



**High Quality Photoionisation
Detector Lamps (PID)**

**excelitas[®]**

PID Lamps

For a safer work environment

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 Excelitas PID lamps.



Multi-Gas monitors are capable of detecting VOC's with a PID sensor. Picture courtesy of Crowcon Detection Instruments Ltd

Photoionisation is the term for the absorption of high energy photons by a gas or vapour molecule, which has an ionisation potential lower or approximate to the photon energy provided by the source. This results in ionisation of that molecule. If an electric field is applied in the region of the ionised molecular species, then the current generated is proportional to the concentration of the molecules within the sample environment; this provides a simple method for quantitative analysis of a variety of gaseous or vapour compounds with lower ionisation potential than the photon energy of the source/lamp. The technique is non destructive so can be used in conjunction with other detectors for extending the analysis. 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 and high voltage power supplies can be supported. For hand-held detectors, RF versions provide the solution to demands for smaller size and low-power drive circuitry. Excelitas 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 Excelitas Technical Team can work with OEMs to design and build product to their specific dimensional and performance requirements.

Your advantages with Excelitas PID lamps

- DC or RF driven PID lamps for hand-held and fixed installations
- Customized lamp designs and dimensions to fit your specific application
- Different gas fills and window materials with photon energies from 8.4 – 10.6 eV for more selectivity in gas detection
- High purity window material for better transmission and higher intensity
- Proprietary getter technology and high purity gas fill for longer lamp life
- Reliable processes and highest quality lamps due to automated production

VOC Gas Detection

Photoionisation detector lamps (PID) are most commonly used in VOC detection, gas chromatography (GC), trace gas monitoring and sample ionisation for mass spectrometry. They are available with a variety of gas fills including krypton and xenon gas.

VOC Gas Detection

Standard products and custom designs

Recently PID monitoring is increasingly used often combined with other techniques, to provide safe monitoring of hazardous materials for emergency response teams, industrial maintenance, public safety and military protection.

Applications

- VOC gas detection
- Gas Chromatography (GC)
- Mass Spectrometry (MS)
- Field monitoring of air and soil
- Emergency first response
- Jar headspace screening
- Leak detection
- Personnel safety in confined spaces

Excelitas has extensively tested and selected materials to establish a quality standard in PID manufacture. Excelitas' 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 Excelitas' position as the leader in this market.

Product range RF PID lamps

Lamp Type	PKR 100-6-14	PKR 106-6-14	PKR 106-6	PKR 100	PKR 106
	①	①	①	③	③
Photon Energy (eV)	10.0	10.6	10.6	10.0	10.6
Gas Fill	Krypton	Krypton	Krypton	Krypton	Krypton
Diameter (mm)	6	6	6	12.7	12.7
Length (mm)	14	14	30	53	53
Operating current (mA)*	26	26	26	150	150
Typical RF power input	< 0.5	< 0.5	< 0.5	0.5	0.5
Ignition time (s)*	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0	0.1	0.1

Product range DC PID lamps

Lamp Type	PKS 106
	④
Photon Energy (eV)	10.6
Gas Fill	Krypton
Diameter (mm)	19.6
Length (mm)	53.5
Ignition voltage (V)	1,500
Operating current (mA)**	< 2
Typical operating current (mA)**	0.5
Ignition time (s)**	< 2

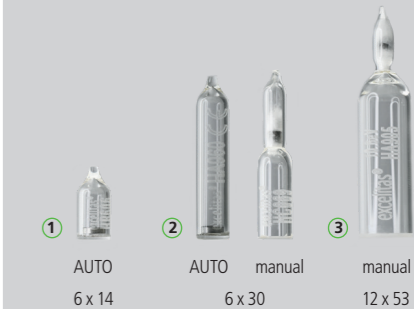
Detectable substances with PID

Substance	Energy (eV)	Window Material
Styrene	8.40	Xe Kr
Benzene	9.24	
Tetrachloroethylene	9.32	
Trichloroethylene	9.45	
Methyl Ethyl Ketone (MEK)	9.54	
Chloroethene	9.99	
Isopropyl Alcohol (IPA)	10.10	
Ammonia	10.18	
Acetaldehyde	10.22	
Pentane	10.34	
Oxygen	12.10	

PID lamp spectra - energy table in eV

Gas	Energy/eV	λ/nm	Window material
Xenon	9.6/8.4	129/147	MgF ₂
Krypton	10.0	124	MgF ₂ + CaF ₂
Krypton	10.6/10.0	117/124	MgF ₂

PID RF excited



PID DC excited



About Excelitas Technologies

Excelitas is a leading provider of advanced, life-enriching technologies that make a difference, serving global market leaders in the life sciences, advanced industrial, next-generation semiconductor, aerospace and defense end markets. Headquartered in Pittsburgh, PA, USA, Excelitas is an essential partner in the design, development and manufacture of photonic technologies, offering leading-edge innovation in sensing, detection, imaging, optics, and specialty illumination for customers worldwide. Excelitas is at the forefront of addressing many of the relevant megatrends impacting the world today, including precision medicine, industrial automation, artificial intelligence, connected devices (IoT) and military modernization.

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