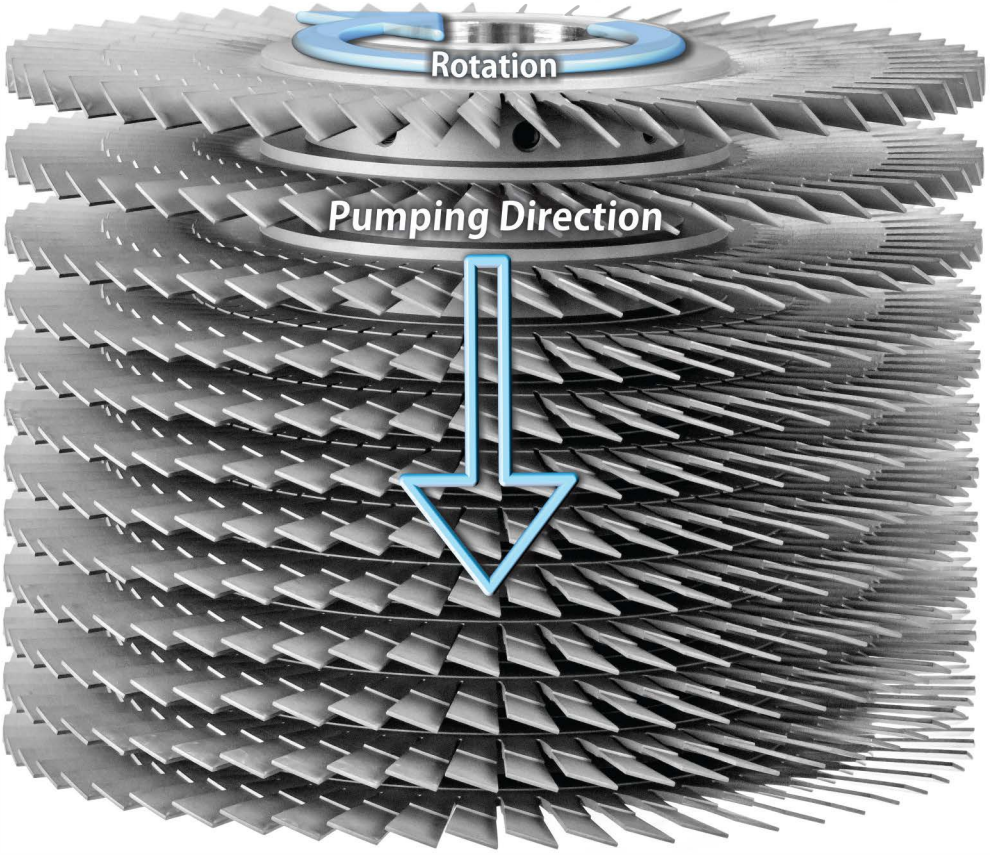
Turbo Molecular Pumps

What's Needed?

Modern turbomolecular pumps are compact high tech devices that provide clean high-vacuum, large pumping speeds, and low ultimate pressures. Even the smaller models provide around 70 liters per second of pumping speeds and pressures greater than 10^{-8} are common, 10^{-10} Torr can be achieved under optimal conditions. The ultimate pressure of a turbo system depends in part on the type of intake flange, e.g., KF, ISO, and Conflat flanges, where all metal sealed intake flanges are required for pressures lower than 10^{-8} Torr. Turbomolecular pumps cannot exhaust directly to atmosphere and therefore require a backing pump along with other supporting items to operate, including, turbo pump controller, air cooling fan or water cooling kit, vent valve, inlet screen which are some common items **(see system below)** which displays our Agilent V551 package deal with all components labeled, turbo pump, controller, air cooling fan, water cooling kit, inlet screen). The following paragraphs will discuss the many aspects of turbomolecular pumps, including their design, how they work, and ultimate pressures, along with relations between pumping speed, compression ratio, backing pump size, maintenance, and pumping of corrosive gases.

How the Turbo Molecular Pump Works

The rotor of a turbomolecular pumps operate at high rotational speeds, ranging from 24,000 to 90,000 rpm. The rotor blades are thin and angled to accelerate gas molecules in the direction of the pumping action. The turbomolecular pumps can be thought of as a momentum transfer device, a molecular turbine. The moving turbo pump rotor blades collide with the individual gas molecules and accelerate them. The velocity of the gas molecule after being contacted with the turbo rotor is a sum product of the rotor velocity and the thermal velocity of the gas molecules. The net result is pumping action, a higher conductance in the pumping direction with lower conductance in opposite back flow direction.

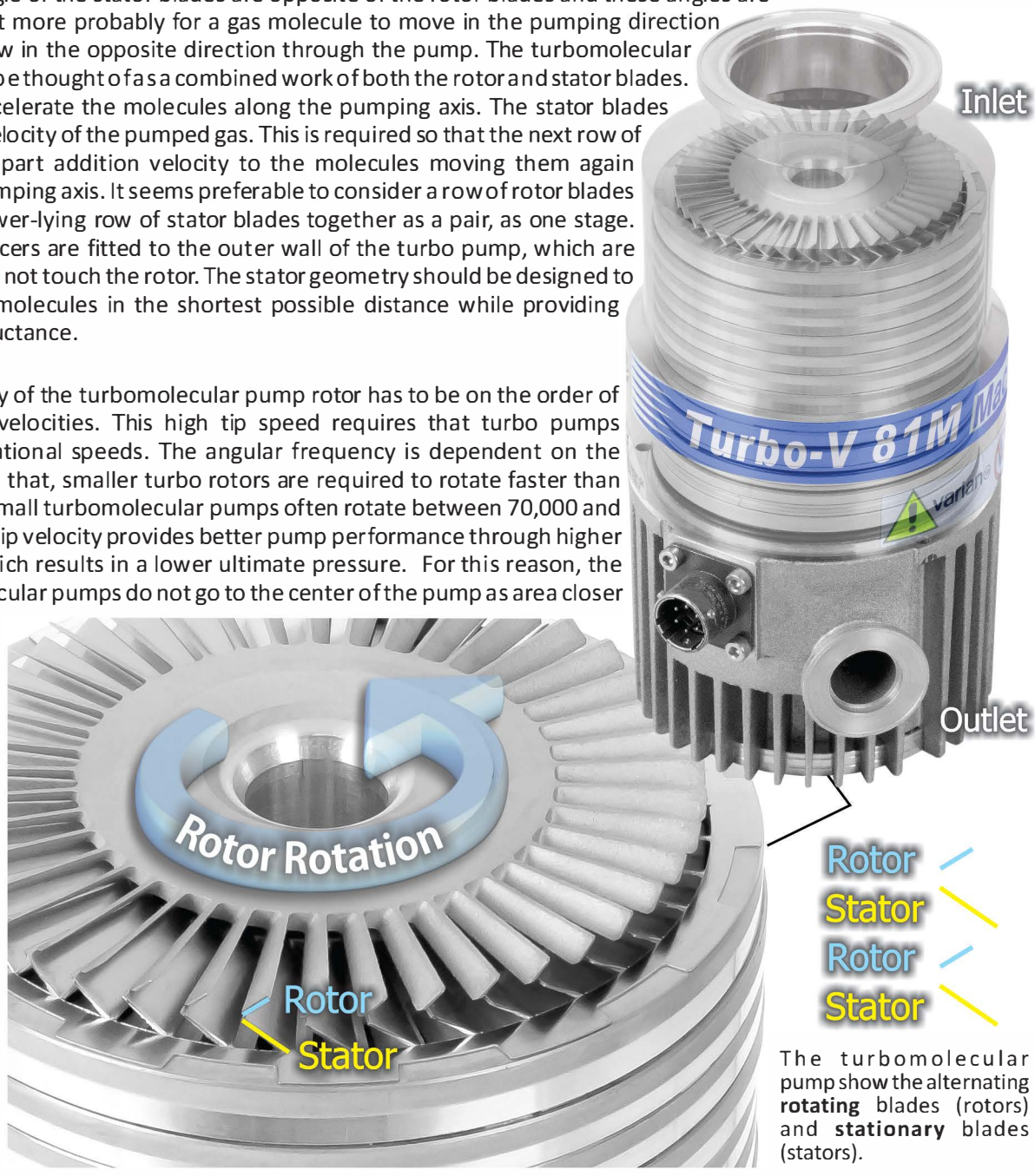


The photograph of a turbo pump rotor is shown **here** where the turbo pump rotor has been machined from a single block of high strength aluminum alloy. Because the compression for a single row of turbo blades would be small, series of blades are needed. Modern turbomolecular pump rotors are designed with 9 or more blade rows, resembling a multi-stage axial-flow compressor, to produce a functioning high-vacuum pump with adequate compression & optimal pumping speed. The blades nearest the intake of the pump are designed to have a high pumping speed and lower compression ratio since they will be pumping gas molecules at low pressure. As the gas molecules pass through the turbo pump they are compressed and therefore the blades nearest the turbo exhaust are designed for high compression and low pumping speed.

(Cont.) How the Turbo Molecular Pump Works

The turbo pump includes stationary rows of stator blades in between each row of rotor blades (**see below**). The angle of the stator blades are opposite of the rotor blades and these angles are optimized to make it more probably for a gas molecule to move in the pumping direction rather than back flow in the opposite direction through the pump. The turbomolecular pumping action can be thought of as a combined work of both the rotor and stator blades. The rotor blades accelerate the molecules along the pumping axis. The stator blades then decrease the velocity of the pumped gas. This is required so that the next row of rotor blades can impart addition velocity to the molecules moving them again farther along the pumping axis. It seems preferable to consider a row of rotor blades and the adjacent lower-lying row of stator blades together as a pair, as one stage. The stators with spacers are fitted to the outer wall of the turbo pump, which are held close too but do not touch the rotor. The stator geometry should be designed to decelerate the gas molecules in the shortest possible distance while providing adequate flow conductance.

The blade tip velocity of the turbomolecular pump rotor has to be on the order of thermal molecular velocities. This high tip speed requires that turbo pumps operate at high rotational speeds. The angular frequency is dependent on the rotor diameter, such that, smaller turbo rotors are required to rotate faster than larger pumps, e.g., small turbomolecular pumps often rotate between 70,000 and 90,000 rpm. Higher tip velocity provides better pump performance through higher gas compression which results in a lower ultimate pressure. For this reason, the blades of turbomolecular pumps do not go to the center of the pump as area closer to the center of the pump will have slower speed and lower compression. For these reasons, turbo pumps are designed with blade length no longer than 30% of the rotor diameter. Turbo pump designs are also optimized to prevent back-flow between the rotor and stators along with preventing leakage around rotor blade tips.

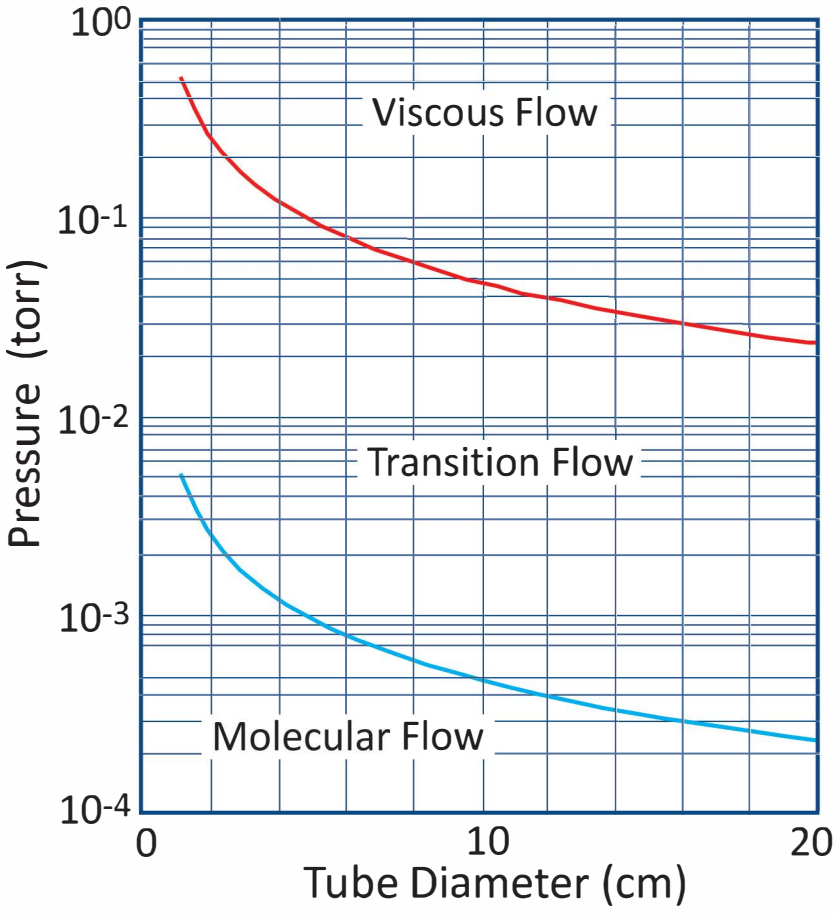


The turbomolecular pump show the alternating **rotating** blades (rotors) and **stationary** blades (stators).

Flow Regimes

Turbomolecular pumps get their name from the fact that they operate in the molecular flow regime below $1x10^{-3}$ Torr. In molecular flow the mean free path between gas molecules is larger than the spacing between the adjacent turbo pump surfaces. Correspondingly, molecular flow inside the turbo pump is dominated by gas-turbo surface collisions and after impact the individual gas molecules traveling in their own straight lines in the direction of pumping action until they again collide with another surface of the pumps. Effective turbomolecular pumping action requires the absence of gas-gas molecule collisions which tend to reorient molecular trajectories and destroy the established pumping action.

A quick note on gas flow is needed here to help assist our discussion below. As pressure is lowered from atmospheric pressure the gas flow goes through viscous, transition, and then into molecular flow. Viscous flow of gas occur is in the pressure range from atmosphere to 1 Torr and is dominated by gas-gas collisions where the distance between gas molecules is small and distances between the chamber walls is large. Transition flow is in the 1 to $1x10^{-3}$ Torr range and is dominated by both gas-gas and gas-wall collisions.



Molecular flow conditions dominate thought-out most of the turbomolecular pump. However, at the point of turbo exhaust the gas has been compressed and flow is usually in the transition flow or even approaching low viscous flow. This is the reason the rotor blades have a larger angle near the discharge to produce a higher compression and help prevent the molecules from back flowing. For this reason, the turbomolecular pump cannot exhaust to atmospheric pressure and must be backed by a roughing pump and held in the transition flow regime. If the exhaust pressure is allowed to increase so that the last blade row was in viscous flow the rotor would be subjected to extra torque, rotor speed would slow down, a sudden loss of pumping speed would be experienced, motor power consumption would increase, and the motor & bearing temperature would start to increase. It is important to select the correct backing pump which has the pumping speed and ultimate pressure required for the turbomolecular pump. On a similar point, if crossover is attempted at a pressure higher than 1 Torr, nothing will be gained because at such high pressure the turbo pump will be idling and will represent an impedance to the backing pump.

Compression Ratio

Compression ratio is the maximum difference in pressure between the exhaust and intake of the turbomolecular pump, for example, if the exhaust is at $1x10^{-3}$ and the intake is $1x10^{-9}$ Torr then the compression is 10^6. The maximum compression for modern commercial turbomolecular pump designs is gas dependent, on the order of 10^3 for hydrogen (H_2), 10^4 for helium(He) , and 10^9 for nitrogen (N_2) . We can conclude that a turbomolecular pump is less effective at pumping hydrogen than it is at pumping nitrogen and therefore compression is mass dependent. The hydrogen molecules are hardest to pump because they are lighter having a higher thermal velocity, a sample list of average thermal velocities (root mean square of the speeds) are H_2 = 1,840 m/s, He = 1,300 m/s, N_2 = 593 m/s, 0_2 = 461 m/s, and CO_2 = 393 m/s which are calculated by:

Equation (1) $$v_{rms} = \sqrt{\frac{3RT}{M}}$$

Where R = 8.314 J/mol K, T = 273 K, and M = molecular weight in kg/mol. Since hydrogen has a very high thermal velocity it has a higher probability to back flow through the turbo pump causing inefficient pumping. The opposite is true for heavier gases, the turbo molecular vacuum pump gas capture efficiency is higher when the rotor's tip velocity is high compared to the molecule's thermal velocity, that is, we would expect much higher compression for heavier gases which move slower, e.g., N_2, O_2, CO_2 and Ar. The maximum compression ratio (K*max*) for a given gas is proportional to:

Equation (2) $$K_{max} \propto e^{\frac{V_b\sqrt{M}}{\sqrt{2kN_0T}}}$$

Where V_b is the linear blade velocity and is often on the order of 400 m/s, M is molecular weight in kg/mol, T = Temperature in degrees Kelvin. We can see from equation 2 that the maximum compression ratio (K*max*) increases as blade tip velocity increases, molecular mass increase, and as gas temperature decreases. A sample chart showing the maximum compression ratio (K*max*) as a function of foreline pressure for a typical commercial turbo molecular pump is shown at **figure 7-1 to the right.** This chart is representative of a full turbo pump (compound turbo molecular pumps will be described on preceding sections) where the compression falls to zero around 1 Torr as the foreline pressure approaches viscous flow.

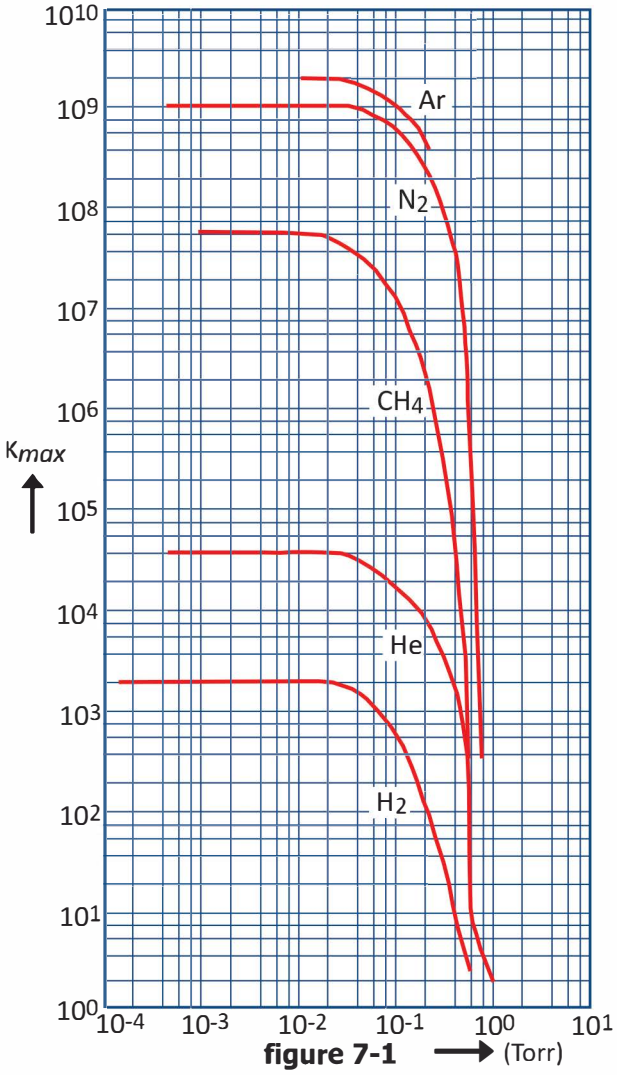


figure 7-1

Maximum compression of turbomolecular pump as a function of the foreline Pressure.

Ultimate Pressure

As the pressure of a sealed chamber is lowered by its roughing pumps from atmosphere to the high vacuum crossover pressure, typically in the 10^{-3} Torr range, the concentration of the remaining gases inside the chamber starts to change. As the chamber's pressure enters the upper limits of high vacuum pumping, around 10^{-4} Torr, the residual gas is now around 99% water vapor. The initial chamber filled volume gases, e.g., N_2 & O_2 have been effectively pumped away. The source of water vapor originates as outgassing from vacuum chamber walls, elastomer seals, and the internal surface areas of the turbomolecular pump. The water enters the chamber when it is opened to atmosphere from humid air. In a short period of time layers upon layers of water molecules attach to the inside of the vacuum chamber and its contents.

The pump down process of water outgassing can take a long time because water molecules often desorb from one surface where they travel across the chamber and reabsorb to the other side. Thermal energy from the chamber wall is needed to provide enough energy for the water molecule to break the water bonding and desorb freely in to the vacuum. Since the chamber gases are in molecular flow the desorbed water molecules travel in straight lines. They could just as easily collide with an adjacent chamber wall and reabsorb; as they could enter, be captured, and pumped away by the turbo molecular pump. To increase the water desorption rate and achieve a faster pump down time baking of the chamber is required where heaters are mechanically attached to the outer walls of the vacuum chamber and upper intake flange of the turbomolecular pump. Typically bake out temperatures of 250 ^{o}C for metal sealed flanges are required to reach UHV pressures.

The potential ultimate pressure limit for a turbomolecular pump is directly correlated to their intake flange seal design. There are two basic intake vacuum sealing flange types; those which include an O-ring seal and those which include a metal seal. The elastomer O-ring sealed flanges are typically KF-40, ISO-63, ISO-100, ISO-160, ISO-200, and larger. Turbomolecular pumps designed with elastomer O-ring sealed intake flanges are popular for their ease of installation but are limited to ultimate pressure in to 10^{-8} Torr range. The elastomer sealed intake flanges provide two different types of gas loads to the vacuum chamber; 1. Outgassing as molecular water is desorbing from inside the elastomer material to the vacuum side of the seal, 2. Permeation where ambient atmospheric gases passes directly through the seal into the vacuum. Outgassing and permeation are based on two different mechanisms and as such the outgassing of elastomer O-rings will decrease with time whereas permeation is a constant rate. O-ring sealed turbo pumps should not typically be baked above 100 ^{o}C as Viton material starts to degrade at 180 ^{o}C.

(Cont.) Ultimate Pressure

Those turbomolecular pumps designed with metal sealed intake flanges include Conflat sizes, CF 2.75, 4.5, 6, 8, 10 inches and larger. Metal sealed flanges take more time and effort to install, copper Conflat gaskets are one time use only, but can be baked to higher temperatures 250°C and are not susceptible to outgassing and permeation gas loads. The ultimate pressure limit of turbomolecular pumps with metal sealed intake flanges is in the ultra-high vacuum, 10^{-9} to 10^{-10} Torr range, and will be limited by the turbos design and corresponding maximum compression ratio of the lighter gases.

The ultimate obtainable pressure for a turbomolecular vacuum pump is greatly depended on its ability to pump molecular hydrogen (H_2). The residual gas spectrum of a baked metal sealed intake flange turbo molecular pump is shown **below at figure 7-2** and shows that the majority of the residual gas at 10^{-9} Torr is hydrogen. When the goal is to reach ultimate pressure in ultra-high vacuum it is important to purchase a turbo pump with the highest compression ratio for hydrogen. The number of stages in a turbomolecular pump design can influence its ability to pump hydrogen. It is also import to consider and minimize sources of hydrogen, for example, UHV turbomolecular pumps will be sensitive to small amounts of hydrogen in the roughing lines. Hydrogen can be formed from vacuum pump lubricating oil that breaks down slowly under high-temperatures inside oil-sealed mechanical backing pumps. If the hydrogen discharge to inlet pressure ratio across the turbo pump approaches the maximum compression ratio the pumping speed will be diminished. It is important to note that UHV pressures in the $1x10^{-10}$ to $4x10^{-11}$ Torr have been achieved with the use of tandem turbomolecular pump systems.

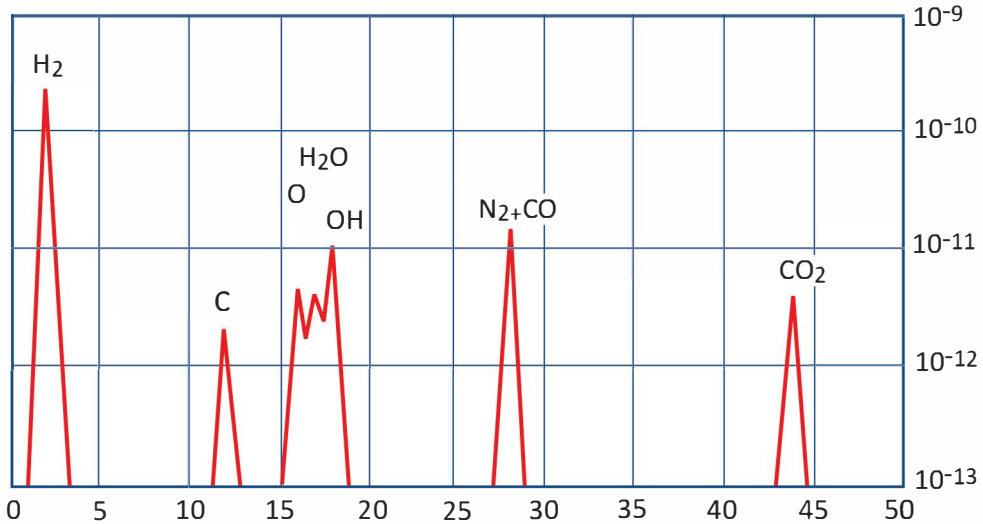


figure 7-2

Relative molecular mass M

This graph shows that the majority of the residual gas at 10^{-9} Torr is hydrogen.

Hybrid Turbo Pumps

It is important when ordering a turbo pump system to understand the differences between a full turbomolecular pump (conventional design) and a hybrid turbomolecular-drag combination pump (more modern design). The conventional full turbomolecular pump requires a backing pump that produces 10^{-2} to 10^{-3} Torr roughing pressure, such as, dual stage oil-sealed rotary vane pumps or with the larger more expensive dry scroll pumps which can also produce these required roughing pressures. The modern design is to incorporate turbomolecular pump and drag stages on the same shaft, which can yield an improvement of 100 times greater compression ratio. This permits higher discharge pressures up to the 5 to 10 Torr range and allows for the use of smaller less-expensive oil-free backing pumps. Hybrid turbomolecular-drag pumps are more favorable for modern analytical instruments, manufacturing, and research applications which often require cleanliness and mandate the use of completely oil-free vacuum pumping systems.

A photograph of a modern hybrid turbo drag pump design, shown **here at figure 7-3** is of an Agilent Varian V301 model pump rotor with the three lower circular-shaped uncut disks called "MacroTorr" turbo-drag stages. The drag stages rotate at tangential velocities comparable to that of room temperature air molecules. The pumped gas molecules flow inside drag channels producing and effective intermediate backing for the turbomolecular stages. The end result is an improvement in compression ratio compared to conventional pumps, the ability to exhaust to higher roughing line pressures, and facilitates the development of modern completely dry high-vacuum systems.

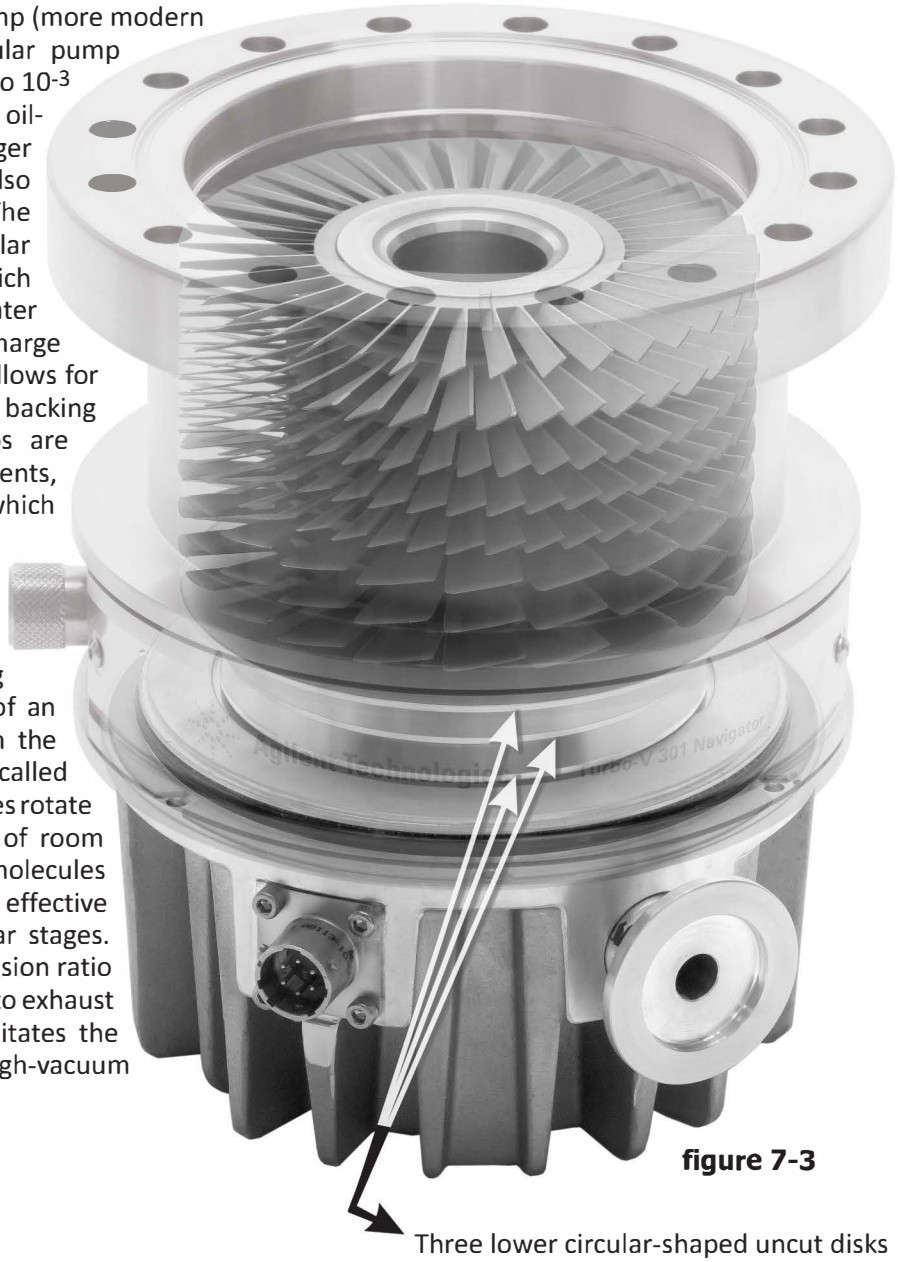


figure 7-3

Three lower circular-shaped uncut disks called "MacroTorr" turbo-drag stages.

Vibration & Balance

Modern turbomolecular vacuum pump manufacturing processes include quality dynamic rotor balancing which reduces pump vibrations and extends the life for the rotor bearings. Many vibration sensitive instruments require high-vacuum pumping, such as, electron microscopes and mass spectrometers. The turbo pump rotor is balanced in multiple plans by removing material so that the rotors rotational axis is as close as possible with the principle axis of inertia, typical residual displacement is 0.02 µm. This is important since, the high rotational speed of the rotor would transmit imbalance as vibrations to the body of the pump. To further dampen the residual rotor imbalance, the rotor bearings are held in the turbomolecular pump motor housing by elastomer anti-vibration rings. Some turbo pump designs use a combination of magnetic bearing and physical ceramic bearings to further dampen the effects of residual rotor imbalance.

Rotor Suspension & Bearings

Many modern commercial turbomolecular pumps include either two lubricated mechanical ball bearings or a combination of one permanent magnetic bearing (on the high vacuum side) & one mechanical ball bearing (on the rough vacuum side). In current model pumps, the use of ceramic ball bearings is very popular, since ceramic ball bearings when compared to steel ball bearings produce a lower centrifugal force, have a higher strength, and do not produce micropitting with the dissimilar steel race. Ceramic ball bearings are also smoother in finish than steel ball bearings which produces less noise and vibration at high rotational speeds. Modern ceramic ball bearings are very durable and can last a long time even under conditions of limited lubrication.

Oil Backstreaming

Many older high-vacuum systems include a full turbomolecular pump and an oil-sealed rotary vane backing pump. In such systems, there is a chance that vacuum pump oil molecules could backstream from the roughing line through the turbomolecular pump in to the vacuum chamber. This is not the case when the turbo molecular pump is operating at full speed under normal high-vacuum operating conditions. Backstream is not probable at full speed, where the capture and pumping efficiency is high, because the tip velocity of the turbo pump rotor is very fast compared to the thermal velocity of large vacuum pump oil molecules. Backstreaming tends to occur more often when the high vacuum turbomolecular pump is turned off. One needs to avoid leaving the turbomolecular pump under vacuum while it is not in operation. Under these conditions oil molecules can backstream through the turbo into the vacuum chamber. It is good practice to integrate a turbomolecular pump vent valve device which starts venting the turbo pump when it has decreased to 60% of its full speed, which is typically the limit where vacuum pump oil molecules will start to backstream through the turbo pump to the vacuum chamber.

Venting Turbo Pumps

When power is removed from the turbo pump the rotor speed will start to decrease and so will the corresponding compression ratio. At about 60% of full speed hydrocarbon molecules can start backstreaming from the roughing line to contaminate the turbomolecular pump. Good vacuum practice is to start venting the turbo pump using a vent valve device at this point, vent valves are often powered by the turbo pump controller. The time that it takes to vent the turbo pump to atmospheric pressure depends on the system design and model of turbo pump but is often in the range of 30 seconds to 2 minutes. Most vent valve devices have the ability to be connected to a dry nitrogen or argon source to reduce the amount of water vapor that enters the system on shutdown. These automated vent valve devices also help protect against turbo pump contamination under accidental power failure occurs.

Turbo Pump Cooling

Cooling of a turbomolecular pump is very important to the life of the pump. If a turbomolecular pump is allowed to overheat lubrication of the mechanical ball bearing will be effected. At elevated temperatures the vacuum oils and greases start to break down into thick-tacky substances which produce additional drag forces on the rotor making it effectively hard to rotate. This in turn requires more energy to rotate the rotor and can be quantified as early signs of bearing failure. It is important to understand the required amount of cooling, many turbomolecular pumps can be air cooled with a cooling fan mounted near the motor section of the turbo pump. The rule of thumb is that air cooling is adequate if the turbo intake pressure is below 10 mTorr and the ambient air temperature is below 30 ^{o}C. Water cooling is very effective at removing heat from the turbomolecular vacuum pump. Cooling water temperatures should not be below 15 ^{o}C as the bearing lubricant can become thickened and require additional energy to maintain the rotational speed of the rotor. Ideal Vacuum also offers dedicated chiller solutions that will provide constant fixed temperature cooling fluid for your turbomolecular pump. Chillers are beneficial because they provide a constant flow of cooled fluid at the same temperature year round, this is not the case with tap water, which can have temperature fluctuations from summer to winter seasons. Our research has shown that the purchase and operation costs of a dedicated chiller unit to cool your turbo pump is more cost effective than running tap water over an extended period of time.

Splinter Shield

A splinter shield is an effective filtering device, often made of wire mesh, which is placed at the turbomolecular vacuum pump inlet flange to keep small solid objects from falling or being sucked into the turbo rotor. Splinter shields are included in most of our turbomolecular pump package deals as a safety device to protect your turbo pump during operation. In many cases, we stock splinter shields with different particle filtering sizes having different mesh densities. It should be noted that the addition of a splinter shield will reduce the effective turbo pumps pumping speed up to 15%.

Turbo Pump Mounting

Most modern turbomolecular pumps with grease-lubricated or oil-wick lubricated ceramic bearings can be mounted in any orientation. However, statistics show that turbomolecular pumps mounted in the standard upright position seems to yield a longer pump service life.

Pumping Corrosive Gases

In applications that require high vacuum pumping of corrosive gases the main concern is to protect the motor and the turbo bearing sections of the pump. This is done by applying a controlled slow flow of inert gas to these areas at a pressure that is just above the roughing line exhaust pressure. The idea is to provide a slight positive flow of inert gas through the bearings and motor sections which will keep the corrosive gases out. In some corrosive series turbo pumps special bearing lubrication, such as, Fomblin and Krytox corrosive-resistant inert fluids and or greases are used. At molecular flow conditions below $1x10^{-3}$ Torr the low density of the corrosive gases are not concentrated enough to do extensive damage to the turbo rotor. In some semiconductor applications, corrosive resistant turbomolecular pumps are on occasions exposed to pressures higher than $1x10^{-3}$ Torr. In these cases, a protective nickel coating is applied to the aluminum rotor which will resist etching attack from corrosives, such as, Cl_2, BCl_3, and CCl_4. In some cases where corrosive gases may tend to condense, the inside of the turbo pump is heated to a temperature higher than the condensation temperature. In these cases, a purge gas flow, which is typically on the order of 30 sccm is applied to the bearing and motor areas of the pump. These corrosive series turbomolecular pumps typically do not reach ultimate pressures lower than 10^{-8} Torr. The typical life span for a turbomolecular pump used in corrosive applications is typically limited to 2 - 3 years.

Alcatel Adixen®
by PFEIFFER VACUUM™

Manufacture's Warranty
Most NEW Pumps
IN STOCK

MDP 5011 Turbo Drag Pump

The Alcatel/ Adixen Pfeiffer, MDP 5011 Turbo drag high vacuum pump has a pumping speed of 7.5 liters per second (l/s). The inlet is ISO LF63 with an KF-16 exhaust foreline flange. The turbo drag pump can be used for all general-purpose high vacuum applications. Cooling fan is set to 1 phase 115VAC, turbo without fan can run on 115VAC or 220VAC with controller. This is a brand new pump and comes with a cooling fan and a manufacture full warranty. Controller cable and ACT 200TH controller sold separately.

With ISO LF 63 Inlet
115 VAC with Fan
(N_2 7.5 l/s)

Model	INLET	IDEAL VAC P/N	Adixen P/N	Price*
MDP-5011	ISOLF63	P104333	795602	$4,590.00

MDP 5011 SPECIFICATIONS

		Units	MDP 5011
Inlet			ISO LF 63
Rotation Speed		rpm	27,000
Pump Speed	N2	l/s	7.5
	He	l/s	4
	H2	l/s	3
Compression Rate	N2		$1x10^9$
	He		$2x10^4$
	H2		$1x10^3$
Ultimate Pressure		Torr	$1x10^{-6}$
Weight with fan		kg (lb)	3 (6.6)
Backing Pump Minimum		cfm	0.5
Start Time		min.	1
Operate Position			Any
Exhaust Flange			KF16

ACCESSORIES	IDEAL VAC P/N	Adixen P/N	Price*
ACT 200TH Controller (115/240VAC)	P105093	ACT200TH	$2,592.00
Cable Pump to Controller 3.5m	P105265	A463676-035	$465.00
Lubricant Syringe for Bearings	P103325	200027	$145.00
Inlet Flange Screen ISO NWLF63		063117	
Electrical Venting Valve (115VAC)		063171	
Ceramic Bearing for MDP 5011 (1ea.)	P105332	✱ 066671	$495.00
Ceramic Bearing for MDP 5011 (1ea.)	P105333	✱ 066672	$559.80
Ceramic Bearing for MDP 5011 (1ea.)	P105334	✱ 066673	$495.00
Ceramic Bearing for MDP 5011 (1ea.)	P105335	✱ 066674	$495.00
Ceramic Bearing for MDP 5011 (1ea.)	P105336	✱ 066675	$495.00
O-ring Seal Kit for MDP5011	P105337	062194	$145.60

✱ The last two digits of the S/N of the MDP 5011 turbo pump represent the lower and upper bearings. The first digit represents the upper bearing, the second digit represents the lower bearing. The last digit of the P/N bearing will either represent the upper or lower bearing. Example: S/N 8550123. Would use P/N 066672 (upper bearing) and P/N 066673 (lower bearing). We recommend the upper and lower bearings be replaced together.

Turbo to Controller Cable P105265

Syringe for Bearings P103325

Catalog Pricing Subject to Change

AGILENT Varian
V81-M Turbo Drag Pump

The New Turbo V 81-M maximizes performance at minimum cost and size. With a pumping speed of 77 l/s with N_2. Offering very high foreline tolerance as high as 10 Torr maximum roughing line pressure yields a substantial advantage: primary pump size can be significantly reduced such that even small backing pumps as small as 4 CFM (scroll or rotary vane) can be used to operate the Turbo V 81-M in all its pumping profiles. Thanks to one of the features of the MacroTorr technology you can now reduce the cost of your vacuum system and get better performance at the same time. This Varian Turbo V81-M has the most effective pumping stage technology currently available. It is designed for very high gas load operations, has a monolithic rotor and maintenance free ceramic ball bearings with no contamination. Now with optional T-Plus Software you can connect your laptop directly to the pump control unit and start to use it. You can start or stop the pump, as well as check its temperature, gas load conditions, parameters and diagnostics. This unit is the pump only and comes in 4 different inlet sizes. All optional accessories and different configurations are available. Controller and cable sold separately.

Manufacture's Warranty
Most NEW Pumps
IN STOCK

With CF 4.5" Inlet
(N_2 77 l/s)

With KF40 Inlet
(N_2 50 l/s)

Turbomolecular Hybrid Drag Pump	INLET	IDEAL VAC P/N	Agilent P/N	Price*
V81-M	KF40	P103592	9698902	$4,769.00
V81-M	CF 2.75"	P103735	9698904	$4,917.00
V81-M	ISO LF 63	P103048	9698901	$4,769.00
V81-M	CF 4.5"	P103123	9698903	$4,917.00

V81-M SPECIFICATIONS

Pumping Speed (l/s)			
With CF 4 1/2" or ISO63	N_2: 77 l/s	He: 65 l/s	H_2: 50 l/s
With CF 2 3/4" or KF40	N_2: 50 l/s	He: 56 l/s	H_2: 46 l/s
Compression Ratio	N_2: $5X10^8$	He: $8X10^4$	H_2: $7X10^3$
Base Pressure	$5X10^{-10}$ mbar ($3.8 X 10^{-10}$ Torr) with Conflat Flange		
Inlet Flange	CF 4.5" OD	ISO LF 63	
	CF 2.75" OD	KF 40	
Foreline Flange	KF NW 16		
Rotational Speed	1350 Hz (max)		
Start-up Time	< 60 sec.		
Recommended Forepump	Mechanical: Agilent DS42-DS102 Dry Pump: Agilent SH110		
Operation Position	Any		
Cooling Requirements	Natural Air, Forced Air or Water		
Bakeout Temperature	120° C at inlet flange max. (CF flange) 80° C at inlet flange max. (ISO flange)		
Vibration Level (displacement)	<0.01 µm at inlet flange		
Weight kg (lbs.)	ISO 63: 2 (4.4) CF 4.5": 2.98 (6.57)		

ACCESSORIES	IDEAL VAC P/N	Agilent P/N	Price*
Rack Controller 81-AG Base	P103125	9698988	$2,122.00
Rack Controller 81-AG RS232/485	P103127	9698989	$2,239.00
Rack Controller 81-AG Profibus		9698990	
PCB 24V Controller	P103195	9699538	$1,020.00
V81 Navigator Controller	P103197	9698996	$1,469.00
PCB 24V Controller Signal Cable	P103227	9699869	$375.00
Vent Valve, V81, 0.5mm	P104002	9699844	$747.07
Vent Valve Ext. Cable V81, 5m	P104003	9699941	$137.27
Air Cooling Fan V-81	P103224	9699290	$399.62
Air Cooling Fan V81 Ext. Cable 5m	P103998	9699940	$135.84
Inlet Screen V81 CF 2.75"		9699328	$145.46
Inlet Screen V81 KF40	P103988	9699309	$166.50
Inlet Screen V81 LFNW63, CF 4.5"	P103210	9699300	$147.35
FRG700 Active Gauge Kit KF40#	P103961	9699190	$1,722.00
FRG700 Active Gauge Kit ISOLF63#	P102033	9699192	$1,804.00
FRG700 Active Gauge Kit 4.5" CF#	P103964	9699193	$1,954.00

#ACTIVE GAUGE KIT Includes: Active Gauge FRG-700, cable, vacuum tee and connecting hardware depending on inlet flange.

* Catalog Pricing
Subject to Change

AGILENT Varian V81-T Full Turbo Molecular Pump

The new Turbo V81T maximize performance at minimum cost and compact size (pumps with Conflat 4.5 inch inlet flange have a pumping speed of 77 l/s of nitrogen). The V81T are full turbo pumps, this is very important when ordering, the V81T pumps must be backed with roughing pressures below 60 mTorr. These V81T full turbo molecular pumps will not operate at roughing pressures higher than 100 mTorr and if higher roughing pressures are desired we recommend the V81M compound drag turbo pumps, which operate as high as 10 Torr maximum roughing line pressure. For V81T roughing we recommend the SH-110 and the DS-42 or DS-102 series dual-stage rotary vane pump which provide 60 mTorr or lower ultimate pressure. The V81T turbo pumps are designed with a monolithic rotor and maintenance free ceramic ball bearings and no contamination. Now with optional T-Plus Software you can connect your laptop directly to the pump control unit and start to use it. You can start or stop the pump, as well as check its temperature, gas load conditions, parameters and diagnostics. This unit is the pump only and comes in 4 different inlet sizes. All optional accessories and different configurations are available. Controller and cable sold separately.

Manufacture's Warranty
Most NEW Pumps
IN STOCK

With CF 4.5" Inlet
(N_2 77 l/s)

With KF40 Inlet
(N_2 50 l/s)

Full Turbomolecular Pump	INLET	IDEAL VAC P/N	Agilent P/N	Price*
V81-T	KF40	P105818	9698906	$3,968.00
V81-T	CF 2.75"	P105819	9698908	$4,131.00
V81-T	ISO LF 63	P105821	9698905	$3,968.00
V81-T	CF 4.5"	P105820	9698907	$4,131.00

V81-T SPECIFICATIONS

Pumping Speed (l/s)			
With CF 4 1/2" or ISO63	N_2: 77 l/s	He: 65 l/s	H_2: 50 l/s
With CF 2 3/4" or KF40	N_2: 50 l/s	He: 56 l/s	H_2: 46 l/s
Compression Ratio	N_2: $5X10^6$	He: $8X10^3$	H_2: $7X10^2$
Base Pressure	$5X10^{-9}$ mbar ($3.8 X 10^{-9}$ Torr) with Conflat Flange		
Inlet Flange	CF 4.5" OD CF 2.75" OD	ISO LF 63 KF40	
Foreline Flange	KF NW 16		
Rotational Speed	1350 Hz (max)		
Start-up Time	< 60 sec.		
Recommended Forepump	Mechanical: Agilent DS42-DS102 Dry Pump: Agilent SH110		
Operation Position	Any		
Cooling Requirements	Natural Air, Forced Air or Water		
Bakeout Temperature	120° C at inlet flange max. (CF flange) 80° C at inlet flange max. (ISO flange)		
Vibration Level (displacement)	<0.01 µm at inlet flange		
Weight kg (lbs.)	ISO 63: 1.82 (4) CF 4.5": 2.68 (5.90)		

ACCESSORIES	IDEAL VAC P/N	Agilent P/N	Price*
Rack Controller 81-AG Base	P103125	9698988	$2,122.00
Rack Controller 81-AG RS232/485	P103127	9698989	$2,239.00
Rack Controller 81-AG Profibus		9698990	
PCB 24V Controller	P103195	9699538	$1,020.00
V81 Navigator Controller	P103197	9698996	$1,469.00
PCB 24V Controller Signal Cable	P103227	9699869	$375.00
Vent Valve, V81, 0.5mm	P104002	9699844	$747.07
Vent Valve Ext. Cable V81, 5m	P104003	9699941	$137.27
Air Cooling Fan V-81	P103224	9699290	$399.62
Air Cooling Fan V81 Ext. Cable 5m	P103998	9699940	$135.84
Inlet Screen V81 CF 2.75"		9699328	$145.46
Inlet Screen V81 KF40	P103988	9699309	$166.50
Inlet Screen V81 LFNW63, CF 4.5"	P103210	9699300	$147.35
FRG700 Active Gauge Kit KF40#	P103961	9699190	$1,722.00
FRG700 Active Gauge Kit ISOLF63#	P102033	9699192	$1,804.00
FRG700 Active Gauge Kit 4.5" CF#	P103964	9699193	$1,954.00

#ACTIVE GAUGE KIT Includes: Active Gauge FRG-700, cable, vacuum tee and connecting hardware depending on inlet flange.

Catalog Pricing
Subject to Change

AGILENT Varian 304 FS TwisTorr

The new Generation TwisTorr 304FS is a 300 l/s turbo pump with Agilent Floating Suspension. the breakthrough bearing technology that reduces acoustical noise, vibration and exceptional stability. Proven best performance on the market, with new TwisTorr stages optimized for H_2 compression ratio. High throughput and optimized performance for light gases in routine applications meet the needs of the instrumentation market. Maintenance free, oil free and in any orientation. These models offer water cooling with no risk of corrosion and optimized heat transfer. A unique solution in the smallest package of any turbomolecular pump on today's market. The TwisTorr 304 FS offers dry, clean vacuum for demanding industrial and semiconductor applications. Ideal for academic and research applications. Comes in 4 intake sizes with plenty of accessories.

CF6"
(N_2 250 l/s)

LF100
(N_2 250 l/s)

Turbomolecular Drag Pump	INLET	IDEAL VAC P/N	Agilent P/N	Price*
304FS TwisTorr	ISO LF 100	P105543	X3500A-011-020	$7,495.00
304FS TwisTorr	Conflat CFF 6 inch	P105542	X3500A-011-021	$7,495.00
304FS TwisTorr	ISO LF 160		X3500A-011-022	$7,495.00
304FS TwisTorr	Conflat CFF 8 inch		X3500A-011-023	$8,195.00

304FS TwisTorr SPECIFICATIONS

Pumping Speed ISO100 / CF 6 inch ISO160 / CF 8 inch	N_2: 250l/s	He: 255 l/s	H_2: 220 l/s	Ar: 250l/s
Compression Ratio	N_2: $1X10^{11}$	He: $1X10^{8}$	H_2: $1.5X10^{6}$	Ar: $1X10^{11}$
Base Pressure	<1 X 10^{-10} Torr) with conflat flange			
Inlet Flange	CF 8.00" OD	ISO LF 160		
	CF 6.00" OD	ISO LF 100		
Foreline Flange	KF NW 16 (KF25 optional)			
Rotational Speed	60000 rpm (1010 hz drive freq.)			
Start-up Time	< 3 min.			
Recommended Forepump	Mechanical: Agilent DS102			
Operation Position	Any			
Cooling Requirements	Air / Water			
Bakeout Temperature	120° C at inlet flange max. (CF flange) 80° C at inlet flange max. (ISO flange)			
Noise Pressure Level	<50 dB(A) at 1 meter			
Weight kg (lbs.)	ISO 100 5.5(12.3) / CF 6 in. 7.5(16.5) ISO 160 5.7(12.6) / CF 8 in. 9.7(20.9)			

ACCESSORIES	IDEAL VAC P/N	Agilent P/N	Price*
304 FS on Board Controller 24VDC	P105539	X3507-64002	$1,730.00
304 FS on Board Controller 100-240VAC	P105540	X3507-64003	$1,730.00
304 FS AG Rack Controller w/RS323/485	P105541	X3506-64002	$2,965.00
304 FS on Board Controller w/Profibus		X3506-64003	$4,160.00
Mains Cable NEMA plug, 3m long	P103999	9699958	$88.03
Mains Cable European plug, 3m long	P104463	9699987	$88.03
Serial Cable and T-plus Software	P104164	9699883	$288.48
Inlet Screen ISO100	P105532	X3500-68000	$200.60
Inlet Screen Conflat CFF 6 inch	P103987	9699302	$195.91
Inlet Screen ISO160	P105563	X3500-68001	$440.00
Inlet Screen Conflat CFF 8 inch	P104473	9699304	$241.34
Water Cooling Kit Metal	P104475	9699337	$339.47
Water Cooling Kit Plastic	P104474	9699347	$209.94
Air Cooling Kit for On Board Controller	P105534	X3500-68010	$594.49
Fan Extension Cable for On Board Controller	P105538	9699949	$458.78
Air Cooling Kit for for Rack AG Controller	P105535	X3500-68011	$594.49
Fan Extension Cable for Rack AG Controller	P103998	9699940	$135.84
Bracket for On Board Controller Side Mount	P105902	X3500-68012	$232.00
Vibration Isolator ISO100		9699344	
Vibration Isolator Conflat CFF 6 inch	P104477	9699334	$2,928.80
Vibration Isolator ISO160	P104476	9699345	$2,872.16
Vibration Isolator Conflat CFF 8 inch	P104478	9699335	$5,368.29
Vent Flange, NW 10 KF/M8	P104479	9699108	$128.42
Delay Vent Valve 1.2 mm Orifice		X3505-68000	$1,812.79
Delay Vent Valve 0.5 mm Orifice		X3505-68001	$1,812.79
Vent Valve N.O. for Rack AG Controller 0.5 mm	P104002	9699844	$747.01
Vent Valve for On-Board Controller 1.2 mm	P105533	9699834	$1,025.71
Vent Valve for On-Board Controller 0.5 mm		9699834M006	
Purge Valve 10 SCCM NW16KF-M12	P104480	9699239	$439.36
Purge Valve 10 SCCM 1/4 Swagelok-M12	P104481	9699240	$448.41
Purge Valve 20 SCCM NW16KF-M12	P104482	9699241	$445.82
Purge Valve 20 SCCM 1/4 Swagelok-M12	P104483	9699242	$462.68
Purge Valve 10 SCCM 1/4 Swagelok- 1/4 Swagelok	P105537	9699232	$456.18
Purge Valve 20 SCCM 1/4 Swagelok- 1/4 Swagelok	P105536	9699236	$462.68
Foreline Flange KF25 1/4 Gas	P105415	9699130	$169.66

* Catalog Pricing Subject to Change

AGILENT Varian 551 Turbo Navigator

The new Agilent V 551 Turbo Navigator maximizes performance at minimum cost and size. With a pumping speed of 550 l/s with N_2. Thanks to the features of the MacroTorr technology you can now reduce the cost of your vacuum system and get better performance at the same time. It has the most effective pumping stage technology currently available. It is designed for very high gas load operations, has a monolithic rotor, maintenance free ceramic ball bearings and can be mounted in any position. Extreme fast pump downs with foreline pressure up to 15 Torr. Three inlet sizes available, does not come with cables, fan or controller, all sold separately.

Turbo Pump (ONLY)	INLET	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-V 551 Navigator	ISO LF160	P105824	9698922	$12,595.00
Turbo-V 551 Navigator	CF 6.00"		9698925	
Turbo-V 551 Navigator	CF 8.00"	P105825	9698923	$12,585.00

ACCESSORIES	IDEAL VAC P/N	Agilent P/N	Price*
Turbo V-551 Nav. Cont. 110/220VAC(bottom mount)	P105833	9698976	$3,561.00
Turbo V-550 Nav. Rack Controller 110 / 220VAC	P105830	9699544	$3,581.00
T-Plus CD Software w/serial cable	P104164	9699883	$288.48
Mains cable NEMA plug, 3meters	P103999	9699958	$88.03
Mains cable Euro plug, 3 meters	P104463	9699957	$88.03
Inlet screen for ISO LF NW 100 or CF 6"	P103987	9699302	$195.91
Inlet screen for ISO LF NW 160 or CF 8"	P104473	9699304	$241.34
Heater band, 220 VAC		9699807	
Heater band, 120 VAC		9699808	
Water cooling kit	P104475	9699337	$339.47
Plastic water cooling kit	P104474	9699347	$209.94
Air cooling kit fan for Navigator Controller	P105831	9699339	$656.00
Air cooling kit fan for Rack Controller	P105832	9699314	$595.00
Bracket for Navigator Controller side mount		9699349	
Vibration damper isolator CF 6"	P104477	9699334	$2,928.77
Vibration damper isolator ISO LF 160	P104476	9699345	$2,872.16
Vibration damper isolator CF 8"	P104478	9699335	$5,368.29
Vent flange, NW 10 KF/MB	P104479	9699108	$128.42
Vent device auto delay for rack cont 120VAC		9699831	$2,044.61
Vent valve for standard rack controller		9699843	$1,109.25
Vent valve for Navigator controller	P105533	9699834	$1,025.71
Purge Valve 10 SCCM KF16 X M12	P104480	9699239	$439.36
Purge Valve 10 SCCM 1/4 Swagelok X M12	P104481	9699240	$448.41

CF Conflat 6" Pump ONLY (N_2 550 l/s)

ISO LF160 System with bottom mount controller (N_2 550 l/s)

ISO LF160 Pump ONLY (N_2 550 l/s)

V551 Navigator SPECIFICATIONS

Pumping Speed (l/s) With CF 8" or ISO 160	N_2: 550l/s	He: 600 l/s	H_2: 510 l/s
Compression Ratio	N_2: $1X10^9$	He: $1X10^7$	H_2: $1X10^6$
Base Pressure	$<1X10^{-10}$ mbar ($<1 X 10^{-10}$ Torr) with CF flange		
Inlet Flange	CF 6.00" OD CF 8.00" OD	ISO LF 160	
Foreline Flange	KF 25		
Rotational Speed	42,00 rpm		
Start-up Time	< 5 min.		
Recommended Forepump	Mechanical: Agilent DS302 Dry Pump: Agilent TS300		
Operation Position	Any		
Cooling Requirements	air or water		
Bakeout Temperature	120° C at inlet flange max. (CF flange) 80° C at inlet flange max. (ISO flange)		
Vibration Level (displacement)	<0.01 µm at inlet flange		
Weight kg (lbs.)	ISO LF 160: 19.4 (43) CF 6"/8": 23.4(51.6)		

Catalog Pricing Subject to Change

AGILENT Varian
Turbo V-1001 Navigator

These Agilent Varian Turbo-V 1001 Navigator turbomolecular high-vacuum pumps come in 4 different inlet flange sizes, ISO LF160, ISO LF200, ISO200F (bolt holes) and Conflat CF 10 inch. The Turbo-V 1001 Navigator turbomolecular pumps have a maximize performance at minimum cost and size, with a pumping speed of 950 l/s of nitrogen (N_2). We recommend a primary pump size as small as 14 CFM (e.g., Agilent Varian TriScroll 300, IDP-15, or TriScroll 600 dry scroll vacuum pumps or DS402 rotary vane vacuum pump) which can be used to operate the Turbo V 1001 in all its pumping profiles. The Turbo-V 1001 are compound pumps which include the MacroTorr drag stage technology to achieve the high-compression ratios for light gases and maximize the throughput of the pump. The Turbo V 1001 Navigator turbo pumps with ISO-F bolted inlet flange have an ultimate pressure as low as $1x10^{-8}$ Torr when used correctly, for example, the ISO inlet versions of these pumps allow the intake flange to be baked up to 80 degrees Celsius. These intake flanges are ISO-F which require bolted hardware instead for double claw clamps.

Agilent Varian Turbo-V 1001 Navigator turbomolecular high-vacuum pumps are integrated into many analytical instrumentation applications including Electron Microscopy (SEM, TEM), Focused Ion-beam Systems (FIB) and Surface Analysis Modern focused-beam systems such as SEM's, TEM's and FIB's utilize columns that project electrons or ions onto microscopic samples for detailed analysis. This is the pump only, controller, cables and accessories sold separately.

With bottom mount controller and fan

CF Conflat 10"
(N_2 950l/s)

Turbo-V 1001 Navigator SPECIFICATIONS

Pumping Speed (l/s) with inlet screen	**ISO LF 160** N_2: 790 l/s He: 820 l/s H_2: 860 l/s	**CF 10" or ISO LF200** N_2: 950 l/s He: 870 l/s H_2: 900 l/s	**ISO LF 250** N_2: 1050 l/s He: 900 l/s H_2: 920 l/s
Compression Ration	N_2: $1X10^9$ He: $1X10^7$ H_2: $1X10^6$		
Base Pressure	$<1X10^{-10}$ mbar ($<1X10^{-10}$ Torr) with CF flange		
Inlet Flange	ISO LF160, ISO LF200, ISO LF200F, Conflat CF 10"		
Foreline Flange	KF40		
Rotational Speed	38,000 rpm		
Start Up Time	<4 min.		
Recommended forepump	Agilent DS40 2, TS300		
Operating Position	Any		
Cooling	Air or Water		
Weight kg (lbs)	**ISO LF 160 flange** 19 (41.8) **ISO LF 200 flange** 19.4 (43)	**CF 10 in. flange** 25.5 (54.2) **ISO LF 250 flange** 21.2 (46.6)	

Turbo Pump (ONLY)	INLET	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-V 1001 Navigator	ISO LF160	P106001	9698933	$19,995.00
Turbo-V 1001 Navigator	ISO LF200	P106002	9698931	$19,995.00
Turbo-V 1001 Navigator	ISO LF200F	P106003	9698946	$19,995.00
Turbo-V 1001 Navigator	CF 10 inch	P106000	9698932	$19,995.00
Turbo-V 1001 Navigator	ISO-250 ISO-K	P106086	9698934	$19,995.00
Turbo-V 1001 Navigator	ISO-250F	P106087	9698947	$19,995.00

ACCESSORIES	IDEAL VAC P/N	Agilent P/N	Price*
Turbo V-1001 Nav. Cont. 110/220VAC(bottom mount)	P106016	9698978	$3,561.00
Turbo V-1001 Nav. Rack Controller 110/220VAC	P106017	X3501-64003	$3,581.00
T-Plus CD Software w/serial cable	P104164	9699883	$288.48
Mains cable NEMA plug, 3meters	P103999	9699958	$88.03
Mains cable Euro plug, 3 meters	P104463	9699957	$88.03
Inlet screen DN 160, ISOLF 160	P104473	9699304	$241.34
Inlet screen DN 200, ISOLF 200 & CF 10 inch	P104488	9699316	$314.98
Inlet screen DN 250, ISOLF 250		9699350	
Heater band, 220VAC		9699327	
Heater band, 120VAC		9699317	
Metal water cooling kit	P104475	9699337	$339.47
Plastic water cooling kit	P104474	9699347	$209.94
Air cooling kit use with Navigator controller	P106018	9699297	$886.96
Air cooling kit use with rack controller	P106019	9699315	$720.21
Bracket for navigator controller side mount		9699298	
Vibration damper, ISO LF160	P104476	9699345	$2,872.16
Vibration damper, ISO LF200		9699346	
Vent flange, KF10 - M8	P104479	9699108	$128.42
Vent valve for rack controller		9699843	$1,109.25
Vent valve for Navigator controller, ½ mm orfice	P105333	9699834	$1,025.71
Purge valve 10 SCCM KF16 - M12	P104480	9699239	$439.36
Purge valve 10 SCCM ¼ Swagelok - M12	P104481	9699240	$448.41

* Catalog Pricing Subject to Change

Oerlikon Leybold

TurboVac 50

The New Oerlikon Leybold TurboVac 50 turbo molecular high vacuum pumps have a pumping speed of 50 liters per second (l/s). The inlet flange is KF 40, ISO LF 63, CF 2.75 in. or CF 4.5 in. with a ISO KF-16 exhaust foreline flange. The Oerlikon Leybold TurboVac 50 turbomolecular pump can be used for all general-purpose high vacuum applications. TurboVac pumps are fitted with ceramic ball bearings and are lubricated for life by grease. Ceramic balls are lighter, smoother and harder than steel ball bearings. This increases the lifetime of the pump. The electronic frequency converter (controller) and the connector cables required for operation and are sold separately.

Manufacture Warranty
Most NEW Pumps
IN STOCK

With ISO LF 63 Inlet
(N_2 55 l/s)

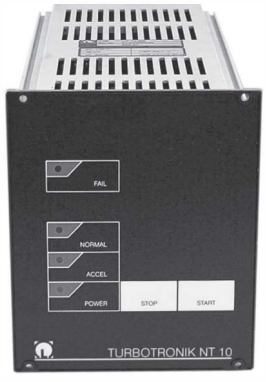
With KF40 Inlet
(N_2 33 l/s)

Model	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
TurboVac 50	KF40	P103051	85400	$3,976.00
TurboVac 50	CF 2.75"	P105209	85399	$3,976.00
TurboVac 50	ISO LF63	P103050	85401	$3,976.00
TurboVac 50	CF 4.5"	P105210	85402	$3,976.00

ACCESSORIES	IDEAL VAC P/N	Oerlikon P/N	Price*
NT10 Electronic Freq. Converter(110VAC)	P103049	85901	$1,695.00
NT10 Turbo Pump Converter Cable 10ft.	P102881	12108	$295.00
Air Cooling Fan	P103062	85406	$354.00
WaterCooling Kit		800135V0003	

TurboVac 50 SPECIFICATIONS

		KF 40 / 2.75"CF	ISO LF 63 / 4.5"CF
Inlet		KF 40 / 2.75"CF	ISO LF 63 / 4.5"CF
Pump housing		Aluminum	Aluminum
Pump speed at 10^{-3} mbar ($0.75X10^{-3}$ Torr)	N2 l/s	33	55
	He l/s	26	48
	H2 l/s	28	30
Max. gas throughput at 10^{-2} mbar ($0.75X10^{-2}$ Torr)	N2 l/s	0.30	0.40
	He l/s	0.25	0.35
	H2 l/s	0.20	0.25
Max. compression when idle	N_2	$2x10^6$	$2x10^6$
Ultimate pressure	mbar(Torr)	$5x10^{-8}$(<$3.75x10^{-8}$)	$5x10^{-8}$(<$3.75x10^{-8}$)
Max. foreline press. for N_2	mbar(Torr)	$1x10^{-1}$($0.75x10^{-2}$)	$1x10^{-1}$($7.5x10^{-2}$)
Vacuum pump roughing	cfm	2	2
Run-up time 95% nominal spd.	min.	2	2
Exhaust flange		KF16	KF16
Weight	kg(lbs.)	2(4.4)	2(4.4)



NT 10 Converter (Controller)
P103049

Cooling Fan
P103062

NT 10 Converter to Pump Cable P102881

Catalog Pricing Subject to Change

Oerlikon Leybold

TurboVac 151

The New Oerlikon Leybold TurboVac 151 turbomolecular high vacuum pump has a pumping speed of 145 liters per second (l/s). The inlet is 100 CF (6 inch Conflat) or ISO LF100 with a KF-25 exhaust foreline flange. The Oerlikon Leybold TurboVac 151 turbomolecular pump can be used for all general-purpose high vacuum applications. The standard model turbomolecular Turbovac 151 pump is without a purge gas facility and is suited for only pumping of air or inert gases. The "C" model is available with a KF10 purge gas port and is suited for pumping aggressive or reactive gases. The purge gas protects the bearing area and the motor of the Turbovac. TurboVac pumps are fitted with ceramic ball bearings and are lubricated for life by grease. Ceramic balls are lighter, smoother and harder than steel ball bearings. This increases the lifetime of the pump. These pumps can be mounted in any orientation for your chambers. Cables and controller sold separately.

Model	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
TurboVac 151	ISO LF100	P103052	85631	$7,684.00
TurboVac 151	100 CF (CF 6")	P103053	85632	$7,462.00
TurboVac 151C	ISO LF100	P103054	85635	$8,630.00
TurboVac 151C	100 CF (CF 6")	P103055	10341	$9,335.00

With CF 6" Inlet
(N_2 145 l/s)

With ISO LF100 Inlet
(N_2 145 l/s)

TurboVac 151 SPECIFICATIONS

Inlet			ISO LF 100	100 CF (CF 6")
Pump speed at 10^{-3} mbar ($0.75X10^{-3}$ Torr)	N_2	l/s	145	145
	Ar	l/s	150	150
	He	l/s	135	135
	H_2	l/s	115	115
Gas throughput	N_2	l/s	1.5 mbar x l/s	1.5 mbar x l/s
	Ar	l/s	1.3 mbar x l/s	1.3 mbar x l/s
	He	l/s	1.5 mbar x l/s	1.5 mbar x l/s
	H_2	l/s	1.0 mbar x l/s	1.0 mbar x l/s
Ultimate pressure		mbar(Torr)	$<1x10^{-10}$($<7.5x10^{-11}$)	$<1x10^{-10}$($<7.5x10^{-11}$)
Max. foreline press. for N_2		mbar(Torr)	$<5x10^{-1}$($<3.8x10^{-1}$)	$<5x10^{-1}$($<3.8x10^{-1}$)
Run up time		min.	2	2
Cooling			water or air	water or air
Exhaust flange/ Purge Port (C only)			KF25 / (KF10)	KF25 / (KF10)
Weight		kg(lbs.)	8(17)	8(17)

ACCESSORIES	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbo Drive TD20 Classic Freq. Conv.	P103194	800075V0005	$3,332.00
Air Cooling Fan (115VAC)	P103064	89408	$477.00
Cable between turbo and conv. 10ft.	P102882	85765	$375.00

Cooling Fan
P103064

TD20 Converter
(Controller)
P103194

TD20 Converter to Pump Cable
P102882

* Catalog Pricing
Subject to Change

Oerlikon Leybold

TurboVac 361

The New Oerlikon Leybold TurboVac 361 turbomolecular high vacuum pump has a pumping speed of 345 liters per second (l/s). The inlet is ISO LF100, ISO LF160, CF6" or CF8" and has a KF-25 exhaust foreline flange. The Oerlikon Leybold TurboVac 361 turbomolecular pump can be used for all general-purpose high vacuum applications. The standard model turbomolecular Turbovac 361 pump is without a purge gas facility and is suited for only pumping of air or inert gases. The "C" model is available with a KF10 purge gas port and is suited for pumping aggressive or reactive gases. The purge gas protects the bearing area and the motor of the Turbovac. TurboVac pumps are fitted with ceramic ball bearings and are lubricated for life by grease. Ceramic balls are lighter, smoother and harder than steel ball bearings. This increases the lifetime of the pump. These pumps can be mounted in any orientation for your chambers. Cables and controller sold separately.

With 100CF(6") Inlet
(N_2 345 l/s)

With ISO LF100 Inlet
(N_2 345 l/s)

Model	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
TurboVac 361	ISO LF100	P103056	85670	$11,638.00
TurboVac 361	100 CF (CF 6")	P103057	85671	$11,999.00
TurboVac 361	ISO LF160	P103059	85672	$11,990.00
TurboVac 361	160 CF (CF 8")	P103060	85673	$11,990.00
TurboVac 361C	ISO LF100	P103058	85675	$13,252.00
TurboVac 361C	100 CF (CF 6")		11209	$13,004.00
TurboVac 361C	ISO LF160	P103061	85677	$13,252.00

TurboVac 361 SPECIFICATIONS

Inlet		ISO LF 100/100CF(6")	ISO LF 160/160CF(8")
Pump speed at 10^{-3} mbar ($0.75X10^{-3}$ Torr)	N_2 l/s	345	400
	Ar l/s	350	410
	He l/s	340	380
	H_2 l/s	340	370
Gas throughput	N_2 l/s	3.0 mbar x l/s	3.0 mbar x l/s
	Ar l/s	2.5 mbar x l/s	2.5 mbar x l/s
	He l/s	3.0 mbar x l/s	3.0 mbar x l/s
	H_2 l/s	2.0 mbar x l/s	2.0 mbar x l/s
Ultimate pressure	mbar(Torr)	$<1x10^{-10}$ ($<7.5x10^{-10}$)	$<1x10^{-10}$ ($<7.5x10^{-10}$)
Max. foreline press. for N_2	mbar(Torr)	$<5x10^{-1}$ ($<3.8x10^{-1}$)	$<5x10^{-1}$ ($<3.8x10^{-1}$)
Run up time	min.	2	2
Cooling		water or air	water or air
Weight	kg(lbs.)	12(26)	12(26)

ACCESSORIES	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbo Drive TD20 Classic Freq. Conv.	P103194	800075V0005	$3,332.00
Air Cooling Fan (115VAC)	P103064	89408	$477.00
Cable between turbo and cont. 10ft.	P102882	85765	$375.00

Cooling Fan
P103064

TD20 Converter
(Controller)
P103194

TD20 Converter to Pump Cable
P102882

Catalog Pricing
Subject to Change

Oerlikon Leybold

TurboVac 600C

The New Oerlikon Leybold TurboVac 600C Classic Line turbo molecular high vacuum pump has a pumping speed of 560 liters per second (l/s). The inlet is ISO LF160 or Conflat CF 8" with a KF-40 exhaust foreline flange and a KF-10 vent port. The Oerlikon Leybold TurboVac 600C turbomolecular pump can be used for all general-purpose high vacuum applications and for pumping aggressive and reactive gases.The 600C models come with a purge gas facility for aggressive gases. The purge gas protects the bearing area and the motor of the Turbovac. TurboVac pumps are fitted with ceramic ball bearings and are lubricated for life by grease. Ceramic balls are lighter, smoother and harder than steel ball bearings. This increases the lifetime of the pump. These pumps can be mounted in any orientation for your chambers. Cables and controller sold separately.

With 160CF (8") Inlet
(N_2 560 l/s)

With ISO LF160 Inlet
(N_2 560 l/s)

Model	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
TurboVac 600C	ISO LF160	P103090	800150V0015	$13,945.00
TurboVac 600C	160 CF (CF 8")	P103091	800150V0017	$13,945.00

TurboVac 600C SPECIFICATIONS

Inlet		ISO LF 160	160 CF (CF 8")
Pump speed at 10^{-3} mbar ($0.75X10^{-3}$ Torr)	N_2 l/s	560	560
	Ar l/s	550	550
	He l/s	600	600
	H_2 l/s	570	570
Gas throughput	N_2 l/s	4.0 mbar x l/s	4.0 mbar x l/s
	Ar l/s	4.0 mbar x l/s	4.0 mbar x l/s
	He l/s	5.5 mbar x l/s	5.5 mbar x l/s
	H_2 l/s	4.0 mbar x l/s	4.0 mbar x l/s
Ultimate pressure	mbar(Torr)	$<10^{-9}$($<10^{-9}$)	$<10^{-10}$($<10^{-10}$)
Max. foreline press. for N_2	mbar(Torr)	$1x10^{-1}$($<.75x10^{-1}$)	$1x10^{-1}$($<.75x10^{-1}$)
Nominal rotation speed		36000	36000
Run up time	min.	3	3
Cooling		water or air	water or air
Exhaust flange / (Purge Port)		KF40 / (KF10)	KF40 / (KF10)
Weight	kg(lbs.)	17(37.5)	17(37.5)

ACCESSORIES	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbo Drive TD20 Classic Freq. Conv.	P103194	800075V0005	$3,332.00
Cable between turbo and freq. conv. 10ft.	P102882	85765	$375.00

TD20 Converter to Pump Cable
P102882

TD20 Frequency Converter (Controller)
P103194

* Catalog Pricing Subject to Change

Oerlikon Leybold

TurboVac 1000C

The New Oerlikon Leybold TurboVac1000C Classic Line turbo molecular high vacuum pump has a pumping speed of 850 to 1100 liters per second (l/s) depending on inlet. The inlet is ISO LF100, ISO LF200, CF 6" or CF 8" with a KF-40 exhaust foreline flange and a KF-10 vent port. The Oerlikon Leybold TurboVac 1000C turbomolecular pump can be used for all general-purpose high vacuum applications and for pumping aggressive and reactive gases. The 1000C models come with a purge gas facility for aggressive gases. The purge gas protects the bearing area and the motor of the Turbovac. TurboVac pumps are fitted with ceramic ball bearings and are lubricated for life by grease. Ceramic balls are lighter, smoother and harder than steel ball bearings. This increases the lifetime of the pump. These pumps can be mounted in any orientation for your chambers. Cables and controller sold separately.

Model	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
TurboVac 1000C	ISO LF160	P103092	85535	$25,054.00
TurboVac 1000C	160 CF (CF 8")	P103093	85491	$23,500.00
TurboVac 1000C	ISO LF200	P103095	15300	$23,500.00
TurboVac 1000C	200 CF (CF 10")	P103094	11764	$23,500.00

10 inch Conflat Inlet
(N_2 1100 l/s)

TurboVac 1000C SPECIFICATIONS

Inlet		ISO LF160 160CF (CF 8")	ISO LF200 200CF (CF 10")
Pump speed at 10^{-3} mbar ($0.75X10^{-3}$ Torr)	N_2 l/s	850	1100
	Ar l/s	810	1050
	He l/s	880	975
	H_2 l/s	900	970
Gas throughput	N_2 l/s	6.5 mbar x l/s	6.5 mbar x l/s
	Ar l/s	4.0 mbar x l/s	4.0 mbar x l/s
	He l/s	7.0 mbar x l/s	7.0 mbar x l/s
	H_2 l/s	8.0 mbar x l/s	8.0 mbar x l/s
Ultimate pressure	mbar(Torr)	$<10^{-10}$($<10^{-10}$)	$<10^{-10}$($<10^{-10}$)
Max. inlet press. for N_2	mbar(Torr)	1 x 10^{-2} ($0.75x10^{-2}$)	1 x 10^{-2} ($0.75x10^{-2}$)
Nominal rotation speed		36000	36000
Run up time	min.	9	9
Cooling		water or air	water or air
Exhaust flange / (Purge Port)		KF40 / (KF10)	KF40 / (KF10)
Weight	kg(lbs.)	25(55)	25(55)

ACCESSORIES	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbo Drive TD20 Classic Freq. Conv.	P103194	800075V0005	$3,332.00
Cable between turbo and freq. conv. 10ft.	P102882	85765	$375.00

TD20 Converter to Pump Cable
P102882

TD20 Frequency Converter (Controller)
P103194

Catalog Pricing
Subject to Change

Oerlikon Leybold

Turbovac SL80

These Oerlikon Leybold TurboVac SL80 turbomolecular vacuum pumps have a CF Conflat 4.5 inch, KF 40 or ISO LF63 inlet with KF-16 roughing flange and a 65 l/s pumping speed. This new generation of turbomolecular pumps have improved mechanical rotor suspension and the compound stage excels through a new compact design, improved vacuum performance and a standardized accessories program. The SL series pumps are among the quietest turbo pumps on the market today, the SL 80 pumps have less than 46 dB(A) noise level. The Oerlikon Leybold SL-80 can have an ultimate pressure as low as 1.5x10^{-10} Torr with CF inlet flange and backed with oil sealed rotary vane or scroll pump. The Oerlikon Leybold TURBOVAC SL turbomolecular pumps are highly flexible regarding the controller-mounting position, which can be placed onboard, as a bench-top unit or in a rack. In addition, the pumps can be mounted in virtually any position and handles the most advanced and demanding applications. This is the turbo pump, accessories sold separately on this website.

Model	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbovac SL80	ISO LF63	P105456	800002V3001	$4,635.00
Turbovac SL80	CF 4.5"	P105457	800002V3002	$4,635.00
Turbovac SL80	KF40	P105465	800002V3004	$4,635.00

Turbovac SL80 SPECIFICATIONS

Inlet			KF40	ISO LF63	CF 4.5"
Outlet				ISO KF 16	
Ultimate Pressure		Torr	1.5 X 10^{-8}	1.5 X 10^{-8}	1.5 X 10^{-10}
Pump speed	N_2	l/s	40	65	65
	Ar	l/s	34	60	60
	He	l/s	44	55	55
	H_2	l/s	40	49	49
Compression ratio for	N_2			>1 x 10^{11}	
	Ar			>1 x 10^{11}	
	He			2 x 10^{6}	
	H_2			4 x 10^{4}	
Max. foreline pressure (N_2)		Torr		12	
Recommended Roughing Pumps				Trivac D4B, D8B, Scrollvac SC5D, Divac 1.4	
Rotational Speed		rpm		72,000	
Run-up times		min.		1.5	
Cooling (ambient air)		optional		water or cooling fan	
Max power consumption		W		120	
Weight		kg (lbs)	1.8 (3.97)	1.9 (4.19)	3.1 (6.84)

ACCESSORIES	IDEAL VAC P/N	Oerlikon P/N	Price*
Connection Kit for SL80 to Roughing Pumps	P105464		$275.00
SL80 & TW70 Water Cooling Unit	P105452	800135V0001	$425.00
Start Stop Switch to control 24 VDC remotely	P105455	15248	$99.95
TD-400 Mounting kit for bottom mount, SL80	P105461	800110V0008	$395.00
TD-400 Mounting kit for side mount, SL80	P105462	800110V0005	$295.00
Air Cooling Unit SL80, TW70H Turbo Pumps	P105460	800136V0001	$425.00
TD-400 Controller cable ,SL80, SL300, 0.7 ft.	P105458	800152V0021	$160.00
TD-400 Controller cable ,SL80, SL300, 3.0 ft.		15247	$225.00
TD-400 Electronic Frequency Converter	P105453	800073V0002	$1,056.00
Turbo.Controller 300 Power Supply, 24VDC	P105454	800100V0001	$1,427.00
24VDC cable connects TC300 to TD400, 10.5ft.	P105451	800091V0300	$427.00
Turbo.Power 300 Power Supply, 24VDC	P105510	800100V0002	$942.00
24VDC cable connects TP300 to TD400, 10.5ft.	P105509	800094V0300	$325.00
SL80 Purge Vent Valve, 24sccm, 115VAC	P105506	800152V0042	$984.00
Inlet Screen KF40 for SL80	P105487	E20017169	$99.99
Inlet Screen ISO LF 63	P105463	E20017170	$99.99
Inlet Screen CF 4.5 inch	P105488	E20017171	$135.00

* Catalog Pricing
Subject to Change

Oerlikon Leybold

Turbovac SL300

These Oerlikon Leybold TurboVac SL300 turbomolecular vacuum pumps have a DN 100 CF Conflat 6 inch, or ISO LF100 with KF-16 roughing flange and a 270 l/s pumping speed. This new generation of turbomolecular pumps have improved mechanical rotor suspension and the compound stage excels through a new compact design, improved vacuum performance and a standardized accessories program. The SL series pumps are among the quietest turbo pumps on the market today, the SL 300 pumps have less than 49 dB(A) noise level. The Oerlikon Leybold SL-300 can have an ultimate pressure as low as $1x10^{-10}$ Torr with CF inlet flange and backed with oil sealed rotary vane or scroll pump. The Oerlikon Leybold TURBOVAC SL turbomolecular pumps are highly flexible regarding the controller-mounting position, which can be placed onboard, as a bench-top unit or in a rack. In addition, the pumps can be mounted in virtually any position and handles the most advanced and demanding applications. This is the turbo pump, accessories sold separately on this website.

Model	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbovac SL300	ISO LF100	P105545	800170V3005	$7,495.00
Turbovac SL300	CF 6.0"	P105466	800170V3006	$7,495.00

With CF 6.0" Inlet (N_2 270 l/s)

With ISO LF100 Inlet (N_2 270 l/s)

Turbovac SL300 SPECIFICATIONS

Inlet			ISO LF 100	CF 6.0"
Outlet			ISO KF 16	
Ultimate Pressure		Torr	1×10^{-8}	1×10^{-10}
Pump speed	N_2	l/s	270	270
	Ar	l/s	260	260
	He	l/s	265	255
	H_2	l/s	190	190
Compression ratio for	N_2		$>1 \times 10^{11}$	
	Ar		$>1 \times 10^{11}$	
	He		2×10^{7}	
	H_2		4×10^{5}	
Max. foreline pressure (N_2)		Torr	6	
Recommended Roughing Pumps			Trivac D4B, D8B, Scrollvac SC5D, Divac 3.8	
Rotational Speed		rpm	60,000	
Run-up times		min.	4.0	
Cooling (ambient air)		optional	water or cooling fan	
Max power consumption		W	115	
Weight		kg (lbs)	5.2 (11.5)	7.4 (16.3)

ACCESSORIES

ACCESSORIES	IDEAL VAC P/N	Oerlikon P/N	Price*
Connection Kit for SL300 to Roughing Pumps	P105464		$275.00
SL300 Water Cooling Unit		800135V0002	$425.00
Start Stop Switch to control 24 VDC remotely	P105455	15248	$99.95
TD-400 Mounting kit for bottom mount, SL300		800110V0009	$395.00
TD-400 Mounting kit for side mount, SL300		800110V0006	$299.95
Air Cooling Unit SL300 110VAC	P105511	800136V0002	$455.00
TD-400 Controller cable ,SL80, SL300, 0.7 ft.	P105458	800152V0021	$160.00
TD-400 Controller cable ,SL80, SL300, 3.0 ft.		15247	$225.00
TD-400 Electronic Frequency Converter	P105453	800073V0002	$1,056.00
Turbo.Controller 300 Power Supply, 24VDC	P105454	800100V0001	$1,427.00
24VDC cable connects TC300 to TD400, 10.5ft.	P105451	800091V0300	$427.00
Turbo.Power 300 Power Supply, 24VDC	P105510	800100V0002	$942.00
24VDC cable connects TP300 to TD400, 10.5ft.	P105509	800094V0300	$325.00
SL300 Purge Vent Valve,12sccm, 115VAC	P105507	800152V0041	$984.00
Inlet Screen ISO-LF100	P105495	800132V0101	$199.99

Catalog Pricing Subject to Change

Edwards EXT75 DX

NEW Edwards EXT 75DX 24V turbo molecular high vacuum pump with KF 16 or 25 outlet port. Pump has a Pumping Speed of 66 liters per second (l/s) with ISO LF 100 inlet. The Edwards EXT 75DX 24V turbo molecular pump inlet has 4 inlet sizes. This Edwards turbomolecular pump can be used for all general-purpose high vacuum applications. Comes with an on board 24 volt controller but needs a 24 Volt source for input power. The Edwards Turbo and Instrument Controller (TIC) is optional for this pump and provides front panel controls and indicators. The EXT75DX comes in nine models and are state of the art technology providing reliable high and ultra high vacuum ranges. This is the turbo pump only accessories sold separately.

Model	INLET	IDEAL VAC P/N	Edwards P/N	Price*
EXT75DX	ISO LF 63	P106077	B72241000	$5,720.00
EXT75DX	ISO LF63 reversed body		B72248000	$5,635.00
EXT75DX	CF 63 CF 4.5"	P106078	B72242000	$6,061.00
EXT75DX	NW40 KF40	P106076	B72243000	$5,720.00
EXT75DX	ISO LF100		B72245000	$6,622.00
EXT75iDX	ISO LF 63(main) KF16(interstage)		B72237000	$6,165.00
EXT75iDX	ISO LF 63(main) KF25(interstage)		B72238000	$6,165.00
EXT75iDX	KF40(main) KF16(interstage)		B72235000	$6,165.00
EXT75DX	ISO NW100 KF25 Outlet	P103286	B72246000	$6,622.00

EXT75DX SPECIFICATIONS

	Inlet Flange			
	ISO LF 63	CF 4.5"	KF 40	ISO LF100
Pumping speed				
N_2 l/s	61	61	42	66
He l/s	57	57	49	59
H_2 l/s	53	53	48	54
Ultimate pressure (Torr)				
With rotary vane backing pump	$<5x10^{-7}$	$<5x10^{-10}$	$<5x10^{-7}$	$<5x10^{-7}$
With diaphragm backing pump	$<5x10^{-7}$	$<5x10^{-9}$	$<5x10^{7}$	$<5x10^{-7}$
Outlet port		KF16	KF16	KF16/25
Interstage port (i)	KF16 or KF25		KF16	
Weight lbs. (kg)	6.6 (3.0)	10.8 (4.9)	6.4 (2.9)	7.0 (3.2)

ACCESSORIES	IDEAL VAC P/N	Edwards P/N	Price*
TIC Turbo Controller (100 W)		D39711000	$1,547.00
TIC Turbo Controller (200 W)	P105874	D39712000	$2,109.00
TIC Turbo and Instrument Cont. (100 W)	P106074	D39721000	$2,398.00
TIC Turbo and Instrument Cont. (200 W)	P106075	D39722000	$2,878.00
TIC Relay Box	P106081	D39711805	$750.00
TIC Logic Interface Cable 2m	P106082	D39700833	$60.00
ACX75 Air Cooler	P106080	B58053075	$450.00
TAV5 Vent-Valve 0.5mm 1/8 BSP	P105358	B58066010	$645.00

* Catalog Pricing Subject to Change

Edwards nEXT 240D

The nEXT 240D pumps consist of the turbomolecular pump with a permanently attached controller containing drive electronics. The controller controls the electrical supply to the pump with the exception of standby speed control. It has no manual controls and can only be operated through the logic interface. To operate the nEXT pump you must connect it to your own control equipment and power supply or alternatively use the TIC Turbo Controller or TIC Turbo and Instrument Controller. The controller drives the brush-less d.c. motor in the pump.

The Edwards nEXT240D is a hybrid bearing compound turbopump and available with either ISOLF-100 or Conflat 6 inch inlet flanges and has a pumping speed of 240 l/s with nitrogen. The nEXT pumps combine Edward's proven bearing technology (oil lubricated ceramic lower bearing with dry permanent magnetic upper bearing), an improved rotor design with a new molecular drag stage to deliver improved pumping speed and compression ratios, and true user serviceability. They feature 24 to 48 VDC sensor less motors with a built in drive that is fully compatible with Edwards 200W TIC controllers. They are available pre-set with either 80W or 160W maximum power models, the 80W pumps can be used with the Edwards 100W TIC controllers for low power applications but will require a longer ramp time to full operating speed.

The new Edwards nEXT technology have enabled the pumps to be serviced in the field. An interim oil lubrication change can be performed, on site locally, typically in less than 5 minutes with the minimum of specialist tooling. A bearing and oil lubrication service, with minimum disassembly can be performed in less than 10 minutes using basic workshop tools and an Edwards tool kit. The nEXT pumps will advise the user when a service is due and what level of intervention is required. The request for service is by a simple flashing LED sequence on the pumps, and by serial communication notification. These are turbo pumps only, controllers and special accessories are sold separately.

Manufacture Warranty
Most NEW Pumps IN STOCK

Model	INLET	IDEAL VAC P/N	Edwards P/N	Price*
nEXT240D	ISO LF100 80W		B81200101	
nEXT240D	CF 6" 80W		B81200201	
nEXT240D	ISO LF100 160W	P105866	B81200100	$9,357.00
nEXT240D	CF 6" 160W		0B8120020	

nEXT240D SPECIFICATIONS

Inlet Flange	ISO LF100	CF 6.00"
Pumping speed		
N_2 l/s	240	240
He l/s	230	230
H_2 l/s	165	165
Ultimate pressure (Torr)		
With rotary vane backing pump	$<6x10^{-8}$	$<6x10^{-10}$
With diaphragm backing pump	$<6x10^{-8}$	$<6x10^{-10}$
Outlet	KF25	KF25
Interstage/booster port	KF25	KF25
Vent/purge port	1/8 " BSPP	1/8 " BSPP
Weight lbs. (kg)	12.5 (5.7)	19.5 (8.8)

ACCESSORIES	IDEAL VAC P/N	Edwards P/N	Price*
TIC Turbo Controller (100 W)		D39711000	$1,547.00
TIC Turbo Controller (200 W)	P105874	D39712000	$2,109.00
TIC Turbo and Instrument Cont. (100 W)	P106074	D39721000	$2,398.00
TIC Turbo and Instrument Cont. (200 W)	P106075	D39722000	$2,878.00
TIC Relay Box	P106081	D39711805	$750.00
TIC Logic Interface Cable 2m	P106082	D39700833	$60.00
TAV 5 Vent Valve 1/8" BSP	P105358	B58066010	$645.00
TAV 6 Vent Valve 1/8" BSP		B58066020	
nEXT Radial Fan		B58053175	
nEXT Axial Fan	P105875	B58053185	$466.56
mEXT Water Cooling Block		B80000815	
Turbo Extension Cable 2m	P106079	D39700836	$349.55

Catalog Pricing
Subject to Change

PFEIFFER

HiPace 80

These new Pfeiffer HiPace 80 turbo drag pumps are excellent quality turbomolecular vacuum pumps for high vacuum applications. They come in 3 inlet versions, KF40, ISO LF63 and CF 4.5 inch. They come with G 1/8 inch venting connections and KF16 outlet. These Pfeiffer HiPace 80 pumps come with an integrated electronic drive unit, model TC 110 which operates on 24 VDC. These turbo pumps have a pumping speed of 67 l/sec nitrogen with CF 4.5 inch inlet. This is the pump and TC 110 electronic drive unit. Cables and accessories sold separately.

With CF 4.5" Inlet
(N_2 67 l/s)

With ISO LF63 Inlet
(N_2 67 l/s)

Model	INLET	IDEAL VAC P/N	Pfeiffer P/N	Price*
HiPace 80	KF40	P105122	PMP03942	$6,073.50
HiPace 80	ISO LF63	P103317	PMP03940	$6,073.60
HiPace 80	DN63 CF 4.5"	P103316	PMP03941	$6,074.00

HiPace 80 SPECIFICATIONS

Ultimate Pressure	ISO LF63, KF40 <1 X 10^{-7} Torr	CF 4.5 in. <1 X 10^{-10} Torr	
Inlet		KF40	LF63 / CF 4.5"
Outlet		KF16	KF16
Venting Connection		G 1/8"	G 1/8"
Pump speed	N_2 l/s	35	67
	Ar l/s	30	66
	He l/s	41	58
	H_2 l/s	38	48
Compression ratio for	N_2 l/s	$>10^{11}$	$>10^{11}$
	Ar l/s	$>10^{11}$	$>10^{11}$
	He l/s	$1.3x10^7$	$1.3x10^7$
	H_2 l/s	$1.4x10^5$	$1.4x10^5$
Max. backing vacuum pressure			
Nitrogen (N_2)	mbar	20	20
Max. gas throughput			
Nitrogen (N_2)	mbar l/s	2	2
Run up time	min.	1.7	1.7
Operating PS Voltage		24 VDC	24 VDC
Weight	kg(lbs.)	2.4 (5.3)	2.4 (5.3) 3.8 (8.3)

ACCESSORIES	IDEAL VAC P/N	Pfeiffer P/N	Price*
DCU 110 Display Control Unit	P103318	PMC01820	$1,695.00
Cooling Fan Unit w/TC110 pumps	P103333	PMZ01300	$485.00
Water Cooling Kit	P103334	PM016623-T	$199.95
ISO LF 63 Center Ring w/Screen	P103360	PM016207AU	$265.00
CF 63 (CF 4.5") Splinter Shield (0.4mm)	P105099	PM016333	$212.00
CF 63 (CF 4.5") Splinter Shield (0.8mm)	P105097	PM016312	$212.00
Cable between DCU110 and TC110 EDU	P103335	PM061351-T	$375.00
Vent Valve TVF 005 G1/8", w/M8plug	P103336	PMZ01290	$849.15

* Catalog Pricing Subject to Change

Manufacture Warranty
Most NEW Pumps
IN STOCK

PFEIFFER
HiPace 300

These new Pfeiffer HiPace 300 turbo drag pumps are excellent quality turbomolecular vacuum pumps for high vacuum applications. They have two intake options and a (KF16) exhaust flange, and G 1/8" venting connection. These Pfeiffer HiPace 300 pumps come with an integrated electronic drive unit, model TC 400 which operates on 24 VDC. These turbo pumps have a pumping speed of 260 l/s with nitrogen (CF) Inlet. A standard model and chemical (C) version is available. Comes with water kit cooling hook ups, but does not come with cables or fan, all sold separately.

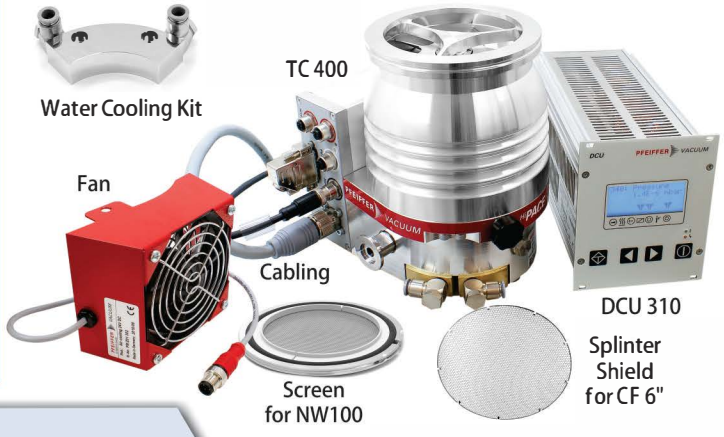
Model	INLET	IDEAL VAC P/N	Pfeiffer P/N	Price*
HiPace 300	ISO LF100	P103385	PMP03900	$12,594.10
HiPace 300	CF 6"	P103387	PMP03901	$12,594.40
HiPace 300C	ISO LF100	P103386	PMP03906	$13,499.20
HiPace 300C	CF 6"	P105445	PMP03996	$13,499.20

HiPace 300 SPECIFICATIONS

Ultimate Pressure	ISO LF100 <1 X 10^{-7} Torr	CF 6.0 in. <1 X 10^{-10} Torr
Inlet		ISO LF100 DN100 CF 6"
Outlet		KF16"
Venting Connection		G 1/8"
Pump speed	N_2 l/s Ar l/s He l/s H_2 l/s	260 255 255 220
Compression ratio for	l/s N_2 l/s Ar l/s He l/s H_2	- $>10^{11}$ $>10^{11}$ $>10^{8}$ $>10^{5}$
Max. backing vacuum pressure Nitrogen (N_2)	mbar	20
Max. gas throughput Nitrogen (N_2)	mbar l/s	14
Run up time	min.	1.8
Operating PS Voltage		24 VDC
Weight	kg(lbs.)	6.7 (14.75) (LF 100) 8.7 (19.125)(CF)

ACCESSORIES

ACCESSORIES	IDEAL VAC P/N	Pfeiffer P/N	Price*
DCU 310 Display Control Unit	P103388	PMC01822	$2,495.00
Cooling Fan Unit w/TC400 pumps	P103409	PMZ01302	$400.00
Water Cooling Kit	P103364	PM016624-T	$295.99
ISO NW LF 100 Center Ring w/Screen	P103410	PM016211AU	$399.95
CF 100 (CF 6") Splinter Sheid (0.8mm)	P105098	PM016315	$299.95
Cable between DCU310 and TC400 EDU	P103408	PM061352-T	$235.00
Vent Valve TVF 005 G1/8", w/M8plug	P103336	PMZ01290	$849.15
Vent Valve TVF005 G1/8", w/M12plug	P103407	PMZ01291	$827.55



Catalog Pricing
Subject to Change

Alcatel Adixen
by PFEIFFER VACUUM

ACT 200TH

The Alcatel Adixen Act 200TH Controller is a 1/4 rack mount 3U format, and monitors, speed, current consumption, temp, running time, fault and has 10 alarm codes. Controls: speed, venting, auto start, start delay and maintenance schedule. This is the controller only, cables and turbo pump sold separately.

Rack Controller

Model	IDEAL VAC P/N	Adixen P/N	Price*
ACT 200 TH - 115/220VAC	P105093	200004	$2,592.00
ACT 200 TH Controller cable 3.5m for pumps ATP 80, ATP 100	P105094	A463207-035	$394.95
ACT 200 TH Controller cable 3.5m for pumps MDP 5011, MDP5011CP	P105265	A463676-035	$465.00

Controls Adixen MDP 5011, MDP 5011CP, APT 80, ATP 80C, ATP 100, ATP 100C turbo pumps, controller cable not included.

Legacy Controller Cables

ACT 100 Controller cable .5m	P104624	N/A	$375.00
ACT 100 Controller cable 2.5m	P104625	N/A	$435.00

Controls MDP 5011, MDP5011CP Pumps

ACT 600TH

The Alcatel Adixen Act 600TH Controller is a 1/2 rack mount format. Designed with a high level of communication interface. Displays: rotation speed, pump current, temperatures, running time, fault detection and diagnostic codes. Controls: rotational speed, venting, auto start, start delay and maintenance schedule. 110/220VAC. This is the controller only, cables and turbo pump sold separately.

Rack Controller

Model	IDEAL VAC P/N	Adixen P/N	Price*
ACT 600 TH - 115/220VAC	P105817	111692	$3,240.00
ACT 600 TH Control Cable 3.5m	P105096	A461237-035	$475.00

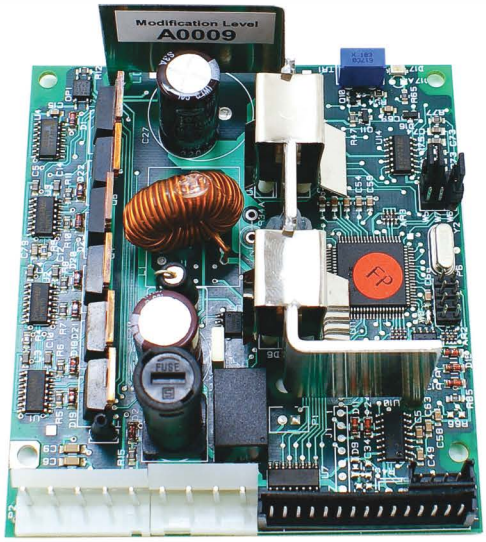
Controls Adixen ATP150/C, ATP400/C/HPC, ATP900/C/HPC & ATH300 model ball bearing turbomolecular or hybrid turbo pumps (replaces ACT 1000)

* Catalog Pricing Subject to Change

AGILENT Varian

V81 PCB24V

The Varian Agilent Turbo-V 81 PCB 24 VDC Vacuum Pump Controller is a solid state frequency converter that is driven by a chip microcomputer and is composed of a PCB that includes all the circuitry necessary for its operation. This controller uses 24 volt DC to operate. Controller cable and Turbo Pump sold separately.



Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo V81 PCB 24VDC	P103195	9699538	$1020.00
TV81 PCB Controller Cable 1m	P103227	9699869	$399.95

Controls Agilent Turbo V81M & Turbo V81T Pumps

V81 AG Navigator

The Varian Turbo-V 81-AG Navigator controllers are driven by a single chip microcomputer and consist of two PCBs which include power supply and 3-phase output, analog and I/O section, microprocessor and digital section. The power supply, together with the 3-phase output converts the single phase AC mains supply or 24Vdc supply into a 3-phase low voltage, medium frequency output, which is required to power the pump. Controller cable attached to controller. Turbo pump sold separately.

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo V81 AG Navigator	P103197	9698996	$1,469.00

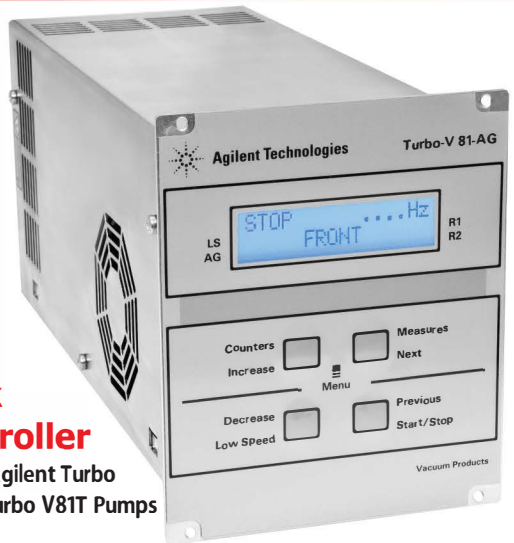
On Board Controller

Controls Agilent Turbo V81M & Turbo V81T Pumps

V81 AG RACK

This Turbo-V81-AG Rack Controller is a microprocessor controlled frequency converter with new enhanced features that allow greater control and communication capabilities. It is a compact 1/4 rack unit designed for full worldwide compatibility. This controller has vent valve control, active gauge pressure reading and pump operation parameter controls. It also contains self diagnostic and protection features and active gauge pressure reading capabilities. Controller cable is included. Turbo pump sold separately.

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo V81AG Rack 115/220VAC	P103125	9698988	$2,122.00
Turbo V81AG Rack 115/220VAC w/RS232/485	P103127	9698989	$2,239.00



Rack Controller

Controls Agilent Turbo V81M & Turbo V81T Pumps

Catalog Pricing Subject to Change

AGILENT Varian

V-301 Navigator

The Turbo-V 301 Navigator controllers are microprocessor controlled frequency converters, fully controllable through PC software, with self-diagnostic and protection features that ensure the highest degree of reliability. They can be mounted on board, either on the bottom or on the side of the pump, offering outstanding flexibility and simplicity. This Agilent Varian Turbo V301 Navigator Controller has the following features: Drives the V301 turbo pump, powers cooling fan, drives vent valve and operates Agilent full range active pressure gauges. 110/220VAC. Comes with controller cable. Turbo pump not included.

On Board Controller

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-V301 Navigator	P103556	9698973	$1,942.00

Controls Agilent Turbo V301 Navigator Turbo Pumps

V301 AG Rack

This Turbo-V301-AG Rack Controller is a microprocessor controlled frequency converter with new enhanced features that allow greater control and communication capabilities. It is a compact 1/4 rack unit designed for full worldwide compatibility. This controller has vent valve control, active gauge pressure reading and pump operation parameter controls. It also contains self diagnostic and protection features and active gauge pressure reading capabilities. Controller cable is included. Turbo pump sold separately. 110/220VAC.

Rack Controller

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo V301AG Rack 115/220VAC	P103126	9698991	$3,328.00
Turbo V301AG Rack 115/220VAC RS-232/485	P103128	9698992	$3,491.00

Controls Agilent Turbo V301 Navigator Turbo Pumps

* Catalog Pricing Subject to Change

Turbo Controllers

AGILENT Varian

Controls Agilent TwisTorr Turbo V-304 Turbo Pumps

TwisTorr 304 FS AG

The TwissTorr 304 FS AG rack controller is a solid-state frequency converter. It drives the pumps of the TwisTorr 304-FS family. Powers the pump cooling fan and drives the vent valve. It also provides and acquires the pressure of the wide range gauge and reads the speed after the stop command. Comes with power cord and controller cable. Turbo pump sold separately.

Rack Controller

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-304 FS AG Rack Controller 110/220VAC	P105541	X3506-64002	$2,965.00

V-304 FS Navigator

The Turbo V-304 FS Navigator controllers are microprocessor controlled frequency converters, fully controllable through PC software, with self-diagnostic and protection features that ensure the highest degree of reliability. They are on board controllers and can be mounted on the bottom or side of the turbo pump, offering outstanding flexibility and simplicity. Comes with controller cable. Turbo pump sold separately.

On Board Controller

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-304 Navigator Controller 110/220VAC	P105540	X3507-64003	$1,730.00
Turbo-30-4 Navigator Controller 24 VDC	P105539	X3507-64002	$1,730.00

Controls Agilent TwisTorr Turbo V-304 Turbo Pumps

Catalog Pricing
Subject to Change

AGILENT Varian

V550 Turbo

The V550 controllers are microprocessor-controlled frequency converters with self diagnostic and protection features that ensure the highest degree of reliability. The compact, 1⁄2 rack unit has a multifunction alphanumeric display for pump status and error code diagnostics. The front panel has a two-line dot matrix LCD display with back lighting. It displays rotational speed as the pump starts up and indicates when full speed is reached. At any time during the operation of the pump, the speed, current, power, and bearing temperature can be displayed. Additionally, the microprocessor acts as a pump cycle log, and can display the number of vacuum cycles, the cycle time for the current cycle, and the total operating hours on the pump. Remote operation can be accomplished with logic level contact closures and with optional computer interfaces. Turbo pump sold separately.

Rack Controller

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-V550 Rack Controller 110/220 VAC	P105830	9699544M001	$3,581.00

Controls Agilent Turbo V551 Navigator Turbo Pumps

V-551 Navigator

The Turbo V551 Navigator controllers are microprocessor controlled frequency converters, fully controllable through PC software, with self-diagnostic and protection features that ensure the highest degree of reliability. They can be mounted on the bottom or side of the turbo pump, offering outstanding flexibility and simplicity. Comes with signal cable and power cord. Turbo pump sold separately.

On Board Controller

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-V551 Navigator(under pump) 110/220 VAC	P105833	9698976	$3,561.00

Controls Agilent Turbo V551 Navigator Turbo Pumps

* Catalog Pricing Subject to Change

AGILENT Varian

Turbo-V 1001 HT

The Agilent Varian Turbo-V 1001HT rack-mount controllers can power the Turbo-V 1001 turbo molecular pumps, its cooling fan, and its vent valve. These Agilent Varian TV1001 rack-mount turbo pump controllers can operate on 100, 120, 220, or 240 volts AC input power. A manually operated input voltage selector is integrated into the rack mount controller power supply input. A flat-head screwdriver can be used to pop out the voltage selector box, rotate the voltage selector to the desired input voltage, and re-insert. The Agilent Varian TV1001 rack-mount turbo pump controllers also incorporate auxiliary power connectors (1 Amp max output) for powering the cooling fan and vent valve devices. These auxiliary connectors are located in the upper right-hand corner on the back side of controller. Warning, these auxiliary power connectors are not to be used to power the roughing pump, 1 Amp maximum output! The turbo pump to controller cable is integral being built into the Turbo-V 1001 rack-mount controller and is standard 10 foot length. A P1 connector on the back side of the rack-mount controller handles interlock an other logic. A P1 interlock-jumped connector is provided with each new Turbo-V 1001 rack-mount controller and this connector must be in place to by-pass the interlock and allow the pump to start after installation. Turbo pump sold separately.

Rack Controller

Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-V-1001 Rack Controller 110/220 VAC	P106017	X3501-64003	$5,522.00

Controls Agilent Turbo-V 1001 Turbo Pumps

V-1001 Navigator

The Agilent Varian V1001 Navigator controller is designed to mount below or on the side and provide power for the Turbo-V 1001 turbo molecular pump, its cooling fan, and its vent valve. These Agilent Varian V1001 Navigator controllers are built to automatically operate on any input voltage between 100 to 240 VAC. The Agilent Varian Turbo-V 1001 Navigator turbo pump controllers also incorporate auxiliary 24 VDC power connectors for powering the cooling fan and vent valve devices through ports P4 and P3 respectively.

On Board Controller

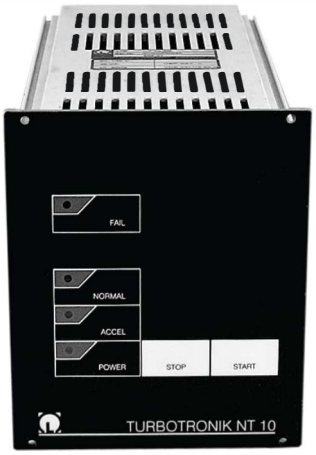
Model	IDEAL VAC P/N	Agilent P/N	Price*
Turbo-V1001 Navigator (under pump) 110/220 VAC	P106016	9698978	$4,419.00

Controls Agilent Turbo V 1001 Turbo Pumps

Oerlikon Leybold

Turbotronik NT 10

The Turbotronic NT 10 frequency converter drives the turbo induction pump motor. The following operating status are displayed using LEDs, power, fail, normal, accelerate and start and stop. Cabling and turbo pumps sold separately.



Model	IDEAL VAC P/N	Oerlikon P/N	Price*
Trubotronik NT 10 - 110VAC	P103049	85901	$1,695.00
NT10 cable to TMP 50 Turbo Pump 10ft.	P102881	12108	$295.00

Controls Oerlikon Leybold TurboVac TMP 50 Pumps

TurboDrive TD20 Classic

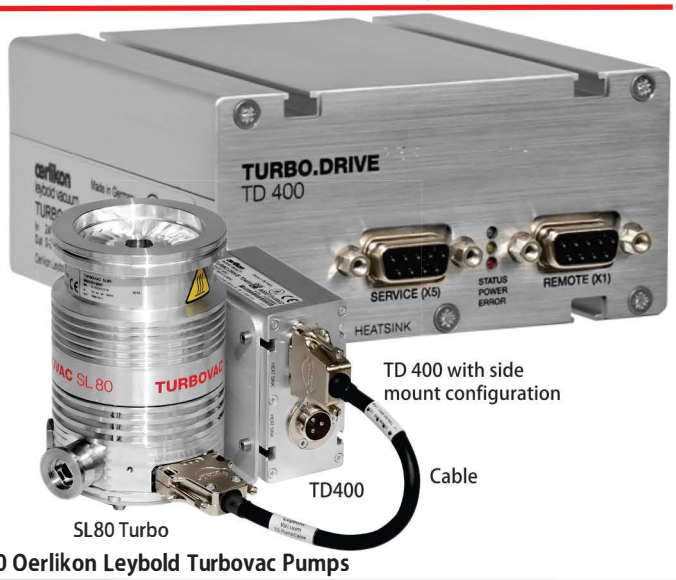
The Turbo.Drive TD20 Classic frequency converter drives the turbo induction pump motor. The following operating status are displayed using LEDs, status, power, error, load, stop and start. Cabling and turbo pumps sold separately.

Model	IDEAL VAC P/N	Oerlikon P/N	Price*
TurboDrive TD20 - 110/220VAC	P103194	800075V0005	$3,332.00
Turbo Drive TD20 -110/220VAC w/RS232	P105761	800075V0002	$3,430.00
TD20 cable to Turbo Pump 10ft.	P102882	85765	$375.00

Controls Oerlikon Leybold TMP 151, 151C, 361, 361C, 600, 600C, 1000, 1000C and 1100C Turbo Pumps

Turbo.Drive TD400

These Oerlikon Leybold Turbo.Drive TD 400 electronic frequency converter controllers are used with the SL series turbo pumps. The TURBO.DRIVE 400 supplies power to the SL 80 &300 series turbomolecular pumps and is used to control their operation. Requires a 24VDC input for power. Cabling and turbo pumps sold separately.



Model	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbo.Drive TD400	P105453	800073V0002	$1,056.00
SL80 Turbo to TD400 Cable .2m	P105458	9699869	$160.00
Mounting Kit for bottom mount w/cable	P105461	800110V0008	$395.00
Mounting Kit for side mount w/cable	P105462	800110V0005	$295.00

Supplies power to SL80 and SL300 Oerlikon Leybold Turbovac Pumps

* Catalog Pricing Subject to Change

Oerlikon Leybold Turbo.Control 300

These Oerlikon Leybold Turbo.Control 300 are used to provide 24 VDC power and control logic to the Turbo.Drive 400 frequency converter. The Turbo.Control 300 can be used on the bench top, or mounted in a rack system, and can operate on 85-264 VAC, 50/60Hz input power.

Model	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbo.Control 300	P105454	800100V0001	$1,427.00
Start/Stop Switch	P105455	15248	$99.95

Provides 24 volts and control logic to the Turbo.Drive 400

Turbo.Power 300

These Oerlikon Leybold TURBO POWER 300 are used as a power supply unit for powering the frequency converter Turbo.Drive TD400 with 24 VDC and are used with the SL series turbo pumps. In connections with the Turbo.Drive TD400 they work with the following Leybold turbo pumps. Cable and turbo pumps sold separately.

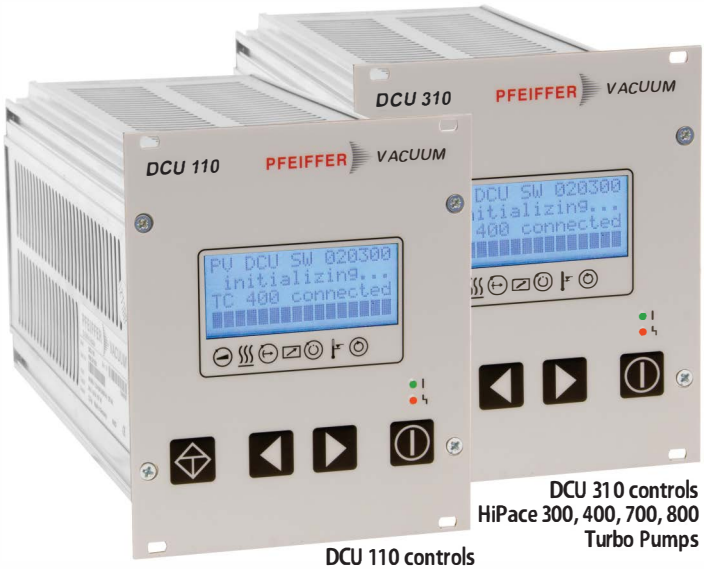
Model	IDEAL VAC P/N	Oerlikon P/N	Price*
Turbo.Power 300	P105510	800100V0002	$942.00

Controls TW 70H, TW 250S, TW 220/150, TW 220/150/15, TW 300, TW 300H, SL-80, SL-300 Turbo Pumps

PFEIFFER DCU 110/310

The DCU 110 and DCU 310 with integrated power supply for 24 VDC electrical supply to the HiPace series of Vacuum Turbo Pumps. 3 RU 19" rack module with easy to read display. The DCU operates and monitors all parameters of the HiPace Turbo Pumps and operates and displays pressure from Pfeiffer Active Gauges. Comes with RS485 interface cable. Turbo pumps sold separately.

Model	IDEAL VAC P/N	Pfeiffer P/N	Price*
DCU 110 Control Unit 110/220VAC	P103318	PMC01820	$1,695.00
DCU 110 Connection Cable to Pump 10ft.	P103335	PM061351-T	$375.00
DCU 310 Conrol Unit 110/220VAC	P103388	PMC01822	$2,495.00
DCU 310 cable to TC 400 Drive Unit 10ft.	P103408	PM061352-T	$235.00



DCU 310 controls HiPace 300, 400, 700, 800 Turbo Pumps

DCU 110 controls HiPace 10, 60, 80 Turbo Pumps

Catalog Pricing Subject to Change

Edwards TIC Turbo Controller

The Edwards TIC turbo pump controller is a compact turbo controller with a large clear graphical display, an intuitive user interface, and serial communications providing full remote control and data logging functions via a new Windows based PC program. The controller automatically recognizes and supports one 24 VDC turbomolecular pump from the EXT and nEXT turbo pump range. The Edwards TIC controller provides output power to directly support the turbo cooling fan & vent valve along with mains for the backing pumps (up to the nXDS20i dry scroll and RV12 rotary vane vacuum pumps) which may be controlled via an optional relay box. There are two different output power variants available, 100 or 200 Watt which determines the ramp speed of the turbo pump. In addition, the 200 Watt models have the ability to power a 24 VDC backing pump, such as Edwards XDD1 or nXDS through a 15 pin D-sub connector. These Edwards TIC turbo pump controllers are designed to operate EXT 75dx, nEXT 240, 300 and 400 turbo pumps. The TIC with instrument controls include pressure gauge control functions. This is the controller only no turbo or connection cable included.

With or Without Instrument Controls

TIC Controller	IDEAL VAC P/N	Edwards P/N	Price*
TIC Turbo Controller (100 W)		D39711000	$1,547.00
TIC Turbo Controller (200 W)	P105874	D39712000	$2,109.00
TIC Turbo and Instrument Cont. (100 W)	P106074	D39721000	$2,398.00
TIC Turbo and Instrument Cont. (200 W)	P106075	D39722000	$2,878.00

Compatibility:

EXT75DX - fast ramp
255DX - slow ramp
EXT70H + EXDC80 - fast ramp
EXT255H + EXDC80 - slow ramp
nEXT 240, 300, 400
Mains backing pumps, XDS, nXDS scroll, up to RV12 (via an optional relay box)
Air Cooler, ACX70 and ACX250
Vent Valve, TAV5 and TAV6
Bakeout band (via an optional relay box)
24 V backing line valves, LCPV16EKA and LCPV25EKA (via an optional relay box)

EXDC Controller

Controls BOC Edwards EXT70, EXT70H, TXT250, EXT255H, EXT351, EXT501 Turbo Pumps

The EXDC controls the electrical supply for a BOC Edwards EXT70, EXT70H, EXT250, EXT255H, EXT351 or EXT501 turbomolecular pump. The EXDC has no manual controls and can only be operated through the logic interface. To operate the EXT pump, you must therefore connect the EXDC to your own control equipment and electrical supply. Two models of EXDC are available, the only difference between the two models is the output power, 80 watts and 160 watts. Turbo pump not included.

Model		IDEAL VAC P/N	Edwards P/N	Price*
EXDC80	80 watts		D39640000	
EXDC160	160 watts	P105413	D3964000	$1,350.00

* Catalog Pricing Subject to Change

Alcatel Adixen
by PFEIFFER VACUUM

DRYTEL 1025

The Drytel Series is recommended for all applications where a dry, clean vacuum is required, such as in industry, semiconductor, analytical, instrumentation, pharmaceutical, chemicals and research and development laboratories. Contains a Molecular Turbo Drag pump and a rugged Diaphragm Pump, none requiring lubricant to operate. To be used for ultra-high clean vacuum processes.

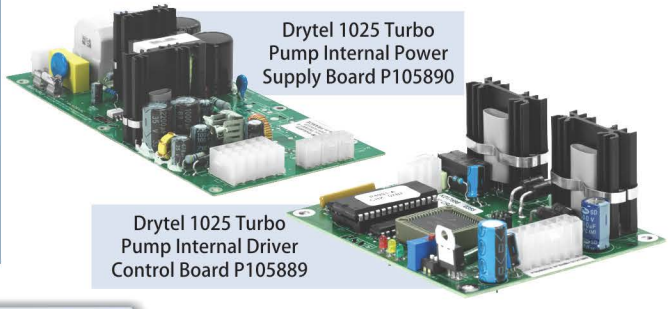
DryTel 1025 with AMD1 and MDP5011
(N2 7.5 l/s)

Diaphragm Pump	Turbo Pump	INLET	IDEAL VAC P/N	Adixen P/N	Price*
AMD1	MDP5011	ISO 63	P102095	D025ASNND710	$11,500.00

Totally DRY

Replacemet Parts	IDEAL VAC P/N	Adixen P/N	Price*
Drytel 1025 Internal Driver Control Board	P105889	P0365E1	$640.00
Drytel 1025 Internal Power Supply Board	P105890	P0330E1	$685.00

DRYTEL 1025 SPECIFICATIONS		Units	1025
High Turbo Vacuum Pump			MDP 5011
Diaphragm Pump			AMD1
H.P. Pump Spd. (60hz.)		m^3/hr	1.4
L.P Pump Speed	N_2	l/s	7.5
	He	l/s	4
	H_2	l/s	3
Ult. Pressure		mTorr	1×10^{-6}
Start-up Time		min	2
Cooling System			Air
Max. Ambient Temp.		°C	0 to 40
Weight		kg (lb)	16 (34)
Standard Inlet Flange (exhast KF16)			63 ISO-LF
Size	L	in.	15.25
	W	In.	12
	H	in.	13


Drytel 1025 Turbo Pump Internal Power Supply Board P105890

Drytel 1025 Turbo Pump Internal Driver Control Board P105889

* Catalog Pricing Subject to Change

AGILENT Varian

Mini-TASK AG81

The new Mini-TASK AG81 is a portable 60 l/s maximum pumping speed fully integrated high vacuum turbo pumping system with an ultimate pressure of 3.75 x 10^{-8} Torr. The Mini Task AG81 is powered by the Varian Turbo-V 81 MacroTorr turbomolecular pump backed with a 10 l/min diaphragm pump. The Mini Task is an oil-free high performance vacuum pump system. The Mini Task AG81 can be operated in any position and has low power requirements optimized by a new generation controller. It is designed to meet demanding applications while being cost effective and comes in three inlet flange sizes.

Manufacture Warranty
Most NEW Pumps IN STOCK

V-81M Turbo Drag Pump & 10 l/m diaphragm pump
(N_2 60 l/s CF 4.5")

FULL RANGE GAUGE KIT for Mini-TASK

Turbo Pump	Diaphragm Pump	INLET	IDEAL VAC P/N	Agilent P/N	Price*
V81M	10 l/min	KF40	P102030	9699180	$7,995.00
V81M	10 l/min	ISO 63	P103099	9699181	$8,814.00
V81M	10 l/min	CF 4.5"	P103100	9699182	$7,995.00

Gauge	Tee Fitting Size	IDEAL VAC P/N	Agilent P/N	Price*
FRG700	KF40 Inlet to KF25	P103961	9699190	$1,722.00
FRG700	ISO 63 Inlet to KF25	P102033	9699192	$1,804.00
FRG700	CF4.50" Inlet to CF2.75"	P103964	9699193	$1,954.00

KIT Includes: Active Gauge FRG-700, cable, vacuum tee and connecting hardware depending on inlet flange.

MIN-TASK AG81 SPECIFICATIONS

Flange Inlet		KF40	ISO63	CFF 4.5 inch
Pumping Speed (l/s)	N_2	40	60	60
	He	36	40	40
	H_2	45	55	55
Base Pressure		1.5 x 10^{-4} mTorr	1.5 x 10^{-4} mTorr	6 x 10^{-5} mTorr*
Bakeout Temperature		80 °C at inlet	80 °C at inlet	120 °C at inlet
Shipping Weight lbs. (kg)		16.4 (7.5)	16.4 (7.5)	18.3 (8.3)
Pumpdown Time (1 liter volume)	60 sec. to 7 x 10^{-2} mTorr, 120 sec. to 1 x 10^{-1} mTorr, 160 sec. to 7 x 10^{-2} mTorr			
Turbo Pump Rotational Speed	80,000 rpm			
Start-up Time	Less than 2 min.			
Operating Position	Any			
Operating Ambient Temperature	5 °C to 35 °C / 32 °F to 122 °F			
Input Voltage & Frequency	90V to 240VAC, 50hz / 60 hz			
Maximum Input Power	220 watts			
Serial Communications	RS-232 cable, 9 pin D-type male, 9-pin D-type female, T-Plus Navigator Software			

* 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.

* Catalog Pricing Subject to Change

AGILENT Varian

TPS Compact

The TPS-Compact is a dry high vacuum turbo molecular pumping system. It can be ordered with the Turbo-TV81 MacroTorr (maximum pumping speed of 77 l/s) or Turbo-TV304 Navigator (maximum pumping speed of 250 l/s). The TPS-Compact is a totally dry high vacuum pumping system with an ultimate pressure of $1x10^{-9}$ Torr. The backing pump inside is a 60 l/min Varian IDP-3 dry scroll vacuum pump. This is an oil-free high performance vacuum pump system and has reduced power consumption thanks to the superior scroll pump performance. The TPS-Compact is designed to meet demanding applications while being cost effective and has several configurations available.

Scroll Pump	Turbo Pump	INLET	IDEAL VAC P/N	Agilent P/N	Price*
IDP-3	TV81M	KF40	P103239	9698217	$9,597.60
IDP-3	TV81M	ISO 63	P102032	9698219	$9,648.90
IDP-3	TV81M	CF 2.75"		9698218	$8,995.00
IDP-3	TV81M	CF 4.5"	P103238	9698220	$10,815.00
IDP-3	TV304	ISO 100	P104416	9698221	$12,580.90
IDP-3	TV304	ISO 160	P104417	9698223	$12,620.75
IDP-3	TV304	CF 6"	P104418	9698222	$12,670.15
IDP-3	TV304	CF 8"	P104419	9698224	$12,709.10

(These are all 110 VAC Configured, 220 VAC is also available)

Manufacture Warranty
Most NEW Pumps
IN STOCK

With ISO 160 IDP3 & Turbo-V304 Navigator
(N_2 215 l/s)

FULL RANGE GAUGE KIT for TPS-Compact

Gauge	Tee Fitting Size	IDEAL VAC P/N	Agilent P/N	Price*
FRG700	KF40 Inlet to KF25	P103961	9699190	$1,722.00
FRG700	ISO 63 Inlet to KF25	P102033	9699192	$1,804.00
FRG700	ISO 100 Inlet to KF25	P103962	9699194	$1,895.00
FRG700	ISO 160 Inlet to KF25		9699195	Price on Request
FRG700	CF2.75" Inlet to CF2.75"	P103963	9699199	$1,854.00
FRG700	CF4.50" Inlet to CF2.75"	P103964	9699193	$1,954.00
FRG700	CF6.00" Inlet to CF2.75"	P103965	9699201	$2,195.00
FRG700	CF8.00" Inlet to CF2.75"		9699202	Price on Request

KIT Includes: Active Gauge FRG-700, cable, vacuum tee and connecting hardware depending on inlet flange.

TPS-Compact SPECIFICATIONS

	Equipped with Turbo-TV 81 MacroTorr Pump	Equipped with Turbo-TV304 Navigator Pump
Pumping Speed	N_2 77 l/s	N_2 250 l/s
Base Pressure	1.5×10^{-6} mTorr (CF Flange), 1.5×10^{-5} mTorr (KF/ISO Flanges)	1.5×10^{-6} mTorr (CF Flange), 1.5×10^{-5} mTorr (KF/ISO Flanges)
Pumpdown Time	80 sec. (7.5×10^{4} mTorr), 110 sec (750 mTorr)	80 sec. (7.5×10^{4} mTorr), 110 sec (750 mTorr)
(14 liter volume)	155 sec. ($1x10^{-1}$ mTorr), 400 sec. ($1x10^{-2}$ mTorr)	155 sec. ($1x10^{-1}$ mTorr), 230 sec. ($1x10^{-2}$ mTorr)
Turbo Pump Rotational Speed	80,000 rpm	56,000 rpm
Start-up Time	15 sec.	15 sec.
Operating Ambient Temperature	5°C to 35°C	5°C to 35°C
Input Voltage & Frequency	115VAC or 220VAC	115VAC or 220VAC
Maximum Input Power	260 Watts	310 Watts
Bakeout Temperature	120°C at inlet (CF Flange) - 80°C at inlet (KF/ISO Flanges)	120°C at inlet (CF Flange) - 80°C at inlet (ISO Flanges)
Communication	RS232 - Analogical I/O	RS232 - Analogical I/O
Weight	16.7Kg (36.8 lbs.)	19.1Kg (42.1 lbs.)

* Catalog Pricing Subject to Change

Edwards

T-Station 75

Manufacture Warranty
Most NEW Pumps
IN STOCK

The T-Station 75 is Edwards entry level turbopumping system. It combines the proven EXT75DX turbo pump with a choice of either an oil sealed rotary vane E2M1.5 backing pump or an XDD1 diaphragm pump where a totally dry system is desired. The T-Station comes with our new TAG (Turbo and Active Gauge) controller fitted as standard which enables single button start/stop of the system, the ability to control one of our Active Gauges, vent valve control and delayed start of the turbo pump to either time or pressure if a gauge is fitted, making the T-Station ideal for general laboratory needs.

Turbo Pump	Backing Pump	INLET	IDEAL VAC P/N	Edwards P/N	Price*
EXT75DX	E2M1.5	KFNW40	P104948	TS75W1002	$8,303.00
EXT75DX	E2M1.5	ISOLF63	P104949	TS75W2002	$8,554.00
EXT75DX	E2M1.5	CF 4.5"	P104950	TS75W3002	$8,764.00
EXT75DX	XDD1	KFNW40	P104951	TS75D1002	$9,225.00
EXT75DX	XDD1	ISOLF63	P104952	TS75D2002	$9,504.00
EXT75DX	XDD1	CF 4.5"	P104953	TS75D3002	$9,880.00

(These are all 1 10 VAC Configured, 220 VAC is also available)

T-Station 75 SPECIFICATIONS

Flange Inlet		KF40	ISO63	CFF 4.5 inch
Pumping Speed (l/s)	N_2	42	61	61
	He	49	57	57
	H_2	48	63	63
Ultimate Base Pressure with E2M1.5 Rotary Vane		3.75×10^{-6} mTorr	3.75×10^{-6} mTorr	3.75×10^{-7} mTorr
Ultimate Base Pressure with XDD1 Diaphragm		3.75×10^{-5} mTorr	3.75×10^{-5} mTorr	3.75×10^{-6} mTorr
Shipping Weight lbs. (kg)	with XDD1 diaphragm 38 (17) - with E2M1.5 rotary vane 46 (21)			
Noise Level	56 dB(A)			
Leak Tightness	<1X 10^{-6} mbar l/s			
Operating Ambient Temperature	12 to 40° C			
Input Voltage	110 or 220 VAC Depending on model			

* Catalog Pricing Subject to Change

Turbo Pump Systems

PFEIFFER

HiCube 80 ECO

This is a NEW Pfeiffer HiCube 80 Eco and is the complete solution for high vacuum applications, modular, flexible, compact and versatile. Comes with a HiPace 80 Turbo Pump with fan cooling included and a KF40, ISO 63 or CF 4.5 inch inlet flange, MVP 015-2 Diaphragm (Backing/Roughing Pump), TPS 110 Power Supply Pack and a DCU 002 Display and Control Unit. The DCU can also be removed from the metal case and used as a remote control. This pumping station will pump down to 10^{-4} mTorr. It is completely plug and play and easily integrates well with Pfeiffer Vacuum Controllers and Gauges (Sold Separately).

Manufacture Warranty
Most NEW Pumps
IN STOCK

With MVP 015-2 and HiPace80 Turbo Pump w/CF4.5" Inlet
(N_2 67 l/s)

Diaphragm Pump	Turbo Pump	INLET	IDEAL VAC P/N	Pfeiffer P/N	Price*
MVP015-2	HiPace80	NWKF40		PMS03552A	$8,620.00
MVP015-2	HiPace80	ISOLF63	P103217	PMS03555	$6,995.00
MVP015-2	HiPace80	CF 4.5"	P103218	PMS03556	$6,995.00

Installation Hard ware & Cables Sold Separately

Dual or Single Gauge Controllers

ACCESSORIES	IDEAL VAC P/N	Pfeiffer P/N	Price*
Full Range Pirani Cold Cathode Gauge KF25	P103214	PTR26000	$1,399.95
Full Range Pirani Cold Cathode Gauge CF 2.75"	P103215	PTR26002	$1,595.00
PCR 260 Pirani Capactitance Gauge KF16	P103413	PTR26850	$634.00
PBR 260 Pirani Hot Cathode Gauge KF16	P103414	PTR27000	$1,281.00
TPG261 Single Channel Controller for Gauges	P103213	PTG28030	$1,225.00
TPG262 Dual Channel Controller for Gauges	P103415	PTG28280	$1,995.99
TPG256A Six Channel Controller for Gauges	P103416	PTG28760	$2,650.00
Sensor cable for Full Range Gauge & Controllers(10ft.)	P103216	PT448250T	$142.50

Compact Gauges

Six Channel Gauge Controller

HiCube 90 ECO SPECIFICATIONS

Flange Inlet		**KF40**	**ISO LF 63**	**CFF 4.5 inch**
Pumping Speed (l/s)	N_2	35	67	67
Ultimate Base Pressure with HighPace 80 & MVP015-2		5 x 10^{-4} mTorr	5 x 10^{-4} mTorr	5 x 10^{-7} mTorr
Shipping Weight lbs. (kg)		37 (16.6)	37 (16.6)	40 (18)
Venting Connection		G 1/8"		
Run-up Time		1.7 min.		
Cooling Method		Fan		
Input Voltage		Selectable from 115-230 VAC		

* Catalog Pricing Subject to Change

Oerlikon Leybold

TURBOLAB 80 Fully Featured

These turbomolecular pumps are fully assembled and ready to operate high vacuum systems and are designed as a table top unit. The TurboLab 80 has a TurboVac SL 80 wide range turbomolecular vacuum pump with TD 400 integrated frequency converter, air cooling, ceramic ball bearings, splinter guard and grease lubrication. With a pumping speed of N_2 65 l/s and connections of DN 63 ISO LF 63 or DN 63 CF (4.5 inch conflat). Comes with an onboard dual stage Leybold DIVAC 0.8 T diaphragm roughing/backing pump. These are fully featured models with pressure indication readings, while connected to optional PTR 90, ITR 90 or TTR 90 sensor gauges. These systems are made to meet demanding applications while being cost effective.

Diaphragm Pump	Turbo Pump	INLET	IDEAL VAC P/N	Oerlikon P/N	Price*
Divac 0.8	SL80	DN 63 ISO-K	P105197	501591A1000	$6,995.00
Divac 0.8	SL80	DN 63 CF 4.5"	P105198	501591A2000	$6,995.00

ACCESSORIES

	IDEAL VAC P/N	Oerlikon P/N	Price*
ITR 90 BA/Pirani Gauge 10^{-10} Torr, KF25	P105195	12091	$1,592.40
Cable for ITR 90 Gauge, 15 ft.	P105426	12455	$199.95
PTR 90 Cold Cathode Gauge 10^{-9} Torr, KF25	P105196	230070	$1,465.00
Cable for PTR 90 Gauge, 15 ft., Type F	P105444	230032V01	$150.80
DN63 ISO-K (LF) to KF25 Adaptive TEE	P103579	NA	$286.00
DN63 CF (4.5" CF) to (2.75" CF) Reducer TEE	P103788	NA	$255.00
(2.75"CF) to KF 25 Adapter	P101287	NA	$68.25

(All O-Rings, Clamps and Install Hardware Available and In-Stock)

Oerlikon Leybold TURBOLAB 80 SPECIFICATIONS

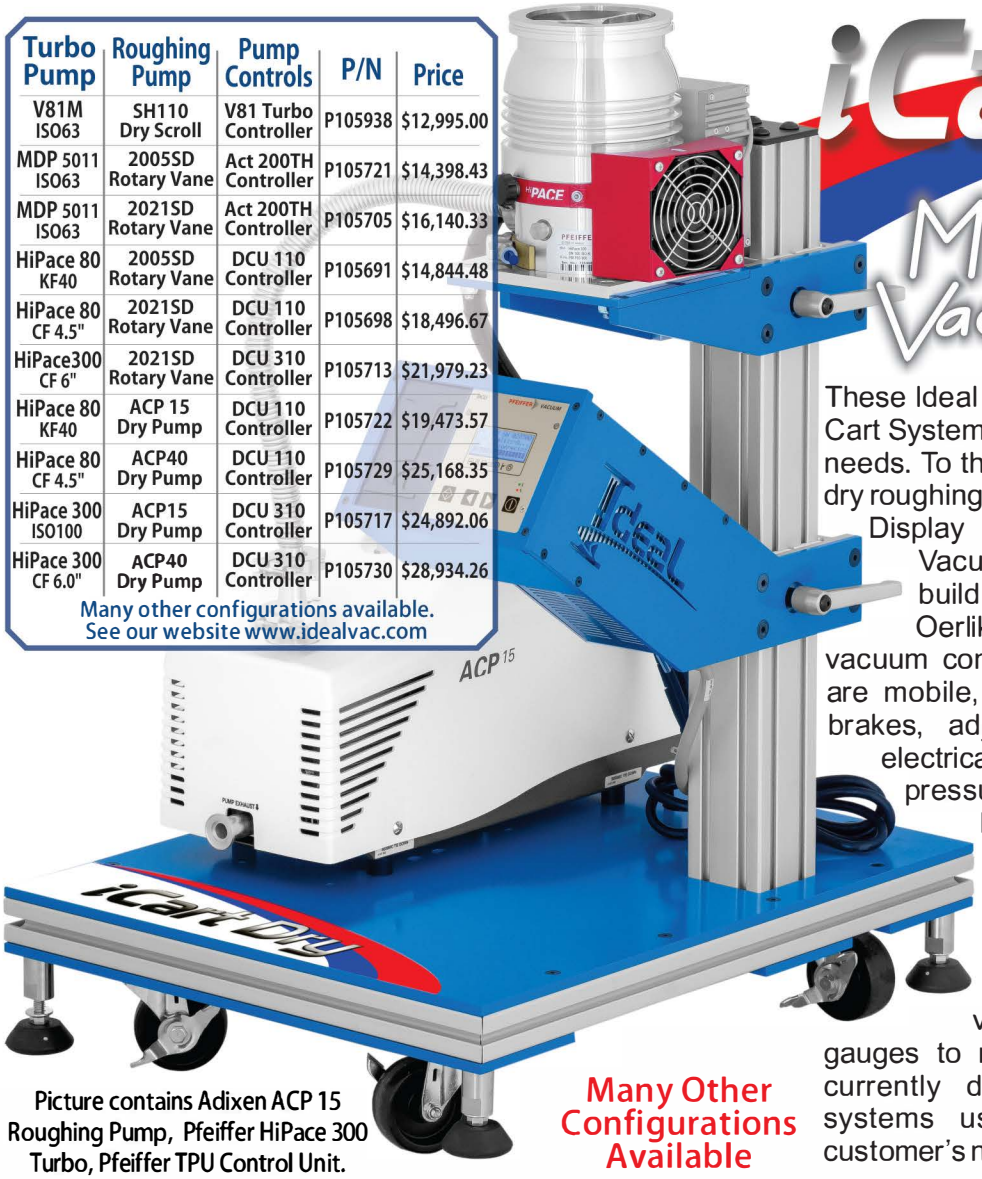
High Vacuum Inlet Connections		DN 63 ISO-K (LF) or DN 63 CF (4.5" Conflat)
Pumping Speed for N_2	l/s	65
Ultimate Pressure	mTorr	10^{-4} / 10^{-5}
Run-Up Time	mins.	1.5
Pumping Speed of Diaphragm Pump	m^3/hr	0.7
Ultimate Pressure Diaphragm Pump	Torr	2.25
Power AC		88-264 VAC
Power Consumption	W	300
Weight	kg (lbs)	14.5 (32)
Dimensions (WxHxD)	inch	10X14X14

* Catalog Pricing Subject to Change

Turbo Pump Systems

Turbo Pump	Roughing Pump	Pump Controls	P/N	Price
V81M ISO63	SH110 Dry Scroll	V81 Turbo Controller	P105938	$12,995.00
MDP 5011 ISO63	2005SD Rotary Vane	Act 200TH Controller	P105721	$14,398.43
MDP 5011 ISO63	2021SD Rotary Vane	Act 200TH Controller	P105705	$16,140.33
HiPace 80 KF40	2005SD Rotary Vane	DCU 110 Controller	P105691	$14,844.48
HiPace 80 CF 4.5"	2021SD Rotary Vane	DCU 110 Controller	P105698	$18,496.67
HiPace300 CF 6"	2021SD Rotary Vane	DCU 310 Controller	P105713	$21,979.23
HiPace 80 KF40	ACP 15 Dry Pump	DCU 110 Controller	P105722	$19,473.57
HiPace 80 CF 4.5"	ACP40 Dry Pump	DCU 110 Controller	P105729	$25,168.35
HiPace 300 ISO100	ACP15 Dry Pump	DCU 310 Controller	P105717	$24,892.06
HiPace 300 CF 6.0"	ACP40 Dry Pump	DCU 310 Controller	P105730	$28,934.26

Many other configurations available.
See our website www.idealvac.com



Picture contains Adixen ACP 15 Roughing Pump, Pfeiffer HiPace 300 Turbo, Pfeiffer TPU Control Unit.

iCart Dry

Mobile Custom Vacuum Systems

These Ideal Vacuum Products iCart Dry Mobile Cart Systems can be custom built to meet your needs. To the left, are included Adixen ACP 15 dry roughing pump and Pfeiffer TPU Control Unit Display and Pfeiffer HiPace 300 Turbo Vacuum with TC 400 Controller. We can build these systems from Agilent/Varian, Oerlikon Leybold, and or Pfeiffer/Adixen vacuum components. The iCart Dry systems are mobile, contain four wheels with locking brakes, adjustable levelers, and have an electrical power strip. They have ultimate pressures of $1x10^{-6}$ Torr and 7.5 l/s to 260 l/s pumping speeds.

These iCarts are an ideal starting point for building mobile vacuum systems; we can customize to add turbo pumps, roughing pumps, vacuum lines, and vacuum pressure gauges to meet your requirements. We are currently designing custom high vacuum systems using these carts to meet our customer's needs. Please call for a quote today.

Many Other Configurations Available

IVP iCart Mobile Vacuum System

• System can be Customized • Locking Brakes and Levelers •

• Can be built with Varian/Agilent, Oerlikon Leybold, Pfeiffer/Adixen Components •

Call For Quote: **(505) 872-0037**

* Catalog Pricing Subject to Change

PACKAGE DEALS

Alcatel Adixen by PFEIFFER VACUUM

Package Deal Include:

Turbo Drag Pump	Controller
Adixen MDP-5011 Pumping Speed 7.5 l/s Ultimate Pressure 1 X10^{-6} mTorr Inlet Flange ISO LF-63 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	**Adixen ACT 200TH** 1/4 Rack 3U Format 4 indicator lights LCD Display START/STOP, Settings Standby, Power Switch RS 232/485 Includes Cable to Turbo Pump 100-240 VAC

Total Package Price*
P/N P105528
$7,795.00

Package Deal Include:

Turbo Drag Pump	Roughing Pump	Controller
Adixen MDP-5011 Pumping Speed 7.5 l/s Ultimate Pressure 1 X10^{-6} mTorr Inlet Flange ISO LF-63 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	**Adixen 2005SD** ROTARY VANE VACUUM PUMP Nominal Pumping Speed 3.8 cfm Inlet KF25 Outlet KF25 Oil Capacity 0.83 liter Weight 55 lbs 110/220 VAC	**Adixen ACT 200TH** 1/4 Rack 3U Format 4 leds: Power, Start, At Speed, Fault REMOTE Control : ON/OFF Hour Counter Includes Cable to Turbo Pump 115VAC

Total Package Price*
P/N P104925
$10,495.00

Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS Alcatel Adixen by PFEIFFER VACUUM

Package Deal Include:	Turbo Drag Pump	Roughing Pump	Controller
Total Package Price* P/N P104894 $9,995.00	Adixen MDP-5011 Pumping Speed 7.5 l/s Ultimate Pressure 1 X10^{-6} mTorr Inlet Flange ISO LF-63 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Pfeiffer MVP 020-3AC DIAPHRAGM PUMP Nominal Pumping Speed 0.7 cfm Rotational Speed 1800 rpm Inlet: GBSPP 1/8" Elbow ON/OFF switch Selectable Voltage 110/220 VAC Weight 6.6 lbs	Adixen ACT 200TH 1/4 Rack 3U Format 4 leds: Power, Start, At Speed, Fault REMOTE Control : ON/OFF Hour Counter Includes Cable to Turbo Pump 115VAC

OPTIONAL: Inlet Adapter to make GBSPP 1/8" to KF16 - P/N P103352

Package Deal Include:	Turbo Drag Pump	Roughing Pump	Controller
Total Package Price* P/N P104926 $9,995.00	Adixen MDP-5011 Pumping Speed 7.5 l/s Ultimate Pressure 1 X10^{-6} mTorr IInlet Flange ISO LF-63 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Pfeiffer O15-4 DIAPHRAGM PUMP Nominal Pumping Speed 0.6 cfm Inlet KF16 Rotational Speed 1800 rpm Selectable Voltage 110VAC Weight 7.6 lbs	Adixen ACT 200TH 1/4 Rack 3U Format 4 leds: Power, Start, At Speed, Fault REMOTE Control : ON/OFF Hour Counter Includes Cable to Turbo Pump 115VAC

All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
Turbomolecular Pump • Controller

Turbomolecular Pump	Controller
Agilent Turbo-V-81M	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Self Diagnostics
Inlet Flange NW KF40	Vent valve control
Foreline (out) Flange KF16	Pump parameter control
Comes with fan	Protection features
(for non-corrosive gases)	LED Readout
Weight 6.6 lbs	Includes Cable to Turbo Pump
	110/220VAC

Total Package Price*
P/N P104442
$5,995.00

Turbomolecular Pump	Controller
Agilent Turbo-V-81M	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Self Diagnostics
Inlet Flange 2.75 inch CF Conflat	Vent valve control
Foreline (out) Flange KF16	Pump parameter control
Comes with fan	Protection features
(for non-corrosive gases)	LED Readout
Weight 6.6 lbs	Includes Cable to Turbo Pump
	110/220VAC

Total Package Price*
P/N P104422
$5,995.00

Turbomolecular Pump	Controller
Agilent Turbo-V-81M	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Self Diagnostics
Inlet Flange ISO LF 63	Vent valve control
Foreline (out) Flange KF16	Pump parameter control
Comes with fan	Protection features
(for non-corrosive gases)	LED Readout
Weight 6.6 lbs	Includes Cable to Turbo Pump
	110/220VAC

Total Package Price*
P/N P103047
$6,125.00

Turbomolecular Pump	Controller
Agilent Turbo-V-81M	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Self Diagnostics
Inlet Flange 4.5 inch CF Conflat	Vent valve control
Foreline (out) Flange KF16	Pump parameter control
Comes with fan	Protection features
(for non-corrosive gases)	LED Readout
Weight 6.6 lbs	Includes Cable to Turbo Pump
	110/220VAC

Total Package Price*
P/N P103122
$6,480.00

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:

Turbo Drag Pump • Roughing Pump • Controller

	Turbomolecular Pump	Roughing Pump	Controller
Total Package Price* P/N P104444 $8,599.00	Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange NW KF40 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent IDP3 DRY SCROLL PUMP Pumping Speed 60 l/m, 2.1 cfm Ultimate Pressure 2.5X10^{-1} torr Inlet Flange KF16 Outlet Flange 10 mm hose barb 115 VAC Weight 23 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC

Turbomolecular Pump	Roughing Pump	Controller	
Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange 2.75 inch CF Conflat Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent IDP3 DRY SCROLL PUMP Pumping Speed 60 l/m, 2.1 cfm Ultimate Pressure 2.5X10^{-1} torr Inlet Flange KF16 Outlet Flange 10 mm hose barb 115 VAC Weight 23 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC	Total Package Price* P/N P104445 $8,599.00

	Turbomolecular Pump	Roughing Pump	Controller
Total Package Price* P/N P103129 $8,599.00	Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange ISO LF 63 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent IDP3 DRY SCROLL PUMP Pumping Speed 60 l/m, 2.1 cfm Ultimate Pressure 2.5X10^{-1} torr Inlet Flange KF16 Outlet Flange 10 mm hose barb 115 VAC Weight 23 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC

Turbomolecular Pump	Roughing Pump	Controller	
Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange 4.5 inch CF Conflat Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent IDP3 DRY SCROLL PUMP Pumping Speed 60 l/m, 2.1 cfm Ultimate Pressure 2.5X10^{-1} torr Inlet Flange KF16 Outlet Flange 10 mm hose barb 115 VAC Weight 23 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC	Total Package Price* P/N P103130 $8,599.00

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
Turbo Drag Pump • Roughing Pump • Controller

Total Package Price*
P/N P104446
$9,599.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent Turbo-V-81M	**Agilent SH110**	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	DRY SCROLL PUMP	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 110 l/m, 4 cfm	Self Diagnostics
Inlet Flange NW KF40	Ultimate Pressure 5X10^{-2} Torr	Vent valve control
Foreline (out) Flange KF16	Inlet Flange KF25	Pump parameter control
Comes with fan	Outlet Flange KF16	Protection features
(for non-corrosive gases)	115/220 VAC	LED Readout
Weight 6.6 lbs	Weight 44 lbs.	Includes Cable to Turbo Pump
		110/220VAC

Total Package Price*
P/N P104447
$9,599.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent Turbo-V-81M	**Agilent SH110**	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	DRY SCROLL PUMP	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 110 l/m, 4 cfm	Self Diagnostics
Inlet Flange 2.75 inch CF Conflat	Ultimate Pressure 5X10^{-2} Torr	Vent valve control
Foreline (out) Flange KF16	Inlet Flange KF25	Pump parameter control
Comes with fan	Outlet Flange KF16	Protection features
(for non-corrosive gases)	115/220 VAC	LED Readout
Weight 6.6 lbs	Weight 44 lbs.	Includes Cable to Turbo Pump
		110/220VAC

Total Package Price*
P/N P103132
$9,599.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent Turbo-V-81M	**Agilent SH110**	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	DRY SCROLL PUMP	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 110 l/m, 4 cfm	Self Diagnostics
Inlet Flange ISO LF 63	Ultimate Pressure 5X10^{-2} Torr	Vent valve control
Foreline (out) Flange KF16	Inlet Flange KF25	Pump parameter control
Comes with fan	Outlet Flange KF16	Protection features
(for non-corrosive gases)	115/220 VAC	LED Readout
Weight 6.6 lbs	Weight 44 lbs.	Includes Cable to Turbo Pump
		110/220VAC

Total Package Price*
P/N P103131
$9,599.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent Turbo-V-81M	**Agilent SH110**	**Agilent Turbo-V81-AG**
Pumping Speed 50 l/s N_2	DRY SCROLL PUMP	1/4 Rack 3U Format
Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 110 l/m, 4 cfm	Self Diagnostics
Inlet Flange 4.5 inch CF Conflat	Ultimate Pressure 5X10^{-2} Torr	Vent valve control
Foreline (out) Flange KF16	Inlet Flange KF25	Pump parameter control
Comes with fan	Outlet Flange KF16	Protection features
(for non-corrosive gases)	115/220 VAC	LED Readout
Weight 6.6 lbs	Weight 44 lbs.	Includes Cable to Turbo Pump
		110/220VAC

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
Turbo Drag Pump • Roughing Pump • Controller

	Turbomolecular Pump	Roughing Pump	Controller
Total Package Price* P/N P104395 $7,899.00	Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange NW KF40 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent DS42 ROTARY VANE VACUUM PUMP Pumping Speed 46 l/m, 1.6 cfm Ultimate Pressure 3X10^{-4} torr Inlet/Outlet Flange KF16 Oil Capacity 0.6 liter 110 VAC Weight 24 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC

Turbomolecular Pump	Roughing Pump	Controller	
Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange 2.75 inch CF Conflat Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent DS42 ROTARY VANE VACUUM PUMP Pumping Speed 46 l/m, 1.6 cfm Ultimate Pressure 3X10^{-4} torr Inlet/Outlet Flange KF16 Oil Capacity 0.6 liter 110 VAC Weight 24 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC	Total Package Price* P/N P104448 $7,899.00

	Turbomolecular Pump	Roughing Pump	Controller
Total Package Price* P/N P103225 $7,899.00	Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange ISO LF 63 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent DS42 ROTARY VANE VACUUM PUMP Pumping Speed 46 l/m, 1.6 cfm Ultimate Pressure 3X10^{-4} torr Inlet/Outlet Flange KF16 Oil Capacity 0.6 liter 110 VAC Weight 24 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC

Turbomolecular Pump	Roughing Pump	Controller	
Agilent Turbo-V-81M Pumping Speed 50 l/s N_2 Ultimate Pressure 3.8 X10^{-6} mTorr Inlet Flange 4.5 inch CF Conflat Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 6.6 lbs	Agilent DS42 ROTARY VANE VACUUM PUMP Pumping Speed 46 l/m, 1.6 cfm Ultimate Pressure 3X10^{-4} torr Inlet/Outlet Flange KF16 Oil Capacity 0.6 liter 110 VAC Weight 24 lbs.	Agilent Turbo-V81-AG 1/4 Rack 3U Format Self Diagnostics Vent valve control Pump parameter control Protection features LED Readout Includes Cable to Turbo Pump 110/220VAC	Total Package Price* P/N P103226 $7,899.00

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
Turbo Drag Pump • Roughing Pump • Controller

Total Package Price*	Turbomolecular Pump	Roughing Pump	Controller
P/N P104449	**Agilent Turbo-V-81M**	**Agilent DS102**	**Agilent Turbo-V81-AG**
$8,195.00	Pumping Speed 50 l/s N_2	ROTARY VANE VACUUM PUMP	1/4 Rack 3U Format
	Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 114 l/m, 4.0 cfm	Self Diagnostics
	Inlet Flange NW KF40	Ultimate Pressure 2.5X10^{-4} Torr	Vent valve control
	Foreline (out) Flange KF16	Inlet/Outlet Flange KF25	Pump parameter control
	Comes with fan	Oil Capacity 0.6 liter	Protection features
	(for non-corrosive gases)	110 VAC	LED Readout
	Weight 6.6 lbs	Weight 48 lbs.	Includes Cable to Turbo Pump
			110/220VAC

Turbomolecular Pump	Roughing Pump	Controller	Total Package Price*
Agilent Turbo-V-81M	**Agilent DS102**	**Agilent Turbo-V81-AG**	P/N P104450
Pumping Speed 50 l/s N_2	ROTARY VANE VACUUM PUMP	1/4 Rack 3U Format	$8,295.00
Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 114 l/m, 4.0 cfm	Self Diagnostics	
Inlet Flange 2.75 inch CF Conflat	Ultimate Pressure 2.5X10^{-4} Torr	Vent valve control	
Foreline (out) Flange KF16	Inlet/Outlet Flange KF25	Pump parameter control	
Comes with fan	Oil Capacity 0.6 liter	Protection features	
(for non-corrosive gases)	110 VAC	LED Readout	
Weight 6.6 lbs	Weight 48 lbs.	Includes Cable to Turbo Pump	
		110/220VAC	

Total Package Price*	Turbomolecular Pump	Roughing Pump	Controller
P/N P103133	**Agilent Turbo-V-81M**	**Agilent DS102**	**Agilent Turbo-V81-AG**
$8,395.00	Pumping Speed 50 l/s N_2	ROTARY VANE VACUUM PUMP	1/4 Rack 3U Format
	Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 114 l/m, 4.0 cfm	Self Diagnostics
	Inlet Flange ISO LF 63	Ultimate Pressure 2.5X10^{-4} Torr	Vent valve control
	Foreline (out) Flange KF16	Inlet/Outlet Flange KF25	Pump parameter control
	Comes with fan	Oil Capacity 0.6 liter	Protection features
	(for non-corrosive gases)	110 VAC	LED Readout
	Weight 6.6 lbs	Weight 48 lbs.	Includes Cable to Turbo Pump
			110/220VAC

Turbomolecular Pump	Roughing Pump	Controller	Total Package Price*
Agilent Turbo-V-81M	**Agilent DS102**	**Agilent Turbo-V81-AG**	P/N P103134
Pumping Speed 50 l/s N_2	ROTARY VANE VACUUM PUMP	1/4 Rack 3U Format	$8,495.00
Ultimate Pressure 3.8 X10^{-6} mTorr	Pumping Speed 114 l/m, 4.0 cfm	Self Diagnostics	
Inlet Flange 4.5 inch CF Conflat	Ultimate Pressure 2.5X10^{-4} Torr	Vent valve control	
Foreline (out) Flange KF16	Inlet/Outlet Flange KF25	Pump parameter control	
Comes with fan	Oil Capacity 0.6 liter	Protection features	
(for non-corrosive gases)	110 VAC	LED Readout	
Weight 6.6 lbs	Weight 48 lbs.	Includes Cable to Turbo Pump	
		110/220VAC	

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
Turbomolecular Pump • Controller

Turbomolecular Pump	Controller	Total Package Price*
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 12.3 lbs	**24 VDC or 110/220VAC Navigator Controller** Fits on side or underneath pump Controls TwisTorr 304 Pumps Self Diagnostics Protection features Controller cable & power cord 110/220VAC or 24VDC	24 VDC P/N P105547 $8,895.00 110/220 VAC P/N P105549 $8,895.00

Turbomolecular Pump	Controller	Total Package Price*
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange CFF 6 inch Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 16.5 lbs	**24 VDC or 110/220VAC Navigator Controller** Fits on side or underneath pump Controls TwisTorr 304 Pumps Self Diagnostics Protection features Controller cable & power cable 110/220VAC or 24VDC	24 VDC P/N P105548 $8,895.00 110/220 VAC P/N P105550 $8,895.00

Turbomolecular Pump	Controller	Total Package Price*
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 12.3 lbs	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC	P/N P105551 $9,995.00

Turbomolecular Pump	Controller	Total Package Price*
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange CFF 6 inch Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 16.5 lbs	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC	P/N P105552 $9,995.00

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
TurbomolecularPump • Roughing Pump • Controller

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-8}Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 12.3 lbs	**Agilent DS42** ROTARY VANE VACUUM PUMP Pumping Speed 46 l/m, 1.6 cfm Ultimate Pressure 1X10^{-3} Torr Inlet/Outlet Flange KF16 Oil Capacity 0.6 liter 110 VAC Weight 24 lbs.	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller & power cable 110/220VAC

Total Package Price*
P/N P105565
$11,695.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-10}Torr Inlet Flange CFF 6 inch Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 16.5 lbs	**Agilent DS42** ROTARY VANE VACUUM PUMP Pumping Speed 46 l/m, 1.6 cfm Ultimate Pressure 1X10^{-3} torr Inlet/Outlet Flange KF16 Oil Capacity 0.6 liter 110 VAC Weight 24 lbs.	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller & power cable 110/220VAC

Total Package Price*
P/N P105564
$11,695.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 12.3 lbs	**Agilent DS102** ROTARY VANE VACUUM PUMP Pumping Speed 114 l/m, 4.0 cfm Ultimate Pressure 1X10^{-3} Torr Inlet/Outlet Flange KF25 Oil Capacity 0.6 liter 110 VAC Weight 48 lbs.	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller & power cable 110/220VAC

Total Package Price*
P/N P105554
$12,095.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-10}Torr Inlet Flange CFF 6 inch Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 16.5 lbs	**Agilent DS102** ROTARY VANE VACUUM PUMP Pumping Speed 114 l/m, 4.0 cfm Ultimate Pressure 1X10^{-3} Torr Inlet/Outlet Flange KF25 Oil Capacity 0.6 liter 110 VAC Weight 48 lbs.	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller & power cable 110/220VAC

Total Package Price*
P/N P105553
$12,095.00

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
TurbomolecularPump • Roughing Pump • Controller

Total Package Price*	Turbomolecular Pump	Roughing Pump	Controller
P/N P105556	**Agilent TwisTorr 304 FS**	**Agilent DS202**	**Agilent 304 FS AG Rack Controller**
$12,395.00	Pumping Speed 250 l/s N_2	ROTARY VANE VACUUM PUMP	Powers the pump
	Ultimate Pressure 1X10-8 Torr	Pumping Speed 192 l/m, 6.8 cfm	Controls TwisTorr 304 Pumps
	Inlet Flange ISO LF 100	Ultimate Pressure 1X10-3 Torr	Powers cooling fan & vent valve
	Foreline (out) Flange KF16	Inlet/Outlet Flange KF25	Protection features
	Comes with fan	Oil Capacity 0.6 liter	Controller cable & power cable
	(for non-corrosive gases)	110 VAC	110/220VAC
	Weight 12.3 lbs	Weight 48 lbs.	

Total Package Price*	Turbomolecular Pump	Roughing Pump	Controller
P/N P105555	**Agilent TwisTorr 304 FS**	**Agilent DS202**	**Agilent 304 FS AG Rack Controller**
$12,395.00	Pumping Speed 250 l/s N_2	ROTARY VANE VACUUM PUMP	Powers the pump
	Ultimate Pressure 1X10-10 Torr	Pumping Speed 192 l/m, 6.8 cfm	Controls TwisTorr 304 Pumps
	Inlet Flange CFF 6 inch	Ultimate Pressure 1X10-3 Torr	Powers cooling fan & vent valve
	Foreline (out) Flange KF16	Inlet/Outlet Flange KF25	Protection features
	Comes with fan	Oil Capacity 0.6 liter	Controller cable & power cable
	(for non-corrosive gases)	110 VAC	110/220VAC
	Weight 16.5 lbs	Weight 48 lbs.	

Total Package Price*	Turbomolecular Pump	Roughing Pump	Controller
P/N P105562	**Agilent TwisTorr 304 FS**	**Agilent IDP3**	**Agilent 304 FS AG Rack Controller**
$12,095.00	Pumping Speed 250 l/s N_2	DRY SCROLL PUMP	Powers the pump
	Ultimate Pressure 1X10-8 Torr	Pumping Speed 60 l/m, 2.1 cfm	Controls TwisTorr 304 Pumps
	Inlet Flange ISO LF 100	Ultimate Pressure 2.5X10-1 torr	Powers cooling fan & vent valve
	Foreline (out) Flange KF16	Inlet Flange KF16	Protection features
	Comes with fan	Outlet Flange 10 mm hose barb	Controller cable & power cable
	(for non-corrosive gases)	115 VAC	110/220VAC
	Weight 12.3 lbs	Weight 23 lbs.	

Total Package Price*	Turbomolecular Pump	Roughing Pump	Controller
P/N P105561	**Agilent TwisTorr 304 FS**	**Agilent IDP3**	**Agilent 304 FS AG Rack Controller**
$12,095.00	Pumping Speed 250 l/s N_2	DRY SCROLL PUMP	Powers the pump
	Ultimate Pressure 1X10-10 Torr	Pumping Speed 60 l/m, 2.1 cfm	Controls TwisTorr 304 Pumps
	Inlet Flange CFF 6 inch	Ultimate Pressure 2.5X10-1 torr	Powers cooling fan & vent valve
	Foreline (out) Flange KF16	Inlet Flange KF16	Protection features
	Comes with fan	Outlet Flange 10 mm hose barb	Controller cable & power cable
	(for non-corrosive gases)	115 VAC	110/220VAC
	Weight 16.5 lbs	Weight 23 lbs.	

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
TurbomolecularPump • Roughing Pump • Controller

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 12.3 lbs	**Agilent SH110** DRY SCROLL PUMP Pumping Speed 110 l/m, 4 cfm Ultimate Pressure 5X10^{-2} Torr Inlet Flange KF25 Outlet Flange KF16 115/220 VAC Weight 44 lbs.	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P105558
$13,895.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange CFF 6 inch Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 16.5 lbs	**Agilent SH110** DRY SCROLL PUMP Pumping Speed 110 l/m, 4 cfm Ultimate Pressure 5X10^{-2} Torr Inlet Flange KF25 Outlet Flange KF16 115/220 VAC Weight 44 lbs.	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P105557
$13,895.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 12.3 lbs	**Agilent TriScroll 300** DRY SCROLL PUMP Pumping Speed 250 l/m, 8.8cfm Ultimate Pressure 5X10^{-2} Torr Inlet Flange KF25 Outlet Flange KF16 Air Cooled Dry Pump 100-115 VAC Weight (58 lbs.)	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P105560
$15,295.00

Turbomolecular Pump	Roughing Pump	Controller
Agilent TwisTorr 304 FS Pumping Speed 250 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange CFF 6 inch Foreline (out) Flange KF16 Comes with fan (for non-corrosive gases) Weight 16.5 lbs	**Agilent TriScroll 300** DRY SCROLL PUMP Pumping Speed 250 l/m, 8.8cfm Ultimate Pressure 5X10^{-2} Torr Inlet Flange KF25 Outlet Flange KF16 Air Cooled Dry Pump 100-115 VAC Weight (58 lbs.)	**Agilent 304 FS AG Rack Controller** Powers the pump Controls TwisTorr 304 Pumps Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P105559
$15,295.00

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
Turbomolecular Pump • Controller

Turbomolecular Pump	Controller
Agilent Turbo V 551 Navigator Pumping Speed 550 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange ISO LF 160 Foreline (out) Flange KF25 Comes with fan (for non-corrosive gases) Weight 43 lbs.	V-551 Controller Navigator Fits underneath pump Controls Turbo V 551 Navigator Self Diagnostics Navigator software controllable Protection features Controller cable

Total Package Price*
P/N P105828
$15,995.00

Turbomolecular Pump	Controller
Agilent Turbo V 551 Navigator Pumping Speed 550 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange CFF 8 inch Foreline (out) Flange KF25 Comes with fan (for non-corrosive gases) Weight 52 lbs.	V-551 Controller Navigator Fits underneath pump Controls Turbo V 551 Navigator Self Diagnostics Navigator software controllable Protection features Controller cable

Total Package Price*
P/N P105829
$15,995.00

Turbomolecular Pump	Controller
Agilent Turbo V 551 Navigator Pumping Speed 550 l/s N_2 Ultimate Pressure 1X10^{-8} Torr Inlet Flange ISO LF 160 Foreline (out) Flange KF25 Comes with fan (for non-corrosive gases) Weight 43 lbs.	Agilent Turbo V 550 Rack Controller Powers the pump Controls Turbo V551 Navigator Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P105826
$15,995.00

Turbomolecular Pump	Controller
Agilent Turbo V 551 Navigator Pumping Speed 550 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange CFF 8 inch Foreline (out) Flange KF25 Comes with fan (for non-corrosive gases) Weight 52 lbs.	Agilent Turbo V 550 Rack Controller Powers the pump Controls Turbo V551 Navigator Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P105827
$15,995.00

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

AGILENT Varian

*Package Deal Include:
Turbomolecular Pump • Controller

Turbomolecular Pump	Controller
Agilent Turbo-V 1001 Navigator Pumping Speed 950 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange ISO LF 200 Foreline (out) Flange KF40 Comes with fan (for non-corrosive gases) Weight 43 lbs.	**Turbo-V 1001 Controller Navigator** Fits underneath pump Controls Turbo V 1001 Navigator Self Diagnostics Navigator software controllable Protection features Controller cable

Total Package Price*
P/N P106011
$22,995.00

Turbomolecular Pump	Controller
Agilent Turbo-V 1001 Navigator Pumping Speed 950 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange CFF 10 inch Foreline (out) Flange KF40 Comes with fan (for non-corrosive gases) Weight 43 lbs.	**Turbo-V 1001 Controller Navigator** Fits underneath pump Controls Turbo V 1001 Navigator Self Diagnostics Navigator software controllable Protection features Controller cable

Total Package Price*
P/N P106012
$22,995.00

Turbomolecular Pump	Controller
Agilent Turbo-V 1001 Navigator Pumping Speed 950 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange ISO LF 200 Foreline (out) Flange KF40 Comes with fan (for non-corrosive gases) Weight 43 lbs.	**Agilent Turbo V 1001 Rack Controller** Powers the pump Controls Turbo V1001 Navigator Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P106014 **$22,995.00**

Turbomolecular Pump	Controller
Agilent Turbo-V 1001 Navigator Pumping Speed 950 l/s N_2 Ultimate Pressure 1X10^{-10} Torr Inlet Flange CFF 10 inch Foreline (out) Flange KF40 Comes with fan (for non-corrosive gases) Weight 43 lbs.	**Agilent Turbo V 1001 Rack Controller** Powers the pump Controls Turbo V1001 Navigator Powers cooling fan & vent valve Protection features Controller cable & power cable 110/220VAC

Total Package Price*
P/N P106015 **$22,995.00**

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold OEM Package

*Package Deal Include:

TurboVac Pump • Frequency Converter • Cables

Total Package Price*
P/N P105469
$5,695.00

TurboVac Pump	Turbo.Drive 400 Frequency Converter
TurboVac SL80 Pump Pumping Speed N_2 40 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange KF40 Foreline (out) Flange KF16 With Inlet Screen Weight 4.0 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump With Separate Start/Stop Switch Weight 1.6 lbs

TurboVac Pump	Turbo.Drive 400 Frequency Converter
TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange ISO LF63 Foreline (out) Flange KF16 With Inlet Screen Weight 4.2 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump With Separate Start/Stop Switch Weight 1.6 lbs

Total Package Price*
P/N P105467
$5,695.00

Total Package Price*
P/N P105474
$5,695.00

TurboVac Pump	Turbo.Drive 400 Frequency Converter
TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-10} Torr Inlet Flange DN63 CF 4.5 Inch Foreline (out) Flange KF16 With Inlet Screen Weight 7.0 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump With Separate Start/Stop Switch Weight 1.6 lbs

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold BASIC Package

*Package Deal Include:

TurboVac Pump • Frequency Converter • Power Supply • Cables

Total Package Price*
P/N P105479
$6,693.00

TurboVac Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
TurboVac SL80 Pump Pumping Speed N_2 40 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange KF40 Foreline (out) Flange KF16 With Inlet Screen Weight 4.0 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

TurboVac Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange ISO LF63 Foreline (out) Flange KF16 With Inlet Screen Weight 4.2 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

Total Package Price*
P/N P105480
$6,693.00

Total Package Price*
P/N P105475
$6,693.00

TurboVac Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-10} Torr Inlet Flange DN63 CF 4.5 Inch Foreline (out) Flange KF16 With Inlet Screen Weight 7.0 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold Roughing Package

*Package Deal Include:

TurboVac Pump • Roughing Pump • Controller • Cables

Total Package Price*
P/N P105476
$10,995.00

TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
TurboVac SL80 Pump Pumping Speed N_2 40 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange KF40 Foreline (out) Flange KF16 With Inlet Screen Weight 4.0 lbs **SC5D Scroll Roughing Pump** Displacement 3.8 CFM Ultimate Pressure 3.8 x 10^{-2} Torr Inlet Flange KF25 Exhaust Flange KF16 Noise Level 52 db(A) Weight 31 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange ISO LF63 Foreline (out) Flange KF16 With Inlet Screen Weight 4.2 lbs **SC5D Scroll Roughing Pump** Displacement 3.8 CFM Ultimate Pressure 3.8 x 10^{-2} Torr Inlet Flange KF25 Exhaust Flange KF16 Noise Level 52 db(A) Weight 31 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

Total Package Price*
P/N P105448
$10,995.00

Total Package Price*
P/N P105471
$10,995.00

TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-10} Torr Inlet Flange DN63 CF 4.5 Inch Foreline (out) Flange KF16 With Inlet Screen Weight 7.0 lbs **SC5D Scroll Roughing Pump** Displacement 3.8 CFM Ultimate Pressure 3.8 x 10^{-2} Torr Inlet Flange KF25 Exhaust Flange KF16 Noise Level 52 db(A) Weight 31 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold Roughing Package

*Package Deal Include:

TurboVac Pump • Roughing Pump • Controller • Cables

	TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
Total Package Price* P/N P105477 $9,493.00	**TurboVac SL80 Pump** Pumping Speed N_2 40 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange KF40 Foreline (out) Flange KF16 With Inlet Screen Weight 4.0 lbs **D4B Rotary Vane Roughing Pump** Displacement 3.4 CFM Ultimate Pressure 1 x 10^{-3} Torr Inlet Flange KF16 Exhaust Flange KF16 110 VAC Weight 42 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start and Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

	TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
	TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange ISO LF63 Foreline (out) Flange KF16 With Inlet Screen Weight 4.2 lbs **D4B Rotary Vane Roughing Pump** Displacement 3.4 CFM Ultimate Pressure 1 x 10^{-3} Torr Inlet Flange KF16 Exhaust Flange KF16 110 VAC Weight 42 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start and Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

Total Package Price* P/N P105470
$9,493.00

	TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
Total Package Price* P/N P105472 $9,493.00	**TurboVac SL80 Pump** Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-10} Torr Inlet Flange DN63 CF 4.5 Inch Foreline (out) Flange KF16 With Inlet Screen Weight 7.0 lbs **D4B Rotary Vane Roughing Pump** Displacement 3.4 CFM Ultimate Pressure 1 x 10-3 Torr Inlet Flange KF16 Exhaust Flange KF16 110 VAC Weight 42 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start and Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold Roughing Package

*Package Deal Include:

TurboVac Pump • Roughing Pump • Controller • Cables

	TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
Total Package Price* $9,794.00 P/N P105478	**TurboVac SL80 Pump** Pumping Speed N_2 40 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange KF40 Foreline (out) Flange KF16 With Inlet Screen Weight 4.0 lbs **D8B Rotary Vane Roughing Pump** Displacement 6.9 CFM Ultimate Pressure 1 x 10^{-3} Torr Inlet Flange KF16 Exhaust Flange KF16 110 VAC Weight 47 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

	TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
	TurboVac SL80 Pump Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange ISO LF63 Foreline (out) Flange KF16 With Inlet Screen Weight 4.2 lbs **D8B Rotary Vane Roughing Pump** Displacement 6.9 CFM Ultimate Pressure 1 x 10^{-3} Torr Inlet Flange KF16 Exhaust Flange KF16 110 VAC Weight 47 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

Total Package Price* $9,794.00 P/N P105468

	TurboVac Pump and Roughing Pump	Turbo.Drive 400 Frequency Converter	Turbo.Control 300 Power Supply
Total Package Price* $9,794.00 P/N P105473	**TurboVac SL80 Pump** Pumping Speed N_2 65 l/s Ultimate Pressure 1.5 x 10^{-10} Torr Inlet Flange DN63 CF 4.5 Inch Foreline (out) Flange KF16 With Inlet Screen Weight 7.0 lbs **D8B Rotary Vane Roughing Pump** Displacement 6.9 CFM Ultimate Pressure 1 x 10^{-3} Torr Inlet Flange KF16 Exhaust Flange KF16 110 VAC Weight 47 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs	**Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold OEM Package

*Package Deal Include:

TurboVac Pump • Frequency Converter • Cable

TurboVac Pump	Turbo.Drive 400 Frequency Converter
TurboVac SL300 Pump Pumping Speed N_2 270 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 With Inlet Screen Weight 11.5 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump With Separate Start/Stop Switch Weight 1.6 lbs

Total Package Price*
P/N P105499
$8,895.00

TurboVac Pump	Turbo.Drive 400 Frequency Converter
TurboVac SL300 Pump Pumping Speed N_2 270 l/s Ultimate Pressure 1.5 x 10^{-10} Torr Inlet Flange DN100 CF 6.0 inch Foreline (out) Flange KF16 With Inlet Screen Weight 16.3lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump With Separate Start/Stop Switch Weight 1.6 lbs

Total Package Price*
P/N P105489
$8,895.00

*All Vacuum Hoses and Connecting Vacuum Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold BASIC Package

*Package Deal Include:

TurboVac Pump • Frequency Converter • Power Supply • Cables

Total Package Price*
P/N P105500
$9,995.00

TurboVac Pump & Turbo.Control 300 PS	Turbo.Drive 400 Frequency Converter
TurboVac SL300 Pump Pumping Speed N_2 270 l/s Ultimate Pressure 1.5 x 10^{-8} Torr Inlet Flange ISO LF 100 Foreline (out) Flange KF16 With Inlet Screen Weight 11.5 lbs **Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs

TurboVac Pump & Turbo.Control 300 PS	Turbo.Drive 400 Frequency Converter
TurboVac SL300 Pump Pumping Speed N_2 270 l/s Ultimate Pressure 1.5 x 10^{-10} Torr Inlet Flange DN100 CF 6.0 inch Foreline (out) Flange KF16 With Inlet Screen Weight 16.3lbs **Turbo.Control 300 Power Supply** Status indicating LEDs Start & Stop With connecting cable to pump AC Power Cord Weight 3.3 lbs	**Turbo.Drive TD400 Frequency Converter** With RS232 Interface Comes with side mount and connecting cable to pump Weight 1.6 lbs

Total Package Price*
P/N P105490
$9,995.00

*All Vacuum Hoses and Connecting Vacuum Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold Roughing Package

*Package Deal Include:

TurboVac Pump • Roughing Pump • Frequency Converter • Power Supply • Cables

TurboVac Pump Roughing Pump	Turbo.Control 300 PS Turbo.Drive TD400

Total Package Price*

P/N P105501

$12,495.00

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-8} Torr
Inlet Flange ISO LF 100
Foreline (out) Flange KF16
With Inlet Screen
Weight 11.5 lbs

D4B Rotary Vane Roughing Pump
Displacement 3.4 CFM
Ultimate Pressure 1 x 10^{-3} Torr
Inlet Flange NW KF16
Exhaust Flange NW KF16
110 VAC
Weight 42 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

TurboVac Pump Roughing Pump	Turbo.Control 300 PS Turbo.Drive TD400

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-10} Torr
Inlet Flange DN100 CF 6.0 inch
Foreline (out) Flange KF16
With Inlet Screen
Weight 16.3lbs

D4B Rotary Vane Roughing Pump
Displacement 3.4 CFM
Ultimate Pressure 1 x 10^{-3} Torr
Inlet Flange NW KF16
Exhaust Flange NW KF16
110 VAC
Weight 42 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

Total Package Price*

P/N P105493

$12,495.00

*All Vacuum Hoses and Connecting Vacuum Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold Roughing Package

*Package Deal Include:

TurboVac Pump • Roughing Pump • Frequency Converter • Power Supply • Cables

TurboVac Pump Roughing Pump	Turbo.Control 300 PS Turbo.Drive TD400

Total Package Price*
P/N P105502
$12,895.00

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-8} Torr
Inlet Flange ISO LF 100
Foreline (out) Flange KF16
With Inlet Screen
Weight 11.5 lbs

D8B Rotary Vane Roughing Pump
Displacement 6.9 CFM
Ultimate Pressure 1 x 10^{-3} Torr
Inlet Flange NW KF16
Exhaust Flange NW KF16
110 VAC
Weight 47 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

TurboVac Pump Roughing Pump	Turbo.Control 300 PS Turbo.Drive TD400

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-10} Torr
Inlet Flange DN100 CF 6.0 inch
Foreline (out) Flange KF16
With Inlet Screen
Weight 16.3lbs

D8B Rotary Vane Roughing Pump
Displacement 6.9 CFM
Ultimate Pressure 1 x 10^{-3} Torr
Inlet Flange NW KF16
Exhaust Flange NW KF16
110 VAC
Weight 47 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

Total Package Price*
P/N P105492
$12,895.00

*All Vacuum Hoses and Connecting Vacuum Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold Roughing Package

*Package Deal Include:

TurboVac Pump • Roughing Pump • Frequency Converter • Power Supply • Cables

TurboVac Pump
Roughing Pump
Turbo.Control 300 PS
Turbo.Drive TD400

Total Package Price*
P/N P105503
$14,995.00

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-8} Torr
Inlet Flange ISO LF 100
Foreline (out) Flange KF16
With Inlet Screen
Weight 11.5 lbs

SC5D Scroll Roughing Pump
Displacement 3.8 CFM
Ultimate Pressure 3.8 x 10^{-2} Torr
Inlet Flange NW KF25
Exhaust Flange NW KF16
Noise Level 52 db(A)
Weight 31 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

TurboVac Pump
Roughing Pump
Turbo.Control 300 PS
Turbo.Drive TD400

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-10} Torr
Inlet Flange DN100 CF 6.0 inch
Foreline (out) Flange KF16
With Inlet Screen
Weight 11.5 lbs

SC5D Scroll Roughing Pump
Displacement 3.8 CFM
Ultimate Pressure 3.8 x 10-2 Torr
Inlet Flange NW KF25
Exhaust Flange NW KF16
Noise Level 52 db(A)
Weight 31 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

Total Package Price*
P/N P105491
$14,995.00

*All Vacuum Hoses and Connecting Vacuum Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

Oerlikon Leybold Roughing Package

*Package Deal Include:

TurboVac Pump • Roughing Pump • Frequency Converter • Power Supply • Cables

TurboVac Pump
Roughing Pump
Turbo.Control 300 PS
Turbo.Drive TD400

Total Package Price*
P/N P105504
$15,995.00

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-8} Torr
Inlet Flange ISO LF 100
Foreline (out) Flange KF16
With Inlet Screen
Weight 11.5 lbs

SC15D Scroll Roughing Pump
Displacement 10.6 CFM
Ultimate Pressure 3.8 x 10^{-2} Tor
Inlet Flange NW KF25
Exhaust Flange NW KF16
Noise Level 58 db(A)
Weight 55 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

TurboVac Pump
Roughing Pump
Turbo.Control 300 PS
Turbo.Drive TD400

TurboVac SL300 Pump
Pumping Speed N_2 270 l/s
Ultimate Pressure 1.5 x 10^{-10} Torr
Inlet Flange DN100 CF 6.0 inch
Foreline (out) Flange KF16
With Inlet Screen
Weight 11.5 lbs

SC15D Scroll Roughing Pump
Displacement 10.6 CFM
Ultimate Pressure 3.8 x 10^{-2} Tor
Inlet Flange NW KF25
Exhaust Flange NW KF16
Noise Level 58 db(A)
Weight 55 lbs

Turbo.Control 300 Power Supply
Status indicating LEDs
Start & Stop
With connecting cable to pump
AC Power Cord
Weight 3.3 lbs

Turbo.Drive TD400 Frequency Converter
With RS232 Interface
Comes with side mount
and connecting cable to pump
Weight 1.6 lbs

Total Package Price*
P/N P105505
$15,995.00

*All Vacuum Hoses and Connecting Vacuum Hardware NOT INCLUDED in Package Deals

* Catalog Pricing Subject to Change

Turbo Pump Systems (Packages)

PACKAGE DEALS

PFEIFFER

*Package Deal Include:

Turbo Drag Pump • Controller • Cables

Total Package Price*
P/N P103389
$7,995.00

Turbo Drag Pump	Display & Controller Unit
HiPace 80 Pumping Speed 67 l/s N2 Ult. Pressure 5 X 10^{-7} Torr Inlet Flange ISO LF 63 Foreline (out) Flange KF16 Comes with Integrated TC110(24VDC) & Cooling Fan (for non-corrosive gases) Weight 5.25 lbs	**DCU110** 1/4 Rack 3U Format Self Diagnostics Control over turbo pump Operate & Display Pressure Gauges LED Readout Includes Cable to Turbo 110/220VAC

Vent Valve TVF 005 Shown is OPTIONAL

Turbo Drag Pump	Display & Controller Unit
HiPace 80 Pumping Speed 67 l/s N2 Ult. Pressure 5 X 10^{-10} Torr Inlet Flange CF 4.5 in. Foreline (out) Flange KF16 Comes with Integrated TC110(24VDC) & Cooling Fan (for non-corrosive gases) Weight 5.25 lbs	**DCU110** 1/4 Rack 3U Format Self Diagnostics Control over turbo pump Operate & Display Pressure Gauges LED Readout Includes Cable to Turbo 110/220VAC

Total Package Price*
P/N P103390
$7,995.00

Vent Valve TVF 005 Shown is OPTIONAL

Total Package Price*
P/N P103391
$13,799.50

Turbo Drag Pump	Display & Controller Unit
HiPace 300 Pumping Speed 260 l/s N2 Ult. Pressure 1 X 10^{-8} Inlet Flange ISO LF 100 Foreline (out) Flange KF16 Comes with Integrated TC400(24VDC) (for non-corrosive gases) Weight 15 lbs	**DCU310** 1/4 Rack 3U Format Self Diagnostics Control over turbo pump Operate & Display Pressure Gauges LED Readout Includes Cable to Turbo 110/220VAC

Turbo Drag Pump	Display & Controller Unit
HiPace 300 Pumping Speed 260 l/s N2 Ult. Pressure 1 X 10^{-10} Inlet Flange 6 in. Conflat Foreline (out) Flange KF16 Comes with Integrated TC400(24VDC) (for non-corrosive gases) Weight 15 lbs	**DCU310** 1/4 Rack 3U Format Self Diagnostics Control over turbo pump Operate & Display Pressure Gauges LED Readout Includes Cable to Turbo 110/220VAC

Total Package Price*
P/N P103392
$13,898.50

*All Vacuum Hoses and Connecting Hardware NOT INCLUDED in Package Deals

* Catalog Pricing
Subject to Change