

TECHNICAL NOTE

CHALLENGES WHEN MAKING LASER MEASUREMENTS IN VACUUM ENVIRONMENTS



Depending on the experiment requirements, different degrees of vacuum can be obtained. The quality of a vacuum is determined by the amount of matter remaining in the environment and can therefore be measured by the total pressure. Ultra high vacuums can reach pressures as low as 10^{-9} Pa and involve experimental challenges that one has to consider in order to design an experimental setup.

The most important phenomenon to happen in a vacuum environment is the outgassing. When the external pressure is really low, the most volatile materials will tend to release gas molecules in the air. In a vacuum chamber, silicon molecules expelled from the detector cable and glue will condensate onto optics and causing deterioration.

Heat dissipation is another concern when using our detectors in a high vacuum. Most of them rely on convection cooling for stable operation. The vacuum environment prevents proper cooling and can result in the sensor reaching very high temperatures, which can lead to damage.

GENTEC-EO SOLUTIONS

Depending on the vacuum level and the customer requirements, Gentec-EO offers different solutions.

Solutions for outgassing issues

- Replacement of standard detector cables and glues for low-outgassing materials
- Aluminium anodising of the detector's case to remove the organic materials

Solution for signal transmission

- Offering of different adaptor feed throughs in order to transmit the electrical output signal to a monitor outside of the vacuum chamber



Solution for heat dissipation

- Integration of a water cooled system inside the vacuum chamber
- Removal of the heat by direct contact of the detector with a material outside of the vacuum chamber

Gentec-EO offers a number of adapted solutions to overcome experimental challenges when working in a vacuum experimental environment. If you want more information please contact us at info@gentec-eo.com.