oxford diffraction
driving X-ray innovation

Onyx

165 mm large area CCD detector

- Ø 165 mm active area
- 2k x 2k Kodak CCD chip
- 2-3 seconds high speed read-out
- High dynamic range by true 17 bit digitisation
- High speed single corner readout to avoid quadrant offsets

Onyx is the largest area CCD detector from Oxford Diffraction. Optimised for low noise, and with a front face of 165 mm diameter, Onyx is ideal for laboratory-based crystallography studies of biological macromolecules, as well as fast screening of proteins. The very fast readout (2-3 seconds for a 512 x 512 image) enables Onyx to be used in data-enhancing fine-slicing acquisition mode.

The 20 Kg Onyx 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 Onyx consists of a Gadox scintillator mounted on a fibre-optic taper of demagnification 2.5:1. The taper is non-permanently bonded to a high specification 2K Kodak CCD chip which employs state of the art blue plus technology. The Kodak chip is readout via a single pre-amplifier and 17 bit analogue-to-digital circuit – this means that there is no offset between different quadrants of the image,which can be a problem with multiple corner readouts.

Digitisation of the data is achieved within the CCD head and transferred to the control PC by a fibre-optic communication link – this results in ultra low noise.

To minimise dark current, the chip is cooled to -45ºC by a Peltier pyramid, making long exposure times of >10 minutes no problem. Cooling for the Peltier is provided by refrigerated water from an Oxford Diffraction closed circuit CCD chiller unit.

Patented CCD design

Electrical system

Power connection	1/AC 230V ± 10%, 50/60Hz
Maximum power consumption	250 W
Maximum mains current	1.1A
Main fuse	3.15A
Ground terminal	2.5 mm^2 Cu

Technical data

Overall dimensions	324 x 193 x 210 mm
Weight	20 kg
Active area	165 mm
CCD chip	Kodak KAF4301-E, 2048 x 2048 pixels
Pixel size on scintillator	60 µm
Scintillator material	Gadox
Fibre optic reduction	2.5:1; low distortion reduction taper
Peltier cooling	-45ºC (three stage cooler)
Temperature stability	±0.05ºC(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 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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