



Technology Innovation  
from the Leader in Ultra-High Vacuum

## **AGILENT ION PUMP 200**

**The first ion pump with maximum pumping speed  
at low pressure**



**Agilent Technologies**

# The new Agilent Ion Pump 200

Technology Innovation from the Leader in UHV

## NEW VIP 200: Features & Benefits

VIP 200 is the right pump for XHV (eXtreme High Vacuum) and UHV (Ultra High Vacuum) applications

- Research Centers
- Universities and Laboratories
- Particle Accelerators
- Beamlines

### eXtreme High Vacuum Performance

- Maximum pumping speed at low pressure ( $10^{-8}$  mbar range)
- Best in class pumping speed for Nitrogen and Argon
- Reduced outgassing through Vacuum Firing thermal treatment
- New Diode and Noble Diode element design (more cells vs Volume)
- StarCell element: superior performance and stability for Noble gases.
- Optimized magnetic field distribution gives higher pumping speed

### Versatile & Compact Design

- The smallest size in its category
- Wide range of configurations available, including side port and different HV feed throughs
- New heater design allows for high thermal efficiency and easy mounting operation
- Pumping elements fully replaceable

### Agilent Quality

- Recognized Technology & Market leadership from the Ion Pump inventor: «All innovations introduced by Agilent in Ion Pump technology have become the standard in the industry»
- High standards of Manufacturing Excellence
- High reliability and performance guaranteed by severe test methodology



Image courtesy of CERN

## Ion Pump Evolution Made UHV Possible

### The Early History

With its acquisition of Varian, Inc. in 2010, Agilent Technologies inherited an unequalled wealth of experience in the field of high- and ultra-high vacuum technology. Varian developed and commercialized this critical enabling foundation technology and has provided clean high- and ultra-high vacuum for many developments in science and technology, from particle accelerators and analytical instruments to semiconductors and coatings.

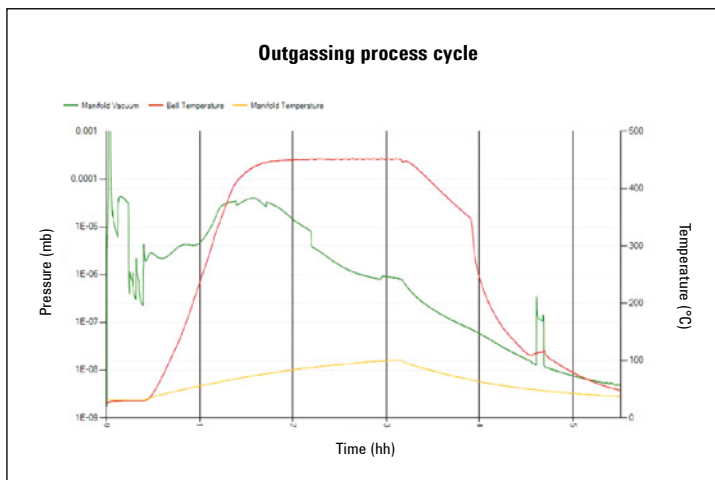
The original activity of Varian Inc., co-founded in 1948 by Sigurd and Russell Varian, the inventor of the Klystron, was in the field of microwave electron tubes. Robert Jepsen joined the company in 1951 and, as director of the Klystron research group, led investigation into electronic vacuum pumping to achieve the low pressures required by electron tubes. This led to the realization in 1957 of the first sputter ion pump (SIP), later named the Vaclon pump, of which Jepsen was co-inventor.





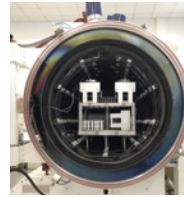
## The New Agilent Ion Pump 200

### Innovative Vacuum Thermal Treatment



#### UNIQUE VACUUM FIRING PROCESS

- Vacuum firing process applied to all surfaces exposed to vacuum, it effectively reduces Hydrogen outgassing rate and allows faster pumpdown to ultimate pressure.



#### STANDARD OUTGASSING PROCESS AT HIGH TEMPERATURE (450°) IN UHV OVEN

- Shortened time to reach base pressure compared to standard Ion pumps (up to 40% faster)



#### VACUUM FIRING

In the design of a large vacuum system, stainless steel is the most common material selected for the vacuum chambers because it can routinely achieve an outgassing rate of  $10^{-12}$  mbar-l/(s-cm<sup>2</sup>) for hydrogen after a 24-h bakeout at 300 °C <sup>(1)</sup>. Much lower outgassing rates have been measured for vacuum fired stainless steel, down in the range of  $10^{-15}$  mbar-l/(s-cm<sup>2</sup>) <sup>(2)</sup>

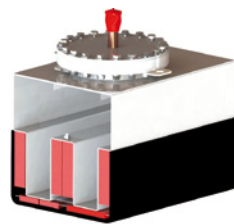
(1) R. Calder and G. Levin, Brit. J. Appl. Phys. 18, 1459 (1967).

(2) J-P. Bojon, N. Hilleret and B. Versolatto, CERN AT-VAC internal note.

## Best Pumping Speed at 10<sup>-8</sup> mbar range

#### NEW VIP200: OPTIMIZED MAGNETIC FIELD

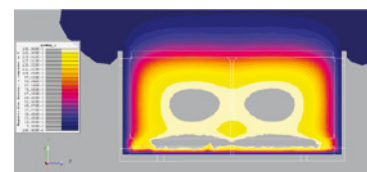
- Thanks to the optimized magnetic field distribution and element design, the VIP 200 is the most compact pump in its category.
- VIP 200 achieves peak pumping speed in the 10<sup>-8</sup> mbar range, the normal operating range for ion pumps, while conventional ion pumps are at peak at higher pressure (10<sup>-6</sup> mbar).



Increased magnetic field (16 magnets for Diode/N. Diode, 20 magnets for starCell):

- No significant change outside the pole piece.
- Uniformity of the field inside the pump pocket is greatly enhanced
- Increased pumping speed

Isovalue curves showing the values of the magnetic field in the direction of the cell axis in the element housing.

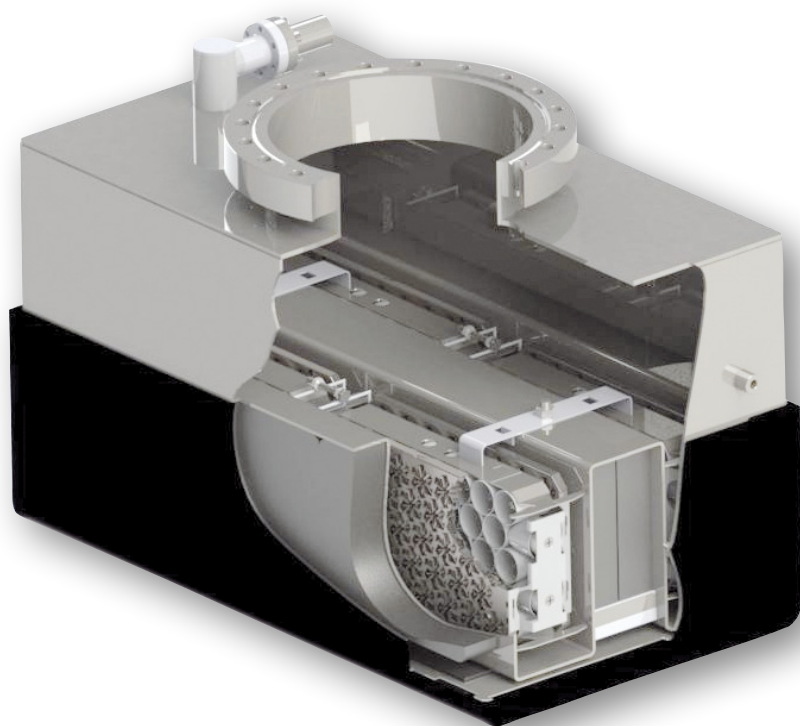


- **Dark blue:** low magnetic field values
- **Yellow:** high magnetic field values.
- **Gray in the center and bottom of the pocket:** above 1500 Gauss.
- **Gray area outside:** below the minimum of the scale

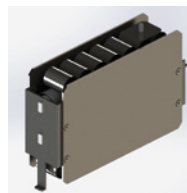




## The first ion pump with maximum pumping speed at low pressure



### Ion Pump Elements



#### DIODE & NOBLE DIODE

New element design

- New anode design
- New ceramic isolator
- #4 elements/pump
- Elements fully replaceable

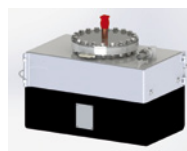


#### STARCELL

Incomparable performance for noble gases

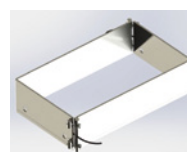
- #4 elements/pump
- Simplified assembly
- Elements fully replaceable

### New Heater Design



#### EASY MOUNTING OPERATION

- No need to disassemble the pole piece



#### THERMAL EFFICIENCY

- Uniform heat distribution

### 4UHV Ion Pump Controller

The VIP 200 can be operated with the state-of-the-art Agilent 4UHV controller, which adjusts in every pressure range to provide the high voltage at which pumping speed is maximal for that range.

#### 4UHV - FOR ULTRA HIGH VACUUM



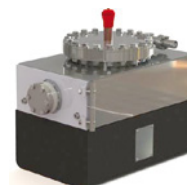
The new state-of-the-art Agilent 4UHV Ion Pump Controller can operate up to four VIP 200 simultaneously and independently (4x80W configuration) or two VIP 200 (2x200W). The 4UHV starts and controls ion pumps of any type (Diode, Noble Diode, StarCell). The variable voltage feature ensures optimum pumping speed and pressure reading throughout the operating pressure range.

### Versatility



#### WIDE RANGE OF FEED THROUGH SELECTION:

- FISCHER
- SHV 10kV (Safeconn compatible)
- DESY (optional)

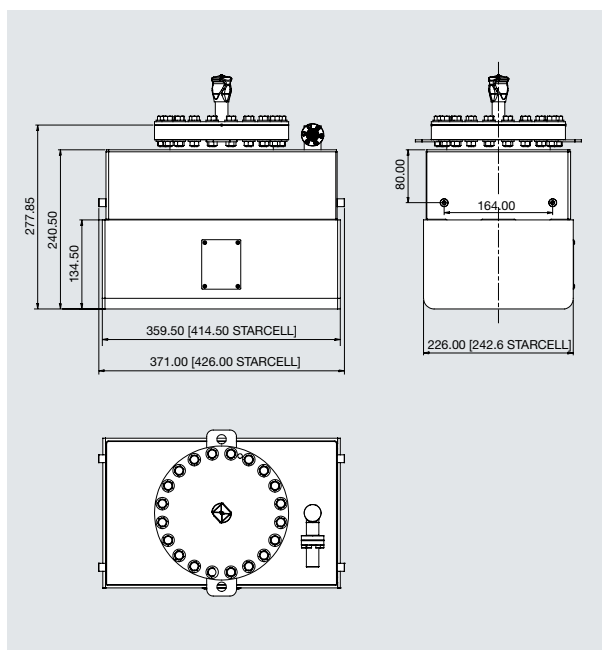
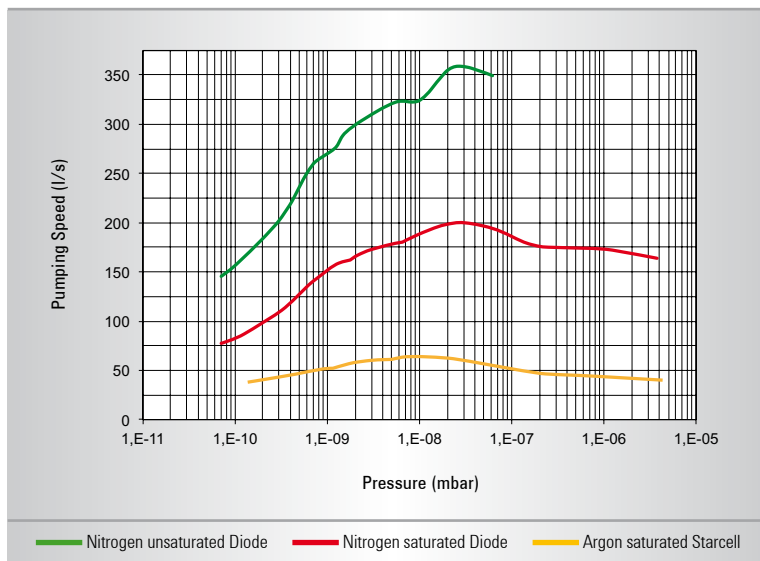


#### ADDITIONAL PORT (2<sup>3</sup>/<sub>4</sub> ConFlat)

# The New Agilent Ion Pump 200



## Pumping Speed vs Pressure



## Technical Specifications

Specification	Model		
	Noble Diode	Diode	StarCell
Saturated pumping speed for Nitrogen (*) (l/s)	185	200	180
Saturated pumping speed for Argon (*) (l/s)	60	-	63
Operating life at $1 \times 10^{-6}$ mbar of Nitrogen (hours)	50000	50000	80000
Protect current	50 mA	50 mA	50 mA
Operating voltage (max)	+7000 Vdc +/- 10 %	+7000 Vdc +/- 10 %	-7000 Vdc +/- 10 %
Suggested starting pressure (mbar)	$\leq 1 \times 10^{-5}$	$\leq 1 \times 10^{-5}$	$\leq 1 \times 10^{-4}$
Ultimate pressure (mbar)	$10^{-11}$	$10^{-11}$	$10^{-11}$
Inlet flange	8" CFF (NW 160) AISI 304 ESR	8" CFF (NW 160) AISI 304 ESR	8" CFF (NW 160) AISI 304 ESR
Internal volume (litres)	12.2	12.2	14
Temperature limits (°C):			
Pump with magnets	350	350	350
HV cable	220	220	220
Material:			
Body	AISI 304L	AISI 304L	AISI 304L
Cathodes	Titanium/ Tantalum	Titanium	Titanium
Anodes	AISI 304L	AISI 304L	AISI 304L
Magnets	Ferrite (Ceramic 8)	Ferrite (Ceramic 8)	Ferrite (Ceramic 8)
Pole piece	Iron	Iron	Iron
Ceramics	Alumina	Alumina	Alumina
Weight, lbs (kg)	99 (45)	99 (45)	112 (51)

\* Tested according to ISO/DIS 3556-1-1992

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## Ordering Information

	Part number		
	Diode	Noble Diode	StarCell
<b>Fischer feedthrough</b>			
VIP 200 Ion Pump	X3601-64000	X3601-64018	X3601-64040
VIP 200 Ion Pump with heaters 120V	X3601-64002	X3601-64020	X3601-64042
VIP 200 Ion Pump with heaters 220V	X3601-64004	X3601-64022	X3601-64044
VIP 200 Ion Pump with with side port (2¾ in.)	X3601-64001	X3601-64019	X3601-64041
VIP 200 Ion Pump with with side port (2¾ in.) and heaters 120V	X3601-64003	X3601-64021	X3601-64043
VIP 200 Ion Pump with with side port (2¾ in.) and heaters 220V	X3601-64005	X3601-64023	X3601-64045
<b>SHV feedthrough</b>			
VIP 200 Ion Pump	X3601-64012	X3601-64030	X3601-64052
VIP 200 Ion Pump with heaters 120V	X3601-64014	X3601-64032	X3601-64054
VIP 200 Ion Pump with heaters 220V	X3601-64016	X3601-64034	X3601-64056
VIP 200 Ion Pump with with side port (2¾ in.)	X3601-64013	X3601-64031	X3601-64053
VIP 200 Ion Pump with with side port (2¾ in.) and heaters 120V	X3601-64015	X3601-64033	X3601-64055
VIP 200 Ion Pump with with side port (2¾ in.) and heaters 220V	X3601-64017	X3601-64035	X3601-64057
For part numbers with other feedthrough versions, please refer to your local Agilent representative.			
<b>Cables and heaters</b>			
HV radiation resistant cable, 4 m (13 ft), with interlock, for Fischer F/T	9290705	9290705	9290705
HV radiation resistant cable, 10 mt (33ft), with Interlock, for Fischer F/T	9290708	9290708	9290708
HV radiation resistant cable, 4 m (13 ft), for SHV F/T	9297010M023	9297010M023	9297010M023
HV radiation resistant cable, 10 mt (33ft), for SHV F/T	9297010M025	9297010M025	9297010M025
Heaters 120V (two items)	X3601-68003	X3601-68003	X3601-68005
Heaters 220V (two items)	X3601-68004	X3601-68004	X3601-68006
Heaters 120V for side port version (two items)	X3601-68007	X3601-68007	X3601-68009
Heaters 220V for side port version (two items)	X3601-68008	X3601-68008	X3601-68010

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Published Apr 2016  
VPD-0715EN



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