



Photoionisation Detector Lamps (PID) High Quality PID Lamps from Heraeus Noblelight

Introduction

Demand for hazardous material (hazmat) monitoring is ever increasing, as we become more aware of the dangers of chemicals used in industrial processes and the need for personal and environmental protection. One set of materials – Volatile Organic Compounds (VOCs) – can be detected with very high sensitivity using Photoionisation Detection (PID), and the need for monitoring VOCs is driving demand for Heraeus' PID lamps

Technique

Photoionisation is the term for the absorption of high energy photons by a molecule which results in ionisation of that molecule. The current created by ionisation is proportional to the concentration of the molecule, so this provides a simple method for quantitative analysis of a variety of compounds.

The technique is non destructive so can be used in conjunction with other detectors for extending the analysis. Photons will only ionise molecules with an ionisation potential less than the photon energy. Heraeus' PID lamps are available in a range of energies to suit compound selection.

Applications

From industrial processes to chemical storage, accidents and chemical warfare, the need for chemical detection is essential for personal safety. PID monitoring is increasingly used, often combined with other detection techniques, to provide safe monitoring of hazardous materials for Emergency Response Teams, Industrial Maintenance, Public Safety and Military Protection.

Operational examples

Emergency first response, Chemical Weapon & Toxic Industrial Chemical monitoring, Leak Detection, Hazardous Materials, Landfill Surveillance, Atmosphere Monitoring, Environmental Clean-up, Confined Space Entry, Arson Investigation, Petrochemical, Personal Exposure Monitoring (STEL & TWA), Industrial Painting, Gas Chromatography

Detectable gases (amongst others)

Volatile Organic Compounds (VOCs), Acetaldehyde, Ammonia, Benzene (Toluene, Ethyl Benzene and Xylene - BTEX compounds), Butane, Ethylene, Gasoline Vapours, Jet Fuel, Liquefied Petroleum Gas (LPG)



PID lamp spectra – Energy Table in eV

Gas	Energy/ eV	PID λ /nm	Window materials
Xenon	9.6/8.4	129/147	MgF ₂
Xenon	8.4	147	Sapphire (Al ₂ O ₃)
Krypton	10.6/10.0	117/124	MgF ₂
D2	10.2	122	MgF ₂
Argon	11.7	105	LiF



Design and Production Expertise

Heraeus has extensively tested and selected materials to establish a quality standard in PID manufacture. Heraeus' proprietary manufacturing processes ensure state-of-art performance and consistency over the lifetime of the lamps. A unique sealing technique enables the use of thinner MgF₂ windows, providing improved transmission and life. High purity of the gas spectrum is achieved throughout the life of the lamp by the use of an internal getter in the RF version.

A programme of Continuous Improvement Processes ensures that performance and capacity are increased, thereby maintaining Heraeus' position as the leader in this market.

Available range – standard product and custom designs

PID lamps are available in both DC operated and RF operated versions. In general DC operation is the preferred option for fixed-installation instruments such as Gas Chromatographs, where continuous monitoring is required without circuit power constraints. For hand-held detectors, RF versions provide the solution to demands for smaller size and low-power drive circuitry.

Heraeus manufactures a wide range of PID lamps to standard design in both RF and DC versions. Customers can also benefit from our design expertise, as the Heraeus Technical Team can work with OEMs to design and build product to their specific dimensional and performance requirements.

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