

New Agilent TwisTorr 305 Turbo Pump

Connect with Quality Vacuum!





Introducing the Agilent TwisTorr 305

The TwisTorr 305 turbomolecular pump is the first example of a new way of designing and manufacturing Agilent vacuum products.

Performance, innovation, attention to detail, and reliability are the main pillars of this high-quality product that offers an impressive number of features in a compact package.

Two main versions of this turbo pump are available: TwisTorr 305-IC, featuring a powerful and sleek Integrated Control unit, and the TwisTorr 305 FS, a stand-alone pump powered and controlled by a remote control unit.

In addition to the patented TwisTorr drag stages, which provide high compression ratios for light gases and high foreline pressure tolerance, the product offers very low vibration and lowest noise level in its class.



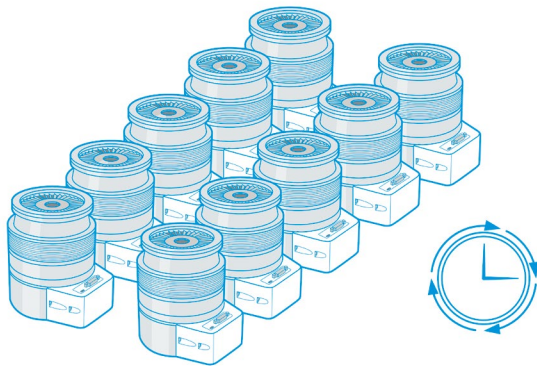
Smart connectivity: Bluetooth, USB and NFC

The new Vacuum Link App offers remote control of the pump, making it easy to monitor your system, and providing a quick way to share pump information with your colleagues and with Agilent personnel. Support is just a few clicks away: Agilent dedicated Support Team will assist readily and professionally.



Design Process and Quality Test Elements

The product life cycle design method drives and tracks the design process through the six steps of proposal, investigation, lab prototype, production prototype, pilot run, and ramp to volume. Multiple controls and accurate tracking ensure full confidence in performance, quality, and regulatory data published for users.



Agilent quality and reliability

Life test

Pump reliability is proven through an accelerated life test on a statistically significant number of pumps, exposed for extended time to accelerating factors.

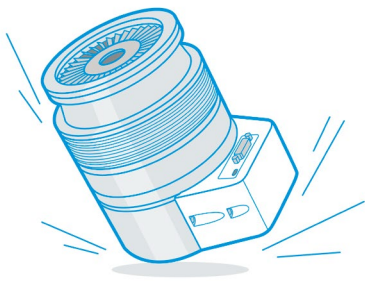
The test provides confidence in the pump's hassle-free operation for an average period of more than five years.

Shock test

Pump resistance to shocks is proven by tests on a batch of pumps in both operative and non-operative conditions. Every pump is exposed to a 30 to 120 g acceleration (equivalent to a drop from 82 cm/32" for the non-operative pump, and 15 cm/6" for the operative pump).

Pumps are shock-tested six times in vertical, horizontal, and upside-down orientations.

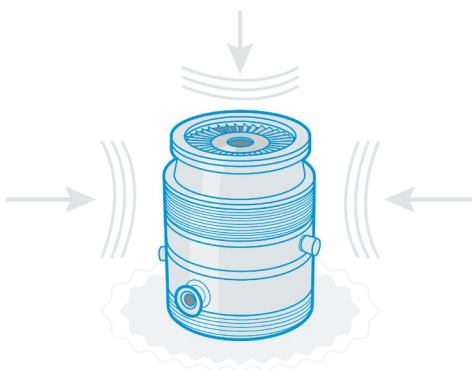
No issues occurred with the tested pumps after 24 drops (no rotor mechanical contacts, no change to pump operation). Pump unbalance, verified after every drop, showed minor variations, well below acceptance threshold.



Vibration test

Resistance to vibration generated by external sources was demonstrated through a set of tests on a batch of pumps both in operative and non-operative conditions. Each pump was exposed to energy levels from 0.5 to 2 g during 105-minute vibration cycles in vertical, horizontal, and upside-down orientations at full rotational speed and non-operative.

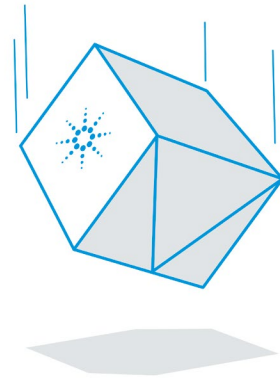
The test confirmed pump robustness and resistance with vibrations, as no rotor mechanical contacts or changes to pump operation were observed, and the pump unbalance remained well below the acceptance threshold.



Packaging test

The packaging functionality was verified with test sessions on packed pumps, which were tested using a pattern of 18 drops from 96 cm / 37.8" height.

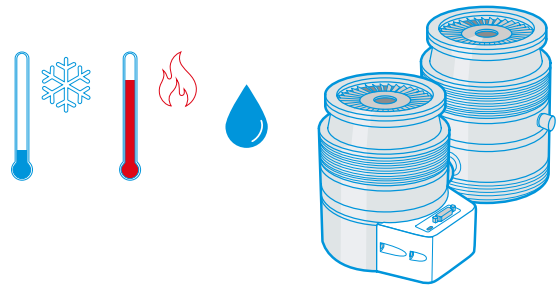
The TwisTorr 305 can withstand 30 g level of acceleration (due to drop) and suffer no damage during shipment.



Stability over time

Thermal test

Pumps were exposed for 86 h to temperatures ranging from -40 °C to +70 °C (non-operative) and from 0° C to 40 °C (operative). Pump imbalance and correct operation were verified 11 times on every pump with only minor variations, well below the acceptance threshold. Thermal testing confirmed pump robustness under all expected operative and non-operative temperature conditions.



Quiet and low-vibration

Fourier analysis

The pump vibration spectrum is verified on every pump during the manufacturing process and in final testing before the pump shipment. The average maximum vibration level at full speed: 0.4 m/s².



Noise test

Audible pump noise was verified through a set of tests on a batch of pumps in 12 different operative statuses and orientations, including: vertical, horizontal, and inverted positions; with and without gas load; high temperature and low temperature; full speed and low speed.

The average pump noise resulting from the 168 measurements was 41 dB(A) +/-3σ in normal operation.



NOTE: Test data provided are referred to TwisTorr 305 FS, 305-IC.

New Vacuum Link App for TwisTorr 305

Innovation in vacuum control and data sharing



A new way to be connected to your work: export and share device data easily and quickly.



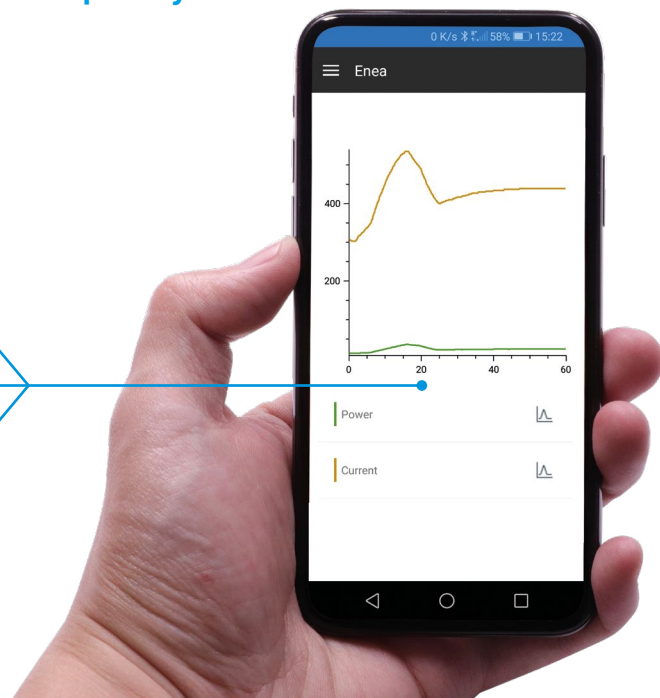
Bluetooth remote control



USB direct wire



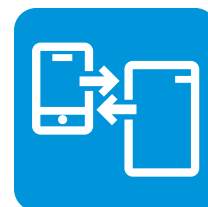
NFC Near field communication



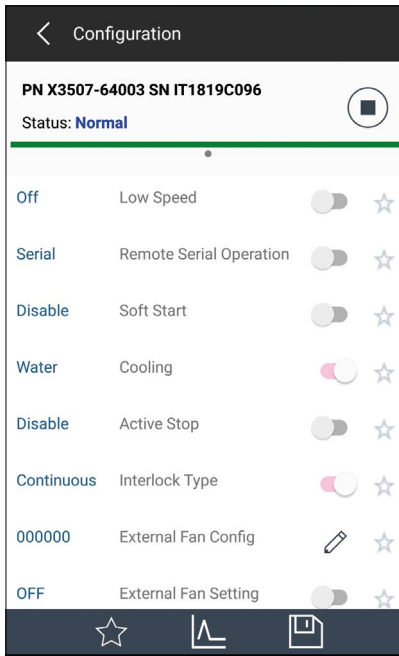
Smart Connectivity at hand

A totally new experience for busy, connected vacuum users.

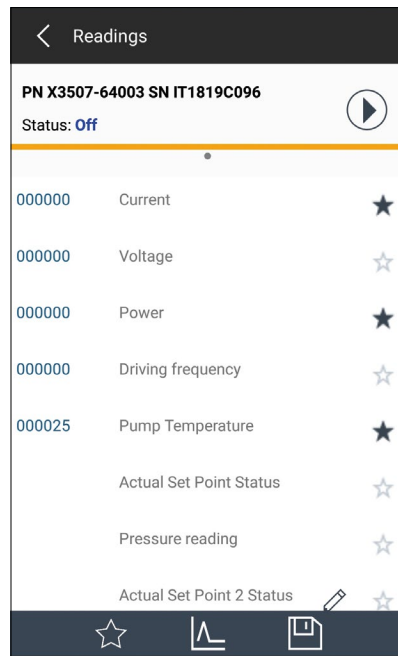
Vacuum Link installs on your Apple or Android smartphone, it allows real-time monitoring of the parameters of your choice, and even offers recording capability: data can be exported to your computer to be easily displayed and shared.



Download the new Vacuum Link app on your smartphone.



Configure your system



Read the pump parameters

A feature-rich app to help speed up the daily tasks.

Vacuum Link can monitor up to three TwisTorr 305 pumps at the same time; a customized "Favorites" page that includes the most important parameters can be created and edited as needed.

Keeping track of pump operation is extremely easy and fast. No need to sit in front of screen of a controller or a computer for long periods.

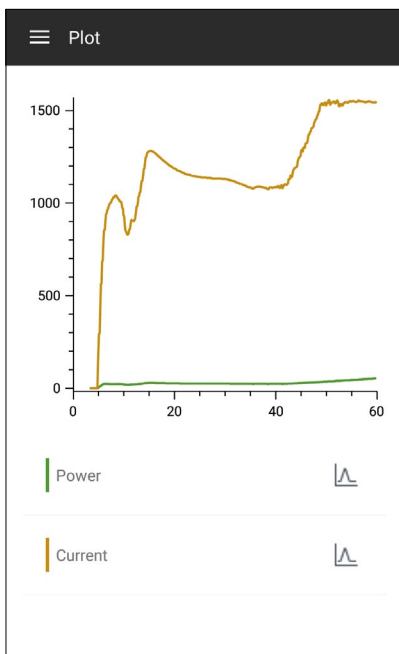


Control, export, and share data

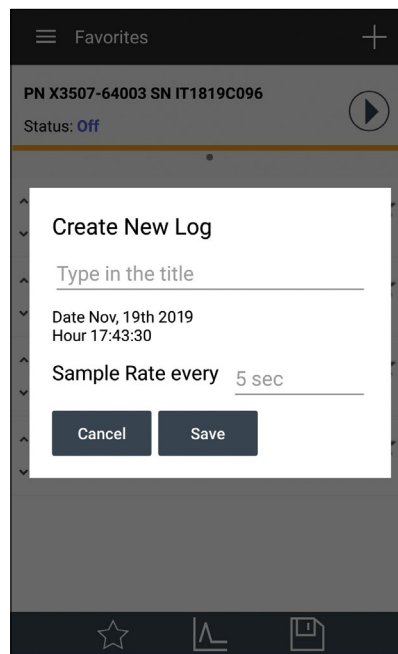
Creating log files is easy and sharing them is extremely quick using the regular features available on virtually any smartphone.

Log files help users review the pump parameters in a spreadsheet.

Plotting parameter variations can be done using the dedicated icon.



See the pump performance in real time



Export and share data

Performance, Quality, Digital Connectivity



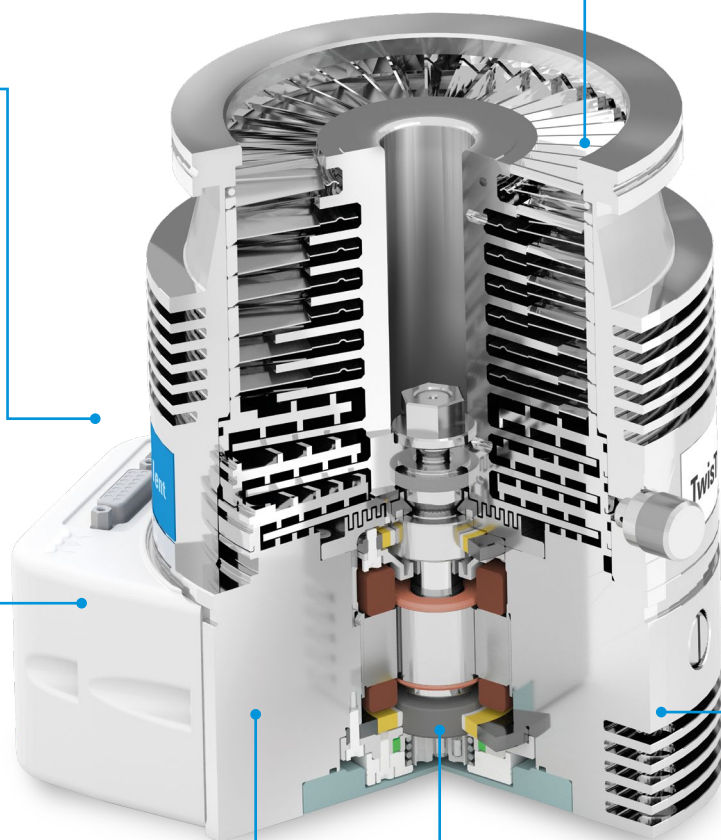
Agilent total quality

TwisTorr 305 family features

- Agilent Floating Suspension (AFS)
- Optimized thermal design
- Thermal mapping
- Agilent quality standards
- New TwisTorr stages with improved labyrinth design.

Your benefits

- Reduced cost of ownership and system downtime
- Proven robustness and reliability:
- Resistance to particles in the vacuum



TwisTorr 305-IC cutaway



New integrated controller

TwisTorr 305 family features

- No cables
- Small dimensions
- Compactness

Your benefits

- Units fit in tiny spaces
- Modern, sleek look
- Very low electronic noise



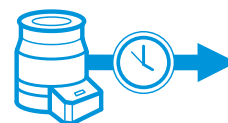
Quiet and low-vibration

TwisTorr 305 family features

- Agilent Floating Suspension
- Agilent Modal Balancing

Your benefits

- Extremely low vibration level (damping effect)
- Quiet pump during operation
- Wider speed adjustment extends pump application range
- Very low noise during ramp and regular operation



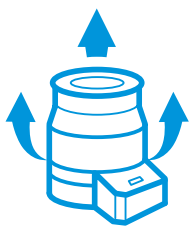
Stability over time

TwisTorr 305 family features

- Agilent Floating Suspension
- Bearings and rotor stable/constant positioning over time

Your benefits

- Stable noise and vibration performance over time.



Superior performance

TwisTorr 305 family features

TwisTorr drag stages allow for:

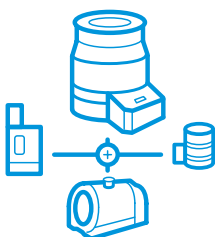
- Superior compression ratio
- High foreline pressure tolerance
- Best-in-class pumping speed

Your benefits

- Low ultimate pressure
- Fast pumpdown
- Smaller, less expensive backing pump
- Lower power consumption



TwisTorr 305 FS and Remote Controller



Easy system integration

TwisTorr 305 family features

- Ceramic ball bearings with permanent lubrication
- Various types of controllers: integrated, remote, serial protocols and Profibus

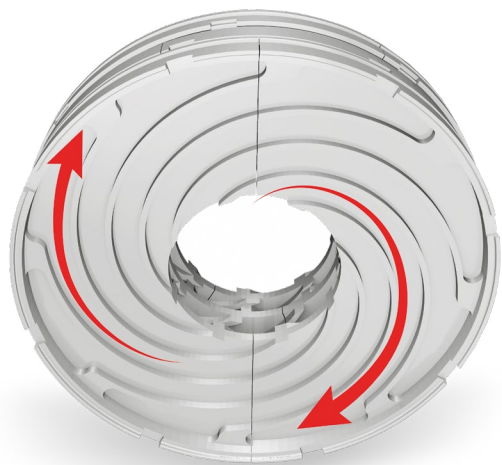
Your benefits

- Compact design
- Plug and play
- Easy pump control and monitoring
- Operation in any position
- Oil-free solution

Applications	TwisTorr FS advantage
Academia and research	Excellent vacuum performance, with TwisTorr stages optimized for H ₂ compression
Electron microscopes	Low vibration, low noise, and high stability
Analytical instruments	Optimized performance for light gases in routine applications
Industrial and semiconductors	Dry, clean vacuum

What Is TwisTorr?

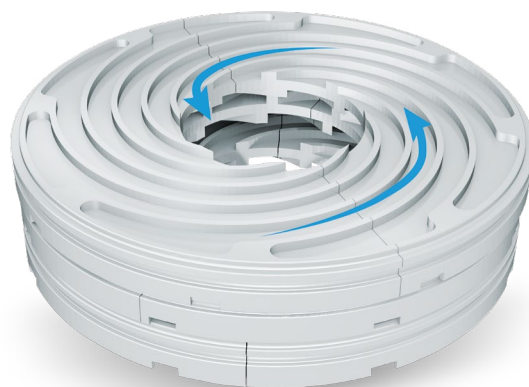
The new molecular-drag technology.



Centrifugal pumping action

Upper surface area of rotating disk transfers momentum to gas molecules.

Spiral groove design on the lower section of the TwisTorr stator causes a centrifugal pumping action.



Centripetal pumping action

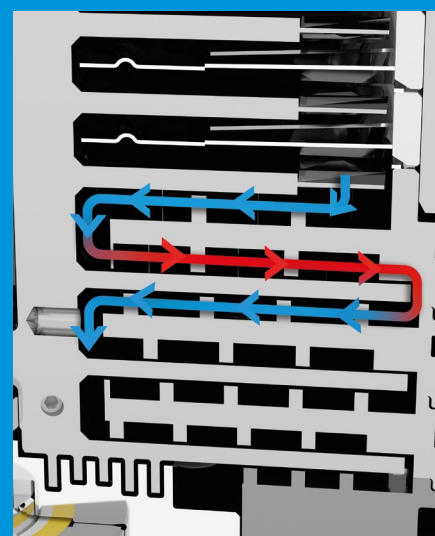
Lower surface area of rotating disk transfers momentum to gas molecules.

Spiral groove design on the upper section of the TwisTorr stator causes a centripetal pumping action.

- 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.
- A single TwisTorr stage can improve the compression ratio for N_2 by up to 100 times compared to conventional stages, providing exceptional foreline tolerance and pumping speed

Leading-edge performance

- Excellent pumping speed for all gases.
- Highest compression ratios for light gases such as hydrogen and helium
- High foreline pressure tolerance
- The turbo pump can work with smaller backing pumps
- Minimal average power consumption



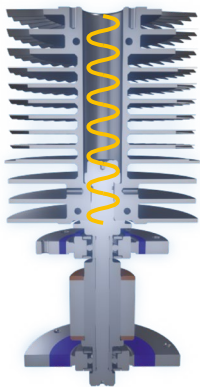
Gas flow in centripetal and centrifugal direction through TwisTorr stages

What Is Agilent Floating Suspension?

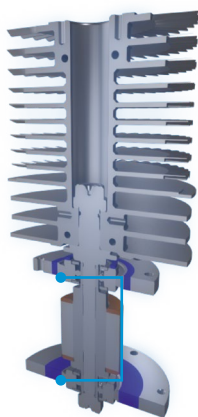
Innovative solution for low vibration and stability over time.



Perfect bearing alignment



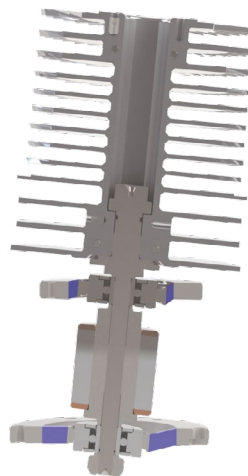
Vibration damping



Thermal stability



TwisTorr rotor, floating suspension, and electrical motor



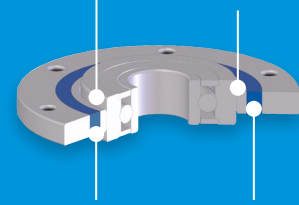
Optimized rotor dynamic behaviour



Upper AFS

Lower AFS

Radial press fitting to maintain the best working conditions for bearings over time



High performance elastomer for vibration damping

- High geometrical precision for perfect bearing alignment
- Improved radial and axial stiffness, optimized rotor dynamic behaviour, and acoustic noise
- Axial spring effect of lower AFS for bearing preload and axial rotor positioning
- Low vibration and low acoustic noise
- Optimal working conditions for the bearings provide extended operating life
- Exceptional stability for the very demanding SEM application
- Excellent thermal stability

Technical Specifications



TwisTorr 305-IC



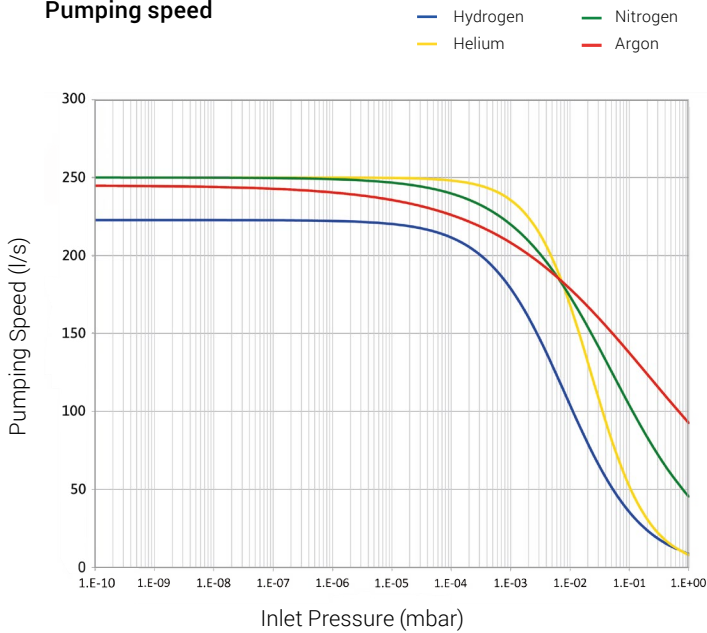
TwisTorr 305 FS

Technical Specifications	
Pumping speed	ISO 100 K / CFF 6" / ISO 160 K / CFF 8"
N ₂	250 L/s
He	255 L/s
H ₂	220 L/s
Ar	250 L/s
Max gas flow rate	
N ₂	250 SCCM
Note: values refer to water-cooling pump version with: - water temperature between 15°C and 20°C (non condensing) - backing pump with pumping speed equal or above (5 m ³ /h) 170 SCCM	
Compression ratio	
N ₂	> 1 x 10 ¹¹
He	> 1 x 10 ⁹
H ₂	1.5 x 10 ⁶
Ar	> 1 x 10 ¹¹
Max foreline pressure tolerance N ₂	
	12 mbar
Note: foreline tolerance defined as the pressure at which the turbopump still produces a compression of 100. For continuous operation, water cooling is recommended (water temperature between 15°C and 20°C).	
Base pressure with recommended forepump	
	<1 x 10 ⁻¹⁰ mbar (<1 x 10 ⁻¹⁰ Torr)
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 ConFlat flange and using the recommended pre-vacuum pump	
Inlet flange	ISO 100 K, CFF 6", ISO 160 K, CFF 8"
Foreline flange	KF16 NW (KF25 - optional)
Rotational speed	60000 rpm (1010 Hz driving frequency)
Start-up time	< 3 minutes (longer when soft start is used)
Recommended forepump	Dry pumps: IDP-3 (no gas flow), IDP-7, IDP-10, Mechanical: DS102, DS302
Operating position	Any
Oper. ambient temperature	+5 °C to +35 °C
Bakeout temperature	Max 80 °C at inlet flange
Lubricant	Permanent lubrication
Cooling requirements	
Air cooling	Natural convection (only with no gas load) Forced air (5- 35 °C ambient temperature)
Water cooling	Minimum flow: 50 l/h (0.22 GPM) Temperature: +15 °C to +30 °C Max pressure: 5 bar (75 psi)

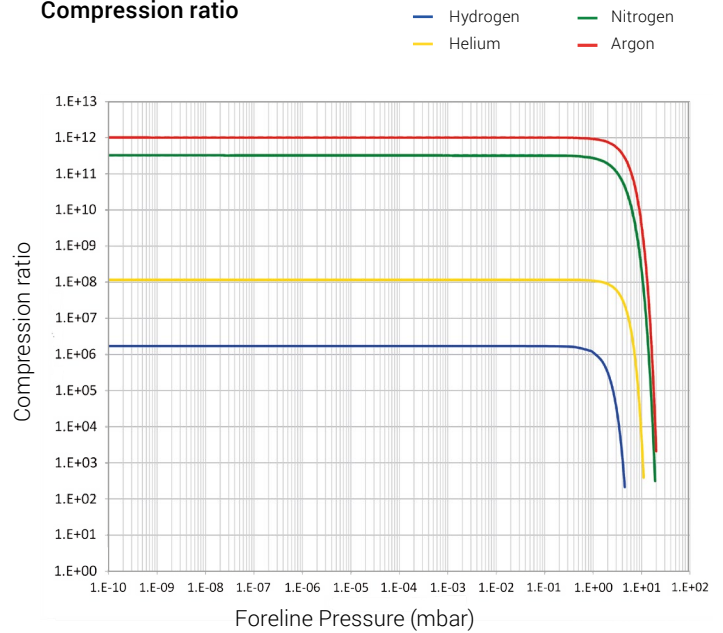
Technical Specifications		
Noise pressure level (at 1m at full speed)	41 dB(A)	
Note: mean values based on a significant sample (Ar and N ₂ compression ratio estimated); standard deviation per test: pumping speed: below ± 7%; noise pressure level: ± 10%" (only pump).		
Installation category	II	
Pollution degree	2	
Storage temp.	-40°C to +70°C	
Max altitude	3000 m	
Weight kg (lbs) TwisTorr 305-IC	ISO 100 K CFF 6"	5,74 kg (12,6) 8,06 kg (17,7)
	ISO 160 K CFF 8"	6,18 kg (13,6) 10,33 kg (22,7)
Weight kg (lbs) TwisTorr 305 FS	ISO 100 K CFF 6"	5,84 kg (12,8) 8,16 kg (17,9)
	ISO 16 0K CFF 8"	6,28 kg (13,8) 10,43 kg (22,9)
Compliance with:	EN 61010-1 EN 61326-1 EN 1012-2 EN 12100 EN 50581 Machinery Directive 2006/42/EC Electromagnetic Compatibility Directive 2014/30/EU Directive 2011/65/EU	

Technical Specifications	
Remote controller	
Voltage	100 - 240 Vac (voltage fluctuation +/- 10%)
Frequency	50 to 60 Hz
Power	450 VA
Fuse	2 x T4 A (slow blow) 250 V
Power supply (24 Vdc):	
Input voltage	24 Vdc
Max input power	200 W
Stand-by power	10 W
Max operating power	150 W with water or air cooling
Protection fuse	8 A
Max operating altitude	3000 m
USB communication	as per USB 1.1
Power cable	Required motor input voltage is 24V +/- 10%; please dimension power cable to guarantee the minimum voltage level. I.e. for AWG 20 resistance is 33,31 mOhm/m; so for a cable of 6 meters and maximum current (7.5A) the voltage lost is 1.5V.

Pumping speed



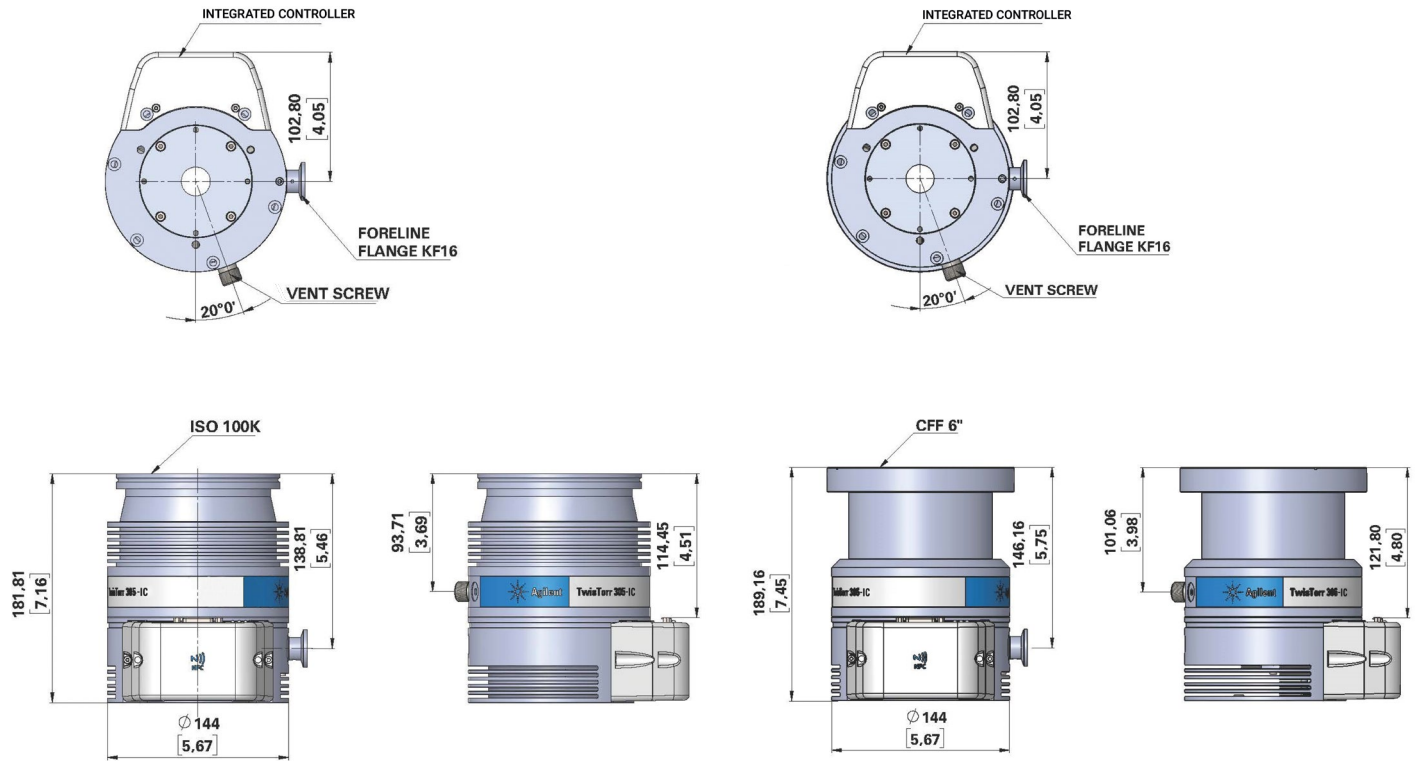
Compression ratio



Outline drawings

Agilent TwisTorr 305-IC

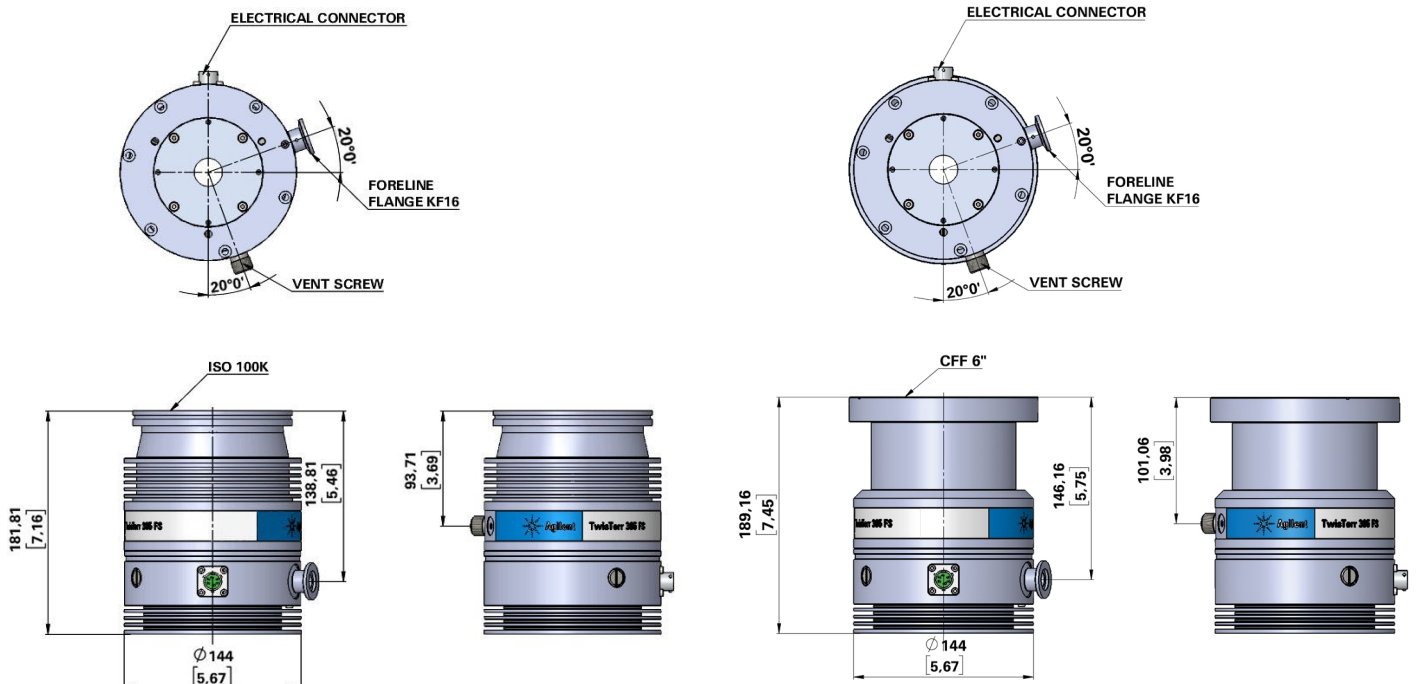
Dimensions: millimeters [inches]



3D Drawings available for download

Agilent TwisTorr 305 FS

Dimensions: millimeters [inches]



3D Drawings available for download

Ordering information

Pumps	Cooling	Flange	Part Number
TwisTorr 305-IC, 485A	Air	ISO 100 K	X3513-64000
TwisTorr 305-IC, 485A	Air	CFF 6"	X3513-64001
TwisTorr 305 IC, 485A	Air	ISO 160 K	X3513-64002
TwisTorr 305 IC, 485A	Air	CFF 8"	X3513-64003
TwisTorr 305 IC, 485A	Water	ISO 100 K	X3513-64004
TwisTorr 305 IC, 485A	Water	CFF 6"	X3513-64005
TwisTorr 305 IC, 485A	Water	ISO 160 K	X3513-64006
TwisTorr 305 IC, 485A	Water	CFF 8"	X3513-64007
TwisTorr 305-IC, 485P	Air	ISO 100 K	X3513-64016
TwisTorr 305-IC, 485P	Air	CFF 6"	X3513-64017
TwisTorr 305-IC, 485P	Air	ISO 160 K	X3513-64018
TwisTorr 305-IC, 485P	Air	CFF 8"	X3513-64019
TwisTorr 305-IC, 485P	Water	ISO 100 K	X3513-64020
TwisTorr 305-IC, 485P	Water	CFF 6"	X3513-64021
TwisTorr 305-IC, 485P	Water	ISO 160 K	X3513-64022
TwisTorr 305-IC, 485P	Water	CFF 8"	X3513-64023
TwisTorr 305-IC, 232	Air	ISO 100 K	X3513-64024
TwisTorr 305-IC, 232	Air	CFF 6"	X3513-64025
TwisTorr 305-IC, 232	Air	ISO 160 K	X3513-64026
TwisTorr 305-IC, 232	Air	CFF 8"	X3513-64027
TwisTorr 305-IC, 232	Water	ISO 100 K	X3513-64028
TwisTorr 305-IC, 232	Water	CFF 6"	X3513-64029
TwisTorr 305-IC, 232	Water	ISO 160 K	X3513-64030
TwisTorr 305-IC, 232	Water	CFF 8"	X3513-64031
TwisTorr 305 FS	Air	ISO 100 K	X3513-64008
TwisTorr 305 FS	Air	CFF 6"	X3513-64009
TwisTorr 305 FS	Air	ISO 160 K	X3513-64010
TwisTorr 305 FS	Air	CFF 8"	X3513-64011
TwisTorr 305 FS	Water	ISO 100 K	X3513-64012
TwisTorr 305 FS	Water	CFF 6"	X3513-64013
TwisTorr 305 FS	Water	ISO 160 K	X3513-64014
TwisTorr 305 FS	Water	CFF 8"	X3513-64015

Controllers

TwisTorr 305 FS Remote Controller 232-485	X3506-64130
TwisTorr 305 FS Remote Controller Profibus	X3506-64131

Cables

Mains cable NEMA plug, 3 m long *	9699958
Mains cable European plug, 3 m long *	9699957
Mains cable China plug, 3 m long *	8121-0723
5 m Turbopump Extension Cable *	969-9942M007
10 m Turbopump Extension Cable *	969-9942M006
15 m Turbopump Extension Cable *	969-9942M005
20 m Turbopump Extension Cable *	969-9942M004
50 m Turbopump Extension Cable *	969-9942M015
5 m Turbopump Fan Extension Cable **	9699949

Inlet Screens	Part Number
Inlet Screen ISO 100 K	X3500-68000
Inlet Screen CFF 6"	9699302
Inlet Screen ISO 160 K	X3500-68001
Inlet Screen CFF 8"	9699304
Cooling	
Water Cooling Kit	9699337
Metric Water Kit 4 x 6 mm	9699347
Air cooling kit for TwisTorr 305-IC ** (Kit X3514-68001 is required)	X3500-68010
Air cooling kit for TwisTorr 305 Remote controller *	X3500-68011
Fan extension cable for Remote Controller *	9699940
5 m Vent Valve Extension cable *	9699941
Vibration isolators	
Vibration isolator ISO 100 K	9699344
Vibration isolator CFF 6"	9699334
Vibration isolator ISO 160 K	9699345
Vibration isolator CFF 8"	9699335
Venting	
Vent Valve N.O. 1, 2 mm for TwisTorr 305-IC ** (Kit X3514-68001 is required)	9699834
Vent Valve N.O. 0,5 mm for TwisTorr 305-IC ** (Kit X3514-68001 is required)	9699834M006
DB15 Mating Connector not wired 7.5A **	X3514-68000
TwisTorr 305-IC Fan/Vent Adapter kit **	X3514-68001
Vent Valve N.O. 0,5 mm Orifice *	9699844
Vent Valve N.O. 1.2 mm Orifice *	9699845
Vent Valve N.C. 1.2 mm Orifice *	9699846
Vent Valve N.C. 0,5 mm Orifice *	9699847
Purge	
Purge valve 10 SCCM NW16KF - M12	9699239
Purge valve 10 SCCM ¼ Swagelock - M12	9699240
Purge valve 20 SCCM NW16KF - M12	9699241
Purge valve 20 SCCM ¼ Swagelock - M12	9699242
Purge valve 10 SCCM ¼ Swagelock - ¼ Swagelock	9699232
Purge valve 20 SCCM ¼ Swagelock - ¼ Swagelock	9699236
Other accessories	
Serial to Bluetooth adapter (necessary for App) *	X3514-68003
KF25 Foreline flange	X3513-68000

* For TwisTorr 305 FS

** For TwisTorr 305-IC

Learn more:

www.agilent.com/chem/TwisTorr305

Buy online:

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