

MP3DR

Self-Contained Miniature Ionization Gauge

Usable Range: 1×10^{-2} to 2×10^{-10} Torr

Technical Features

- Wide Range: Measures from 1×10^{-2} to 1×10^{-10} Torr.
- High Performance: Dual, coated and supported filaments for maximum life. Exceptionally low x-ray limit of $< 1 \times 10^{-10}$ Torr. Once button electronic selection of filament.
- UHV Compatible: CF type seals and 10-11 std. cc/ sec. (He) leak rate ensures reliable UHV operation.
- Reliable service: Simple design means trouble-free years of productive use in the most difficult applications.
- Bakeable: to 200 C (sensor only)
- Pressure Display: Four digit LED
- Emission Current: Selectable
- Set-points: Dual TTL set-points for process control
- Digital Communication: RS232/485
- Power Input: 11.5 to 30 VDC control interface power switch



PRODUCT OVERVIEW

The MP3DR is a miniature Bayard-Alpert high vacuum sensor and integral control electronics in a compact envelope. It is designed to be closely coupled to the user's vacuum system and to provide a local pressure indication and/or digital interface to a computer control system.

The MP3DR derives its performance strength from Televac's cutting edge miniature Bayard-Alpert ionization sensor and user-friendly operation from its intuitive control and display interface.

PRODUCT APPLICATIONS

- Analytical Instruments
- Decorative Coating
- Cryogenics
- Electron Microscopy
- Environmental Simulation
- High Energy Physics
- Illumination Product Mfg.
- Magnetic Media Mfg.
- Molecular Beam Epitaxy
- Optical & Functional Coating
- Physical Vapor Deposition
- Semiconductor Device Mfg.
- Surface Science
- Thermal Processing
- Thin Film Deposition

THEORY OF OPERATION

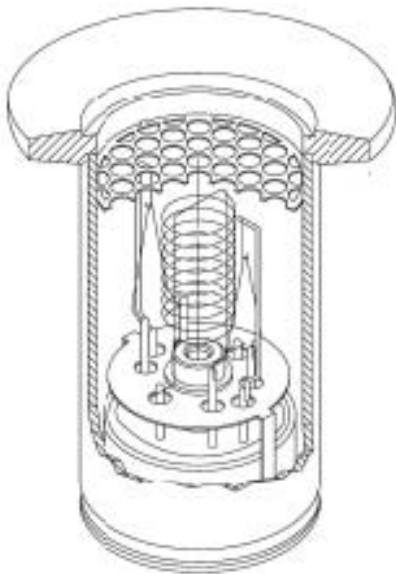
Bayard-Alpert ionization sensors consist of three principal elements: filament, grid and ion collector.

The filament is located outside of the cylindrical grid. The collector is located within the grid, and on the axial centerline.

When the filament is powered, a voltage drop causes sufficient heating to result in electron emission. The filament current is maintained at a constant level to assure constant electron emission. The electrical potential difference between the filament and grid causes the emitted electrons to be accelerated toward the grid. Some of the electrons will pass through the grid.

When an electron collides with a gas molecule, some of the molecule's electrons may disassociate, resulting in a positive ion. These ions accelerate toward the collector. The rate of the electron/molecule collision is proportional to the density of the gas molecules. The resulting ion current (at the collector) is therefore proportional to the density of the gas.

A precision electrometer receives the ion current and converts it into a d.c. voltage. An A/D converter processes the d.c. voltage and the digital signal is fed to the MP3DR processor.



MP3DR Miniature Sensor

DESCRIPTION OF TECHNICAL FEATURES

Measurement Range: The MP3DR sensor can be operated at pressures from 1×10^{-2} to 1×10^{-10} Torr...from somewhat rough vacuum, to well into the UHV region, for a total measurement range of nine decades.

Sensor Construction: The miniature sensor is of all metal construction, with the primary enclosure and many of the internal elements fabricated of 304 stainless steel. The dual filaments are Ytria coated Iridium and are individually supported to provide uniform output over variations in temperature and age and exhibit less calibration error. Coated Iridium filaments tend to withstand pressure bursts with a robustness not possible with lesser materials. The typical user should experience a filament lifetime of 10,000 hours. The precision ion collector is 0.004" diameter, decreasing the x-ray limit of the sensor.

Sensor Emission: The MP3DR user is permitted to select three specific emission current levels or to operate the instrument in an 'auto emission' mode, which automatically selects the proper emission current for the pressure range of operation.

Sensor Degas: The instrument is designed to allow the user to degas the sensor using an electron beam method. The user is permitted to select any degas time in 10 second increments up to a 5 minute duration.

Displays: The instrument uses a 4 digit, segmented blue-green LED display to present the measured pressure. During instrument setup, this display is used to present settings for emission current, degas, setpoints, and K factor. A series of discrete red LEDs are used to present status during instrument setup. While operating, a group of discrete green LEDs are used to present operating mode status.

Process Setpoints: Two adjustable and independent setpoints that use TTL devices are provided. The pressure value for the setpoints are displayed during instrument setup and when triggered, will illuminate one of the discrete LEDs. The setpoint signals are available at the 15 pin d-sub connector.

Digital Communication: All MP3DR instruments are equipped with RS232/485 digital communications, permitting users to automate the instrument's operation and data acquisition. All normal operating parameters such as pressure, setpoints, ion current, filament in use, emission setting and degas status are communicated via signals at the dual 6 pin modular connectors. All parameters that are manually adjusted at the User Control Interface can be controlled via digital communications.

PRODUCT SPECIFICATIONS

OPERATING SPECIFICATIONS

Measurement Range	1 x 10 ⁻² to 1 x 10 ⁻¹⁰ Torr
Sensitivity for Nitrogen	10/Torr
Degas Power	5 Watts e-beam
Bakeout Temp (sensor only)	200 C
Operating Temp:	0 to 40C
X-Ray Limit:	<1 x 10 ⁻¹⁰ Torr
Filament Emission Current	.01, 0.1, 1.0 mA or Auto
Filament Bias Potential	+30 Volts +/- 0.3%
Grid Potential	+180 Volts +/- 0.3%
Filament Heating Voltage	1.5 Volts (2.5 V Max.)
Filament Heating Current	2 Amps (3 A Max.)
Mounting Orientation	Any

CONTROL SYSTEM

Power Input	11.5 -30.0 VDC@750 mA
Display	Segmented. Blue-Green
Process Control Outputs	2 each TTL
Digital Communication	RS 232 / 485
Power/Signal Connector	15 pin d-sub
Digital Port	Dual, 6 pin modular

PHYSICAL DATA

Height	5.25"
Diameter	3.00"
Weight	19.5 oz (KF25 Flange)

OPERATING ENVIRONMENT

Location	Indoors Altitude to 2000 Meters
Temperature:	0 to 40 C
Relative Humidity	80% H to 31C
Installation	Category II



USER CONTROL INTERFACE

ORDERING INFORMATION

MP3DR Miniature Ionization Gauge with KF25 flange	2-7990-131
MP3DR Miniature Ionization Gauge with 2.75" CF flange	2-7990-152
MP3DR Miniature Ionization Gauge with 1" tubulation	2-7990-101
Sensor only, with KF25 flange	3451-8305-35
Sensor only, with 2.75" CF flange	3451-8305-25
Sensor only, with 1" tubulation	3452-8306-05
Digital comm. cable, 7' length with RJ11 modular plug to spade lug	2-9855-007
Power & signals cable, 10' length with 15 pin d-sub to tinned leads	2-9867-010
Power & signals cable, 20' length with 15 pin d-sub to tinned leads	2-9867-020
Power & signals cable, 35' length with 15 pin d-sub to tinned leads	2-9867-035
Power & signals cable, 50' length with 15 pin d-sub to tinned leads	2-9867-050
110 VAC to 24 VDC Power Module, with 6' cable and d-sub connector	2-7900-096

Note: Other non-standard vacuum flange configurations available upon special request



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