

Zero Air for Gas Chromatography

Market Application Publication



Background:

Flame ionization detection (FID), a commonly used detection technique for gas chromatography which involves passing a separated sample through a hydrogen-air flame to ionize a sample, is considerably more sensitive than thermal ionization for a broad range of compounds. FID is typically used to detect volatile organic compounds to nanogram levels. The air for the flame is added to the detector after the separation and the sensitivity is dependent on the ability of the detector to discriminate between the background signal and the signal from the compound(s) of interest. Zero Air, which contains <math><0.1\text{ ppm}</math> of hydrocarbons, is typically used as the oxidant.

In many laboratories, Zero Air is synthetic air provided by an expensive high-pressure gas cylinder. While this is a satisfactory method, the use of an in-house generator to provide Zero Air for FID detection is safer, more convenient, more reliable and more economical than the use of high pressure cylinders. An in-house Zero Air generator is completely automatic and requires a minimum of maintenance.



Features and Benefits:

- Generates UHP Zero Air with total hydrocarbon concentration (THC) to <math><0.05\text{ ppm}</math>
- Low hydrocarbon concentration increases the accuracy and sensitivity of FID detection
- Eliminates buying and installation of bulky and hazardous compressed air tanks
- Prevents running out of gas during instrument operation
- Extremely low cost of operation, no hidden costs (demurrage, maintaining inventory). Payback period typically less than one year
- Operates on a 24 hrs./day, 7 days/week basis with minimum maintenance
- Models available to provide zero air to up to 66 FID's

Application:

UHP Zero Air systems for Gas Chromatography provided by Parker Balston Zero Air Generators employ a four step process including filtration, hydrocarbon removal, cooling and final filtration to produce the required level of purity. Two stages of high efficiency coalescing pre-filtration are employed to remove oil and particulate contamination. The air is then passed through a heated catalysis module to oxidize hydrocarbons into carbon dioxide and water. The air is then cooled and passed through a final membrane filter to remove all particles >0.01 micron.

Case Study:

Dr. Mike Jordan of Agriculture Canada (Kentville, NS, Canada), who analyzes volatile anaerobic compounds in fruit samples reported that the use of an in-house gas generator allows his laboratory to keep the FID detectors on their GC's powered up on a 24/7 basis. Previously, the detectors were powered up only when analyses were to be performed to minimize the consumption of the gas cylinders which were high in cost. When the FID was powered up, it was necessary to recalibrate the FID before analytical measurements could be taken and a significant amount of time was expended before measurements could be taken. Since the installation of an in-house gas generator, the FID detector is powered

up on a continuous basis on and an analytical measurement can be made whenever required. The detectors are now calibrated on a periodic basis that is convenient to the analysis schedule. This protocol saves a considerable amount of time and maximizes laboratory efficiency. In-house generation of the gas also eliminates the need for periodic changing of the gas tank, which also required recalibration of the FID. An additional benefit of less frequent calibration is that it is no longer necessary to train each technician in the calibration process.

Specifications:

Zero Air Generators	75-83	HPZA-3500	HPZA-7000	HPZA-18000	HPZA-30000
Outlet Hydrocarbon Concentration (as Methane)	<0.1 ppm	<0.05 ppm	<0.05 ppm	<0.05 ppm	<0.1 ppm
Outlet Zero Air Flow Rate	1 L/min	3.5 L/min	7.0 L/min	18 L/min	30 L/min
Min/Max Air Pressure	40/125 psig	40/125 psig	40/125 psig	40/125 psig	40/125 psig
Pressure Drop @ Max Flow Rate	4 psig	4 psig	4 psig	4 psig	4 psig
Max Inlet Air Temperature	78°F (25°C)	78°F (25°C)	78°F (25°C)	78°F (25°C)	78°F (25°C)
Inlet/Outlet Ports	1/4" NPT	1/4" NPT	1/4" NPT	1/4" NPT	1/4" NPT
Startup Time for Specified Hydrocarbon Concentration	45 min	45 min	45 min	45 min	45 min
Electrical Requirements (1)	120 VAC/60 Hz, 0.5 Amps	120 VAC/60 Hz, 2 Amps	120 VAC/60 Hz, 2 Amps	120 VAC/60 Hz, 4 Amps	120 VAC/60 Hz, 4 Amps
Dimensions	10"W x 3"D x 12"H (25cm x 8cm x 30cm)	11"W x 13"D x 16"H (27cm x 34cm x 42cm)	→		
Shipping Weight	7 lb. (3 kg)	41 lbs. (19 kg)	41 lbs. (19 kg)	41 lbs. (19 kg)	41 lbs. (19 kg)

Ordering Information

Description	Model Number
Zero Air Generator	75-83, HPZA-3500, HPZA-7000, HPA-18000, HPZA-30000
Maintenance Kit	Model 75-83: MK7583 HPZA Models: MK7840
Installation Kit	IK76803
Preventive Maintenance Plan	75-83-PM, HPZA-3500-PM, HPZA-7000-PM, HPZA-18000-PM, HPZA-30000-PM
Extended Support with 24 Month Warranty	75-83-DN2, HPZA-3500-DN2, HPZA-7000-DN2, HPZA-18000-DN2, HPZA-30000-DN2

Notes: 1. Electrical requirements are for North America; see product catalog and voltage appendix for electrical and plug configurations for locations outside North America.



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