Residual Gas Analyzer
PPT Series

Purpose

The PPT is a small compact RGA designed for:

- Leak detection
- High energy physics
- Vacuum coating
- Vacuum heat treating
- Residual gas analyzer
- Off-gas studies
- Tube & bulb manufacturing
- Surface science studies

Features & Benefits

☐ Operational Advantages
Gains insight into vacuum system operation
Improves quality and yields
Increases uptime

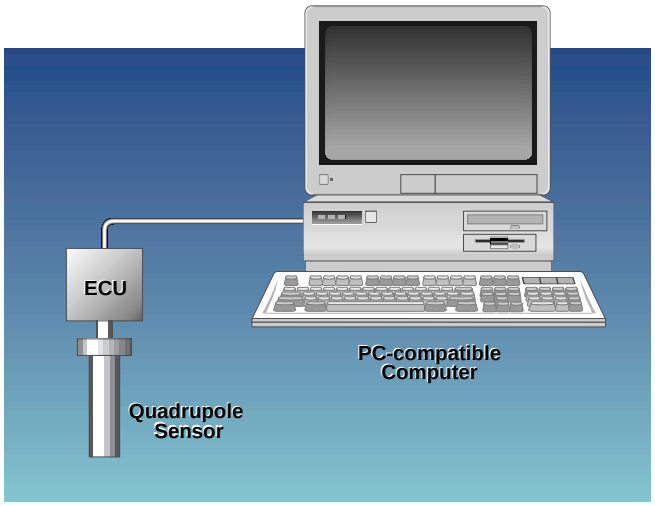
☐ Software Selection:
PPT for Windows®
PPT for DOS®

☐ Compact, Cost-effective Design
Reduces equipment cost
Minimizes installation cost
Eliminates rack space requirements

☐ Mass Ranges to 300 amu
High molecular weight determination

☐ Faraday and Electron Multiplier Detectors
Operation to UHV

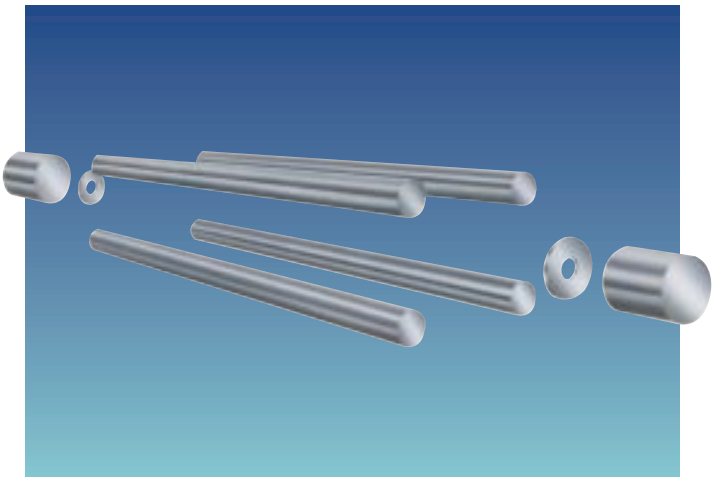
☐ Open and Closed Ion Sources
Maximize sensitivity



Description

The PPT (Partial Pressure Transducer) Series is the first RGA design to combine the traditionally large (and expensive) control electronics modules into a single, lower-cost compact ECU (Electronics Control Unit) that mounts directly on the quadrupole sensor flange. The basic system, consisting only of the quadrupole sensor and ECU, interfaces directly with PC-compatible computers via standard RS-232 or RS-485 communications. The ECU requires 24 VDC power for operation.

MKS INSTRUMENTS



Theory of Operation

Quadrupole-based residual gas analyzers work by ionizing, separating, and detecting ions in order to determine the partial pressure of gases in a vacuum system. As shown in the diagram to the left, ions generated at the ion source are focused through the quadrupole entrance aperture and then mass-filtered by the quadrupole filter rods. The mass-filtered ions are measured as an ion current at the detector.

The quadrupole sensor requires a pressure lower than 1 x 10^{-4} Torr for operation. Accordingly, in high vacuum and ultra-high vacuum applications the quadrupole sensor is normally mounted directly on the vacuum chamber. For atmospheric, rough vacuum, and medium vacuum applications a pumping system and pressure reduction manifold are required.

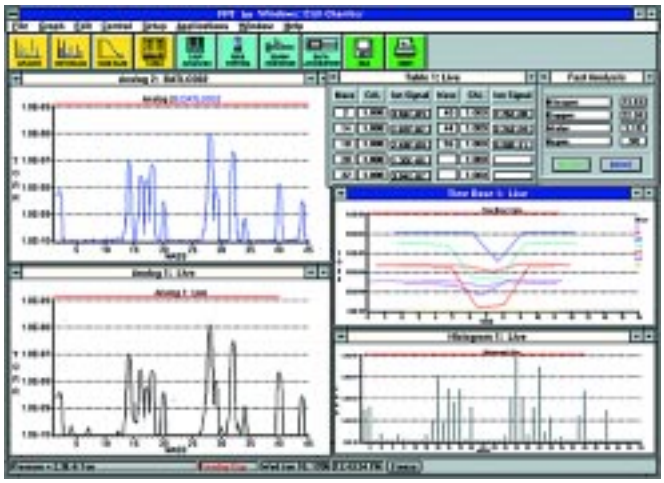
PPT for DOS provides Pressure vs. Time Mode that plots the partial pressure of up to 16 selected ions against time.

Software

The PPT Series is available for use with two different executable software packages. A brief summary of each software package is presented here. Individual data sheets on each software package are also available.

PPT for DOS

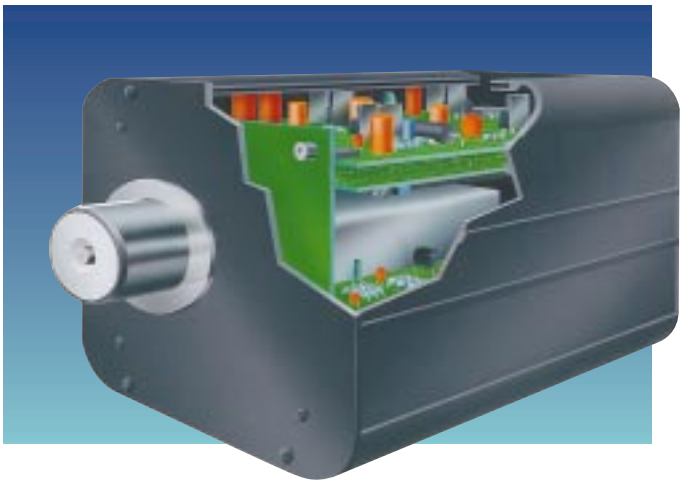
PPT for DOS software is provided with each PPT system. It is designed for ease-of-use and offers menu-driven routines, on-screen editing, and full-color graphics. These features make system operation and data interpretation easy, even for operators with limited experience with the system. PPT for DOS provides fast-capture, real-time graphing which enhances the usability of PPT systems.



PPT for Windows allows the user to display data in several different formats simultaneously.

PPT for Windows

PPT for Windows includes the familiar features available with programs running on a Windows platform. These include pull-down menus, icon tools, and graphic displays. It also includes an information bar which defines system pressure, detector status, operating date and time, and provides a pause/resume scan control. For maximum flexibility, data can be displayed in analog, histogram, timebase and table modes. A Fast Table Mode permits rapid collection of data on 14 user-selectable mass units. A Fast Analysis Mode displays percent data from 10 common gas species in real time.



Design

Compact size is possible through the use of a quadrupole sensor flange-mounted ECU, measuring only 9.5"L x 4.5"D x 5.00"H.

Excellent mass resolution is attained through precision-aligned quadrupole filter assemblies.

Easy maintenance is designed-in through simple ion source construction and an easy filament replacement procedure. To minimize maintenance requirements the PPT, as standard, uses Yttria oxide-coated Iridium filaments, which can withstand accidental vacuum overpressure.

Performance stability is maintained by the use of a continuous dynode electron multiplier detector that does not degrade when exposed to air, unlike discrete dynode types. Reliability is enhanced by built-in diagnostic circuitry which monitors all important quadrupole sensor parameters, and by the use of low parts-count, microprocessor-based electronics.

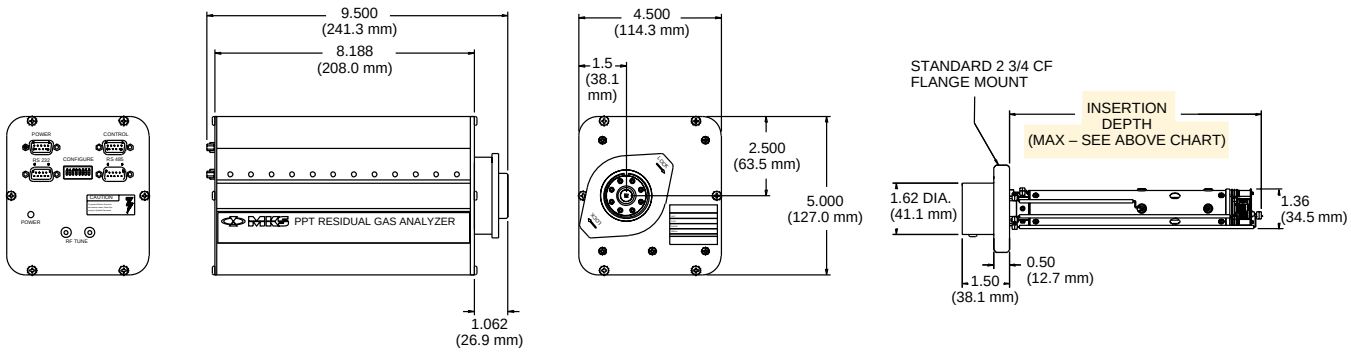
Part Number	Insertion Depth (max.)
PPT-C100-HF PPT-C200-F	8.240 in. (209.3)
PPT-C100-HM PPT-C200-M PPT-C300-M	10.390 in. (263.9)

Manufacture

Contamination of your system is avoided and calibration stability is improved by a 24-hour elevated temperature vacuum bakeout cycle before quadrupole sensor calibration.

Calibration accuracy is provided by calibrating the quadrupole against a transfer standard referenced to an MKS Spinning Rotor Gauge (SRG). The calibration of the SRG is directly traceable to NIST (National Institute of Standards and Technology). With an accuracy of 1% of Reading ±3 x 10^{-8} Torr, the SRG is about ten times more accurate than hot filament gauges commonly used by other manufacturers to calibrate RGA's.

Even pressure/temperature distribution throughout the vacuum manifold is achieved by using RGA calibration stands designed in accordance with the ISO/DIN Standard 3567.



Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

Specifications

Range	1 to 50, 100, 200, 300 amu
Detectors	Faraday cup (FC) or continuous dynode electron multiplier (EM) with FC cup
Ion Source	Open or closed
Maximum Operating Pressure	1 x 10^{-4} Torr (open ion source), 1 x 10^{-2} (closed ion source)
Resolution	
PPT-C100-HF	<5% Valley (Per AVS Standard 2.3)
All other models	<10% of Valley (Per AVS Standard 2.3)
Sensitivity	2 x 10^{-4} Amps/Torr (open ion source)
Emission Current	
Standard	1000µ Amps
Optional	100 to 1000µ Amps, software adjustable (selection of this option disables the two analog outputs. Consult factory for availability on closed-ion source sensors)
Electron Energy	
Standard	75 volts
Optional	10 to 100 Volts, software adjustable (selection of this option disables the two analog outputs. Consult factory for availability on closed-ion source sensors)
Minimum Detectable Partial Pressure	
Faraday Cup	2 x 10^{-11} Torr
Electron Multiplier	5 x 10^{-14} Torr
Maximum Quadrupole Sensor Bakeout Temperature	350°C
ECU Operating Temperature	0°C to 40°C
Standard Interfaces	RS-232 and RS-485/Two analog outputs
Standard I/O Configuration	For emission and scanning, opto-isolated, 5 to 24 VDC input and two active lows are required
TTL Outputs	16 (optional) via add-in card to host computer (consult factory for supporting software)
Power Requirements	24 Volts @ 2 Amps, (voltage tolerance: +10%/-5%)
Mass Filter Pole Diameter	0.25" (6.35 mm)
Mass Filter Length	
All	5.5" (140 mm)
Filament Options	
Standard	Yttria oxide-coated iridium
Optional	Tungsten
Mounting Flange	2.75" CF (DN35CF)
Total Pressure Measurement	Integral ion source electrode
Vacuum Protection	Filament and electron multiplier protection using total pressure measurement
CE Mark Compliance	
Electromagnetic Compatibility	Fully compliant to EMC Directive 89/336/EEC when used with an overall metal braided shielded cable, grounded properly at both ends
Product Safety	Fully compliant to Low Voltage Directive 72/23/EEC

Specifications are subject to change without notice. Windows® and DOS® are registered trademarks of Microsoft Corporation, Seattle, WA.

Bulletin PPT-3/99

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