

Sapphire

High sensitivity CCD detector

- Direct taper
- 2k x 2k Kodak CCD chip
- 92 mm (diagonal) active area
- 2-3 seconds high speed readout
- High dynamic range by true 17 bit digitization



Sapphire brings together Oxford Diffraction's unique low noise CCD technology, with a fibre-optic stub, and the highest quality Kodak 2K CCD chip; the result is a detector of ultra high sensitivity coupled with low noise.

Sapphire has a fast readout of 2-3 seconds, for a 512 x 512 binned image, enabling rapid data collections. Sapphire is the ideal detector for measuring weakly diffracting samples and for making precision measurements, such as in electron density studies.

The Sapphire employs the tried and tested Oxford Diffraction CCD design, including the patented non-permanently bonded fibre-optic taper mounting technology. Its modular construction enables ease of servicing and the exchange of major components including the CCD chip, fibre-optic taper, scintillator and peltier cooler.

The Sapphire consists of a Gadox scintillator mounted on a direct projection fibre-optic taper. The image is recorded on a 2K x 2K Kodak CCD chip which employs state of the art blue plus technology and is readout via a single pre-amplifier and 17 bit analogue-to-digital circuit. Digitisation of the data is achieved within the CCD head and transferred to the control PC by a fibre-optic communication link which results in ultra low noise.

The Sapphire incorporates a peltier cooler which maintains the CCD chip at a temperature of -40°C . Cooling to the peltier is provided by Oxford Diffraction's closed circuit CCD water chiller unit.

Patented CCD design

Electrical system

Power Connection	1/AC 230V \pm 10%, 50/60Hz
Maximum power consumption	200 W
Maximum mains current	1.7A
Main fuse	4.0A
Ground terminal	2.5 mm ² Cu

Technical data

Overall dimensions	266 x 172 x 215 mm
Weight	<9 kg
Active area	92 mm diagonal
CCD chip	Kodak KAF4301-E, 2048 x 2048 pixels
Pixel size on scintillator	31 μ m
Scintillator material	Gadox
Fibre optic reduction	1.3:1; low distortion reduction taper
Peltier cooling	-40°C (four stage cooler)
Temperature stability	\pm 0.05°C (micro-processorized PID)
Analogue-to-digital resolution	True 17 bit
System noise (so-called read noise)	<10 e ⁻ RMS full frame
Dark current	<0.06 e ⁻ /pix.s
Control processor	MC 68322
Communication	2 mono-directional fibre-optic taxi channels
Correlated double sampling (CDS) speed	1.5 MHz
Readout time (complete duty cycle including chip readout, CDS, analogue-to-digital conversion, transfer detector-PC, disk storage)	2 s (4x4 binning)*, 3.2 s (2x2 binning)* *readout times may be optimised within the ranges given depending on application

PC CCD interface

Communication	2 mono-directional fibre-optic taxi channels; PCI
Control processor	TMS 320C6205
Memory	32 Mb
Drivers	Win XP™
Recommended host computer	Pentium IV class PC: 2.4 GHz, 1.0Gb RAM, 240 Gb HDD, CD-RW, DVD+RW, 21" colour display

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