

The PRV Piezo Regulation Valve from Duetting Technologies/AMT offers several key advantages over a Pfeiffer PF I13 936 (a typical electromagnetic precision valve) and a VAT 62.7 gas dosing valve (e.g. 62714-XE64-ABG3) – particularly for ultra-high-vacuum (UHV) applications and processes that require extremely stable, sensitive gas dosing.

Here is a structured comparison:

1. Operating principle and control behaviour

Feature	PRV Piezo Regulation Valve	VAT 62.7 / Pfeiffer PF I13 936
Actuator	Piezoelectric actuator, direct proportional opening via voltage (no mechanical parts or solenoid coil)	Electromagnetic or motorised actuator
Response time	Very fast, immediate change via voltage ($\ll 30$ ms)	≈ 30 ms according to VAT data sheet
Controlability at low flow rates	Extremely sensitive, directly proportional, minimal hysteresis effect	Good controllability, but with bias and magnetisation effects
Dead volume	Minimal, due to integrated piezo system with sapphire plates	Greater dead volume due to electromagnetic housing and moving components

Advantage of PRV: Significantly more precise control at very low gas flow rates (< 10 sccm) without pressure spikes.

2. Vacuum and purity levels

Feature	PRV	VAT 62.7 / Pfeiffer PF I13 936
Leak tightness / base pressure	$< 1 \times 10^{-8}$ mbar (up to $< 1 \times 10^{-11}$ mbar with evacuated gas line)	approx. 1×10^{-8} mbar minimum
Materials (in contact with media)	Sapphire + stainless steel, Viton (gas side)	Stainless steel AISI 316L, FPM seal
Particle-free / UHV-compatible	Designed for UHV systems (mass spectrometry, ion sources, sputtering)	Designed for high-vacuum and process applications (e.g. semiconductors, coating)

Advantage of PRV: UHV-optimised design with sapphire sealing system and a pressure range down to $< 1 \times 10^{-11}$ mbar — outperforms standard process valves.

3. Maintenance and operation

Feature	PRV	VAT 62.7 / Pfeiffer PF I13 936
Maintenance	Virtually maintenance-free; no moving metal parts	Regular inspection of the magnet or seat mechanism required
Safety feature	Automatic closing at 0 V or BNC disconnection (failsafe)	Mains-dependent; depends on the controller
Bake-out resistance	Bakeable up to 100 °C	Up to 80 °C according to VAT specification
Control	Simple DC voltage control, no separate valve interface required	Separate controller electronics required (e.g. VAT controller)

Advantage of PRV: Simpler integration, no proprietary controller required, robust and virtually maintenance-free.

4. Typical applications

- PRV: UHV systems, mass spectrometers, sputter or ion sources, research laboratories with $< 10^{-9}$ mbar.
 - VAT 62.7: Industrial processes (PVD, CVD, battery vacuum drying, pharmaceutical freeze-drying).
 - Pfeiffer PF I13 936: Laboratory or process valve for high-vacuum applications ($< 10^{-6}$ mbar), not optimised for UHV.
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In short

The PRV Piezo Regulation Valve is the superior solution when maximum precision, minimal leak rate, UHV compatibility and simple control are required.

The VAT 62.7, on the other hand, offers advantages across a wide pressure range (1×10^{-8} mbar – 2 bar) and in automated industrial processes with high throughput — but is less sensitive and more complex in design.

The Pfeiffer PF I13 936 lies between the two in terms of performance, but does not achieve the long-term stability or fine control of a piezo module.