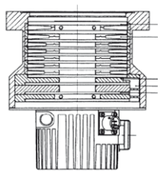
Agilent Turbo-V 2300 TwisTorr

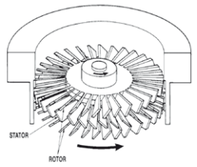
The new molecular-drag Technology

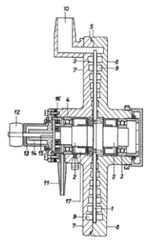
The Measure of Confidence

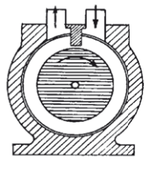
Agilent Technologies

The new molecular-drag technology









2010 ● Agilent Technologies presents the new TwisTorr molecular drag technology based on its well-known hybrid Turbo Molecular Pump design, introducing a spiral drag section that achieves unmatched performance in both pumping speed and compression ratio in the most compact space available.
New state-of-the-art electronics complete this industry leading Turbo Molecular Pump innovation

2003 ● With the Turbo-V 2K-G Varian, now Agilent, introduces a fully integrated Turbo pumping system

1996 ● Introduction by Varian of microprocessor-based on-board controller units: Navigator line

1991 ● Varian introduces a new hybrid type Turbo Molecular Pump: one monolythic rotor provides both high speed (Turbo stages) and high foreline tolerance (MacroTorr stages)

● Use of ceramic ball bearings with life-time lubrication using a proprietary dry solid lubricant

1986 ● Varian begins collaboration with Elettrorava for technology and know-how transfer

1980 ● Introduction of ceramic ball bearing technology

● Compound Turbo Molecular Pumps appear, combining a Turbo section with a Drag section

1970 ● Snecma design commercialized by Elettrorava, with manufacturing based in Turin, Italy

1965 ● First prototype of axial flow turbo pump (Snecma), with open thin blades

● This design is the basis for modern TMP technology

1960 ○ Theoretical basis for the pumping mechanism of axial flow impeller (Shapiro and Kruger, MIT)

1958 First Turbo Molecular pumps developed using experimental design:

○ Double-Ended design (Becker), based on a closed cell design using thick rotor and stator blades (this design was abandoned in the late ‘70s)

○ Axial flow pumping principle, demonstrated in the high vacuum regime (Hablanian)

EARLY 1900 First Molecular Drag pumps

○ 1912 W.Gaede

○ 1922 F.Holweck

○ 1929 M.Siegbahn

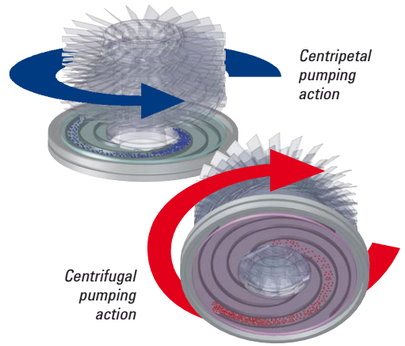
What is TwisTorr

Agilent TwisTorr Technology*

● Pumping effect is created by a spinning rotor disk which transfers momentum to gas molecules.

● Gas molecules are forced to follow spiral groove design on the stator. The specific design of the channel ensures constant local pumping speed and avoids reverse pressure gradients, minimizing power consumption.

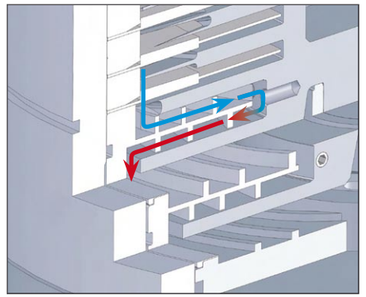
(*) US Patents applications 12/343961 and 12/343980, 24 Dec. 2008.



Space Saving Design

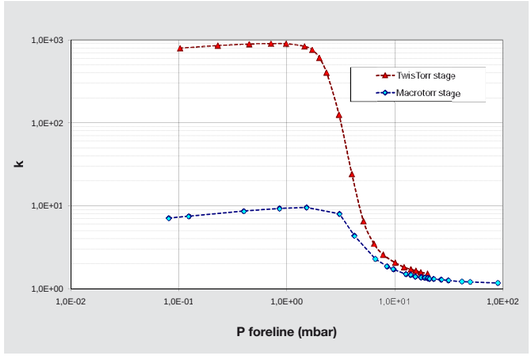
● Our rotor is based on the proven Agilent monolithic rotor design which positions the TwisTorr Stator between two smooth spinning disks and therefore exploits the pumping action by both disk surfaces in series.

● The double-sided spiral groove design on the TwisTorr stators combines centripetal and centrifugal pumping action in series, greatly reducing the size of the drag section.

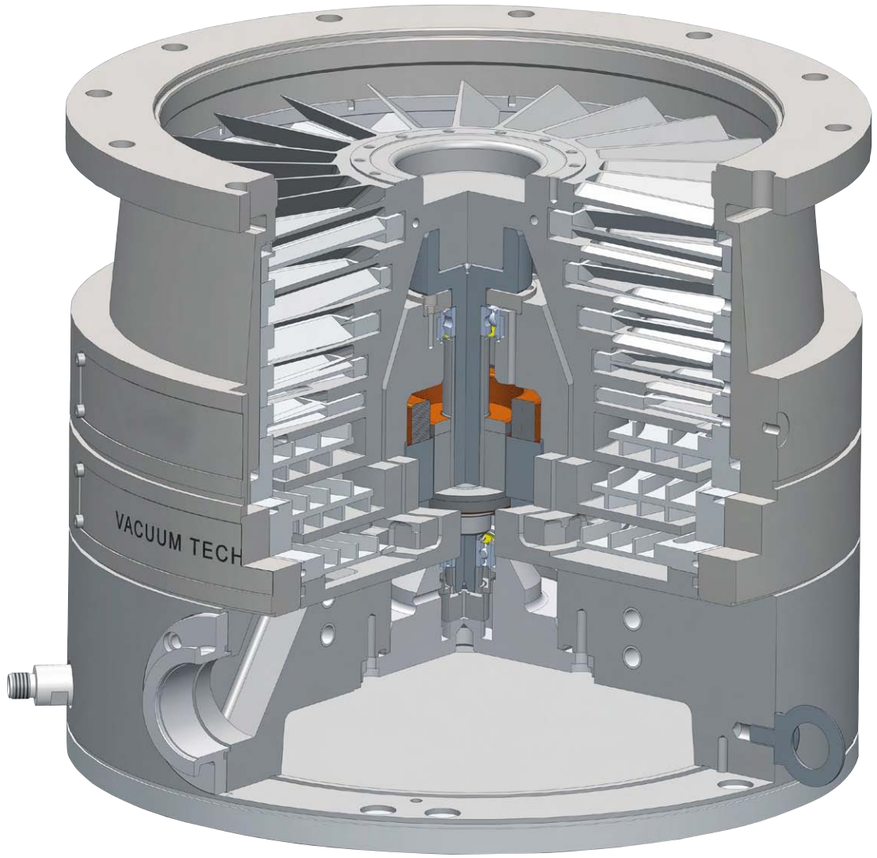


Compression ratio

● Compression ratio for N_2 of a single TwisTorr stage can increase up to a factor of 100 with respect to a MacroTorr stage of the same space and rotor speed, without reducing foreline tolerance and pumping speed.



Agilent TwisTorr Key features



Leading edge performance

- The new Turbo-V 2300 TwisTorr offers the highest pumping speed in its class for N_2
- State of the art TwisTorr technology also creates higher compression ratios for light gases than other large Turbo Molecular Pumps
- The Turbo-V 2300 TwisTorr is designed for scientific and research applications and is operated with a dedicated full display rack controller
- TwisTorr allows for very high foreline pressure tolerance, so the pump may be backed by a smaller, cost-effective dry scroll pump like our TS600

Dedicated UHV solution

- The new high performing TwisTorr drag stages allow for a 20% reduction in the height and weight of the rotor
- High foreline pressure tolerance permits the use of a more compact dry fore pump, allowing you to downsize your system and run a fully UHV-compatible solution
- Rack electronics are ideally suited for research and laboratory environments, and because no electronics are present inside the pump, provide an excellent solution for radioactive applications as well

Advanced electronics

- The Turbo-V 2300 solution is comprised of a stand-alone pump and a rack type display controller unit, available in two voltage versions: 110 and 220 VAC
- Remote control is available through Logical I/O and serial (RS232) connection. Profibus solutions are available on request as well
- The integrated Purge/Vent device allows for a controlled pump slow down, with a modulated vent procedure in combination with the Stop Speed Reading (SSR) function. The embedded purge gas solution protects bearings against dust and corrosive gases

Design for Reliability

- VACUUM PERFORMANCE
  Advanced rotor design in combination with TwisTorr technology has allowed us to reduce the number of pumping stages by 20% compared to conventional designs. The result is a more compact, lighter rotor with improved overall vacuum performance. This compact rotor design also leads to an improved dynamic stability of the rotor and a reduced mechanical load on the suspension.
- ADVANCED ROTOR GEOMETRY
  Our unique monolithic rotor is fully automatically machined out of one single piece of advanced high strength aluminum alloy according to our proprietary design. This highly precise process reduces material stress and relaxes the required assembly tolerances compared with a traditional stacked rotor design, in which individual rotor stages are assembled on a shaft. Our proprietary new inverted shaft fitting process reduces stress by 60% compared to traditional fitting.
- OPERATING EFFICIENCY
  State of the art rotor design with improved motor efficiency allows delivery of higher vacuum performance with lower heat dissipation inside the pump. A further improvement to average lower running temperatures comes from our improved water cooling system, which uses a double loop stainless steel cooling channel casted inside our pump body.

Clean maintenance-free vacuum

- Modern research and scientific applications require the cleanest vacuum solution. For these applications we offer our unique UHV compatible Turbo Molecular Pump design. In our Turbo Molecular Pumps no suspension components are exposed to the UHV side of the system and there are no permanent magnetic bearings that could disturb the experimental chamber.
- Our high-precision ceramic ball bearings are both installed on the fore vacuum side of the pump and permanently lubricated with our unique proprietary solid lubricant characterized by an extremely low vapor pressure. This solution is absolutely maintenance free and allows for installation of the pump in any orientation.
- Our Turbo Molecular Pumps contain no free oil for bearing lubrication, thereby eliminating the need for refills and eliminating the risk of vacuum chamber contamination.

Agilent Turbo-V 2300 TwisTorr Rack

Technical Specifications

Vacuum Performances	
Pumping speed for N_2 (*)	2050 l/s
Pumping speed for He (*)	1800 L/s
Pumping speed for H_2 (*)	1500 L/s
Compression ratio for N_2	>8 x 10^8
Compression ratio for He	8 x 10^5
Compression ratio for H_2	4 x 10^4
Base pressure* (with recommended forepump)	10^{-10} mbar (7.5 x 10^{-11} Torr) (**)
Max foreline pressure for N_2	4 mbar
Inlet Flange	ISO 250F, CFF 12" O.D.
Foreline flange	KF 40 NW

Other	
Nominal rotational speed	33300 rpm
Start-up time without gas load and with the recommended forepump	< 6 minutes
Minimum recommended forepump	TriScroll 600
Operational position	Any
Operating ambient temperature	+5 °C to +35 °C
Bakeout temperature	120°C (CFF), 80°C (ISO)
Max rotor temperature	120 °C
Vibration level (displacement)	< 0.01 µm at inlet flange
Lubricant	Permanent lubrication
Cooling requirements	Water
Coolant water	Recommended flow: 200 l/h Temperature: +15 °C to +30 °C Pressure: 3 to 5 bar (45 to 75 psi)
Noise level	<60 dB(A) at 1 meter
Storage temperature	-20° C to +70° C
Environment protection	IP54
Weight kg (lbs)	ISO 250: 54.2 (119.5) CF 12": 55.3 (121.9)

(*): WITHOUT INLET SCREEN

(*): According to standard DIN 28 428, the base pressure is that measured in a leak-free test dome, 48 hours after the completion of test dome bake-out, with a Turbopump fitted with a CFF flange and using the recommended pre-vacuum pump

Controller Specifications	
Input voltage	100, 120, 220, 240 Vac, 1-phase
Input frequency	50 - 60 Hz
Maximum input power	1300 VA
Output voltage	64 Vac
Output frequency	555 Hz
Output Power starting	560 W maximum
Output Power normal	450 W maximum
Weight (both models)	12,5 kg (28 lbs)
Installation category	II
Pollution degree	2

Ordering Information

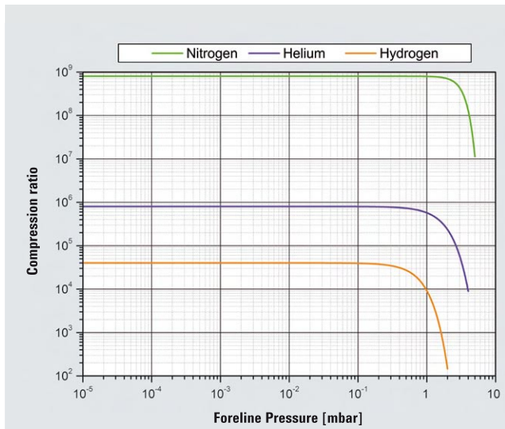
Pump	
969-6000	AGILENT Turbo-V 2300 TwisTorr ISO250F Rack
969-6001	AGILENT Turbo-V 2300 TwisTorr CFF12" OD Rack

Controllers*	
969-9539	AGILENT Turbo-V 2300 Rack Controller 120V
969-9540	AGILENT Turbo-V 2300 Rack Controller 220 V
969-9962	AGILENT Turbo-V 2300 Pump-Controller Cable kit, 5mt

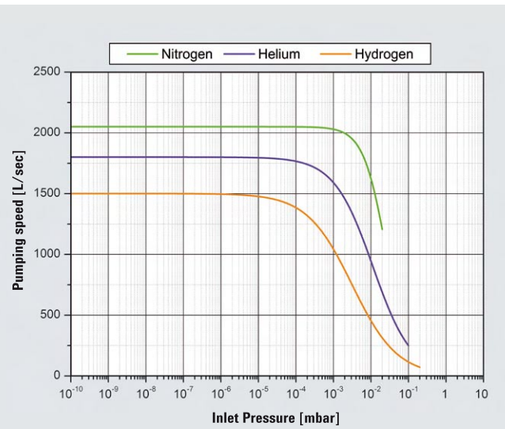
(*): Please note that Rack Controllers do not include the Pump-Controller Cable Kit

Accessories	
969-9958	Mains cable NEMA Plug, 3m long
969-9957	Mains cable European Plug, 3m long
969-9144	Center-ring ISO250
969-9350	Inlet screen DIN ISO 250 // CFF12" AISI
969-9348	Water cooling kit for 6x8 (IDxOD) flexible tube
969-9338	Water cooling kit for 3/8 in. ID flexible tube

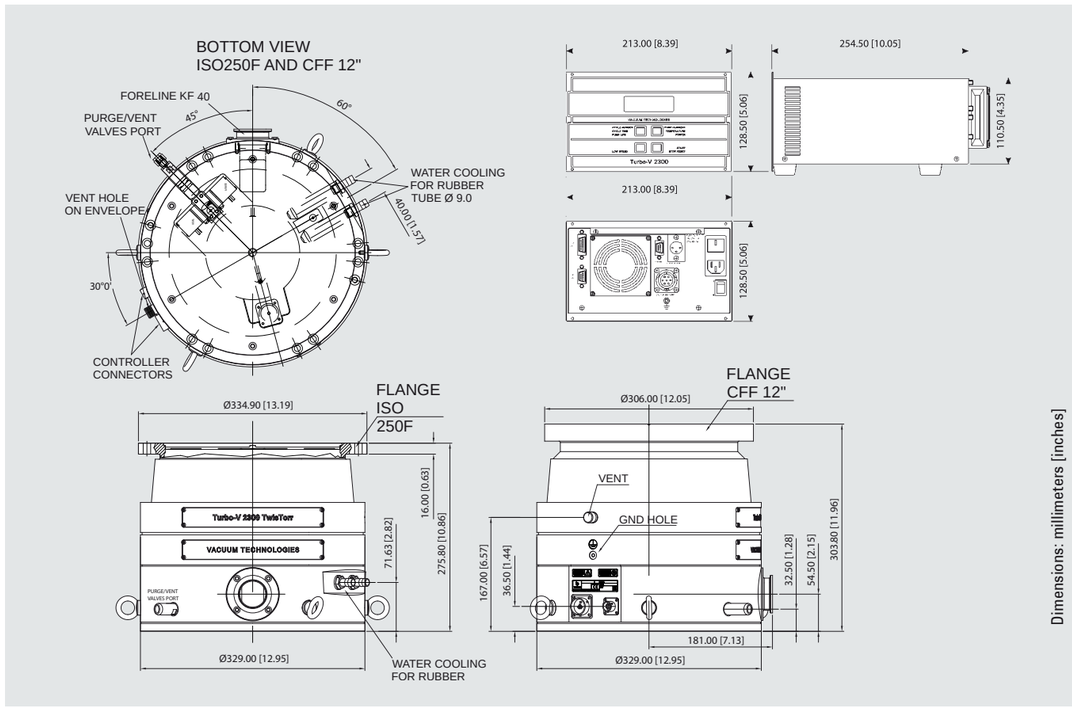
Compression Ratio Vs Foreline Pressure



Pumping Speed



Outline Drawing



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Service & Support

ADVANCE EXCHANGE

To maximize uptime, and for those occasions where you cannot afford stopping your process, Agilent offers exchange units for advanced shipment, with pumps which are rebuilt to as-new specs and latest revision level. As soon as requested, your order can be processed within 24 hours.

REPAIR

Agilent products offer unmatched reliability, performance and cleanliness. Production requirements, however, inevitably create, over time, the need for maintenance and repair. Timely repair at Agilent will keep your products performing at an outstanding level all the time.

UPGRADE

Designed for customers who want replace a unit with a newest technology product. We rebuild these products to as-new specifications, with a full 12-month warranty.level all the time.

Agilent Technologies

United States and Canada
Agilent Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel.: +1 781 861 7200
Toll-Free: +1 800 882 7426
Fax: +1 781 860 5437
vpl-customerservice@agilent.com

Benelux
Agilent Technologies Netherlands B.V.
Herculesweg 8
4338 PL Middelburg
The Netherlands
Tel: +31 118 671570
Fax: +31 118 671569
Toll free: 00 800 234 234 00

China
Agilent Technologies (China) Co. Ltd
No.3, Wang Jing Bei Lu,
Chao Yang District,
Beijing, 100102
China
Tel.: +86 (10) 6439 7888
Fax: +86 (10) 6439 1318
Toll-Free: 800 820 8266
vpc-customerservice@agilent.com

France
Agilent Technologies France
7 avenue des Tropiques
Z.A. de Courtaboeuf - B.P. 12
91941 Les Ulis cedex
France
Tel.: +33 (0) 1 69 86 38 84
Fax: +33 (0) 1 69 86 29 88
Toll free: 00 800 234 234 00
vpf.sales@agilent.com

Germany & Austria
Agilent Technologies
Alsfelder Strasse 6
Postfach 11 14 35
64289 Darmstadt
Germany
Tel.: +49 (0) 6151 703 353
Fax: +49 (0) 6151 703 302
Toll free: 00 800 234 234 00

India
Agilent Technologies India Pvt. Ltd.
G01. Prime corporate Park,
230/231, Sahar Road,
Opp. Blue Dart Centre,
Andheri (East), Mumbai – 400 099.
India
Tel: +91 22 30648287/8200
Fax: +91 22 30648250
Toll Free: 1800 113037
cag_india@agilent.com

Italy
Agilent Technologies Italia S.p.A.
via F.lli Varian 54
10040 Leini, (Torino)
Italy
Tel.: +39 011 997 9111
Fax: +39 011 997 9350
Toll-Free: 00 800 234 234 00
vpt.sales@agilent.com
vpt-customerservice@agilent.com

Japan
Agilent Technologies Japan, Ltd.
8th Floor
Sumitomo Shibaura Building
4-16-36 Shibaura Minato-ku
Tokyo 108-0023
Japan
Tel.: +81 3 5232 1253
Toll-Free: 0120 655 040
Fax: +81 3 5232 1710
vpj-customerservice@agilent.com

Korea
Agilent Technologies Korea Ltd.
Shinsa 2nd Bldg. 2F
966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel.: +82 2 3452 2455
Toll-Free: 080 222 2452
Fax: +82 2 3452 2451
vpk-customerservice@agilent.com

Mexico
Agilent Technologies
Concepcion Beistegui No 109
Col Del Valle
C.P. 03100
Mexico, D.F.
Tel.: +52 5 523 9465
Fax: +52 5 523 9472

Singapore
Agilent Technologies Singapore Pte Ltd
No.1 Yishun Avenue 7
Singapore 768923
Tel: +65 6215 8045
Fax : +65 6754 0574
Toll-Free: 1 800 2762622
vps-customerservice@agilent.com

South East Asia
Agilent Technologies Sales Sdn Bhd
Unit 201, Level 2 uptown 2,
2 Jalan SS21/37, Damansara Uptown
47400 Petaling Jaya ,
Selangor , Malaysia
Tel : +603 7712 6106
Fax: +603 6733 8121
Toll-Free: 1 800 880 805
vps-customerservice@agilent.com

Taiwan
Agilent Technologies Taiwan Limited
20 Kao-Shuang Rd.,
Pin-Chen City, 324
Taoyuan Hsien , Taiwan, R.O.C.
Tel. +886 34959281
Toll Free: 0800 051 342
vpw-customerservice@agilent.com

UK & Ireland
Agilent Technologies UK Ltd
6 Mead Road
Oxford Industrial Park
Yarnton, Oxford OX5 1QU
UK
Tel.: +44 (0) 1865 291570
Fax: +44 (0) 1865 291571
Toll free: 00 800 234 234 00
vpt-customerservice@agilent.com

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