

***VERY IMPORTANT INFORMATION!  
READ BEFORE UNPACKING YOUR SYSTEM!***

VACUUM COMPATIBLE  
**DO / DX CCD**  
**Systems**  
(including systems with Be windows)

## Exposure levels

A slow scan CCD is an extremely sensitive electronic detector in the X-ray / XUV region. Exposure to high incident fluxes will result in permanent damage to the device. Exposure levels must be maintained below the saturation level of the detector.

In order to calculate this level, use the fact that an absorbed photon of energy  $E$  will produce approximately  $E/3.65$  photoelectrons or  $E/25.55$  counts (for the standard gain setting of 7 electrons / count). For example, a 1keV photon which is absorbed in the CCD will generate  $\sim 275$  photoelectrons or  $\sim 39.3$  counts. Therefore 65,000/39.3 or  $\sim 1650$  such photons can be absorbed per pixel before saturation is reached.

The most common causes of damage to Open Front systems are:

- accidental exposure to high fluxes of photons, through poor baffling of the detector and/or insufficient or damaged filtering and
- accidental damage to the CCD surface through inadequate precautions being taken when front plate is removed.

**THE SILICON SURFACE OF YOUR CCD IS EXPOSED WHEN YOU REMOVE THE BLANKING PLATE FROM THE FRONT OF YOUR DO / DX SYSTEM. DAMAGE CAN EASILY OCCUR AT THIS TIME. PLEASE TAKE ALL APPROPRIATE PRECAUTIONS !**

**IF YOUR SYSTEM HAS A BERYLLIUM WINDOW PLEASE NOTE THE FOLLOWING WARNINGS:**  
**BERYLLIUM IS EXTREMELY BRITTLE - AVOID MECHANICAL SHOCK TO THE DETECTOR HEAD AS THIS MAY CAUSE THE WINDOW TO SHATTER. BERYLLIUM PRESENTS A POTENTIAL CANCER HAZARD. OVEREXPOSURE TO BERYLLIUM BY INHALATION MAY CAUSE CHRONIC BERYLLIUM DISEASE, A SERIOUS CHRONIC LUNG DISORDER.**

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A multi stage thermoelectric cooler is built into the detector head. It is used to cool the CCD in order to achieve optimum performance. The temperature setting is controlled through the software. The ultimate temperature to which the CCD can be cooled is critically dependent on the vacuum pressure.

## Cooling of the CCD

DX detector heads are passively cooled and incorporate a copper heatsink with tapped holes (protruding through the sides) for coupling to other components within your vacuum system.

In all cases where the CCD is cooled below the condensation point, **THE USER MUST ENSURE THAT THE VACUUM ENVIRONMENT IS FREE OF WATER VAPOUR AND OTHER CONTAMINANTS.** Substances such as water or oil condensing on the chip will rapidly freeze and permanent damage may occur.

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This DX detector housing is designed for installation within your vacuum chamber. It has been tested to pressures of  $<10^{-5}$  torr and has been found to have minimal effects on both pumpdown time and ultimate pressure reached. Electrical connection between the head and controller card is made using both the supplied cables and vacuum feedthru flange, which incorporates a vacuum compatible electrical feedthru. The DO detector is designed to be coupled to a port on your vacuum chamber. The minimum achievable pressure will depend on the coupling mechanism employed: o-ring based systems are suitable for pressures  $>10^{-6}$  torr whereas metal sealed systems are suitable for UHV applications, down to pressures of  $\sim 10^{-7}$  torr. The maximum bakeout temperature for all DO / DX systems is  $+55^{\circ}\text{C}$ .

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## Vacuum Compatibility