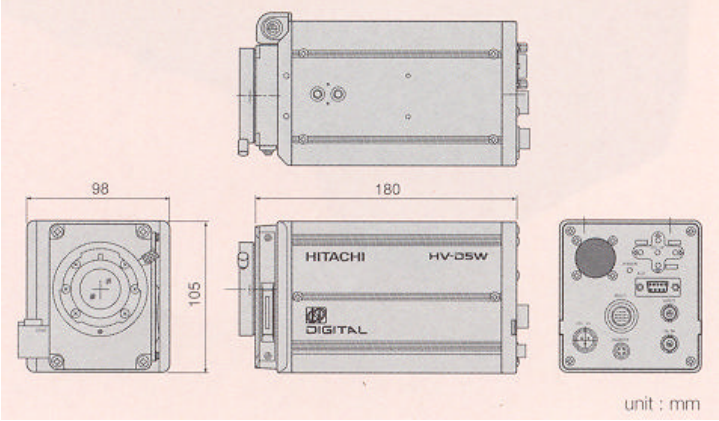
Specifications

Imager:	3 1/2 inch Progressive CCD's
Pixels:	1360 x 1024 (3)
Resolution:	SXGA 1360 x 1024 or 1280 x 960
	VGA 640 x 480
Sensitivity:	2000 lux f8.0
Shading:	Automatic Compensation
Gain:	0 - 12 db or auto level (ALC)
Shutter:	1/15 - 1/100,000 or AES
Lock Scan:	1/15 - 1/100,000 1H steps
Gamma:	0.45 or 1.0 selectable
White Bal:	ATW / Memory / Preset
Masking:	6 vector saturation and hue
Auto Knee:	On / Off
Contrast:	Off / Normal / High
Integration:	1/15 - 4 sec
Trigger:	Frame-on-Demand Mode, 1 Trig.
Sync:	Internal / External H and V drive
Outputs:	IEEE-1394 IIDC (Ver. 1.30)
	Selectable Positive or Negative Image
Remote:	RS-232C
Lens Mount:	C-Mount
Power:	12 volts DC approx. 8 Watts
Size:	(W x H x D) 65 x 65 x 130 mm
Weight:	600 grams

16 : 9 / 4 : 3 Switchable Color Camera HV-D5W

2/3" 16 : 9 / 4 : 3 Switchable 3 CCD Color Camera HV-D5W

- **3 CCD Bayonet Mount Color Camera**
- **Switchable 16 : 9 / 4 : 3 Aspect Ratio**
- **750 TV Lines of Resolution**
- **Digital Signal Processing**
- **4 Scene Files for Storage of Setup Menus**
- **Digital Noise Reduction**
- **6 Vector Color Correction**
- **Adjustable Chroma Level**
- **Dyna Chroma Mode**
- **Auto Tracking White Balance Mode**
- **Auto Electronic Shutter**
- **Auto Knee**
- **Ultra Gain Mode**
- **Field or Frame Integration**
- **Composite, Y/C, RGB or Y/R-Y/B-Y outputs**
- **Genlock**
- **RS-232C Remote Control for all Functions**
- **Optional SDI Output**



At home in medical and microscopy applications, the **HV-D5W** offers features and performance to meet the most demanding needs for this critical industry. Featuring three 520K pixel CCD's allow the camera to be operated in a 16:9 or a 4:3 aspect ratio. An excellent sensitivity of f11.0 at 2000 lux and a S/N ratio of 65db contribute to the cameras high level of performance. Digital Signal Processing enables features like a 6 vector color corrector that can vary the hue and saturation of the three primary and three secondary colors independently, digital noise reduction to reduce repetitive noise, adjustable detail level and center frequency to adjust the picture sharpness, and 4 scene files for storage and recall of all camera setup functions. For operational ease the camera features a number of automatic functions that can be selected, including AES and ATW modes. A bi-directional RS-232C port is provided to allow control from a PC or remote device. Options include a SDI (serial digital interface) output.

Specifications

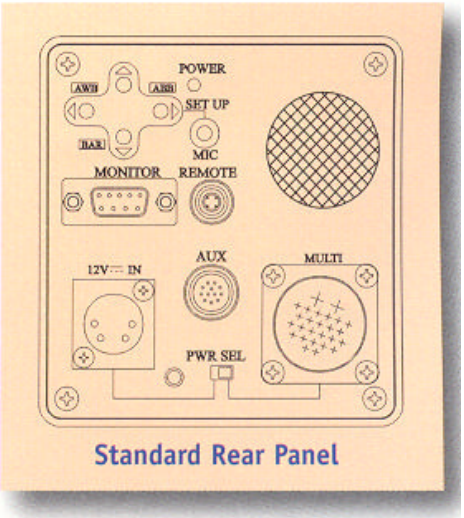
Imager:	3 2/3 inch IT Microlens CCD's
Aspect Ratio:	16:9 / 4:3 Switchable
Pixels:	948 x 485 (3)
Resolution:	750 TV Lines
Sensitivity:	2000 lux f11.0
S/N:	65db
Gain:	0 - 24 db + 12 db Ultra Gain
Shutter:	1/60 - 1/2000 or AES
Lock Scan:	1/60.38 - 1/2000 1H steps
Gamma:	0.35 or 1.0 adjustable
White Bal:	ATW / Memory / Preset
Masking:	6 vector saturation and hue
Auto Knee:	On / Off
Contrast:	Off / Normal / High
Integration:	Field / Frame
DNR:	Off / Mode 1 / Mode 2
Genlock:	VBS, BB, or H and V drive
Color Bars:	SMPTE
Outputs:	VBS, Y/C, Y/R-Y/B-Y, RGB Optional SDI
Remote:	RS-232C
Lens Mount:	Bayonet
Power:	12 volts DC approx. 12 Watts
Size:	(W x H x D) 98 x 105 x 180 mm
Weight:	1.4 k grams

High Definition 1080i Format Color Camera DK-H3A

2/3" 3 CCD High Definition Color Camera DK-H3A

Featuring an outstanding resolution of 1100 TV lines the **DK-H3** is ideally suited for use in high end medical and microscopy applications. Using the latest 2.2M pixel CCD's, the camera outputs video in the 1080i high definition format with an aspect ratio of 16:9. Digital Signal Processing enables a multiple of features including a 6 vector color corrector to allow independent adjustment of the hue and saturation of the three primary and three secondary colors, adjustable detail gain, and center frequency to provide optimum scene sharpness, along with Dyna Chroma and auto knee to improve dynamic range. Automatic functions include AES, ATW and ALC for ease of use. Digital light metering and a variable position white gate can be selected to maintain proper level and white balance. All camera setup functions can be stored in application files for later recall. A bi-directional RS-232C port allows complete control of the camera from a PC or other remote control device.

- **Bayonet Mount Color Camera**
- **3 2/3" 2.2M pixel IT CCD's**
- **1080i Format, 16:9 Aspect Ratio**
- **1100 TV Lines of Resolution**
- **Digital Signal Processing**
- **3 Application Files for User Setup**
- **6 Vector Color Correction**
- **Adjustable Chroma Level**
- **Dyna Chroma Mode**
- **Auto Tracking White Balance Mode**
- **Auto Electronic Shutter**
- **Auto Knee**
- **Field or Frame Integration**
- **RGB or Y/PB/PR outputs**
- **Genlock**
- **RS-232C Remote Control for all Functions**
- **Standard HD SDI Output**



Specifications

Imager:	3 2/3" 2.2M pixel IT CCD's
Aspect Ratio:	16:9
Pixels:	1920 x 1080 (3)
Resolution:	1100 TV Lines
Sensitivity:	2000 lux f8.0
S/N:	56db
Gain:	AGC or Manual
Shutter:	1/60 - 1/2000 or AES
Lock Scan:	1/60.38 - 1/10000 1H steps
Gamma:	0.35 or 1.0 adjustable
White Bal:	ATW / Memory / Preset
Masking:	6 vector saturation and hue
Auto Knee:	On / Off
Contrast:	Off / Normal / High
Integration:	Field / Frame
Genlock:	Trinary or Binary Sync or H and V drive
Color Bars:	SMPTE
Outputs:	Y/PB/PR, RGB, HD SDI
Remote:	RS-232C
Lens Mount:	Bayonet
Power:	12 volts DC approx. 22 Watts
Size:	(W x H x D) 98 x 105 x 180 mm
Weight:	1.5 k grams

Eagle PT-50 Pan / Tilt System

Eagle PT-50 Pan / Tilt Head

- **Quiet Operation**
- **On Board Computer Controlled**
- **Proportional Speed Control**
- **Vector Solving of Pan / Tilt Commands**
- **Serial RS-485 Control**
- **Adjustable Preset Speeds**
- **Adjustable End Limits**
- **Normal or Inverted Operation**
- **Supplies 12 volt DC Power for Camera**
- **PC Control Software Available**
- **Optional Camera Control Module**
- **Optional Component Video Output**
- **Optional SDI Output**

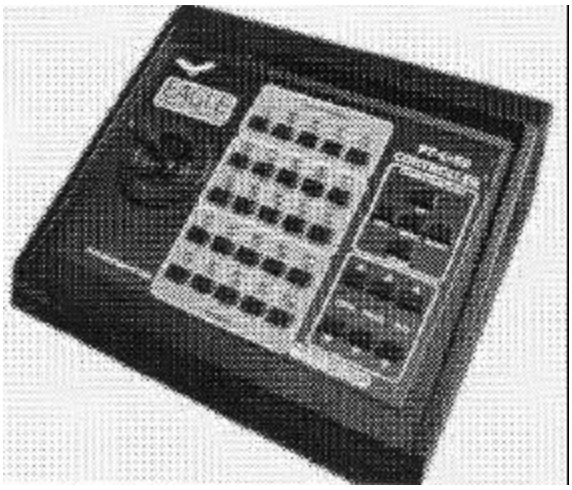
The **Eagle PT-50** is a high quality, light weight pan / tilt head designed for quiet operation with a maximum weight limit of 6 pounds. Its quiet operation and small size permits use in teleconferencing, city council meetings, churches, medical documentation, and entertainment venues. Ideally suited for use with the **HV-D30** and **Fujinon R11** series lenses, the **PT-50** can provide complete camera and lens control through the use of the optional **PT-CCB-50** camera control chip. Normal or inverted operation is possible, and to eliminate the need for strain relief on the system cables, all external connections are made to the stationary base of the pan / tilt head. Power, video, and control signals are passed through the base to the camera. For simplified installation a pre-built camera power and control harness along with an adjustable camera mount is provided with each unit. Pan and tilt limits can be set electronically from the controller to limit movement in desired directions. A single joystick on the **PT-C50** provides proportional speed control for pan and tilt with 3 ranges of coarse speed control. Dedicated Up / Down buttons are provided for control of lens zoom, focus, and iris, with 10 selectable speed ranges. The **PT-50** is compatible with most **Eagle** accessories, allowing the use of different controllers, power supplies, shot boxes, modem control, and power and control splitters.

PT-50 Specifications

Maximum Load:	6 pounds
Pan Range:	±179 degrees
Tilt Range:	±45 degrees
Pan / Tilt Speed:	0 to 15 degrees per second / variable
Accuracy:	± 5 arc minutes (0.08 degrees)
Noise Level:	Less than 30 dBA

Eagle PT-C50 Pan / Tilt Controller

- **Controls up to 8 Pan / Tilt Heads**
- **Stores 20 Presets per Head**
- **Provides Complete Camera Control—Requires camera control module in p/t head**
- **Proportional Speed Control of Pan / Tilt, with 3 Selectable Speed Ranges**
- **10 Selectable Speed Ranges for Zoom, Focus, and Lens Iris Control**



Eagle PT-100 Pan / Tilt System

Eagle Pan / Tilt Head PT-100

- **Heavy Duty Worm Gear Operation**
- **On Board Computer Controlled**
- **Proportional Speed Control**
- **Vector Solving of Pan / Tilt Commands**
- **Serial RS-485 Control - Maximum 16 Units**
- **Storage for 64 Presets per Unit**
- **Adjustable Preset Speeds**
- **Adjustable End Limits**
- **Normal or Inverted Operation**
- **Supplies 12 volt DC Power for Camera**
- **PC Control Software Available**
- **Optional Camera Control Module**

Specifications

PT-100:	For all KP, HV-C and HV-D series cameras.
Load Limit:	15 pounds
Pan Range:	340 degrees
Tilt Range:	340 degrees
Maximum Pan Speed:	20 degrees / sec
Maximum Tilt Speed:	20 degrees / sec
Resolution:	±5.5 Arc Minutes
Camera Power:	12 V DC at 2.5A
Lens Power:	7.5 or 12 V DC
Enviroment:	Indoor / Outdoor
Interface:	RS-485
Input Voltage:	24 V DC 2.5A
Height:	7.0 inches
Width:	4.7 inches
Length:	8.2 inches

Eagle pan/tilt units are compact, rugged motorized pan/tilt systems designed for use in teleconference, distance learning, and point of view shots from buildings or towers. The pan tilt head is environmentally sealed for reliable long term operation. Heavy duty worm drive gears provide reliable and precise movement for the pan and tilt functions, while gear reduction provides for a high torque rating in a compact design. Proportional speed control is provided for the pan, tilt, zoom and focus functions, allowing the operator to change a functions speed during a move. Vector solving of commands, allows the pan and tilt functions to operate together to arrive smoothly at the desired end point. Serial control communications to the pan/tilt head is provided by an RS-485 communications line, providing line lengths of up to 5000 feet, and allowing up to 16 pan/tilt heads to be controlled by a single control unit. A dedicated microprocessor in the pan/tilt head processes all received commands and allows the controller to communicate with another unit, while the previous unit is processing commands. Each pan/tilt head can store up to 64 presets which are retained in non-volatile memory, so presets are not lost when power is removed from the unit. End limits can be assigned and set for the pan, tilt, zoom and focus functions. Three coarse speed ranges can be selected, once selected, proportional speed control operates for that range. This allows the user to tailor the response of the unit to the application. Each unit operates from a single 24 volt DC power supply, and is factory configured to work with the desired camera and lens combination, eliminating setup time and installation errors. Normal, inverted or face down mounting of the unit is possible to suit the desired application and installation.

Accessories

PT-EE-S Small all weather environmental enclosure for the camera includes a sun shield and blower for complete camera protection.

PT-EE-L Large all weather environmental enclosure for use with the HV-D3 includes a sun shield and blower for complete camera protection.

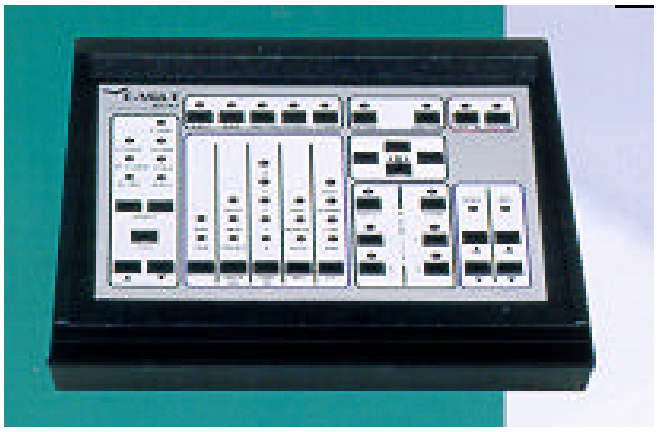
PT-PS-3 24 Volt DC, 6.5 amp power supply for PT-100.

Eagle Pan / Tilt Controllers

Pan / Tilt Controller Model PT-C

The **PT-C** is a stand alone dedicated control unit for the **Eagle** pan/tilt head. The **PT-C** features dual proportional speed control joysticks for the operation of pan/tilt and zoom/focus. Operating on RS-485 communications, the **PT-C** can control up to 16 pan/tilt heads. A 2 line by 20 character back-lit LCD display provides the current function and status of the pan/tilt head being controlled. Storage of up to 64 presets can be set for each pan/tilt head in the system. Using the numeric keypad, the desired preset can be recalled for each pan/tilt unit. A "gang" function is available that can send all pan/tilt heads in the system to the same numeric preset. The numeric keypad and function keys can be used to select coarse speed ranges for pan/tilt, and zoom/focus, as well as for the setting of end limits. The PT-C is designed for table top operation and includes a wall mount power supply for internal electronics.

Camera Control Unit Model PT-CC



The **PT-CC** is an optional accessory designed to work with the **PT-C** using the same RS-485 line to communicate with the pan/tilt head and the camera electronics. The **PT-CC** connects directly to and receives power from the **PT-C**. An optional **PT-CCB** is required to convert the RS-485 commands from the **PT-CC** to RS-232C commands for camera control. The **PT-CCB** is factory installed in the **Eagle** pan/tilt head at the time the system is ordered. The camera control unit can control up to 16 cameras and provides complete control of all camera functions that are available for remote control. Dedicated slide pots are provided for control of the lens iris and camera black level. In manual iris mode, the slide control allows full range of iris operation, while in the auto iris mode the slide control provides an override of the auto iris setting by ± 1 f stop. Switches and LED indicators are provided for selection of iris mode and control of auto white and auto black balance, detail level, shutter speeds, camera/bar operation, red and blue paint controls, and genlock timing functions. Additional camera functions can be selected using the option buttons.

Combined Pan / Tilt and Camera Controller PT-TSC

The **PT-TSC** is a color touch screen controller that combines the functions of pan / tilt and camera control in one unit. Designed to control up to 32 units, the **PT-TSC** through the use of the color touch screen provides complete access and control of all camera menus and operating functions. Convenient front panel push buttons allow easy selection of the first four cameras along with four presets for those cameras in the system. Bi-directional RS-232C control between the **PT-TSC** and the camera allows the operator to verify the status of all camera parameters. Dual joy-sticks provide proportional speed control of pan, tilt, zoom and focus functions.

Camera	Image Size	Pixels	Resolution	Sensitivity	S / N	Lens Mount	Progressive Scan	2 Piece design	AES	AGC	F/Fr on Demand	R/R Mode	Field / Frame	HD / VD Drive	Shutter	Integration	Frame Rate	Square Pixels	Power	VBS Output	Digital Output	Remarks
KP-M1A	2/3"	768 x 493	570	0.3 f1.4	56	C				Y	Y	Y	Y	Y	Y	O	30		12	Y		Additional Types. External gain, Long Integration
KP-MB1A	2/3"	768 x 493	570	0.5 f1.4	56	C		Y		Y		Y	Y	Y	Y		30		12	Y		2 Piece, Compact head Seperated Type
KP-MC1A	2/3"	768x493	570	0.5 f1.4	56	C				Y		Y	Y	Y	Y		30		12	Y		Side View type KP-M1
KP-M2A	1/2"	768 x 494	570	0.5 f1.4	56	C				Y	Y	Y	Y	Y	Y		30		12	Y		Same form factor as KP-M1, AGC or fixed gain, selectable gamma
KP-M2R	1/2"	768 x 494	570	0.3 f1.4	56	C				Y	Y	Y	Y	Y	Y		30		12	Y		Near IR Sensitive, Field-on-Demand
KP-M3A	1/3"	768 x 494	570	0.5 f1.4	56	C				Y	Y	Y	Y	Y	Y		30		12	Y		Same form factor as KP-M1, AGC or fixed gain, selectable gamma
KP-M3R	1/3"	768 x 494	570	0.5 f1.4	56	C				Y	Y	Y	Y	Y	Y		30		12	Y		Near IR Sensitive, Field-on-Demand
KP-M20	1/2"	768 x 494	570	0.3 f1.4	60	C				Y	Y			Y	Y		30		12	y		Ultra compact 29 x 29 39.5mm
KP-M22	1/2"	768 x 494	570	0.3 f1.4	56	C				Y	Y	Y	Y	Y	Y		30		12	Y		Compact Design, Single 12 pin Hirose Connector on rear
KP-M30	1/3"	768 x 494	570	0.3 f1.4	60	C				Y	Y			Y	Y		30		12	y		Ultra compact 29 x 29 39.5mm
KP-M32	1/3"	768 x 494	570	0.3 f1.4	56	C				Y	Y	Y	Y	Y	Y		30		12	Y		Compact Design, Single 12 pin Hirose Connector on rear
KP-F2A	1/2"	658 x 496	500	0.3 f1.4	50	C	Y			Y	Y	Y		Y	Y	Y	30	Y	12	Y		Near IR, 30 frame per second progressive scan, single output
KP-F3	1/3"	647 x 485	500	0.2 f1.4	56	C	Y			Y	Y	Y	Y	Y	Y		30	Y	12	Y		Compact Progressive Scan Camera with Frame-on-Demand
KP-F3W	1/3"	647 x 485	500	0.2 f1.4	56	C	Y			Y	Y	Y	Y	Y	Y		60	Y	12	Y		Compact Progressive Scan, Double Speed, Single Output
KP-F30	1/3"	659 x 494	500	0.2 f1.4	50	C	Y			Y				Y	Y		60	Y	12			Ultra compact 29 x 29 39.5mm, Partial Scan, Frame-on-Demand
KP-F100B	2/3"	1392 x 1040		1.0 f1.4	50	C	Y			Y	Y	Y		Y	Y		15	Y	12	Y	Y	LVDS out, Partial Scan, Quad Seed Mode, RS-232C Remote
KP-F100BCL	2/3"	1392 x 1040		1.0 f1.4	50	C	Y			Y	Y	Y		Y	Y		15	Y	12	Y	Y	CameraLink out, Partial Scan, Quad Seed Mode, RS-232C Remote
KP-F100UV	1/2"	1392 x 1040		1.0 f1.4	50	C	Y			Y	Y	Y		Y	Y		8	Y	12	Y	Y	UV Sensitivity, CameraLink out, Quad Seed Mode, RS-232C
KP-F120	2/3"	1392 x 1040		1.0 f1.4	50	C	Y			Y	Y	Y		Y	Y		30	Y	12	Y	Y	Near IR, LVDS output, Partial Scan, RS-232C Remote, Compact
KP-F120CL	2/3"	1392 x 1040		1.0 f1.4	50	C	Y			Y	Y	Y		Y	Y		30	Y	12	Y	Y	Near IR, CameraLink, Partial Scan, RS-232C Remote, Compact
KP-F120USB	2/3"	1392 x 1040		1.0 f1.4	50	C	Y			Y	Y	Y		Y	Y		30	Y	12	Y	Y	Near IR, USB, Partial Scan, RS-232C Remote, Compact

HITACHI Color Camera Selection Guide

Camera	Type	Image Size	Pixels	CCD's	Resolution	Sensitivity	S / N	Lens Mount	DSP	AES	AGC	ATW	BLC	CCD Cooling	F/Fr on Demand	Field / Frame	Genlock	HD / VD Drive	Shutter	Integration	Pos / Neg Output	RS-232C	Frame Rate	Power	VBS Output	Y/C Output	RGB Output	Y, R-Y, B-Y Out	Remarks
KP-D8	C	1/3"	768 x 494	1	470	2.0 f1.2	48	SP	Y	Y	Y	Y							Y			Y	30	12	Y	Y			Compact self contained, micro camera
KP-D20A	C	1/3"	768 x 494	1	480	0.8 f1.2	50	C/CS	Y	Y	Y	Y	Y						Y		Y	Y	30	12	Y	Y			High Quality Optical path, Compact Design
KP-D20B	C	1/2"	768 x 494	1	480	0.3 f1.2	50	C/CS	Y	Y	Y	Y	Y						Y		Y	Y	30	12	Y	Y			High Quality Optical path, Compact Design
KP-D50	C	1/2"	768 x 494	1	470	2.0 f1.2	50	C/CS	Y	Y	Y	Y	Y					Y	Y		Y	Y	30	12	Y	Y	Y		On Screen menu system for function setting
KP-D70	C	1/3"	768 x 494	1	480	1.5 f1.2	50	C/CS	Y	Y	Y	Y	Y						Y	Y		Y	30	12	Y				Wide Dynamic Range, Dual Shutte, Dual DSP
KP-D531	C	12"	768 x 494	1	480	0.02f1.2	50	C/CS	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y		30	AC	Y	Y			Auto-Change Integration Mode
KP-D590	C	12"	768 x 494	1	480	0.01f1.2	50	C/CS	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y		30	12	Y	Y			Integration up to 64 times
KP-D591	C	12"	768 x 494	1	480	0.01f1.2	50	C/CS	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y		30	AC	Y				Integration up to 64 times
KP-FB30	C	1/2"	659 x 494	1	440	1.0 f1.4	50	C	Y	Y	Y	Y	Y			Y		Y	Y			Y	60	12	Y	Y	Y		RGB Filter, Prog Scan / Interlace Out, Memory
KP-F120C	C	2/3"	1392 x 1040	1		1.0 f1.4	50	C							Y			Y	Y	Y		Y	15	12			Y		1.45 million pixel 8 bit LVDS digital output
HV-C20	C	1/2"	768 x 494	3	700	2000 f5.6	60	C		Y	Y	Y	Y		Y	Y	Y		Y	Y		Y	30	12	Y	Y	Y	O	Compact Self contained camera
HV-D25	C	1/2"	768 x 494	3	800	2000 f9.5	63	C	Y	Y	Y	Y				Y	Y	Y	Y	Y		Y	30	12	Y	Y	Y	Y	3 Application files, 6 vector color corrector
HV-D27	C	1/2"	768 x 494	3	800	2000 f9.5	63	C	Y	Y	Y	Y				Y	Y	Y	Y	Y		Y	30	12	Y	Y	Y	Y	Remote compact Head, 3 Application Files
HV-D30	C	1/3"	768 x 494	3	800	2000 f8.0	64	C	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y		Y	30	12	Y	Y	Y	Y	4 Application files, 6 vector color corrector
HV-F22F	C	1/2"	1360 x 1024	3		2000 f8.0		C	Y	Y	Y	Y	Y		Y			Y	Y	Y	Y		8	12					SXGA Progressive Scan, Frewire Interface
HV-F31F	C	1/3"	1024 x 768	3		2000 f5.6		C	Y	Y	Y	Y	Y		Y			Y	Y	Y	Y		15	12					XGA Progressive Scan, Firewire Interface
HV-D5W	C	2/3"	948 x 485	3	750	2000 f11	65	Bay	Y	Y		Y				Y	Y		Y			Y	30	12	Y	Y	Y	Y	16:9 or 4:3 Switchable aspect ratio
DK-H3A	C	2/3"	1920 x 1080	3	1100	2000 f8.0	56	Bay	Y	Y	Y	Y				Y	Y	Y	Y	Y		Y	30	12			Y		1080i format high def, HD-SDI output

Custom modifications to meet customer requirements can be accommondated, dependent on the quanity of cameras being ordered

Information regarding interface with various frame grabbers is available through the local Hitachi office.

For availability of CCIR or PAL versions, or for additional information on camera features, contact the local Hitachi Offic

Los Angeles 310-328-6116 New York 516-921-7200 Midwest 330-334-4115

Hitachi Color Camera Selector

Hitachi Camera Accessories

HITACHI Camera Accessories		KP-M1A, M2A, M3A	KP-MB1, MC1	KP-M2R, KP-M3R	KP-M20/M30, KP-F30	KP-M22, KP-M32	KP-F1A, F2A	KP-F3, KP-F3W	KP-F100B, F100BCL	KP-F100UV	KP-F120, KP-F120CL	KP-F120USB, F120F	KP-F120C	KP-F200	KP-D8	KP-D20A, KP-D20B	KP-D50	KP-D590	KP-D531, D591	KP-FD30	HV-C20	HV-D25	HV-D27, 37	HV-D30	HV-F22F, HV-F31F	HV-D5W	DK-H3A
Power Supplies	45601-C1	★	★	★	★	★	★	★	★	★	★	★	★	★	★	☺	☺			☺				☺			
	45601-C3																										
	45601-C4	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺				☺							☺		
	45601-C5	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺											☺		
	45601-C7																				☺	☺	☺			☺	
	45601-C9	☺	☺	☺	☺	☺	☺	☺							☺												
	45601-C10														☺												
	45601-C15																			☺				☺			
	AP12-C1	★	★	★	★	★	★	★	★	★	★	★	★	★	★	☺	☺							☺			
	AP12-C4	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺				☺									
	AP12-C7																				☺	☺	☺			☺	
	AP-60AU																				☺	☺	☺				
	IA-60C																										☺
Junction Box	JU-M1A	★	★	★		★			★	★	★	★	★	★													
	JU-F1						★	★																			
	JU-D8														★												
	JU-F30				★																						
Level Converter	JU-C20																				✹	✹	✹				
	JU-Z2																				✹	✹	✹				
Cables	C201 KS	★	★	★	★	★	★	★	★	★	★	★	★	★	★												
	C501 KS	★	★	★	★	★	★	★	★	★	★	★	★	★	★												
	C102 KS	★	★	★	★	★	★	★	★	★	★	★	★	★	★												
	C201RK						☺																				
	C501RK						☺																				
	CK-301KAJ																						☺				
	CK-102KAJ																						☺				
	CK-202KAJ																						☺				
	C9D232C-6															☺						☺	☺	☺			
	C9D232CF-6								☺	☺	☺	☺	☺	☺													
	C9DYC																☺										
	C9DRGB																☺				☺	☺	☺				
	C15HDYC-15																							☺			
	C15HDx5-15PR																							☺			
	C15HDx5-15																							☺			
	C15HDx7-15																			☺				☺			
	CSV10															☺		☺			☺	☺	☺				
	CSV20															☺		☺			☺	☺	☺				
	C-152-RC2																				✹	✹	✹	✹			
	C-302-RC2																				✹	✹	✹	✹			
	C-602-RC2																				✹	✹	✹	✹			
	C-103-RC2																				✹	✹	✹	✹			
	C26PIG								☺	☺																	
	C50PIG										☺	☺	☺	☺													

★ Junction Boxes require a camera cable and a power supply in order to power the camera.

✹ Remote Control Units and Level Converters require a cable to work with the camera.

☺ These items require no additional interface components.

Hitachi Camera Accessories

HITACHI Camera Accessories		KP-M1A, M2A, M3A	KP-MB1, MC1	KP-M2R, KP-M3R	KP-M20, M30, KP-F30	KP-M22, KP-M32	KP-F1, F1A, F2	KP-F3, KP-F3W	KP-F100B, F100BCL	KP-F100UV	KP-F120, KP-F120CL	KP-F120USB, F120F	KP-F120C	KP-F200	KP-D8	KP-D20A, KP-D20B	KP-D50	KP-D590	KP-D531, KP-D591	KP-FD30	HV-C20	HV-D25	HV-D27, 37	HV-D30	HV-F22F, HV-F31F	HV-D5W	DK-H3A
Tripod Adapter	TA-M1	☺	☺	☺			☺		☺	☺																	
	TA-D8														☺												
	TA-D20															☺											
	TA-F3					☺		☺																			
	TA-F30				☺																						
	TA-F120										☺	☺	☺	☺						☺							
	TA-231																☺										
Special Lenses	TF316 3.7mm														☺												
	T812S 8.0mm														☺												
	TF1214 12mm														☺												
	HS20JX(XF)														☺												
Lens Adapters	ML-C230														☺												
	LA-D8														☺												
	Cs to C Mount															☺											
	2XHE Extender	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺	☺	☺	☺							
	EX Tube	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺	☺	☺	☺							
Lens Plug	E4-191J-100															☺	☺	☺	☺	☺	☺	☺		☺	☺		
Dummy Glass	ARC1214	☺	☺		☺	☺	☺	☺	☺		☺	☺		☺													
Remote Unit	RC-C10																				✸	✸	✸				
	RC-C580																	☺									
	RC-Z3																							✸			
12-pin Plug	HR10A-10P-12S	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺	☺			☺									
6-pin Plug	HR10A-7P-6S						☺		☺	☺	☺		☺	☺													
4-pin Plug	HR10A-7P-4P															☺				☺	☺	☺	☺	☺	☺		

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Frame Grabber Compatibility

	Alacron	Applied Silicon	BitFlow Inc.	Coreco	Data Translation	EDC	Epix	ImageNation	Imaging Technology	Imagraph	InSync Technologies	Integral	Matrox	MuTech	National Instruments	PDI	Scion	Sharp	Titan ystems
KP-M1A, M2A, M3A	☺	☺	☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺
KP-MB1	☺	☺	☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺
KP-MC1A, MC2A	☺	☺	☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺
KP-M2R, M3R	☺	☺	☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺
KP-M20, M30	☺	☺	☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺
KP-M22, M32	☺	☺	☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺
KP-F1A	☺		☺	☺				☺	☺	☺	☺	☺	☺	☺	☺			☺	
KP-F2	☺		☺	☺				☺	☺	☺	☺	☺	☺	☺	☺			☺	
KP-F3, F3W	☺		☺	☺				☺	☺	☺	☺	☺	☺	☺	☺			☺	
KP-F30	☺		☺	☺				☺	☺	☺	☺	☺	☺	☺	☺			☺	
KP-F100, F100A	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺	☺				☺
KP-F100B	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺	☺				☺
KP-F100UV	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺	☺				☺
KP-F102	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺		☺	☺	☺				☺
KP-F100C							☺												
KP-F110	☺		☺	☺		☺	☺	☺	☺				☺		☺				☺
KP-F120	☺		☺	☺		☺	☺	☺	☺				☺		☺				☺
KP-D8	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺
KP-D20A / B	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺
KP-D50	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺
KP-D580, D590	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺
KP-D581, D591	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺
KP-FD30																			
HV-C20	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺
HV-D25	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺
HV-D27	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺
HV-D37	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺	☺		☺
HV-D30	☺		☺	☺	☺		☺	☺	☺	☺	☺	☺	☺	☺	☺	☺			☺
HV-F22F																			
HV-F31F																			

For complete compatibility of a particular frame grabber with a given camera please contact the Regional Hitachi Sales Manager or the frame grabber manufacturer. The chart only indicates basic compatibility between the camera and the frame grabber. It does not mean that all functions are supported, or that the combination is suitable for a particular application.

Hitachi Denshi America Ltd.

White Balance

The ability of the camera to adjust to a particular color temperature of light, and make a white object appear white on the monitor is the function of the white balance circuit in the camera. There are several methods that are commonly used to accomplish white balance.

Most modern color television cameras have three basic modes of white balance. For proper operation, and to obtain the correct results, it is important to know when to use a particular mode.

1. **Preset White Balance**: In this mode, the camera is balanced for white, under light that normally has a color temperature of 3200 degrees Kelvin. This is the typical factory adjustment when the camera is set for white balance, and corresponds to the light normally used in TV studios. Operation of the camera under light that is the same color temperature, as that used in the factory, will produce proper color balance, and good color rendition.

2. **Memory White Balance**: In this mode of operation, the camera is pointed at a white object, and the auto white button is pressed. The camera then automatically adjusts the red and blue gains to produce white. This method is normally used for white balance, due to the fact, that it also takes into account any effect the color temperature of the light may have on the object being shot. Depending on the camera, this mode of operation has a large range of color balance, and can handle light with color temperatures from approximately 2000 to 5800 degrees Kelvin.

3. **Auto Tracking White**: In this mode of operation, the camera attempts to make the brightest object in the picture white. The red and blue gain are constantly and automatically adjusted by the camera to account for differences in the color temperature of the light. This mode is useful for long shots, and when the camera must shoot between different color temperatures of light, without being white balanced. There is a drawback to this mode, in that it will attempt to make the brightest object in the scene white. Should the scene not contain any white object, but rather a light colored object, the camera will make this white. This will cause all of the color reproduction of the camera to be incorrect.

For use on pan/tilt systems where the color temperature of the light might vary, and the majority of the shots are wide angle, the Auto Tracking White Balance mode might be used. For tight shots or to maintain the best color balance, the Memory mode of white balance should be used. In this case the white balance function should be performed whenever the scene illumination or color temperature of the light changes.

For microscope applications, it is recommended that the memory mode of white balance be used. The camera should be white balanced under the illumination level that will be used for the slide. The slide should be removed, leaving a pure path of light to the camera. The camera would then be white balanced, by pressing the auto white button. The slide can then be inserted in the path, and the colors should then be correct. If the light intensity is changed, the camera may need to be white balanced again, because normally the color temperature of the light will change with its intensity.

Terms and Definitions

Asynchronous Reset Asynchronous reset, switch selectable on the **KP-M1A** and optional on the **KP-M2** and **KP-M3**, allows the cameras vertical drive to be reset by an external pulse. This allows an external source such as a vision system, to determine when the camera should begin its scan, such that the scanned image will be in the center of the desired field. After the image is scanned, the cameras drive is reset, and the field of video is output. There is normally a one field delay with this mode of operation.

ATW Auto tracking white balance allows the color camera to maintain proper white balance under changing color temperature levels. The video signal is continuously sampled, and adjustment is performed on the separate color amplifiers to correct for variations in changing color temperature of the light, to ensure that the brightest part of the picture remains white.

Backlight Correction (BLC) When a strong light source or reflection exists in a scene, the auto iris on the lens will adjust for the brightest part of the scene, resulting in a dark unclear picture. With BLC, the bright portion of the picture will be ignored for determination of the auto iris setting. This will result in the dark areas being made brighter, while the white suppression circuit will compress the bright area, while maintaining detail. BLC can be set to On or OFF, in the ON mode the area of acceptance can often be varied.

Electronic Shutter The electronic shutter works by controlling the amount of time, in fixed steps, that the CCD array is allowed to accumulate charge. The higher the shutter speed, the less exposure time for the CCD array. This is useful for capturing high speed objects without the blurring, that would occur at a normal exposure time. Higher shutter speeds result in lower sensitivity.

Field on Demand The **KP-M and KP-F Series** of cameras feature the Field on Demand function. This allows the cameras vertical drive to be reset, and an image to be captured and output immediately after an input pulse. This eliminates the one field delay that is associated with asynchronous reset cameras.

Field and Frame Integration In the field mode of integration two adjacent rows of pixels are combined together, and then shifted out as a single line. Pixel rows 1 and 2 are combined to form line one, pixel rows 3 and 4 are combined to form line 3, etc. Pixel rows 2 and 3 are then combined to form line 2, etc. The odd number lines are output first, (field one) followed by the even numbered lines, (field two). In the frame mode of integration, the odd numbered rows of pixels are output first (field one), followed by the even numbered rows of pixels, (field two). Adjacent rows of pixels are not combined. The field mode of integration offers increased sensitivity, a desirable benefit for use with vision systems. The frame mode of integration, offers increased vertical resolution, approximately 40% better than the field mode of integration.

Internal or External Sync In the internal sync mode of operation, a crystal controlled oscillator is used to generate the required horizontal and vertical drive pulses. These are added together to form the composite sync signal that is then added to the video to produce the RS-170 composite video output. When external horizontal and vertical drive pulses are input to the camera, the camera will automatically switch from internal to external sync mode. Automatic sensing is also performed, if a composite sync signal is input to the camera. External synchronization is desirable if the camera needs to be "locked" to the frame grabber or processor, so that the video output of the camera is in time with the video processing.

IR Filter An IR filter is usually placed in front of the CCD array to limit the amount of infared light that is allowed to strike the CCD. The infared filter acts as a low pass filter for light, allowing only the visible spectrum of light to strike the CCD. For special applications, the IR filter can be removed, to extend the spectral response into the near infared region. The camera can then produce a useable, but reduced output level above the 800 nanometer range, known as the near IR range.

Spectral Response The visible light spectrum ranges from 400 to 750 nanometers. Above this the near infred spectrum starts at 750 nanometers and extends to 3 micrometers. While all CCD cameras can produce acceptable pictures in the visible light range, Hitachi has developed two new cameras, the **KP-M2R** and the **KP-F2A/B**, with extended sensitivity into the near infared range. With their extended range, these cameras open new possibilies for medical, microscopy, and machine vision applications.

Termination For best picture quality it is necessary that the monitor is properly terminated. Usually this is accomplished by placing the termination switch to the ON position, or by use of an external terminating resistor. On some newer monitors the termination is automatic. In each case, if the mointor is connected at the end of a single cable run, it should be terminated in 75 ohms. If the monitor is used in a loop-thru configuration, it should be unterminated.