

B/W Digital Camera Systems

# III DX 4 – 285 | 274 | 205 | 1020 FW



Kappa DX denotes complete and ready-to-use camera systems, which means the scope of delivery includes not only a camera, but also a data cable and the Kappa CameraControl (KCC) software.

The camera series is based on variable camera electronics, low power consumption and advanced circuitry, providing both an extremely rugged design and excellent signal quality.

The user can choose from a range of high-quality CCD sensors with megapixel resolution by Sony and Kodak.

Together with the Kappa ImageBase software the DX systems provide comprehensive solutions for applications such as measurement engineering, process automation and scientific diagnostics.

The cameras of the DX series come in a block housing as standard, but for the individual touch they are also available in a striking hexagonal design housing.

The digital Kappa camera systems comply with the highest standards and offer outstanding Kappa-specific technological highlights, such as rugged design, excellent highly linear signal quality, extraordinary signal-to-noise ratio, long-time exposure and, optionally, a second serial interface with bespoke configuration of functions.

High frame rates are achieved by binning and partial scan, while the image size remains freely adjustable.

Digital camera system
Black-and-white
FireWire
12 bit digital signal processing
Progressive scan
Megapixel resolution
External trigger, reset/restart
Partial scan   Binning
Gamma correction
Automatic functions
Long time integration
Cooled camera DX 4C – 285 FW



Standard equipment

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# Technical Data

## Sensor-specific data

### III DX 4 – 285 FW | DX 4C – 285 FW

CCD sensor	2/3" interline transfer CCD progressive scan with micro lenses (Sony ICX285AL, EXview HAD)
Pixel size (H x V)	6.45 $\mu\text{m}$ x 6.45 $\mu\text{m}$
Light-sensitive area (H x V)	8.93 mm x 6.66 mm
Number of pixels (H x V)	1392 x 1040, effective
Spectral sensitivity (without IR-filter)	320 nm – 1100 nm
Full well capacity	23 000 $e^-$
A/D-conversion factor	5.6 $e^-$ / increment
Dynamic range	63 dB (measured in dark image, at 66 ms exposure time and 0 dB gain)
Sensitivity	(measured at 18 dB gain, gamma = 1, and 50 % level, 3000 K) 0.02 lx at 100 ms exposure time 0.000017 lx at 120 s exposure time 0.0000017 lx at 20 min exposure time (cooled camera DX 4C – 285 FW)

### III DX 4 – 274 FW

CCD sensor	1/1.8" interline transfer CCD progressive scan with micro lenses (Sony ICX274AL, EXview HAD)
Pixel size (H x V)	4.40 $\mu\text{m}$ x 4.40 $\mu\text{m}$
Light-sensitive area (H x V)	8.50 mm x 6.80 mm
Number of pixels (H x V)	1628 x 1236, effective
Spectral sensitivity (without IR-filter)	320 nm – 1100 nm
Full well capacity	5 500 $e^-$
A/D-conversion factor	1.3 $e^-$ / increment
Dynamic range	56 dB (measured in dark image, at 115 ms exposure time and 0 dB gain)
Sensitivity	(measured at 18 dB gain, gamma = 1, and 50 % level, 3000 K) 0.05 lx at 100 ms exposure time 0.000042 lx at 120 s exposure time

### III DX 4 – 205 FW

CCD sensor	1/2" interline transfer CCD progressive scan with micro lenses (Sony ICX205AL, EXview HAD)
Pixel size (H x V)	4.65 $\mu\text{m}$ x 4.65 $\mu\text{m}$
Light-sensitive area (H x V)	7.6 mm x 6.2 mm
Number of pixels (H x V)	1392 x 1040, effective
Spectral sensitivity (without IR-filter)	320 nm – 1100 nm
Full well capacity	12 000 $e^-$
A/D-conversion factor	2.9 $e^-$ / increment
Dynamic range	55 dB (measured in dark image, at 66 ms exposure time and 0 dB gain)
Sensitivity	(measured at 18 dB gain, gamma = 1, and 50 % level, 3000 K) 0,04 lx at 100 ms exposure time 0,000033 lx at 120 s exposure time

### III DX 4 – 1020 FW

CCD sensor	2/3" interline transfer CCD progressive scan with micro lenses (Kodak KAI 1020 M)
Pixel size (H x V)	7.4 $\mu\text{m}$ x 7.4 $\mu\text{m}$
Light-sensitive area (H x V)	7.4 mm x 7.4 mm
Number of pixels (H x V)	1004 x 1004, effective
Spectral sensitivity (without IR-filter)	max. 42% at 490 nm
Full well capacity	320 nm – 1000 nm
A/D-conversion factor	42 000 $e^-$
CCD sensor	10.3 $e^-$ / increment
Readout noise	50 $e^-$ rms
Dynamic range	60 dB (measured in dark image, at 33 ms exposure time and 0 dB gain)
Sensitivity	(measured at 18 dB gain, gamma = 1, and 50 % level, 3000 K) 0,06 lx at 100 ms exposure time 0,00005 lx at 120 s exposure time

# Technical Data

## Interface-specific data

### III DX 4 – 285 FW | DX 4C – 285 FW

Camera output (Mono 16)	full frame:	1392 x 1040 pixel, 11 fps		
	binning:	2 fold	4 fold	8 fold
	max. image size (pixel):	696 x 520	348 x 260	174 x 130
	frame rate:	25 fps	41 fps	62 fps
	partial scan	image size freely adjustable		
Exposure	manual:	1 $\mu$ s to 120 s (cooled up to 20 min)		
	automatic (AE):	1 $\mu$ s to 66 ms at 1280 x 960 pixel		
Power supply	9-36 V DC, 3 W			

### III DX 4 – 274 FW

Camera output (Mono 16)	full frame:	1628 x 1236 pixel, 8 fps		
	binning:	2 fold	4 fold	8 fold
	max. image size (pixel):	814 x 618	407 x 309	204 x 154
	frame rate:	15 fps	26 fps	40 fps
	partial scan	image size freely adjustable		
Exposure	manual:	1 $\mu$ s to 120 s		
	automatic (AE):	1 $\mu$ s to 115 ms at 1600 x 1200 Pixel		
Power supply	9-36 V DC, 3 W			

### III DX 4 – 205 FW

Camera output (Mono 16)	full frame:	1392 x 1040 pixel, 11 fps		
	binning:	2 fold	4 fold	8 fold
	max. image size (pixel):	696 x 520	348 x 260	174 x 130
	frame rate:	25 fps	41 fps	62 fps
	partial scan	image size freely adjustable		
Exposure	manual:	1 $\mu$ s to 120 s		
	automatic (AE):	1 $\mu$ s to 66 ms at 1280 x 960 pixel		
Power supply	9-36 V DC, 3 W			

### III DX 4 – 1020 FW

Camera output (Mono 16)	full frame:	1004 x 1004 pixel, 16 fps		
	binning:	2 fold	4 fold	8 fold
	max. image size (pixel):	502 x 502	251 x 251	126 x 126
	frame rate:	36 fps	60 fps	90 fps
	partial scan	image size freely adjustable		
Exposure	manual:	1 $\mu$ s to 120 s		
	automatic (AE):	1 $\mu$ s to 33 ms at 800 x 600 pixel		
Power supply	9-36 V DC, 2.9 W			

## Signal Processing | Software

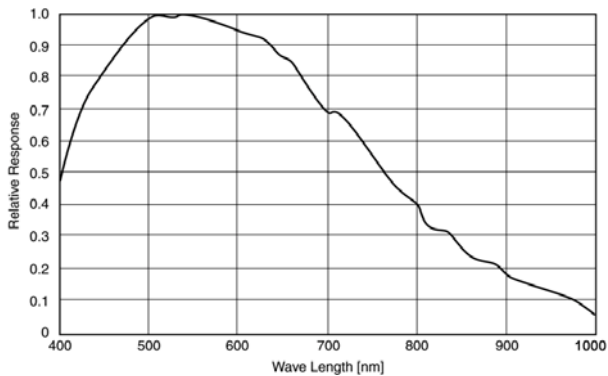
Control software	Kappa CameraControl (KCC)	
System	12 bit digital	
Gain	manual/automatic (AGC): 0 to 18 dB	
Enhancement	contrast:	1.0 to 8.0 fold
	brightness:	subtraction, 0 to 4095 LSB, maximum 50% of the output level
	edges:	adjustable
Gamma	0.3 to 2.2	
Diagnostics	camera name, serial number, revision number, temperature of sensor and camera, built-in test, image size, frame rate, test pattern	
Line generator	2 reticles: position, color and style adjustable	
Measuring window	position and size adjustable	
Synchronization	internal/external, reset/restart (delay < 10 $\mu$ s)	
Hardware trigger	Minimum trigger delay 4.2 $\mu$ s - 8.2 $\mu$ s depending on the sensor type	
	Frame on Demand	

# General Technical Data

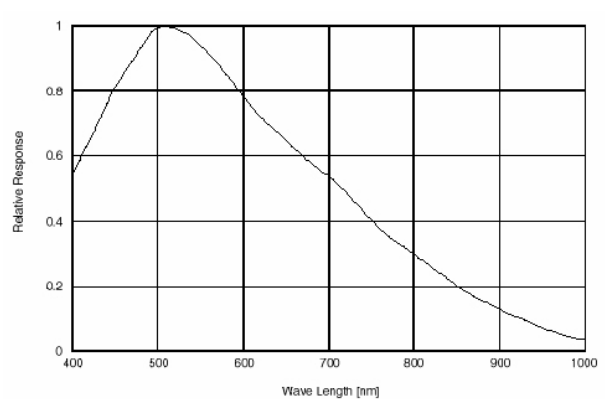
Interfaces	IEEE 1394a/FireWire, 2 ports (6-pin) with 400 Mbit/s system connector (power supply, additional RS 232, control and trigger signals)	
Lens mount	C-mount, focal plane adjustable, CS-mount on request	
Filter	IR-filter, removable	
Temperature	operating temperature -20°C to +60°C, storage temperature -30°C to +70°C	
Dimensions   Weight	block housing:	60 x 60 x 55 mm; 275 g
	design housing:	diameter 75 mm, length 55 mm; 410 g
	cooled camera:	73 x 69 x 115 mm; 860 g
Cable length	FireWire cable up to 10 m (other cable lengths on request)	
System requirements	hardware: connection 1394a OHCI (6 pin) or equivalent, minimum 1.8 GHz, minimum 512 MB RAM, DirectX9-enabled graphics card with at least 64 MB operating system: Microsoft Windows 2000 ®, Microsoft Windows XP ® (32 Bit Edition) Microsoft Windows Vista ® (32 Bit Edition)	
Order-no. block housing	DX 4-285 FW	951-1719
	DX 4-274 FW	951-1721
	DX 4-205 FW	951-1718
	DX 4-1020 FW	951-1703
Order-no. design housing (red)	DX 4-285 FW	951-1719R
	DX 4-274 FW	951-1721R
	DX 4-205 FW	951-1718R
	DX 4-1020 FW	951-1703R
Order-no. cooled camera	DX 4C-285 FW	951-1720
Standard equipment	camera, FireWire cable 4.2 m (6 pin/6 pin), Software CD Kappa CameraControl (KCC) incl. operating manual	
In addition for cooled version	power supply ACC 2 (incl. control cable 4 m and power supply cable)	

## Spectral Sensitivity Characteristics (without IR-filter)

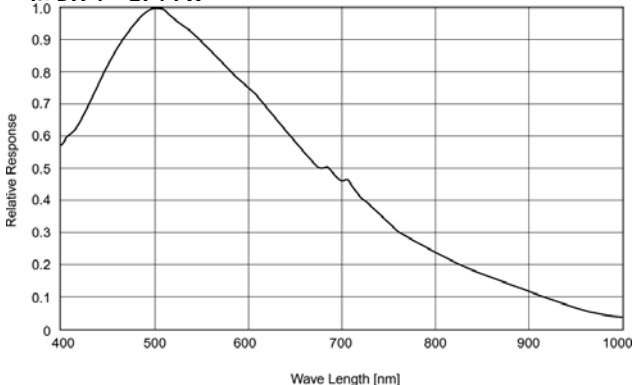
|| DX 4 – 285 FW



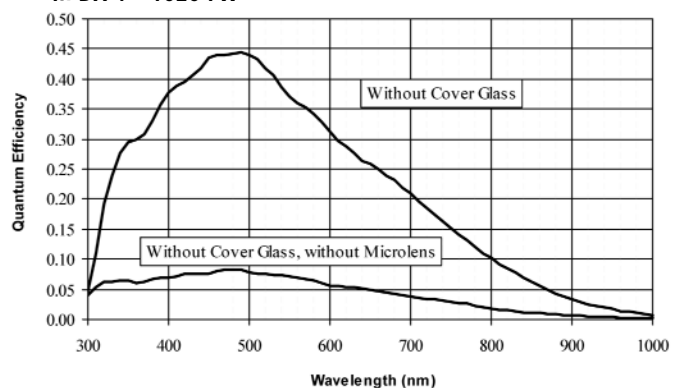
|| DX 4 – 205 FW



|| DX 4 – 274 FW



|| DX 4 – 1020 FW



We are constantly checking the accuracy of the technical data. We are prepared to provide more detailed information on request. Technical data are subject to change without notice!

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