Technical Solutions

Vacuum Considerations for Operation of ‘SO’ High Energy Detection Cameras (Formerly Referred to as ‘DO’)

Products Affected – All SO / DO Camera Types

Description: ‘SO’ / ‘DO’ high energy detection (HED) cameras are an open sensor platform, unlike other Andor camera platforms in which the sensor is housed within a sealed enclosure (vacuum or back-filled). As such, these cameras are often attached directly to a vacuum chamber. However it is worth noting that a vacuum is not explicitly required for camera operation.

Although these open sensor camera platforms are usually operated when connected directly to a vacuum chamber, it is worth noting that camera operation is possible in non-vacuum environments (maintained chamber conditions and **not** a compromised vacuum environment). Please note that by normal operation, it is to be assumed that this refers to acquiring signal and reading out the sensor with the sensor cooled. While these cameras can technically be operated in normal atmospheric conditions, attempting to the cool the sensor would result in the sensor itself acting like a cold finger. As such, this creates the opportunity for moisture to condense from the environment onto the cold surface of the sensor.

Note: This would obviously damage the sensor and the customer would therefore do this at their own risk.

For cameras which are to be operated on chambers held at lower vacuum levels, the local dew point of the sensor environment should be considered in order to avoid condensates forming on the sensor. Precautions to avoid sensor damage should be undertaken such as monitoring the sensor image for signs of condensation, or a sacrificial cold finger should be introduced to the chamber and operated at a temperature lower than the required camera sensor in order to encourage preferential condensation.

If the chamber is to be maintained as a ‘non-vacuum’ environment, it is much more important to ensure that the camera is operated in a non-condensing atmosphere, otherwise as described above, condensates would form on the sensor.

In a non-condensing dry atmosphere, there should be a significantly reduced opportunity for damage from condensates on the sensor. However, note that the cooling performance of the sensor would be reduced due to the increased heat load on the sensor by the retention of energy of the environment inside the chamber. Therefore, the camera would not perform optimally under these conditions.

If the conditions for camera operation were to be greater than one atmosphere, note that the sensors are not tested under these conditions by Andor or the sensor manufacturer. As such, it is unknown how the sensor would operate as there would be concerns whether the sensor feedthroughs and the peltier cooler would be damaged under a pressurised environment.

The majority of applications which utilise these camera types are operated under vacuum conditions at all times.

Please note that Andor specifies that the maximum vacuum level in which the sensor can operate is compatible is > x 10-8 mbar. It is likely that the sensor will operate at lower vacuum levels (< x 10-9 mbar), however, the minimum vacuum level at which the sensor will operate is not specified by the sensor manufacturer and so the customer would operate their camera under these conditions at their own risk.

For further information, please contact your local Andor Product Support team.