

## CHROMA - Series

CHROMA series is characterized by high sensitivity, fast image downloading, reduced weight and dimensions. This includes the cameras: CHROMA CX 3, CHROMA C3 Plus and CHROMA C4 (just as PRELIMINARY).

All this kinds use Kodak KAF CCD sensors, displaying a wide range of resolutions and pixels dimensions. The sensors are front-illuminated, supported by an excellent Quantum Efficiency.

All of them (apart to those with the antiblooming option) can offer a 100% fill factor, allowing one to shoot marvellous images.

Among the main application fields: Biology, Astronomy, Plasma Physics, Semiconductor Physics.

### CHROMA CX 3



Every component is integrated in the aluminium head: CCD, electromechanical shutter, Peltier cooling system, electronics, a motorized filter wheel (optional). The camera is connected to the PC by means of a parallel port (alternatively, a fiber optic connection can be made).

### SPECIFICATIONS

MODEL	CCD	ARRAY FORMAT (HxV)	PIXEL (HxV) $\mu\text{m}$	SIZE (HxV) mm	FWC ke <sup>-</sup>	DARK CURRENT e <sup>-</sup> /pixel-s @ -5°C	QE @ 450, 550, 650 nm	FILL FACTOR %
CX260E	KAF-0261E	512x512	20x20	10.2x10.2	500	12.5	35, 55, 58	100
CX400LE	KAF-0401LE	768x512	9x9	6.9x4.6	100	0.5	20, 35, 42	70
CX400E CX400ME	KAF-0402E KAF-0402ME	768x512	9x9	6.9x4.6	100	0.5	35, 55, 68 55, 67, 82	100
CX1600E CX1600LE	KAF-1602E KAF-1602LE	1536x1024	9x9	13.8x9.2	100 50	0.6 0.5	40, 50, 60 20, 35, 42	100 70

*"C" stands for coloured sensor, "E" is the Enhanced (ITO) version.*

*The values concerning Quantum Efficiency, Full Well Capacity and Dark Current have to be considered as typical.*

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MODEL	CCD	ARRAY FORMAT (HxV)	PIXEL (HxV) $\mu\text{m}$	SIZE (HxV) mm	FWC ke-	DARK CURRENT e-/pixel-s @ -5°C	QE @ 450, 550, 650 nm	FILL FACTOR %
CX3200E CX3200ME	KAF-3200E KAF-3200ME	2184x1472	6.8x6.8	14.85x10.26	55	0.5	40, 52, 65 60, 75, 82	100
CX5000C	KAF-5101CE	2614x1966	6.8x6.8	17.8x13.4	40	0.5	31, 34, 31	68
CX6000E CX6000LE	KAF-6303E KAF-6302LE	3072x2048 3072x2034	9x9	27.65x18.48	100 50	0.5	40, 55, 64 9, 15, 13	100 70

Readout speed	Up to 2.2 Mpixel/s	Filter wheel (opt)	8 or 6 positions according to different models
A/D Converter	14 bit	Max total noise (Typ)	10 e <sup>-</sup>
Partial CCD reading	Programmable	Binning	from 1x1 to 8x8 or arbitrary
Interface	FDL-PCI	Mount	42x0.75 or C
Spectral response	350-1000 nm	Backfocus	26.8/17.5 mm
Cooling	Single stage Peltier -40°C $\Delta\text{T}$	Shutter	Electromechanical
Exposure time	From 0.01 to 9999 s	CCD temperature control	$\pm 0.1$ °C
Settable gains	64	BIAS Control	9 bit
Optical window *	BK7 with 2 AR	Weight	1600 g
Dimensions	155x134x62 mm	Auxiliary port	yes

\* With double coating. On request, it can mount coating and/or double coating windows with non parallel faces and windows in Berillium with X-ray scintillator screen.

The standard system includes:

- assembled unit in light alloy with threaded 42x0.75 input;
- 32 bit FDL-PCI interface;
- 2.5 m PC parallel link cable;
- software for image grab and processing under Windows 95/98/Me/2000/XP with PCI interface (included);
- 230 V power supply;
- case, manual with test report and 24 months of warranty.

## OPTIONS

FOL	Serial fiber optic link (fiber: 30 m, ST 62/125 mount). Different lengths on demand
RGB	RGB interference + Blank, dia. 25 mm
WEL	8-position integrated filter wheel (6-position for CX6000), filter dia. 25 mm
NIK-C	Adapter for Nikon lens
MIN-C	Adapter for 42x1 mm lens
PAR	2.5 m standard parallel port link cable
M10	10 m parallel link cable for FDL-PCI
XTE	¼ " mounting post
TTC	Adapter from 42x0.75 to C mount
CPA	Front panel with C mount and back focus (you can not fit the filter wheel)

# CHROMA C3 Plus

The CHROMA C3 plus is an upgrade for the CHROMA CX 3: it has a better resolution due to 16 bit A/D Converter, a readout speed  $\geq 1\text{Mpixel/s}$  and, more, it is equipped of three integrated peripherals:

- 1) two 32-bit generators able to yield impulses starting from 100 ns with internal time base, or from 20 ns with external time base;
- 2) a 32-bit time delay with a 100 ns step with an internal time base or 20 ns with external time base;

by means of these three devices, you can run an MCP, a LASER or other external devices, as well as synchronize them to the image acquisition.



## SPECIFICATIONS

MODEL	CCD	ARRAY FORMAT (HxV)	PIXEL (HxV) $\mu\text{m}$	SIZE (HxV) mm	FWC ke-	DARK CURRENT e-/pixel-s @ -5°C	QE @ 450, 550, 650 nm	FILL FACTOR %
C3P-260E	KAF-0261E	512x512	20x20	10.2x10.2	500	12.5	35, 55, 58	100
C3P-400LE	KAF-0401LE	768x512	9x9	6.9x4.6	100	0.5	20, 35, 42	70
C3P-400E C3P-400ME	KAF-0402E KAF-0402ME	768x512	9x9	6.9x4.6	100	0.5	35, 55, 68 55, 67, 82	100
C3P-1600E C3P-1600LE	KAF-1602E KAF-1602LE	1536x1024	9x9	13.8x9.2	100 50	0.6 0.5	40, 50, 60 20, 35, 42	100 70
C3P-3200E C3P- 3200ME	KAF-3200E KAF-3200ME	2184x1472	6.8x6.8	14.85x10.26	55	0.5	40, 52, 65 60, 75, 82	100

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# CHROMA C3 Plus

MODEL	CCD	ARRAY FORMAT (HxV)	PIXEL (HxV) μm	SIZE (HxV) mm	FWC ke-	DARK CURRENT e-/pixel-s @ -5°C	QE @ 450, 550, 650 nm	FILL FACTOR %
C3P-5000CE	KAF-5101CE	2614x1966	6.8x6.8	17.8x13.4	40	0.5	31, 34, 31	68
C3P-6000E	KAF-6303E	3072x2048	9x9	27.65x18.48	100	0.5	40, 55, 64	100
C3P-6000LE	KAF-6302LE	3072x2034			50			

Readout speed	≥ 1 Mpixel/s	Filter wheel (opt)	8 or 6 positions according to different models
A/D Converter	16 bit	Max total noise (Typ)	10 e <sup>-</sup>
Partial CCD reading	Programmable	Binning	from 1x1 to 8x8 or arbitrary
Interface	FDL-PCI	Mount	42x0.75 or C
Spectral response	350-1000 nm	Backfocus	26.8/17.5 mm
Cooling	Single stage Peltier -40°C ΔT	Shutter	Electromechanical
Exposure time	From 0.01 to 9999 s	CCD temperature control	±0.1 °C
Settable gains	64	BIAS Control	9 bit
Optical window *	BK7 with 2 AR	Weight	1600 g
Dimensions	155x134x62 mm	Auxiliary port	yes

\* With double coating. On request, it can mount coating and/or double coating windows with non parallel faces and windows in Berillium with X-ray scintillator screen.

The standard system includes:

- assembled unit in light alloy with threaded 42x0.75 input;
- 32 bit FDL-PCI interface;
- 2.5 m PC parallel link cable;
- software for image grab and processing under Windows 95/98/Me/2000/XP with PCI interface (included);
- 230 V power supply;
- case, manual with test report and 24 months of warranty.

## OPTIONS

FOL	Serial fiber optic link (fiber: 30 m, ST 62/125 mount). Different lengths on demand
RGB	RGB interference + Blank, dia. 25 mm
WEL	8-position integrated filter wheel (6-position for CX6000), filter dia. 25 mm
NIK-C	Adapter for Nikon lens
MIN-C	Adapter for 42x1 mm lens
PAR	2.5 m standard parallel port link cable
M10	10 m parallel link cable for FDL-PCI
XTE	¼ " mounting post
TTC	Adapter from 42x0.75 to C mount
CPA	Front panel with C mount and back focus (you can not fit the filter wheel)

# CHROMA C4: PRELIMINARY

The CHROMA C4 is the new generation of CHROMA camera series. It maintains the general characteristic of CHROMA C3, such as the 16 A/D Converter, the three integrated peripherals, with a pulse and time delay generator from 20 nanoseconds to 86 seconds, the mechanical dimensions, but more, it is characterized by:

- Readout speed  $\geq 1$  Mpixel/s
- 8-channel analog input (12 bits)
- 8-bit programmable (both for the input and for the output) parallel port
- Double-stage Peltier cooling system (performing  $-50^{\circ}$  C below ambient)

## Optional :

- 2 D/A outputs (12 bits)
- Integrated USB link
- Integrated electronic focusing



## SPECIFICATIONS

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C4-260E	KAF-0261E	512x512	20x20	10.2x10.2	500	12.5	35, 55, 58	100
C4-400LE	KAF-0401LE	768x512	9x9	6.9x4.6	100	0.5	20, 35, 42	70
C4-400E C4-400ME	KAF-0402E KAF-0402ME	768x512	9x9	6.9x4.6	100	0.5	35, 55, 68 55, 67, 82	100
C4-1600E C4-1600LE	KAF-1602E KAF-1602LE	1536x1024	9x9	13.8x9.2	100 50	0.6 0.5	40, 50, 60 20, 35, 42	100 70
C4-3200E C4-3200ME	KAF-3200E KAF-3200ME	2184x1472	6.8x6.8	14.85x10.26	55	0.5	40, 52, 65 60, 75, 82	100

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# CHROMA C4: PRELIMINARY

MODEL	CCD	ARRAY FORMAT (HxV)	PIXEL (HxV) μm	SIZE (HxV) mm	FWC ke <sup>-</sup>	DARK CURRENT e <sup>-</sup> /pixel-s @ -5°C	QE @ 450, 550, 650 nm	FILL FACTOR %
C4-5000C	KAF-5101CE	2614x1966	6.8x6.8	17.8x13.4	40	0.5	31, 34, 31	68
C4-6000E C4-6000LE	KAF-6303E KAF-6302LE	3072x2048 3072x2034	9x9	27.65x18.48	100 50	0.5	40, 55, 64 9, 15, 13	100 70

Readout speed	> 1 Mpixel/s	Filter wheel (opt)	8 or 6 positions according to different models
A/D Converter	16 bit	Max total noise (Typ)	10 e <sup>-</sup>
Partial CCD reading	Programmable	Binning	from 1x1 to 8x8 or arbitrary
Interface	FDL-PCI	Mount**	32x0.75
Spectral response	350-1000 nm	Backfocus	17.5 mm
Cooling	Double stage Peltier -50°C ΔT	Shutter	Electromechanical
Exposure time	From 0.01 to 9999 s	CCD temperature control	±0.1 °C
Settable gains	64	BIAS Control	9 bit
Optical window*	BK7 with 2 AR	Weight	1600 g
Dimensions	157x134x96.5 mm	Auxiliary port	yes

\* With double coating. On request, it can mount coating and/or double coating windows with non parallel faces and windows in Berillium with X-ray scintillator screen.

\*\* On request, it can mount also 42x0.75 or C

The standard system includes:

- assembled unit in light alloy with threaded 42x0.75 input;
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