Pumps

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Kurt J. Lesker Company

Pump Classifications

Transfer vs. Capture

Vacuum pumps are divided into two groups: gas transfer or gas capture. Transfer pumps force gas molecules in a preferred direction by positive displacement or momentum exchange. Ultimately, the gas is compressed until slightly above atmospheric pressure when it is ejected into the atmosphere. By contrast, capture pumps immobilize gas molecules on special surfaces within the vacuum system. To generalize their applications, transfer pumps are used for high gas loads while capture pumps produce oil-free vacuums and UHV pressures.

Pump Applications: Transfer vs. Capture

1. With the exception of diffusion pumps, all transfer pumps exhibit some kind of mechanical motion, which implies they vibrate to some degree. By contrast, most capture pumps, with the exception of cryogenic pumps, have no moving parts. Capture pumps are therefore preferred in the optical coatings industry where even minimal vibrations to the vacuum system are unacceptable.

2. Car headlight reflectors are made by flash evaporating aluminum onto formed plastic parts in a batch coater. For cost-effective production, the production can only be a few minutes. The high gas load conditions make capture pumps an unlikely first choice.

Operating Pressure Range

The mechanics of the pump design inherently dictate the pressure range at which the pump is able to operate. The vacuum industry recognizes the following pressure regimes:

- **Coarse Vacuum —** 760–1 Torr
- **Medium Vacuum —** 1 Torr–10^{-3} Torr
- **High Vacuum —** 10^{-4}–10^{-8} Torr
- **Ultra High Vacuum —** 10^{-9}–10^{-12} Torr

The transition from atmospheric pressure to the bottom of the UHV range (approx. 1 x 10^{-12} Torr) is a dynamic range of almost 10^{15} and well beyond the capabilities of any single pump. Indeed, to get to any pressure below 10^{-4} Torr requires more than one pump. While the distinction between gas transfer and gas capture is important for applications, classification into vacuum degree is more helpful in pump selection.

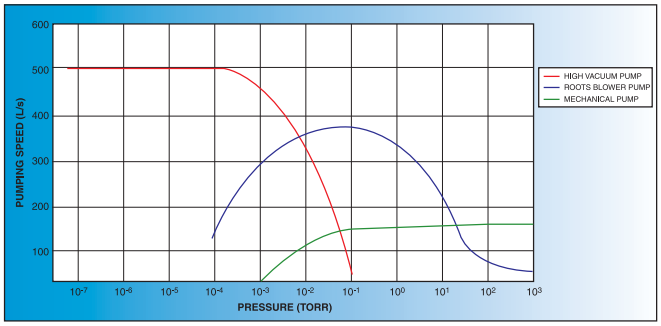
NOTE: While other pump classification criteria are listed below, pumps are ultimately organized according to the operating principle/pumping mechanism that, again, loosely groups pumps into one of the aforementioned pressure ranges.

Ultimate Pressure and Pumping Speed

A pump's *ultimate pressure*, often called its ultimate vacuum, is a value measured when the pump's design is finalized and an example built. In general terms, it is measured by blanking the pump's inlet with a pressure gauge, operating the pump for some time, recording the pressure achieved, and calling that the ultimate pressure. Because there are many pressure units, you will see ultimate pressures quoted in Torr, millibar, Pascal, inches of mercury, etc.

Pumping speed is formally defined as the ratio of the throughput of a given gas to the partial pressure of that gas at a specific point near the inlet port of the pump. With less formality, but more clarity, it is the volume of gas (at any pressure) that is removed from the system by the pump in unit time. In short, pumping speed is a measure of the pump's capacity to remove gas from the chamber. It is measured in *liters per second (L/sec.), cubic feet per minute (cfm), or cubic meters per hour (m^3/hr.)*.

There are several points to note when comparing pumps based on their rated pumping speed. First, pumping speed is measured under the same ideal conditions used to measure ultimate pressure-minimum volume, right at the pump inlet, lowest possible outgassing rate, ideal conditions, etc. Second, pumping speed is specified by the manufacturer as the highest value over the entire operating pressure range of the pump. The pumping speed curve shown **below** illustrates the characteristic differences between roots pumps, mechanical pumps, and high vacuum pumps.



Wet vs. Dry

A wet pump uses low vapor pressure oil in the pumping mechanism. A diffusion pump, for example, uses oil vapor flow as the pumping mechanism while a rotary vane pump uses oil to lubricate and seal sliding joints between vanes and casing. So, in any wet pump, oil liquid and vapor coexist in the pumps vacuum volume.

A dry pump has no gas sealing fluid. Some dry pumps may truly have no lubricants while other dry pumps may have lubricated gears/bearings sealed from the vacuum track by o-rings. The latter, "*somewhat dry pump*," doesn't use oil/grease to seal but does use it to lubricate gears or bearings outside the vacuum volume (as in roots pumps, screw pumps, claw pumps) or at the pump's high-pressure end (as in ceramic ball-bearing turbo pumps). For roots, screw, or claw pumps, shaft-seals prevent vapors re-entering the vacuum volume. For turbo pumps, the pumping mechanism prevents the vapors traveling backwards. The former, "really dry pumps," don't have lubricants anywhere close to the vacuum volume. Capture pumps fall into this category, as do transfer pumps using PTFE (Teflon®) as a sliding lubricant (as in scroll pumps, reciprocating piston pumps) or as the gas seal (as in diaphragm pumps). But solid lubricants lack the lubricity of fluid lubricants and their lifetimes are not as long.

PLEASE NOTE: An oil-free system is never achieved by simply replacing existing oil-sealed pumps with dry pumps. All surfaces in the chamber and pumping lines will be contaminated with an oil film that will act as a secondary source unless rigorously cleaned or replaced.

➤ Pump Classifications

Normal vs. Corrosive

Pumping aggressive gases can severely affect the pump's lifetime depending on the construction of the pump's critical internal components. Pump manufacturers offer chemical (a.k.a. corrosion or corrosive) versions of their pumps that feature some added degree of protection. Because there are no standards covering the chemical resistance of a pump, each pump manufacturer devises its own anti-corrosion strategies.

For various reasons depending on the pumping mechanism involved, capture pumps aren't rated for pumping corrosive gases. Those transfer pumps that are rated for corrosive gases typically have special coatings for shaft bearings: Viton® o-rings and gaskets, gas ballasts, gas bubbles, and use inert fluids where applicable (**see sidebar, at right**).

Rotary Vane Pumps

Vacuum Level: Coarse Vacuum or Medium Vacuum (design dependent)

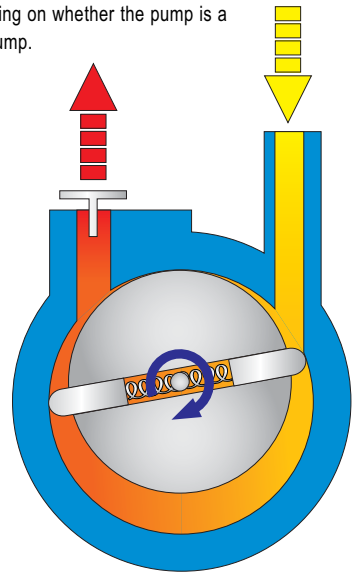
Gas Removal Method: Gas Transfer

Pump Design: Oil-Sealed (wet)

There are two different types of rotary vane pumps—those for coarse vacuum applications and those for medium vacuum applications. The major distinctions between the rotary vane mechanism for coarse pumps and rough pumps are the number of vanes, their tolerances, and the trapping of exhaust oil vapors.

In all rotary vane pumps, gas from the chamber enters the inlet port and is trapped between the rotor vanes and the pump body. The eccentrically mounted rotor compresses the gas and sweeps it toward the discharge port. When gas pressure exceeds atmospheric, the exhaust valve opens and gas is expelled. Oil is used as a lubricant, coolant, and gas sealant for the vanes. Single-stage rough rotary vane pumps have ultimate pressures around 10^{-2} Torr range while two-stage medium vacuum vane pumps reach 10^{-3} Torr. Pumping speeds vary from 1–650 cfm, depending on whether the pump is a coarse vane or rough vane pump.

Rough vane pumps are used primarily as backing pumps for roots or high-vacuum gas transfer pumps such as turbomolecular and diffusion in all vacuum applications. Coarse vane pumps are used in freeze drying, vacuum filtering, vacuum impregnation, materials handling, meat packing, and "house" vacuum systems.



Ballasts, Bubbles, and Inerts

A **gas ballast** adds gas, often air but sometimes inert, into a late position in the pump's compression cycle. The idea is to raise the pressure in the "just-about-to-be-exhausted" segment of gas. Any remaining vapor stays vaporized and is swept out by the larger gas flow.

Gas ballasts help remove:

- Solvent vapors that ruin ultimate pressure, causing loss of lubrication by dilution
- Water vapor that equally ruins ultimate pressure and rusts the internal parts

The benefits of using a gas ballast come at a price though. With the ballast open, the pump's ultimate pressure rises by a factor of ~10.

The **gas bubbler's** path doesn't enter the pumping mechanism at all. Inert gas bleeds into the bottom of the oil casing. While the bubbles help purge dissolved gases from the oil, the bubbler's main purpose is diluting the nasty gas exiting the pump's exhaust valve. When pumping spontaneously combustible gases like phosphine or arsine, or highly flammable gases like hydrogen or methane, an inert gas bubbler is a very good idea. It dilutes gases and promotes increased mass flow toward the burn box. The benefits realized by the gas bubbler do not affect the ultimate pressure of the pump.

Chemically inert fluids replace hydrocarbon oils (HC) in applications where the latter's properties are not suitable, including:

- Reactive process gasses will attack the HC oils
- Oxygen forms explosive mixtures with hot HC vapors
- Spontaneously flammable gas ignites hot HC oil

Only perfluoropolyethers (PFPE) pump fluids are totally inert, completely unreactive, won't explode, and can't catch fire. So, when faced with an application like those listed **above**, use Fomblin® PFPE fluids (see **page 6-13**).

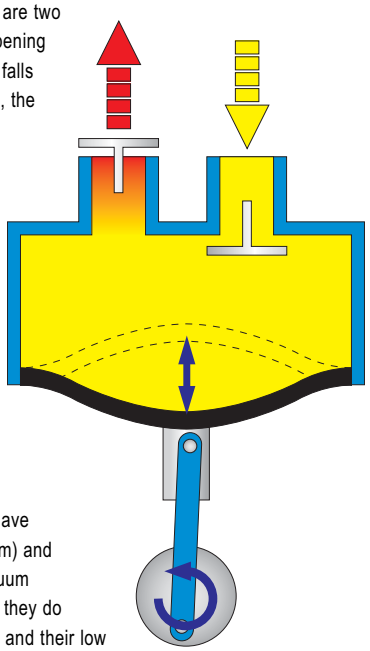
Diaphragm Pumps

Vacuum Level: Medium Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Dry

A flexible metal or polymeric diaphragm seals a small volume at one end. At the other end are two spring-loaded valves, one opening when the volume's pressure falls below the "outside" pressure, the other opening when the volume's pressure exceeds the "outside" pressure. A cam on a motor shaft rapidly flexes the diaphragm, causing gas transfer in one valve and out the other.



Diaphragm pumps often have two stages in series—to produce a lower vacuum, or in parallel, to produce a higher pumping speed. In general, diaphragm pumps have low pumping speeds (<10 cfm) and produce a poor ultimate vacuum (1 Torr to 10 Torr). However, they do exhaust into the atmosphere and their low costs make them attractive roughing pumps. In part, hybrid pumps were developed to accept the poor foreline pressure diaphragm pumps produce. Diaphragm pumps are also used for simple vacuum filtration, thin film evaporation, distillation, gel drying applications, and as sample movers for gas analyzers, membrane filtration, and sample extraction.

Cryosorption Pumps

Vacuum Level: Medium Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Dry

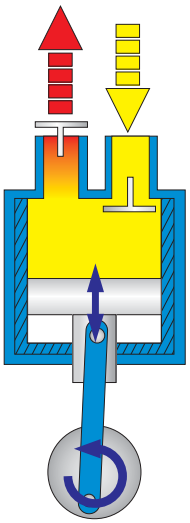
Cryosorption pumps are essentially closed-ended tubes filled with molecular sieve pellets. The tubes are often internally finned or re-entrant to aid heat transfer. The pumping action is created by cooling the molecular sieve with LN_2 in a surrounding dewar. A correctly sized cryosorption pump will evacuate a chamber from atmosphere to approximately 10^{-4} Torr in a few minutes. But it is a one-time operation and the pump needs regeneration before further use. To achieve the lowest pressures, two or more cryosorption pumps are operated in sequence. They are low-cost, trouble-free, and completely dry. Before the advent of dry mechanical pumps, they were often used for the initial rough down of infrequently vented ion-pumped UHV systems. Their simple blow-off rubber stopper valves make the first part of regeneration automatic. More effective regeneration requires heating one pump while it is pumped by another.

Reciprocating Piston Pumps

Vacuum Level: Medium Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Dry



The mechanism, patented by CSIRO Australia, moves a reciprocating piston in a metal cylinder lined with a composite PTFE wall honed to a 3-micron finish. A combination of poppet and slide valves, similar in concept to those of the 4-stroke and 2-stroke internal combustion engines, directs gas flow to and from the cylinder. The pumps are built with up to 4 stages, often connected in parallel or series to achieve an ultimate vacuum of 2×10^{-2} Torr or pumping speeds from 6–32 cfm while exhausting at atmospheric pressure. They are used in clean, dry applications that do not contain aggressive gases, water vapor, or dust. A typical application is roughing load locks in MBE and UHV processing systems.

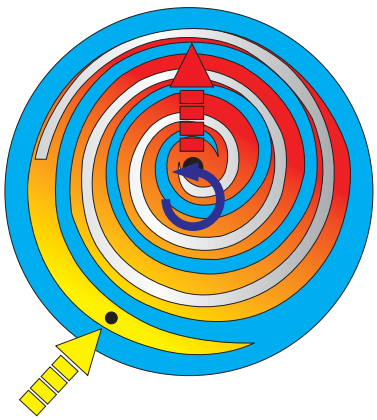
Scroll Pumps

Vacuum Level: Medium Vacuum

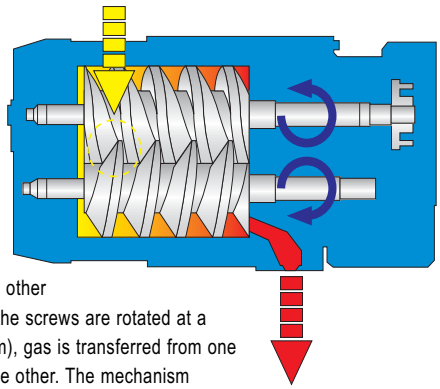
Gas Removal Method: Gas Transfer

Pump Design: Dry

Two open spiral metal strips are nested together. One spiral is fixed while the other "orbits"—its center point describes a small circle but the spiral does not rotate. As the moving spiral orbits, it touches the stationary spiral at everchanging positions. The shape of the spirals means at one orbital point there is an open (crescent-shaped) volume connected to the inlet. A little later in the orbit, the connection with the inlet closes, trapping a volume of gas. Continuing the orbit causes this volume to decrease, compressing the gas until it reaches a minimum volume and maximum pressure at the spirals' center, where the outlet is located. In this orbital position, the inlet is again connected to the large open volume. Typically, two such nested spiral stages are mounted in series, producing an ultimate vacuum in the 10^{-2} Torr range and pumping speed of roughly 12–25 cfm while exhausting at atmospheric pressure. Scroll pumps are used in clean, dry processes and as dry backing pumps for high vacuum pumps. They should not be used outside an ambient temperature range of 5–40° C.



Screw Pumps



Vacuum Level: Medium Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Dry

Two contra-rotating, left- and right-handed "screws" mesh with each other but do not touch. When the screws are rotated at a modest speed (3,600 rpm), gas is transferred from one end of the structure to the other. The mechanism produces an ultimate pressure in the 10^{-3} Torr range, yet can operate with the inlet at atmospheric pressure. Pumping speeds from 30–318 cfm are available. The construction materials are chosen to enable the screw pump to operate in the harsh environments of aggressive gases and particulates found in semiconductor etching and CVD processes. They are also used for roughing dry, high vacuum transfer pumps or initial pumpdown for capture pumps.

Hook and Claw Pumps

Vacuum Level: Medium Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Dry

Two contra-rotating impellers, which in cross-sectional shape look like claws, mesh along their length without touching. The rotary action is not unlike the lobe pump but the claw pump's inlet and outlet ports are in the casing's end wall and are covered or exposed by the end of the impeller shaft. One advantage of this pump is its ability to accept high temperature gases, giving it good water vapor pumping characteristics. Design features such as blowing compressed air into the bearings provide protection against particulates or aggressive gas. Claw pumps have ultimate pressures of just below 10^{-1} Torr and pumping speeds from 50–250 cfm while exhausting into atmospheric pressure. Claw pumps are used in harsh industrial environments, particularly in claw pump semiconductor processing and where water vapor content is high.

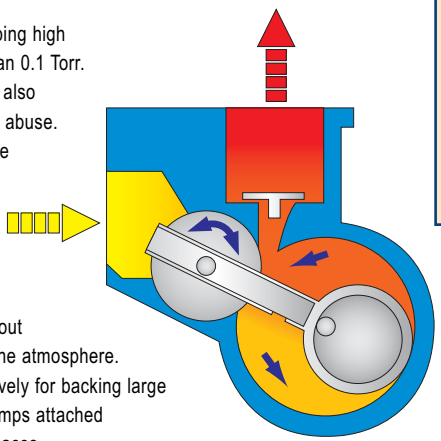
Rotary Piston Pumps

Vacuum Level: Medium Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Oil-Sealed (wet)

This mechanism is best at pumping high gas loads at pressures lower than 0.1 Torr. The mechanism is complex, but also rugged and can withstand much abuse. Gas from the chamber enters the pump body through a sliding sleeve valve. An eccentrically mounted cylinder rocks (orbits) around the inside of the pump body without rotating. It compresses the gas out through the exhaust valve into the atmosphere. Rotary pistons are used extensively for backing large roots pumps and/or diffusion pumps attached to production-sized vacuum furnaces.



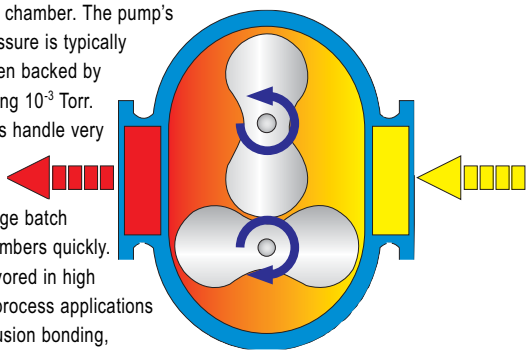
Roots (Rotary Lobe) Pumps

Vacuum Level: Medium Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Oil-Sealed (wet)

The roots (or rotary lobe) action is excellent for moving huge quantities of gas at pressures between 0.01–10 Torr. In cross-section, the two lobes are figure-eights that mesh without touching and counter-rotate to continuously transfer gas in one direction through the pump. The compression ratio (outlet pressure divided by inlet pressure) is between 10 and 100, and single-stage lobe pumps must be backed by rotary vane or piston pumps. The compression ratio also varies with the molecular weight of the gas, the higher velocities of the light gases enabling them to return more easily to the chamber. The pump's ultimate pressure is typically 10^{-4} Torr when backed by a pump pulling 10^{-3} Torr. Roots pumps handle very high gas loads and will cycle large batch process chambers quickly. They are favored in high throughput process applications such as diffusion bonding, distillation towers, and IC fabrication lines.



Roots Pumps and High Pressures

The Roots' pressure range is from ~20 Torr to ~10^{-4} Torr.
Pumping a chamber from atmosphere leads to two non-obvious issues:

- Operating the Roots at full speed generates heat (by gas compression) and requires a power level that damages the motor.
- Leaving the pump off introduces a huge conductance loss.

Roots manufacturers counteract these problems in three ways.

1. A variable speed motor is monitored and a feedback loop keeps its power at an acceptable level to avoid overheating. As the pressure decreases, the same power rotates the rotors faster. At ~20 Torr, the rotors are at full speed.

2. The pump operates at full speed. However, an (automatic) "back" by-pass valve connects downstream- and upstream-sides. If the downstream pressure is too high, the valve opens and gas flows back to the upstream-side effectively equilibrating pressures. At ~20 Torr the downstream pressure is no longer high enough to force the valve open.

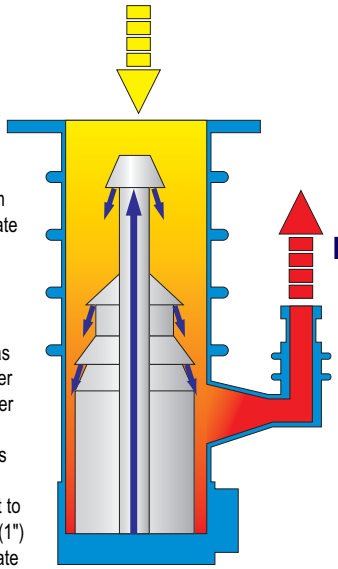
3. The motor operates at full speed, but a fluid drive connects it and the rotors. At high pressure, the rotors cannot be driven at motor speed and there is slippage in the fluid drive. At ~20 Torr, the rotors are at full speed.

Diffusion Pumps

Vacuum Level: High Vacuum

Gas Removal Method: Gas Transfer

Pump Design: Oil-Sealed (wet)



Diffusion pumps were the first high vacuum pumps in operation. Diffusion pumps operate by boiling a low vapor pressure, high molecular weight, non-reactive fluid and forcing a dense vapor stream up a central column and out as a conical vapor curtain, through jets that are angled downward. Gas molecules from the chamber randomly enter the curtain and are pushed toward the boiler by momentum transfer from the fluid molecules. When the vapor curtain reaches the cold wall, the temperature change of perhaps 200–250º C immediately returns it to liquid form at a low vapor pressure. Small (1") and large (36") diameter pumps give ultimate vacuums in the 10^{-4} Torr range. Mid-sized pumps, with an LN_2 trap, reach the 10^{-7} Torr range. Pumping speeds range from perhaps 30 L/s to 50,000 L/s.

Diffusion pumps tolerate operating conditions (e.g., excess particles or reactive gases) that would destroy other high vacuum pumps. They have high pumping speeds for a relatively low cost, and are vibration- and noise-free. Unfortunately, they continuously backstream oil vapor and instantly turn a simple operating error into a major system disaster with oil everywhere. For this reason, diffusion pumps have decreased in popularity but are still seen in applications requiring huge pumping speeds such as molecular beam systems, large scale vacuum furnace processing, and space simulation chambers.

Turbomolecular Pumps

Vacuum Level: High Vacuum & Ultra High Vacuum (design dependent)

Gas Removal Method: Gas Transfer

Pump Design: Dry

Turbo pumps, as they are commonly called, resemble jet engines. A stack of rotors, each having multiple, angled blades, rotate at very high speeds between a stack of stators. Gas molecules randomly entering the mechanism and colliding with the underside of the spinning rotor blade are given momentum toward the pump's exhaust. The compression ratio for N_2 across the pump may exceed 10^8. That is, if the partial pressure in the foreline is 10^{-4} Torr, the chamber partial pressure may be 10^{-12} Torr, 10^8 times lower. (The actual partial pressure depends on many factors not related to compression ratio.) Compression ratios for H_2 and He are much lower, sometimes less than 10^3, which suggests the turbo mechanism alone is not good at producing low chamber pressures when H_2 or He is present.

The ultimate vacuum of most turbos lies between 10^{-7} Torr and 10^{-10} Torr. However, UHV pressures are achieved by backing a large turbo by a small turbo (which, in turn, is backed by a mechanical pump). Turbo pumping speeds range from 50 L/s to 3,500 L/s for normal commercial pumps. Correctly operated and vented, the turbo mechanism prevents vapor backstreaming from the greased rotor bearings. For truly dry chambers, a turbo with magnetically levitated bearings backed by a dry mechanical pump are used. With proper venting, the turbo mechanism stops in less than a minute, which may mean chamber venting is accomplished without the need for a valve separating pump and chamber. Also, a separate roughing line is usually unnecessary because the chamber can be roughed through the stationary or accelerating turbo.

Turbo pumps are used in all vacuum applications between 10^{-4} and 10^{-10} Torr and are replacing diffusion pumps as general workhorses. Turbo pumps are not used on dusty processes or those for which small high frequency vibration might be a problem. However, some turbo pumps are built to resist corrosion from reactive gases.

Molecular Drag Pumps

Vacuum Level: High Vacuum & Ultra High Vacuum (design dependent)

Gas Removal Method: Gas Transfer

Pump Design: Dry

The drag pump has a smooth, high speed tubular rotor, capped at its top end, spinning between closely spaced, cylindrical walls, one outside and one inside the rotor. The stationary walls are helically grooved on the surface facing the rotor. The rotor is driven at tangential velocities, approaching the average velocity of gas molecules. The pumping action is caused by momentum transfer from the rotor to the gas molecules with the spiral grooves providing a preferred flow direction toward the exhaust port. Its compression ratios are typically 10^9 for N_2, 10^4 for He, and 10^3 for H_2. But the mechanism's low pumping speed (less than 10 L/s) means the ultimate vacuum may be only 10^{-6} Torr. The maximum continuous inlet pressure is 0.1 Torr, but its exhaust pressure can be as high as 10 to 40 Torr. That is, the diaphragm pump is an adequate backing pump. Drag pumps are used where relatively low cost, low pumping speeds, and modest ultimate vacuum are demanded.

Turbo-Drag Hybrid Pumps

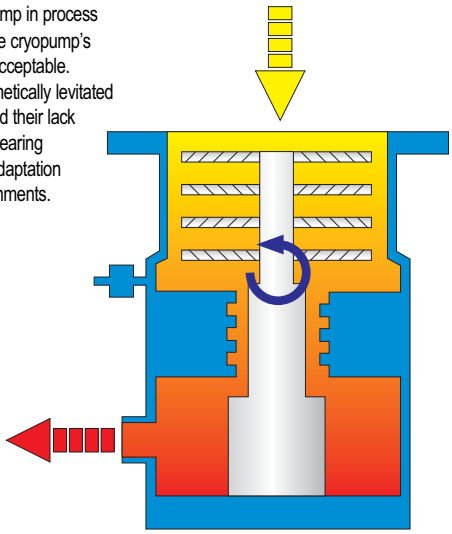
Vacuum Level: High Vacuum & Ultra High Vacuum (design dependent)

Gas Removal Method: Gas Transfer

Pump Design: Dry

The hybrid pump (also called a combination pump or sometimes just turbo pump) combines the input stage of a standard turbo pump with the output stage of a drag pump. The resulting hybrid has a much higher pumping speed than a molecular drag pump yet operates at high foreline pressures often requiring only a diaphragm pump. The compression ratio for hybrid pumps can reach 1,010 for N_2 and more than 10^4 for H_2. Their ultimate pressure is 10^{-11} Torr when backed by a pump giving a low foreline pressure and pumping speed ranges from 50 L/s to 3,200 L/s.

The hybrid pump appears to be rapidly replacing the regular turbo for all R&D applications requiring 10^{-9} Torr, and the cryopump in process applications for which the cryopump's regeneration time is unacceptable. Hybrid pumps with magnetically levitated bearings are truly dry and their lack of lubricated "physical" bearing surfaces enables their adaptation to fairly corrosive environments.

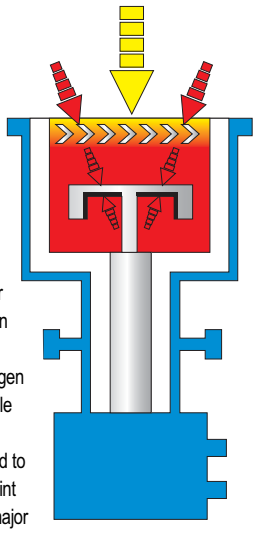


Cryogenic Pumps

Vacuum Level: High Vacuum & Ultra High Vacuum (design dependent)

Gas Removal Method: Gas Capture

Pump Design: Dry



Cryogenic pumps (commonly called cryopumps) are similar in principle to cryosorption pumps, except they are held at lower temperatures. Essentially, there are three surfaces. An outer surface, which is held at 80K and includes an optically opaque chevron baffle, pumps mostly water vapor. It surrounds (and thermally insulates) an inverted cup-shaped inner surface held at 15K to 20K that traps the common atmospheric gases. The underside of the cup is coated with activated carbon and provides hydrogen pumping. All surfaces are cooled by a closed cycle helium cryocompressor attached to the pump by insulated tubes. Cryopumps are particularly suited to pumping atmospheric gases and high melting point vapors (H_2O) in the 10^{-6} to 10^{-9} Torr range. The major disadvantages are poor helium pumping and vibration transmitted from the compressor.

This mechanism is less susceptible to operational errors than other high vacuum pumps. If exposed to the chamber when the quantity of gas (Pressure x Volume) exceeds the manufacturer's recommended number, the pump simply warms, temporarily losing its ability to pump. After the gas load is reduced and the pump cooled, it is again operational. The quantity of gas pumped before regeneration is needed varies from several hundred atm. liters for Ar to a few atm. liters for H_2.

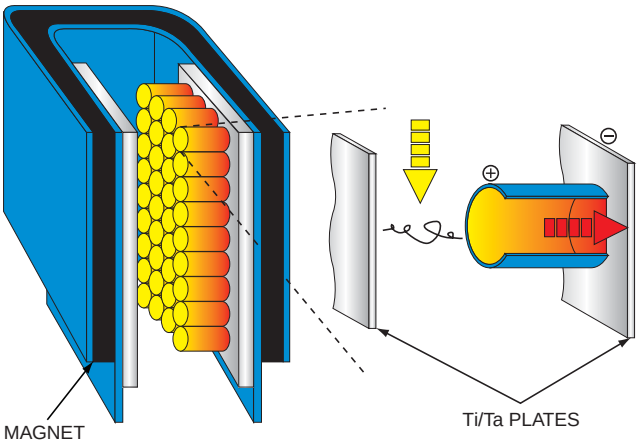
Cryopumps have found great success in non-aggressive semiconductor processes where oil-free operation and high pumping speeds are essential.

Ion Pumps

Vacuum Level: Ultra High Vacuum

Gas Removal Method: Gas Capture

Pump Design: Dry



Ion pumps are the primary choice for all true UHV chambers. They are clean, bakeable, vibration-free, operate from 10^{-6} Torr to 10^{-11} Torr with low power consumption, and have long operating lives. All ion pumps have the same basic components: a parallel array of short, stainless steel tubes, two plates (Ti or Ta) spaced a short distance from the open ends of the tubes, and a strong magnetic field parallel to the tubes' axes.

Electrons from the (cathodic) plates move along tight helical trajectories in the magnetic field through the (anodic) tubes. When a gas molecule is ionized by an electron in a tube, it is strongly attracted to a cathode that it strikes with force sufficient to sputter titanium. The sputtered Ti coats everything: tubes, plates, and pump casing. Several pumping mechanisms are possible, including chemical reaction (getter action), ion burial, and neutral burial (the last two accounting for the pump's ability to pump inert gases).

The ion pump's characteristics are determined by the plate material, its physical form, and the voltage supplied. In the "diode" pump, the Ti plates are grounded and the tubes have a high positive voltage. The diode has high pumping speed for H_2, O_2, N_2, CO_2, CO, and other getterable gases. The "noble diode" pump has the same electrical supply as the diode, but Ta is substituted for one Ti plate. This reduces the pump's H_2 pumping speed, but enables higher pumping speed and greater stability for Ar and He. In the "triode" pump, the plates are slotted or penetrated in some manner and connected to a high negative voltage. Both the tubes and the pump casing (acting as a third electrode) are grounded. Sputtering from the slotted plates deposits Ti not only on the tubes and plates but also on the pump casing. Inert gases and methane burial on the casing are less susceptible to later ion bombardment, even at high pressures when plates are heavily bombarded.

Titanium Sublimation Pumps

Vacuum Level: Ultra High Vacuum

Gas Removal Method: Gas Capture

Pump Design: Dry

Titanium sublimation pumps (abbreviated as TSP) are evaporable getter-style pumps. The term getter is applied to any active metal that chemically reacts with gases to form a stable, nonvolatile product. There are two types of getters: evaporable and non-evaporable. Both are used as vacuum augmentation devices—they maintain or improve the vacuum level achieved by some other high vacuum or UHV pumping mechanism.

Titanium Sublimation Pumps use multiple thin film evaporations to keep the surface active. Their pumping speeds depend on the surface area of the getter film. Titanium pumps H_2, O_2, N_2, and H_2O well, but has no effect on inert gases or methane. It is used from 10^{-6} Torr to UHV to remove the H_2 residual gas, often as an addition to an ion pump. The adverse effect of a Ti film on any electrical insulator is a major disadvantage. This is where non-evaporable getter pumps like those with getter films made of Zr-Al-Fe are used.

➤ Pump Selection Guide

PUMP SPEED

The following chart is a quick-reference guide that splits all oil-sealed mechanical pumps into two categories, standard and chemical. It then arranges the pumps by displacement within each category. Refer to the corresponding product page for more detailed information on a particular pump model.

Standard Series Model	Manufacturer	Technology	Chemistry	L/min at 50 Hz	Displacement CFM (m^3/hr.)	Ultimate Pressure* Torr (mbar)	Pascal	See Page(s)
E2M0.7	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	15	0.6 (0.9)	2.3×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-18
1400	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Standard Series Hydrocarbon Oil	25	0.9 (1.53)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-35
1399	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Standard Series Hydrocarbon Oi	28	1.2 (2)	1.5×10^{-2} (1.9×10^{-2})	2	4-35
E2M1.5	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	30	1.3 (1.8)	2.3×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-18
DS42	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	36	1.6 (2.3)	3.0×10^{-3} (4.0×10^{-3})	4.0×10^{-1}	4-37
GLD-040	ULVAC	Rotary Vane	Standard Series Hydrocarbon Oil	40	1.7 (2.4)	5.0×10^{-4} (6.7×10^{-4})	6.7×10^{-2}	4-33
Speedivac2	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	45	1.9 (2.7)	9.9×10^{-2} (1.3×10^{-1})	13	4-18
RV3	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	60	2.6 (3.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-22
1405	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Standard Series Hydrocarbon Oil	75	3.2 (5.4)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-35
2005 I	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	90	3.8 (5.4)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-14
2005SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	90	3.8 (5.4)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-13
2005H1	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	90	3.8 (5.4)	3.75×10^{-3} (5.0×10^{-3})	5.0×10^{-1}	4-17
1005SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	90	3.8 (5.4)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-13
DS102	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	95	4 (5.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-37
RV5	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	96	4.1 (5.8)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-22
NT5	œrlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	83	3.5 (5)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-25
1402	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Standard Series Hydrocarbon Oil	133	5.6 (6)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-35
GLD-136	ULVAC	Rotary Vane	Standard Series Hydrocarbon Oil	135	5.7 (8.1)	5.0×10^{-4} (6.7×10^{-4})	6.7×10^{-2}	4-33
2010 I	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	162	6.8 (9.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-14
2010SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	162	6.8 (9.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-13

*The quoted ultimate pressures are the manufacturer's specifications. Some manufacturers use a partial pressure for this specification while others use total pressure. Therefore the practical ultimate pressure may be higher than what is listed here.

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Chemistry	L/min at 50 Hz	Displacement CFM (m^3/hr.)	Ultimate Pressure* Torr (mbar)	Pascal	See Page(s)
DS202	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	162	6.8 (9.6)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-37
RV8	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	162	6.9 (9.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-22
NT10	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	165	7 (9.9)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-25
SV10B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	180	7.7 (11)	7.5×10^{-1} (1)	100	4-29
GLD-201	ULVAC	Rotary Vane	Standard Series Hydrocarbon Oil	200	8.5 (12)	5.0×10^{-4} (6.7×10^{-4})	6.7×10^{-2}	4-33
DS302	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	237	10 (14.2)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-37
RV12	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	237	10 (14.2)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-22
1376	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Standard Series Hydrocarbon Oil	250	10.6 (15)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-35
2015 I	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	250	10.6 (15)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-14
2015SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	250	10.6 (15)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-13
2015H1	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	250	10.6 (15)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-17
1015SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	250	10.6 (15)	3.75×10^{-3} (5.0×10^{-3})	5.0×10^{-1}	4-13
SV 16B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	264	11.2 (16)	4.0×10^{-1} (5×10^{-1})	50	4-29
NT16	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	275	11.6 (16.4)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-25
SV16BI	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	275	11.6 (16.4)	3.7×10^{-2} (5.0×10^{-2})	5	4-28
DS402	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	342	14.5 (20.5)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-37
2021I	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	345	14.6 (20.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-14
2021SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	345	14.6 (20.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-13
E2M18	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	347	14.7 (20.58)	7.5×10^{-4} (3.0×10^{-3})	1.0×10^{-1}	4-18
E1M18	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	347	14.7 (20.8)	2.2×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-18

*The quoted ultimate pressures are the manufacturer's specifications. Some manufacturers use a partial pressure for this specification while others use total pressure. Therefore the practical ultimate pressure may be higher than what is listed here.

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Chemistry	L/min at 50 Hz	Displacement CFM (m^3/hr.)	Ultimate Pressure* Torr (mbar)	Pascal	See Page(s)
Hena 25	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	417	17.6 (25)	1.5×10^{-1} (2.0×10^{-1})	20	4-34
1397	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Standard Series Hydrocarbon Oil	417	17.7 (25)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-35
SV25B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	433	18.3 (26)	4.0×10^{-1} (5×10^{-1})	50	4-29
HS452	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	450	19 (27)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-31
D25B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	493	20.9 (29.6)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-24
DS602	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	505	21.4 (30.3)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-37
E2M28	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	525	22.3 (31.6)	7.5×10^{-4} (3.0×10^{-3})	1.0×10^{-1}	4-18
1374	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Standard Series Hydrocarbon Oil	542	23 (32.5)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-35
2033H1	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	550	23.3 (33)	2.3×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-17
2033SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	550	23.3 (33)	2.3×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-13
HS652	VARIAN	Rotary Vane	Standard Series Hydrocarbon Oil	650	27.5 (39)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-37
SV40B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	650	27.6 (39)	4.0×10^{-1} (5×10^{-1})	50	4-29
SV40BI	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	667	28.2 (40)	3.7×10^{-2} (5.0×10^{-2})	5	4-28
E2M40	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	700	29.7 (42)	7.7×10^{-4} (1.0×10^{-3})	1.0×10^{-1}	4-20
D40B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	767	32.5 (46)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-24
SV 65B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	983	41.8 (59)	4.0×10^{-1} (5.0×10^{-1})	50	4-29
2063H1	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	1,000	42.4 (60)	2.3×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-17
2063SD	adixen	Rotary Vane	Standard Series Hydrocarbon Oil	1,000	42.4 (60)	2.3×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-13
Hena 60	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	1,050	44.5 (63)	1.5×10^{-1} (2.0×10^{-1})	2.0×10^{-1}	4-34
D65B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	1,250	53 (75)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-24

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PUMP SPEED

Model	Manufacturer	Technology	Chemistry	L/min at 50 Hz	Displacement CFM (m^3/hr.)	Ultimate Pressure* Torr (mbar)	Pascal	See Page(s)
E2M80	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	1,333	56.5 (80)	7.7×10^{-4} (1.0×10^{-3})	1.0×10^{-1}	4-20
SV100B	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	1,625	68.9 (97.5)	4.0×10^{-1} (5.0×10^{-1})	50	4-31
Hena 100	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	1,667	70.6 (100)	1.5×10^{-1} (2.0×10^{-1})	20	4-34
E2M175	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	2,967	126 (178)	7.7×10^{-4} (1.0×10^{-3})	1.0×10^{-1}	4-20
SV200	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	3,050	129.5 (180)	5.0×10^{-1} (7.0×10^{-1})	70	4-31
Hena 200	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	3,333	141 (200)	1.5×10^{-1} (2.0×10^{-1})	20	4-34
SV300	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	4,717	200 (283)	5.0×10^{-1} (7.0×10^{-1})	70	4-31
E2M275	EDWARDS	Rotary Vane	Standard Series Hydrocarbon Oil	4,850	206 (291)	7.7×10^{-4} (1.0×10^{-3})	1.0×10^{-1}	4-20
Hena 300	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	5,000	212 (300)	1.5×10^{-1} (2.0×10^{-1})	20	4-34
Hena 400	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	6,667	282.5 (400)	1.5×10^{-1} (2.0×10^{-1})	20	4-34
SV500	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	7,917	336 (475)	7.5×10^{-1} (10)	100	4-34
Hena 630	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	10,500	445 (630)	1.5×10^{-1} (2.0×10^{-1})	10	4-31
SV630	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	11,667	495 (700)	5.0×10^{-1} (7.0×10^{-1})	70	4-31
SV1200	oerlikon leybold vacuum	Rotary Vane	Standard Series Hydrocarbon Oil	15,967	677 (958)	1.1 (1.5)	150	4-31
Hena 1000	PFEIFFER VACUUM	Rotary Vane	Standard Series Hydrocarbon Oil	16,667	706 (1,000)	3.0×10^{-1} (4.0×10^{-1})	40	4-34
1400N	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Chemical Series	22	0.9 (1.3)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-35
2005C1	adixen	Rotary Vane	Chemical Series Fomblin® Prepared	90	3.8 (5.4)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-15
1402N	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Chemical Series	132	5.6 (7.9)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-35
2010C1	adixen	Rotary Vane	Chemical Series Fomblin Prepared	160	6.8 (9.6)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-15

*The quoted ultimate pressures are the manufacturer's specifications. Some manufacturers use a partial pressure for this specification while others use total pressure. Therefore the practical ultimate pressure may be higher than what is listed here.

➤ Pump Selection Guide

PUMP SPEED

Chemical Series Model	Manufacturer	Technology	Chemistry	L/min at 50 Hz	Displacement CFM (m^3/hr.)	Ultimate Pressure* Torr (mbar)	Pascal	See Page(s)
2010C2	adixen	Rotary Vane	Chemical Series Fomblin Prepared	160	6.8 (9.6)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-16
2015C1	adixen	Rotary Vane	Chemical Series Fomblin Prepared	233	10.6 (14)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-15
2015C2	adixen	Rotary Vane	Chemical Series Fomblin Prepared	233	10.6 (14)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-16
1376N	WELCH A Gardner Denver Product	Belt Driven Rotary Vane	Chemical Series	233	10.6 (14)	1.0×10^{-4} (1.3×10^{-4})	1.3×10^{-2}	4-35
2021C2	adixen	Rotary Vane	Chemical Series Fomblin Prepared	345	14.6 (20.7)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-16
2021C1	adixen	Rotary Vane	Chemical Series Fomblin Prepared	345	14.6 (20.7)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-15
D25BCS	oerlikon leybold vacuum	Rotary Vane	Chemical Series Fomblin Prepared	493	20.9 (29.6)	1.88×10^{-3} (2.5×10^{-3})	2.5×10^{-1}	4-26
2033C2	adixen	Rotary Vane	Chemical Series Fomblin Prepared	550	23.3 (33)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-16
2033C1	adixen	Rotary Vane	Chemical Series Fomblin Prepared	550	23.3 (33)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-15
D40BCS	oerlikon leybold vacuum	Rotary Vane	Chemical Series Fomblin Prepared	767	32.5 (46)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-26
2063C1	adixen	Rotary Vane	Chemical Series Fomblin Prepared	1,00	42.4 (60)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-15
2063C2	adixen	Rotary Vane	Chemical Series Fomblin Prepared	1,000	42.4 (60)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-16
D65BCS	oerlikon leybold vacuum	Rotary Vane	Chemical Series Fomblin Prepared	1,250	53 (75)	1.5×10^{-3} (2.0×10^{-3})	2.0×10^{-1}	4-26
2100C1	adixen	Rotary Vane	Chemical Series Fomblin Prepared	2,000	85 (120)	2.25×10^{-3} (3.0×10^{-3})	3.0×10^{-1}	4-15

*The quoted ultimate pressures are the manufacturer's specifications. Some manufacturers use a partial pressure for this specification while others use total pressure. Therefore the practical ultimate pressure may be higher than what is listed here.

■ Adixen™ (Alcatel®) Standard Pascal Series

Standard Pascal Series:

Models 1005, 1015: Single stage

Models 2005, 2010, 2015, and 2021: Mid-size, reliable standard vane pumps good for all general vacuum applications

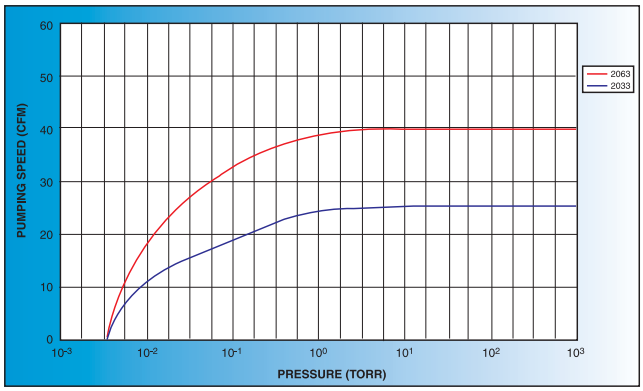
Models 2033 and 2063: Reliable and low vibration, excellent general purpose pumps for medium volume chambers

Features:

- 1- and 2-Stage, direct-drive
- Critical seals on the case are made using o-rings, ensuring no dangerous gases or oils to escape
- Front shaft bearing assembly—including shaft sleeve, lip seal, and seal holder—is easily replaced without dismantling the pump

Adixen (Standard) Single-Stage Specifications

Description	1005SD	1015SD
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	3.8 (5.4)	10.6 (15)
Ultimate Pressure — Torr (mbar)	3.75×10^{-3} (5×10^{-3})	3.75×10^{-3} (5×10^{-3})
Motor Power — HP (kW)	0.74 (0.45)	0.74 (0.45)
Oil Capacity — Quarts (Liters)	1.6 (1.1)	1.5 (1)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	2	2
Standard Oil Type	TKO-19	TKO-19
Pump Weight — lbs. (kg)	46.2 (21)	54 (24.5)
Inlet Flange	KF25	KF25
Exhaust Outlet Flange	KF25	KF25



Adixen (Standard) 2-Stage Specifications

Description	2005SD	2010SD	2015SD	2021SD	2033SD	2063SD
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	3.8 (5.4)	6.8 (9.7)	10.6 (15)	14.6 (20.7)	23.3 (30)	42.4 (60)
Ultimate Pressure — Torr (mbar)	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	2.2×10^{-3} (3×10^{-3})	2.2×10^{-3} (3×10^{-3})
Motor Power — HP (kW)	0.75 (0.45)	0.75 (0.45)	0.75 (0.45)	0.75 (0.45)	1.7 (1.1)	3.5 (2.6)
Oil Capacity — Quarts (Liters)	0.88 (0.83)	1 (0.95)	1 (0.95)	1 (0.98)	3.8 (3.6)	7.4 (7)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	2	2	2	2	7	14
Standard Oil Type	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19
Pump Weight — lbs. (kg)	55 (25)	57.2 (26)	59.4 (27)	61.6 (28)	134 (61)	205 (93)
Inlet Flange	KF25	KF25	KF25	KF25	KF40	KF40
Exhaust Outlet Flange	KF25	KF25	KF25	KF25	KF40	KF40
Overall Dimensions (L x W x H) — in. (mm)	16.5 x 7.4 x 9.4 (420 x 188 x 240)	17.3 x 7.4 x 9.4 (439 x 188 x 240)	18.2 x 7.4 x 9.4 (462 x 188 x 240)	19 x 7.4 x 9.4 (483 x 188 x 240)	27.4 x 8.4 x 15.2 (695 x 213 x 385)	32 x 10.4 x 16.6 (814 x 264 x 422)
Noise Level — dB(A)	56	56	57	58	67	72
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist Eliminator	AV-104200	AV-104200	AV-104200	AV-104200	AV-104887	AV-104887

* These Adixen pumps can be prepped with Fomblin® oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

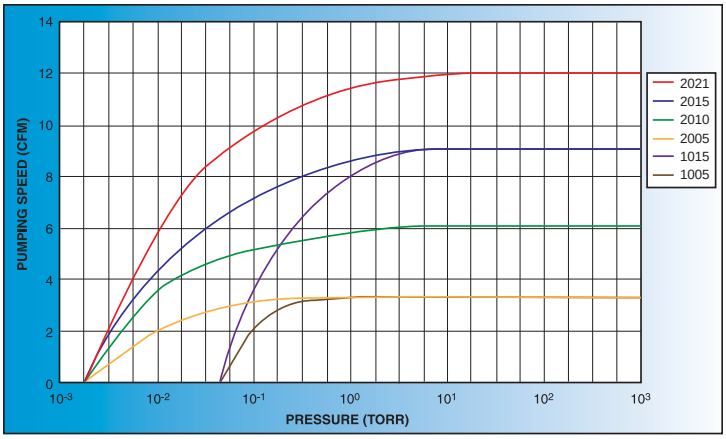
NOTE: See page 4-14 for ordering table.

➤ Rotary Vane Pumps

■ Adixen™ (Alcatel®) Analytical Pascal Series

Analytical Pascal Series:

- Operates more quietly than the Adixen standard series pumps
- Low operating temperatures decrease oil vapor backstreaming while improving ultimate vacuum



Adixen (Analytical) Specifications

Description	2005I	2010I	2015I	2021I
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	3.8 (5.4)	6.8 (9.7)	10.6 (15)	14.6 (20.7)
Ultimate Pressure — Torr (mbar)	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})
Motor Power — HP (kW)	0.75 (0.45)	0.75 (0.45)	0.75 (0.45)	0.75 (0.45)
Oil Capacity — Quarts (Liters)	0.88 (0.83)	1 (0.95)	1 (0.95)	1 (0.95)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	2	2	2	2
Standard Oil Type	TKO-19	TKO-19	TKO-19	TKO-19
Pump Weight — lbs. (kg)	55 (25)	57.2 (26)	59.4 (27)	61.6 (28)
Inlet Flange	KF25	KF25	KF25	KF25
Exhaust Outlet Flange	KF25	KF25	KF25	KF25
Overall Dimensions (L x W x H) — in. (mm)	16.5 x 7.4 x 9.4 (420 x 188 x 240)	17.3 x 7.4 x 9.4 (439 x 188 x 240)	18.2 x 7.4 x 9.4 (462 x 188 x 240)	19 x 7.4 x 9.4 (483 x 188 x 240)
Noise Level — dB(A) 60 Hz (50 Hz)	50 (48)	51 (49)	52 (50)	53 (50)
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist Eliminator	AV-104200	AV-104200	AV-104200	AV-104200

* These Adixen pumps can be prepped with Fomblin oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Pumps			
Model	Voltage & Phases	Part No.	Price
2005SD	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2005SL	Call
2010SD	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2010SL	Call
2015SD	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2015SL	Call
2021SD	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2021SL	Call
2033SD	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2033ASL	Call
2033SD	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2033ASL	Call
2063SD	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2063ASL	Call
2005I	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2005NL	Call
2005I	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2005NL	Call
2010I	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2010NL	Call
2010I	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2010NL	Call
2015I	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2015NL	Call
2015I	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2015NL	Call
2021I	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2021NL	Call
2021I	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2021NL	Call

NOTE: To receive these pumps prewired for high voltage operation (180–254V). Replace the "L" in the part number with an "H." Example: AV-UM2005SL becomes AV-UM2005SH.

NOTE: One charge of TKO-19 included with each pump.

Pump Accessories			
Description	For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	2005, 2010, 2015, 2021	AV-104200	Call
Oil Mist Eliminator	2033, 2063	AV-104887	Call
Clamp for KF16 Flange	All Pascal Series Pumps	QF16-075-C	Call
Viton® Centering Ring for KF16 Flange	All Pascal Series Pumps	QF16-075-SRV	Call
Clamp for KF25 Flange	All Pascal Series Pumps	QF25-100-C	Call
Viton Centering Ring for KF25 Flange	All Pascal Series Pumps	QF25-100-SRV	Call
Clamp for KF40 Flange	All Pascal Series Pumps	QF40-150-C	Call
Viton Centering Ring for KF40 Flange	All Pascal Series Pumps	QF40-150-SRV	Call
TKO-19 Oil (1 quart)	All Pascal Series Pumps	TKO19Q1	Call
TKO-19 Oil (1 gallon)	All Pascal Series Pumps	TKO19G1	Call
Minor Repair Kit	2005SD, 2010SD, 2015SD, 2021SD	AV-103911	Call
Minor Repair Kit	2005I, 2010I, 2015I, 2021I	AV-103912	Call
Minor Repair Kit	2033SD	AV-054285	Call
Minor Repair Kit	2063SD	AV-054485	Call
Major Repair Kit	2005SD	AV-103902	Call
Major Repair Kit	2005I	AV-103906	Call
Major Repair Kit	2010SD	AV-103903	Call
Major Repair Kit	2010I	AV-103907	Call
Major Repair Kit	2015SD	AV-103904	Call
Major Repair Kit	2015I	AV-103908	Call
Major Repair Kit	2021SD	AV-103905	Call
Major Repair Kit	2021I	AV-103909	Call
Major Repair Kit	2033SD	AV-054288	Call
Major Repair Kit	2063SD	AV-054487	Call

➤ Rotary Vane Pumps

■ Adixen™ (Alcatel®) Chemical Pascal C1 Series

Pascal C1 Series 2 Stage:

Specially designed for pumping corrosive or aggressive gases in the chemical industry and R&D, meeting strict requirements with regard to material compatibility and corrosion resistance.

C1 Series rotary vane pumps are adapted to different applications involving corrosive media; free of sensitive materials, they offer reliable operation even in aggressive conditions.

- Stainless steel, gray cast iron, aluminum
- FPM seals
- High strength oil sight glass
- Integrated anti-suckback activated by the oil pump, providing vacuum integrity

REMAN PUMPS
See Pages 16-2–16-3.

Adixen C1 Series Specifications

Description	2005C1	2010C1	2015C1	2021C1	2033C1	2063C1	2100C1
Chemistry	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	3.8 (5.4)	6.8 (9.7)	10.6 (15)	14.6 (20.7)	23.3 (30)	42.4 (60)	85 (120)
Ultimate Pressure — Torr (mbar)	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	2.25×10^{-3} (3×10^{-3})	2.25×10^{-3} (3×10^{-3})	2.25×10^{-3} (3×10^{-3})
Motor Power — HP (kW)	0.75 (0.45)	0.75 (0.45)	0.75 (0.45)	0.75 (0.45)	1.7(1)	3.5 (2.2)	3 (4.8)
Oil Capacity — Quarts (Liters)	0.88 (0.83)	1 (0.95)	1 (0.95)	1 (0.95)	3.8 (3.6)	7.4 (7)	7.9 (7.5)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	2	2	2	2	7	14	15
Standard Oil Type	Diffoil-20	Diffoil-20	Diffoil-20	Diffoil-20	Diffoil-20	Diffoil-20	Diffoil-20
Pump Weight — lbs. (kg)	55 (25)	57.2 (26)	59.4 (27)	61.6 (28)	163 (74)	216 (98)	508 (231)
Inlet Flange	KF25	KF25	KF25	KF25	KF40	KF40	KF50
Exhaust Outlet Flange	KF25	KF25	KF25	KF25	KF40	KF40	KF50
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist Eliminator	AV-066849	AV-066849	AV-066849	AV-066849	AV-066849	AV-066849	AV-066849

* These Adixen pumps can be prepped with Fomblin® oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Pumps			
Model	Voltage & Phases	Part No.	Price
2005C1	90–132 VAC, 50/60 Hz, 1-Ø	AV-UM2005CL	**Call**
2005C1	180-254 VAC, 50/60 Hz, 1-Ø	AV-UM2005CH	**Call**
2005C1	170-520 VAC, 50/60 Hz, 3-Ø	AV-UT2005CL	**Call**
2010C1	90–132 VAC, 50/60 Hz, 1-Ø	AV-UM2010CL	**Call**
2010C1	180-254 VAC, 50/60 Hz, 1-Ø	AV-UM2010CH	**Call**
2010C1	170-520 VAC, 50/60 Hz, 3-Ø	AV-UT2010CL	**Call**
2015C1	90–132 VAC, 50/60 Hz, 1-Ø	AV-UM2015CL	**Call**
2015C1	180-254 VAC, 50/60 Hz, 1-Ø	AV-UM2015CH	**Call**
2015C1	170–520 VAC, 50/60 Hz, 3-Ø	AV-UT2015CL	**Call**
2021C1	90-132 VAC, 50/60 Hz, 1-Ø	AV-UM2021CL	**Call**
2021C1	180-254 VAC, 50/60 Hz, 1-Ø	AV-UM2021CH	**Call**
2021C1	170-520 VAC, 50/60 Hz, 3-Ø	AV-UM2033ACL	**Call**
2033C1	90–132 VAC, 50/60 Hz, 1-Ø	AV-UM2033ACL	**Call**
2033C1	180-254 VAC, 50/60 Hz, 1-Ø	AV-UM2033ACH	**Call**
2033C1	170–520 VAC, 50/60 Hz, 3-Ø	AV-UT2033ACL	**Call**
2063C1	170-520 VAC, 50/60 Hz, 3-Ø	AV-UT2063ACL	**Call**

NOTE: One charge of Diffoil-20 included with each pump.

Pump Accessories			
Description	For Pump Model(s)	Part No.	Price
OME25 C/H	2005C1, 2010C1, 2015C1, 2021C1	AV-066849	**Call**
OME25 C/H Element	OME25 C/H	AV-066800	**Call**
OME40 C1	2033C1, 2063C1	AV-068785	**Call**
OME40 C1 Element	OME40 C1	AV-068778	**Call**
KF25 Clamp	2005C1, 2010C1, 2015C1, 2021C1	QF25-100-C	**Call**
KF25 Centering Ring	2005C1, 2010C1, 2015C1, 2021C1	QF25-100-SRV	**Call**
KF40 Clamp	2033C1, 2063C1	QF40-150-C	**Call**
KF40 Centering Ring	2033C1, 2063C1	QF40-150-SRV	**Call**
Minor Repair Kit	2005C1, 2010C1, 2015C1, 2021C1	AV-104975	**Call**
Minor Repair Kit	2033C1	AV-054286	**Call**
Minor Repair Kit	2063C1	AV-054488	**Call**
Major Repair Kit	2005C1	AV-104976	**Call**
Major Repair Kit	2010C1	AV-104977	**Call**
Major Repair Kit	2015C1	AV-104978	**Call**
Major Repair Kit	2021C1	AV-104979	**Call**
Major Repair Kit	2033C1	AV-054289	**Call**
Major Repair Kit	2063C1	AV-054489	**Call**
Diffoil-20 Oil (1 quart)	All C1 Series Pumps	DIFFOIL20BL	**Call**
Diffoil-20 Oil (1 gallon)	All C1 Series Pumps	DIFFOIL20CA	**Call**

➤ Rotary Vane Pumps

■ Adixen™ (Alcatel®) Chemical Pascal C2 Series

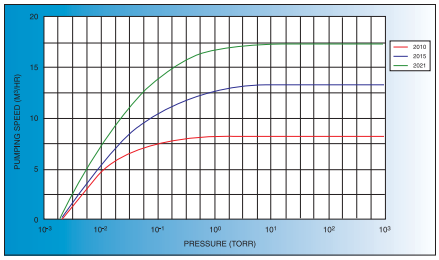
Pascal C2 Semiconductor Compatible Series:

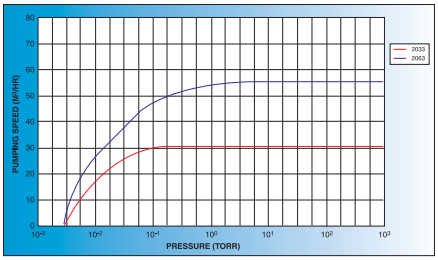
These pumps share the chemical-resistant features of the C1 series but differ in ways that increase their resistance to chloro- and fluoro-containing gases found in semiconductor processing.

- Vanes in both stages are made from a composite material that provides high chemical resistance
- Inlet and exhaust hardware is made of stainless steel
- Oil level sight tube is made from Lexan® to avoid HF etching
- An inert gas bubbler system, in place of the air ballast, works both to cool and to degas the oil
- A special epoxy paint coats the oil casing for additional protection to the pump

Motor Types:

- Pascal pumps are available with either 1-Ø or 3-Ø motors
- Both types are compatible with low and high voltage ranges given in the specification table
- 1-Ø motor features additional advantages—voltage change is made by a simple rocker switch





Adixen C2 Series Specifications

Description	2010C2	2015C2	2021C2	2033C2	2063C2
Chemistry	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared	Chemical Series Fomblin Prepared
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	6.8 (9.7)	10.6 (15)	14.6 (20.7)	23.3 (30)	42.4 (60)
Ultimate Pressure — Torr (mbar)	2.25×10^{-3} (3×10^{-3})	2.25×10^{-3} (3×10^{-3})	2.25×10^{-3} (3×10^{-3})	2.25×10^{-3} (3×10^{-3})	2.25×10^{-3} (3×10^{-3})
Motor Power — HP (kW)	0.75 (0.45)	0.75 (0.45)	0.75 (0.45)	1.7 (1)	3.5 (2.2)
Oil Capacity — Quarts (Liters)	1 (0.95)	1 (0.95)	1 (0.98)	3.8 (3.6)	7.4 (7)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	2	2	2	7	14
Standard Oil Type	Fomblin 25/6	Fomblin 25/6	Fomblin 25/6	Fomblin 25/6	Fomblin 25/6
Pump Weight — lbs. (kg)	57.2 (26)	59.4 (27)	61.6 (28)	167 (76)	216 (98)
Inlet Flange	KF25	KF25	KF25	KF40	KF40
Exhaust Outlet Flange	KF25	KF25	KF25	KF40	KF40
Overall Dimensions) (L x W x H) — in. (mm	17.3 x 7.4 x 9.4 (439 x 188 x 240)	18.2 x 7.4 x 9.4 (462 x 188 x 240)	19 x 7.4 x 9.4 (483 x 188 x 240)	27.4 x 8.4 x 15.2 (695 x 213 x 385)	32 x 10.4 x 16.6 (814 x 264 x 422)
Noise Level — dB(A)	56	57	58	67	72
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist Eliminator	AV-066849	AV-066849	AV-066849	AV-068942	AV-068942

Pumps

Model	Voltage & Phases	Part No.	Price
2010C2	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2010CPL	Call
2015C2	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2015CPL	Call
2021C2	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2021CPL	Call
2033C2	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2033CPL	Call
2010C2	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2010CPL	Call
2015C2	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2015CPL	Call
2021C2	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2021CPL	Call
2033C2	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2033CPL	Call
2063C2	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2063CPL	Call

NOTE: To receive these pumps prewired for high voltage operation (180–254V). Replace the "L" in the part number with an "H." Example: AV-UM2010CPL becomes AV-UM2010CPH.

NOTE: Fomblin not included, must be ordered separately.

Pump Accessories

Description	For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	2010CP, 2015CP, 2021CP	AV-066849	Call
Oil Mist Eliminator	2033CP, 2063CP	AV-068942	Call
Clamp for KF25 Flange	All Pascal Series Pumps	QF25-100-C	Call
Viton® Centering Ring for KF25 Flange	All Pascal Series Pumps	QF25-100-SRV	Call
Clamp for KF40 Flange	All Pascal Series Pumps	QF40-150-C	Call
Viton Centering Ring for KF40 Flange	All Pascal Series Pumps	QF40-150-SRV	Call
Fomblin 25/6 Oil (1 kg)	All Pascal Series Pumps	MFY25/6BB	Call
Fomblin 25/6 Oil (8 kg)	All Pascal Series Pumps	MFY25/6CA	Call
Minor Repair Kit	2010CP, 2015CP, 2021CP	AV-104975	Call
Minor Repair Kit	2033CP	AV-065123	Call
Minor Repair Kit	2063CP	AV-065552	Call
Major Repair Kit	2010CP	AV-104614	Call
Major Repair Kit	2015CP	AV-104615	Call
Major Repair Kit	2021CP	AV-104616	Call
Major Repair Kit	2033CP	AV-065124	Call
Major Repair Kit	2063CP	AV-065553	Call

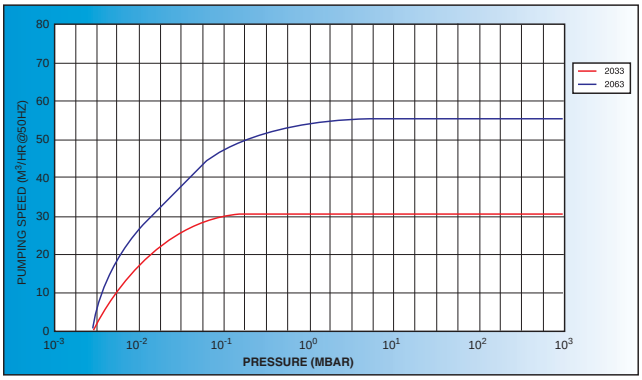
➤ Rotary Vane Pumps

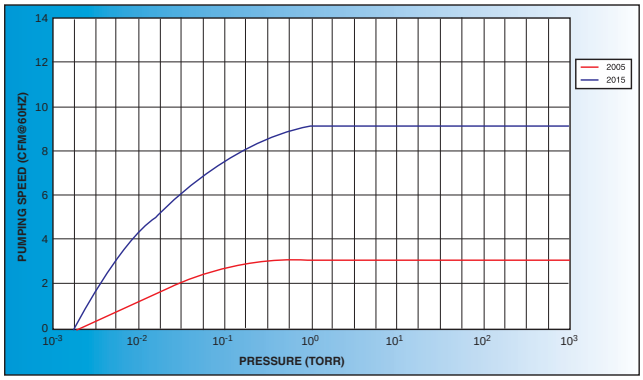
Adixen™ (Alcatel®) Hermetic Pascal Series

REMAN PUMPS
See Pages 16-2–16-3.

Similar to the standard 2005–2063 series pumps, but have been modified to be hermetically sealed.

- Applications include pumping precious gases, such as Helium 3, or radioactive gases in closed loop nuclear or cryogenic systems
- Certified to have leak rates of $<10^{-7}$ Torr-L/sec
- Main shaft features two shaft-seals, one on either side of a separate oil bath to ensure leak tightness





Adixen (Hermetic) Specifications

Description	2005H1	2015H1	2033H1	2063H1
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	3.8 (5.4)	10.6 (15)	23.3 (30)	42.4 (60)
Ultimate Pressure — Torr (mbar)	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	2.2×10^{-3} (3×10^{-3})	2.2×10^{-3} (3×10^{-3})
Motor Power — HP (kW)	0.75 (0.45)	0.75 (0.45)	1.7 (1.1)	3.5 (2.2)
Oil Capacity — Quarts (Liters)	0.6 (0.57)	0.8 (0.76)	5.08 (4.8)	8 (7.57)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	1	1	9	15
Standard Oil Type	TKO-19	TKO-19	TKO-19	TKO-19
Pump Weight — lbs. (kg)	59.5 (27)	65 (29.5)	163 (74)	220 (100)
Inlet Flange	KF25	KF25	KF40	KF40
Exhaust Outlet Flange	KF25	KF25	KF40	KF40
Overall Dimensions (L x W x H) — in. (mm)	18.5 x 6.5 x 9.4 (471 x 164 x 240)	19.8 x 6.5 x 9.4 (502 x 164 x 240)	29.9 x 10.6 x 14.3 (759 x 269 x 364)	34.3 x 11.5 x 15.2 (871 x 293 x 385)
Noise Level — dB(A)	56	57	67	72
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist Eliminator	AV-066849	AV-066849	AV-068744	AV-068744

* These Adixen pumps can be prepped with Fomblin oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Pumps			
Model	Voltage & Phases	Part No.	Price
2005H	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2005HL	**Call**
2005H	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2005HL	**Call**
2015H	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2015HL	**Call**
2015H	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2015HL	**Call**
2033H	90–254 VAC, 50/60 Hz, 1-Ø	AV-UM2033HL	**Call**
2033H	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2033HL	**Call**
2063H	170–460 VAC, 50/60 Hz, 3-Ø	AV-UT2063HL	**Call**

NOTE: To receive these pumps prewired for high voltage operation (180–254V). Replace the "L" in the part number with an "H." Example: AV-UM2005HL becomes AV-UM2005HH.

NOTE: One charge of TKO-19 included with each pump.

Pump Accessories			
Description	For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	2005H, 2015H	AV-066849	**Call**
Oil Mist Eliminator	2033H, 2063H	AV-068744	**Call**
Clamp for KF25 Flange	All Pascal Series Pumps	QF25-100-C	**Call**
Viton® Centering Ring for KF25 Flange	All Pascal Series Pumps	QF25-100-SRV	**Call**
Clamp for KF40 Flange	All Pascal Series Pumps	QF40-150-C	**Call**
Viton Centering Ring for KF40 Flange	All Pascal Series Pumps	QF40-150-SRV	**Call**
TKO-19 Oil (1 quart)	All Pascal Series Pumps	TKO19Q1	**Call**
TKO-19 Oil (1 gallon)	All Pascal Series Pumps	TKO19G1	**Call**
TKO-19 Oil (5 gallons)	All Pascal Series Pumps	TKO19G5	**Call**
Minor Repair Kit	2005H, 2015H	AV-104611	**Call**
Minor Repair Kit	2033H	AV-054282	**Call**
Minor Repair Kit	2063H	AV-054483	**Call**
Major Repair Kit	2005H	AV-104612	**Call**
Major Repair Kit	2015H	AV-104613	**Call**
Major Repair Kit	2033H	AV-054283	**Call**
Major Repair Kit	2063H	AV-054484	**Call**

➤ Rotary Vane Pumps

■ Edwards EM Series (Small)

Compact EM Series Pumps

- Made from corrosion-resistant materials
- Uses positive pressure oil lubrication

Positive Pressure Oil Lubrication:

These pumps have a well-proven, positive pressure oil lubrication system developed by Edwards to ensure correct lubrication in all operating modes, particularly under high gas loads where oil starvation is a common problem with other pumps.

- Integral oil pump ensures an adequate oil flow through the stator/rotor assembly at all times
- Only clean degassed oil is supplied to the high vacuum stage on two-stage pumps
- System is much less dependent on correct oil levels in the reservoir than other pump designs
- Pumps can operate with oil levels as low as 50–70% of the maximum fill level (not recommended)

NOTE: ATEX versions available; please call or visit our website for more information.

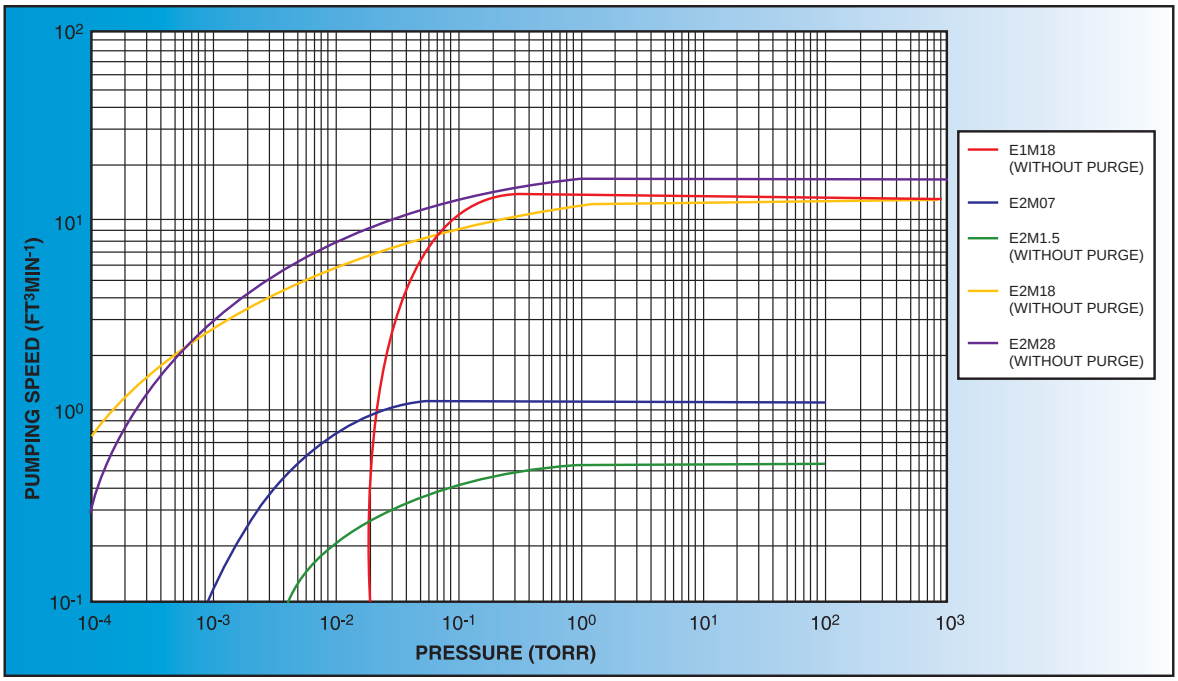
REMAN PUMPS
See Pages 16-2–16-3.

Edwards EM Series (Small) Specifications

Description	SpeediVac 2	E2M0.7	E2M1.5	E2M18	E1M18	E2M28
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	1.9 (2.7)	0.6 (0.9)	1.3 (1.8)	14.7 (20.5)	14.7 (20.5)	22.3 (32.2)
Ultimate Pressure — Torr (mbar)	9.75×10^{-2} (3×10^{-3})	2.3×10^{-3} (3×10^{-3})	2.3×10^{-3} (3×10^{-3})	7.5×10^{-4} (1×10^{-3})	2.2×10^{-3} (3×10^{-3})	7.5×10^{-4} (1×10^{-3})
Motor Power — HP (kW)	0.24 (0.18)	0.12 (0.09)	0.21 (0.16)	1 (0.55)	1 (0.55)	12 (0.75)
Oil Capacity — Quarts (Liters)	0.53 (0.5)	0.28 (0.26)	0.28 (0.26)	1.08 (1.02)	1.48 (1.4)	1.6 (1.5)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	1	1	1	2	3	3
Standard Oil Type	TKO-68	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19
Pump Weight — lbs. (kg)	27.5 (12.5)	22 (10)	22 (10)	79 (36)	70 (32)	88 (40)
Inlet Flange	¼" female BPS	KF10	KF10	KF25	KF25	KF25
Exhaust Outlet Flange	⅜" female BPS	11 mm Hose	11 mm Hose	15 mm Hose	15 mm Hose	15 mm Hose
Overall Dimensions (L x W x H) — in. (mm)	14.8 x 5.79 x 8.34 (376 x 147 x 272)	12.6 x 5.6 x 6.7 (320 x 142 x 171)	12.6 x 5.6 x 6.7 (320 x 142 x 171)	23.9 x 6.7 x 9.9 (608 x 170 x 251)	20.3 x 6.7 x 9.9 (515 x 170 x 251)	23.9 x 6.7 x 9.9 (608 x 170 x 251)
Noise Level — dB(A)	50	43	54	57	57	57
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist Eliminator	—	ED-A46220000	ED-A46220000	ED-A46229000	ED-A46229000	ED-A46233000

* These Edwards pumps can be prepped with Fomblin oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

➤ Rotary Vane Pumps



Model	Pumps Voltage & Phases	Part No.	Price
SpeediVac 2	220–240 VAC, 50 Hz	ED-A13451912	Call
SpeediVac 2	105–115 VAC, 50/60 Hz	ED-A13451988	Call
E2M0.7	115 VAC, 50/60 Hz, 1-Ø	ED-A37141902	Call
E2M0.7	230 VAC, 50/60 Hz, 1-Ø	ED-A37141919	Call
E2M1.5	115 VAC, 50/60 Hz, 1-Ø	ED-A37132902	Call
E2M1.5	230 VAC, 50/60 Hz, 1-Ø	ED-A37132919	Call
E1M18	115 VAC, 50/60 Hz, 1-Ø	ED-A34317984	Call
E2M18	115 VAC, 50/60 Hz, 1-Ø	ED-A36317984	Call
E2M28	115 VAC, 50/60 Hz, 1-Ø	ED-A37317984	Call

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	E2M0.7/E2M1.5	ED-A46220000	Call
Oil Mist Eliminator	E1M18/E2M18	ED-A46229000	Call
Oil Mist Eliminator	E2M28	ED-A46233000	Call
Viton® Centering Ring for KF10	E2M0.7/E2M1.5	QF10-050-SRV	Call
Clamp for KF10	E2M0.7/E2M1.5	QF16-075-C	Call
Viton Centering Ring for KF25	E2M18/E1M18/E2M28	QF25-100-SRV	Call
Clamp for KF25	E2M18/E1M18/E2M28	QF25-100-C	Call
TKO-19 Oil (1 quart)	All EM Series Pumps	TKO19Q1	Call
TKO-19 Oil (1 gallon)	All EM Series Pumps	TKO19G1	Call
Replacement Blade (Vane) Kit	E2M0.7, E2M1.5	ED-A37101132	Call
Replacement Blade (Vane) Kit	E1M18	ED-A34301041	Call
Replacement Blade (Vane) Kit	E2M18	ED-A36301020	Call
Replacement Blade (Vane) Kit	E2M28	ED-A37301135	Call
Repair Kit	E2M0.7, E2M1.5	ED-A37101131	Call
Repair Kit	E1M18/E2M18	ED-A36301131	Call
Repair Kit	E2M28	ED-A37301131	Call

NOTE: One charge of TKO-19 included with each pump.

➤ Rotary Vane Pumps

■ Edwards EM Series (Large)

Positive Pressure Oil Lubrication:

These pumps have a well-proven, positive pressure oil lubrication system developed by Edwards to ensure correct lubrication in all operating modes, particularly under high gas loads where oil starvation is a common problem with other pumps.

- Integral oil pump ensures an adequate oil flow through the stator/rotor assembly at all times
- Only clean degassed oil is supplied to the high vacuum stage on two stage pumps
- System is much less dependent on correct oil levels in the reservoir than other pump designs
- Pumps can operate with oil levels as low as 50–70% of the maximum fill level (NOT RECOMMENDED)

Gas Ballast:

A gas ballast valve introduces a suitable (unreactive and non-condensable) gas into the stator during the compression stage.

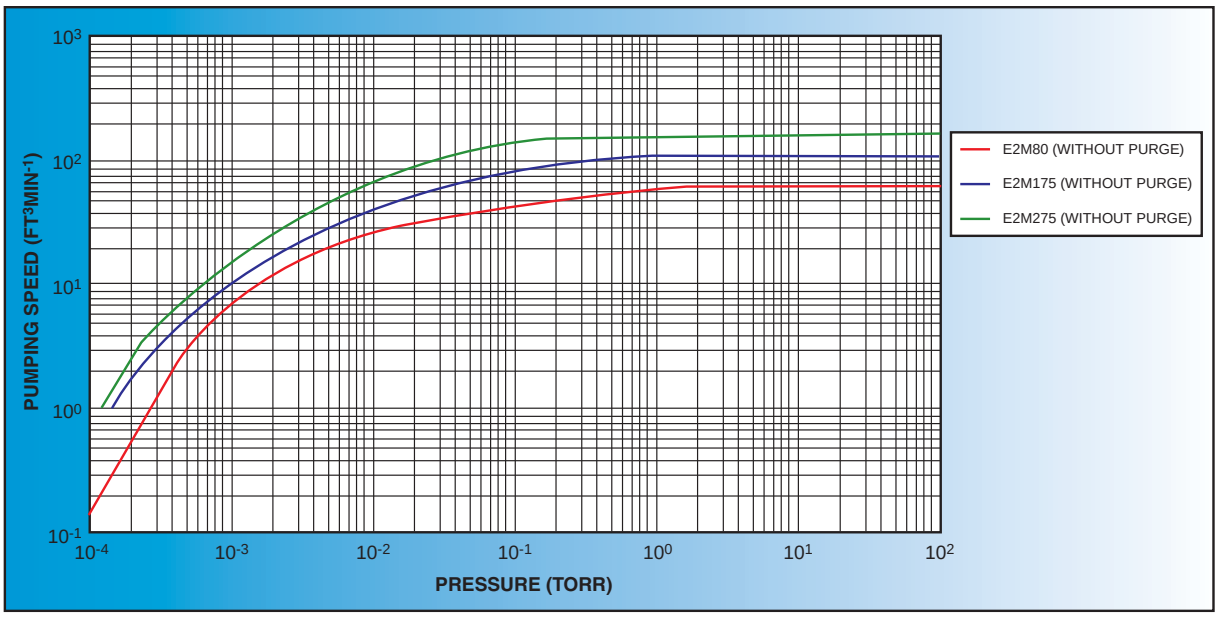
- Helps prevent vapor condensation inside the pump
- Dilutes and helps eject corrosive gases
- Purges the oil of gases and vapors
- Using gas ballast when pumping gases reduces oil degradation and pump corrosion

NOTE: ATEX versions available; please call or visit our website for more information.

Edwards EM Series (Large) Specifications

Description	E2M40	E2M80	E2M175	E2M275
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	29.7 (42.5)	56.5 (80)	126 (178)	206 (292)
Ultimate Pressure — Torr (mbar)	7.7×10^{-4} (1×10^{-3})	7.7×10^{-4} (1×10^{-3})	7.7×10^{-4} (1×10^{-3})	7.7×10^{-4} (1×10^{-3})
Motor Power — HP (kW)	2 (1.1)	4 (2.2)	8.5 (5.5)	11 (7.5)
Oil Capacity — Quarts (Liters)	4.3 (4.1)	6.72 (6.34)	26 (24.6)	29.52 (27.93)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	7	8	35	35
Standard Oil Type	TKO-19	TKO-19	TKO-19	TKO-19
Pump Weight — lbs. (kg)	159 (72)	231 (105)	441 (200)	495 (225)
Inlet Flange	ISO40 Bolt	ISO40 Bolt	ISO63 Bolt	ISO63 Bolt
Exhaust Outlet Flange	KF25 Bolt	KF25 Bolt	ISO40 Bolt	ISO40 Bolt
Overall Dimensions (L x W x H) — in. (mm)	26.2 x 9.4 x 15.6 (665 x 240 x 397)	31.3 x 10.5 x 16.9 (795 x 266 x 430)	36.9 x 15.9 x 20.9 (938 x 404 x 532)	43 x 15.9 x 20.9 (1,091 x 404 x 532)
Noise Level — dB(A)	65	70	75	75
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist	ED-A46203000	ED-A46203000	ED-A46204000	ED-A46204000

➤ Rotary Vane Pumps



Model	Pumps Voltage & Phases	Part No.	Price
E2M40	190/230/460 VAC, 3-Ø	ED-A36402982	**Call**
E2M40 PFPE	190/230/460 VAC, 3-Ø	ED-A36411982	**Call**
E2M80	208/460 VAC, 3-Ø	ED-A36502982	**Call**
E2M80 PFPE	208/460 VAC, 3-Ø	ED-A36511982	**Call**
E2M175	230/460 VAC, 60 Hz, 3-Ø	ED-A36603982	**Call**
E2M275	230/460 VAC, 60 Hz, 3-Ø	ED-A36703982	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	E1M40, E1M80, E2M80	ED-A46203000	**Call**
Oil Mist Eliminator	E2M175, E1M175, E2M275, E1M275	ED-A46204000	**Call**
Bolted NW40 to NW40KF Adapter	All EM Series Pumps	ED-A1516	**Call**
Clamp for KF40 Flange	All EM Series Pumps	QF40-150-C	**Call**
Viton® Centering Ring for KF40 Flange	All EM Series Pumps	QF40-150-SRV	**Call**
Bolted NW50 to NW50KF Adapter	All EM Series Pumps	ED-C10005080	**Call**
Clamp for KF50 Flange	All EM Series Pumps	QF50-200-C	**Call**
Viton Centering Ring for KF50 Flange	All EM Series Pumps	QF50-200-SRV	**Call**
TKO-19 Oil (1 gallon)	All EM Series Pumps	TKO19G1	**Call**
TKO-19 Oil (5 gallons)	All EM Series Pumps	TKO19G5	**Call**
Replacement Blade (Vane) Kit	E1M40	ED-A34401050	**Call**
Replacement Blade (Vane) Kit	E2M40	ED-A36401050	**Call**
Replacement Blade (Vane) Kit	E1M80	ED-A34501050	**Call**
Replacement Blade (Vane) Kit	E2M80	ED-A36501050	**Call**
Repair Kit	E1M40	ED-A36301131	**Call**
Repair Kit	E1M80, E2M80	ED-A34501131	**Call**
Repair Kit	E2M40	ED-A34401131	**Call**

NOTE: One charge of TKO-19 included with each pump.

➤ Rotary Vane Pumps

■ Edwards RV Series

RV Series:

- Feature dual pumping modes to optimize gas throughput or ultimate vacuum, corrosion-resistant polymer blades, printed gasket technology, a single-direction outer shaft seal, and an electronic start relay
- Quiet operation levels (less than 48 dBA)

NOTE: ATEX versions available; please call or visit our website for more information.

REMAN PUMPS
See Pages 16-2–16-3.

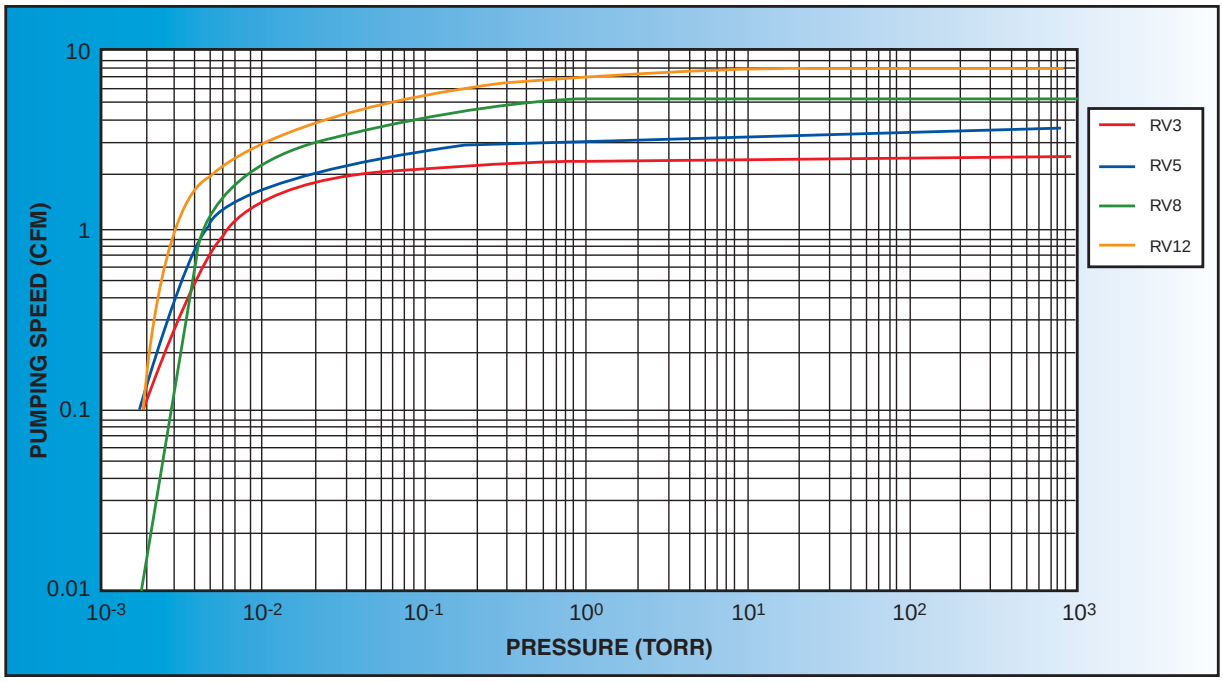
Edwards RV Series Specifications

Description	RV3	RV5	RV8	RV12
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	2.6 (3.7)	4.1 (5.8)	6.9 (9.7)	10 (14.2)
Ultimate Pressure — Torr (mbar)	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})
Motor Power — HP (kW)	0.4 (0.25)	0.4 (0.3)	0.74 (0.55)	0.74 (0.55)
Oil Capacity — Quarts (Liters)	0.72 (0.68)	0.72 (0.68)	0.8 (0.76)	1.12 (1.06)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	1	1	1	2
Standard Oil Type	TKO-19	TKO-19	TKO-19	TKO-19
Pump Weight — lbs. (kg)	47.3 (21.6)	43 (21.5)	57 (26)	58 (26.3)
Inlet Flange	KF25	KF25	KF25	KF25
Exhaust Outlet Flange	KF25	KF25	KF25	KF25
Overall Dimensions (L x W x H) — in. (mm)	16.9 x 6.2 x 8.7 (430 x 158 x 221)	16.9 x 6.2 x 8.7 (430 x 158 x 221)	18.5 x 6.2 x 8.7 (470 x 158 x 221)	19.3 x 6.2 x 8.7 (490 x 158 x 221)
Noise Level — dB(A)	48	48	48	48
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL	CE, CSA, UL
Recommended Mist Eliminator	ED-A46226000	ED-A46226000	ED-A46226000	ED-A46226000

* These Edwards pumps can be prepped with Fomblin oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Model	Pumps Voltage & Phases	Part No.	Price
RV3	115 VAC, 50/60 Hz, 1-Ø	ED-A65201906	**Call**
RV5	115 VAC, 50/60 Hz, 1-Ø	ED-A65301906	**Call**
RV8	115 VAC, 50/60 Hz, 1-Ø	ED-A65401906	**Call**
RV12	115 VAC, 50/60 Hz, 1-Ø	ED-A65501906	**Call**
RV3	230 VAC, 50/60 Hz, 1-Ø	ED-A65201903	**Call**
RV5	230 VAC, 50/60 Hz, 1-Ø	ED-A65301903	**Call**
RV8	230 VAC, 50/60 Hz, 1-Ø	ED-A65401903	**Call**
RV12	230 VAC, 50/60 Hz, 1-Ø	ED-A65501903	**Call**

➤ Rotary Vane Pumps



Description	Pump Accessories For Pump Model(s)	Part No.	Price
KJLC™ Oil Mist Eliminator	RV3, RV5, RV8, RV12	PFEGL915QF25	**Call**
OEM Oil Mist Eliminator	RV3, RV5, RV8, RV12	ED-A46226000	**Call**
Clamp for KF25 Flange	RV3, RV5, RV8, RV12	QF25-100-C	**Call**
Viton® Centering Ring for KF25 Flange	RV3, RV5, RV8, RV12	QF25-100-SRV	**Call**
TKO-19 Oil (1 quart)	RV3, RV5, RV8, RV12	TKO19Q1	**Call**
Replacement Blade (Vane) Kit	RV3	ED-A65201130	**Call**
Replacement Blade (Vane) Kit	RV5	ED-A65301130	**Call**
Replacement Blade (Vane) Kit	RV8	ED-A65401130	**Call**
Replacement Blade (Vane) Kit	RV12	ED-A65501130	**Call**
Repair Kit	RV3, RV5, RV8, RV12	ED-A65201131	**Call**

NOTE: One charge of TKO-19 included with each pump.

*NOTE: Other motor voltage available. Email **pumps@lesker.com** for details.*

➤ Rotary Vane Pumps

■ Oerlikon Leybold HV Standard – Trivac® B Series

Features:

- Direct-drive
- Small footprint, end-mounted sight glass, end-mounted controls, and inlet/outlet ports that can be positioned either vertically or horizontally

About Its Design:

- Incorporates forced-feed oil lubrication and all solvent-resistant seals and gaskets
- Oil-casing, coupling housing, inlet, and exhaust ports are made of aluminum (not made of corrosion-prone nonferrous heavy metals)
- Running these pumps continuously in rough vacuum requires a Mist Eliminator with oil return.

Pumps			
Model	Voltage & Phases	Part No.	Price
D25B	200–230 VAC, 50/60 Hz, 1-Ø	LH-91275-2	Call
D25B	200–230/380–460 VAC, 50/60 Hz, 3-Ø	LH-91276-2	Call
D40B	200–230/380–460 VAC, 50/60 Hz, 3-Ø	LH-91286-2	Call
D65B	200–230/380–460 VAC, 50/60 Hz, 3-Ø	LH-91296-2	Call

Oerlikon Trivac B Series Specifications

Description	D25B	D40B	D65B
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	20.9 (29.5)	32.5 (46)	53 (75)
Ultimate Pressure — Torr (mbar)	1.5 x 10^{-3} (2 x 10^{-3})	1.5 x 10^{-3} (2 x 10^{-3})	1.5 x 10^{-3} (2 x 10^{-3})
Motor Power — HP (kW)	1 (0.75)	3 (2.2)	3 (2.2)
Oil Capacity — Quarts (Liters)	1.52 (1.44)	2.72 (2.57)	3.52 (3.33)
Standard Oil Type	Diffoil-20	Diffoil-20	Diffoil-20
Pump Weight — lbs. (kg)	70.6 (32)	150 (68)	177 (80)
Inlet Flange	KF25	KF40	KF40
Exhaust Outlet Flange	KF25	KF40	KF40
Overall Dimensions (L x W x H) — in. (mm)	26 x 7.5 x 10.4 (660 x 190 x 263)	29.9 x 10.4 x 14 (760 x 264 x 355)	33.1 x 10.4 x 14 (840 x 264 x 355)
Noise Level — dB(A)	52	57	57
Certifications	CE, UL®	CE, UL	CE, UL
Recommended Mist Eliminator	LH-18911	LH-18916	LH-18916

Pump Accessories			
Description	For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	NT5, NT10, NT16, D25B	LH-18911	Call
Oil Mist Eliminator	D65B	LH-18916	Call
Clamp for KF16 Flange	NT5	QF16-075-C	Call
Viton® Centering Ring for KF16 Flange	NT5	QF16-075-SRV	Call
Clamp for KF25 Flange	NT10, NT16, D25B	QF25-100-C	Call
Viton Centering Ring for KF25 Flange	NT10, NT16, D25B	QF25-100-SRV	Call
Clamp for KF40 Flange	D40B, D65B	QF40-150-C	Call
Viton Centering Ring for KF40 Flange	D40B, D65B	QF40-150-SRV	Call
Diffoil-20 Oil (1 quart)	All Trivac Series Pumps	DIFFOIL20BL	Call
Diffoil-20 Oil (1 gallon)	All Trivac Series Pumps	DIFFOIL20CA	Call
Minor Repair Kit	D4B, D8B	LH-19720	Call
Minor Repair Kit	D16B, D25B	LH-19721	Call
Minor Repair Kit	D40B, D65B	LH-19722	Call
Major Repair Kit	D4B	LH-899534	Call
Major Repair Kit	D8B	LH-899535	Call
Major Repair Kit	D16B	LH-899536	Call
Major Repair Kit	D25B	LH-899537	Call
Major Repair Kit	D40B	LH-899538	Call
Major Repair Kit	D65B	LH-899539	Call

■ Oerlikon Leybold–Trivac® NT Series

Trivac NT5, NT10, and NT16

The dual stage rotary vane vacuum pumps of the Trivac NT line are modern pumps developed on the basis of the well proven Trivac A and Trivac B series. The performance scope and the operating characteristics have been optimized to match increasing market requirements.

The rotary vane pumps of the Trivac NT line have almost the same size as their Trivac predecessors, thus an easy substitution on a 1:1 basis without problems.

Advantages to the Customer:

- Sustained 1000 mbar operation
- High water vapor tolerance
- Low noise level

NOTE: These replace the discontinued D4B, D8B, and D16B.

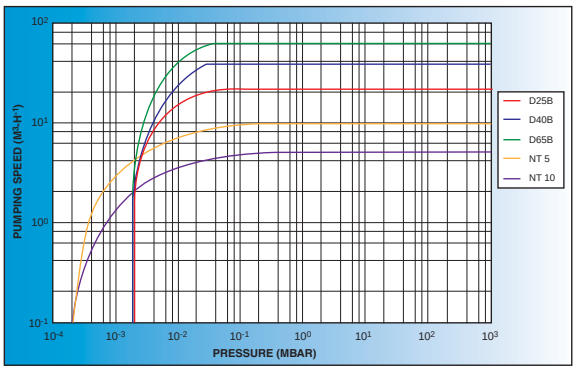
NOTE: One charge of Diffoil-20 included with each pump.

Oerlikon Trivac NT Series Specifications

Description	NT5	NT10	NT16
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60Hz (m^3/hr. @ 50 Hz)	4.2 (6)	7 (9.9)	11.65 (16.5)
Ultimate Pressure — Torr (mbar)	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})
Motor Power — HP (kW)	0.72 (0.45)	0.72 (0.45)	0.89 (0.55)
Oil capacity — Quarts (Liters)	1.32 (1.25)	1.32 (1.25)	1.06 (1)
Fomblin Charge Estimate* — kg (1 liter = 1.96 kg)	2.5	2.5	2
Standard Oil Type	Diffoil-20	Diffoil-20	Diffoil-20
Pump Weight (with oil) — lbs (kg)	48.7 (22.1)	53.4 (24.2)	88.2 (40)
Inlet Flange	KF16	KF25	KF25
Exhaust Outlet Flange	KF16	KF25	KF25
Noise Level — dB(A)	49	49	54
Certifications	CE	CE	CE
Recommended Mist Eliminator	LH-18911	LH-18911	LH-18911

*These Leybold pumps can be prepped with Fomblin® oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Pumps			
Model	Voltage & Phases	Part No.	Price
NT5	115 VAC, 50/60 Hz, 1-Ø 200–230 VAC, 50/60 Hz, 1-Ø	LH-140212	**Call**
NT5	200–230/380–460 VAC, 50/60 Hz, 3-Ø	LH-140213	**Call**
NT10	115 VAC, 50/60 Hz, 1-Ø 200–230 VAC, 50/60 Hz, 1-Ø	LH-140312	**Call**
NT10	200–230/380–460 VAC, 3-Ø	LH-140313	**Call**
NT16	115 VAC, 50/60 Hz, 1-Ø 200–300 VAC, 50/60 Hz, 1-Ø	LH-140220	**Call**
NT16	200–300 VAC, 50/60 Hz, 3-Ø	LH-140221	**Call**



Pump Accessories			
Description	For Pump Model(s)	Part No.	Price
Power Cable 115V	NT5 & NT10	LH-20081090	**Call**
Power Cable 230V	NT5 & NT10	LH-20081141	**Call**
Power Cable 115V	NT16	LH-140304	**Call**
Power Cable 230V	NT16	LH-140305	**Call**

NOTE: On NT series pumps, order power cable separately.

Kurt J. Lesker Company

➤ Rotary Vane Pumps

REMAN PUMPS See Pages 16-2–16-3.

■ Oerlikon Leybold HV Chemical–Trivac® BCS Series

Internal components constructed of gray cast iron, surface-treated aluminum, steel, and stainless steel to protect from corrosion.

Features:

- Pumping of corrosive or aggressive media

Optional Accessories:

- Chemical filter with safety isolation valve
- Exhaust filter with lubricant return
- Inert gas system
- Limit switch system
- Electrical indicator system

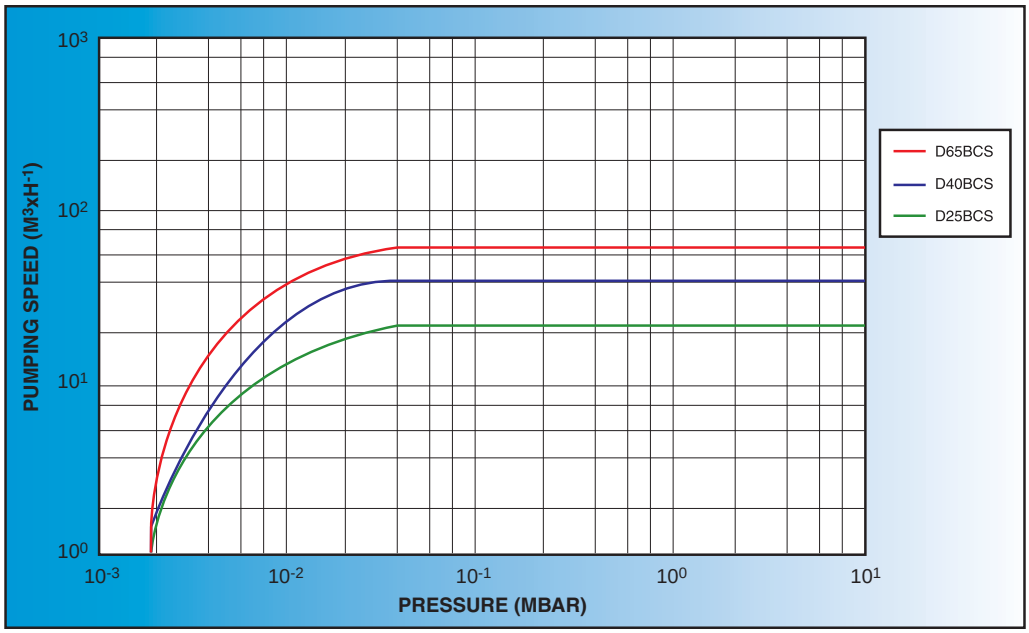
Oerlikon Trivac® BCS Series Specifications

Description	D25BCS	D40BCS	D65BCS
Chemistry	Chemical Series Fomblin Prepared or Hydrocarbon Oil	Chemical Series Fomblin Prepared or Hydrocarbon Oil	Chemical Series Fomblin Prepared or Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	20.9 (29.5)	32.5 (46)	53 (75)
Ultimate Pressure — Torr (mbar)	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})
Motor Power — HP (kW)	1 (0.75)	3 (2.2)	3 (2.2)
Oil Capacity — Quarts (Liters)	1.52 (1.44)	2.72 (2.57)	3.52 (3.33)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	3	5	7
Standard Oil Type*	Diffoil-20 or Fomblin 14/6	Diffoil-20 or Fomblin 14/6	Diffoil-20 or Fomblin 14/6
Pump Weight — lbs. (kg)	70.6 (32)	150 (68)	177 (80)
Inlet Flange	KF25	KF40	KF40
Exhaust Outlet Flange	KF25	KF40	KF40
Overall Dimensions (L x W x H) — in. (mm)	26 x 7.5 x 10.4 (660 x 190 x 263)	29.9 x 10.4 x 14 (760 x 264 x 355)	33.1 x 10.4 x 14 (840 x 264 x 355)
Noise Level — dB(A)	52	57	57
Certifications	CE, UL®	CE, UL	CE, UL
Recommended Mist Eliminator	LH-18956	LH-18957	LH-18957

* These Leybold pumps come factory prepped with the appropriate charge of Fomblin® oil for pumping oxygen and aggressive processes.

*NOTE: Please contact us at **pumps@lesker.com** for more information or additional options not listed.*

➤ Rotary Vane Pumps



Pumps

Model	Voltage & Phases	Pump Oil Prep	Part No.	Price
D25 BCS	208–230 VAC, 50/60 Hz, 1-Ø	Hydrocarbon	LH-91378-2	Call
D25 BCS	208–230/460 VAC, 50/60 Hz, 3-Ø	Hydrocarbon	LH-91378-3	Call
D25 BCS	208–230 VAC, 50/60 Hz, 1-Ø	Fomblin®	LH-91379-2	Call
D25 BCS	208–230/460 VAC, 50/60 Hz, 3-Ø	Fomblin	LH-91379-3	Call
D40 BCS	208–230/460 VAC, 50/60 Hz, 3-Ø	Hydrocarbon	LH-91388-2	Call
D40 BCS	208–230/460 VAC, 50/60 Hz, 3-Ø	Fomblin	LH-91389-2	Call
D65 BCS	208–230/460 VAC, 50/60 Hz, 3-Ø	Hydrocarbon	LH-91398-2	Call
D65 BCS	208–230/460 VAC, 50/60 Hz, 3-Ø	Fomblin	LH-91399-2	Call

Pump Accessories

Description	For Pump Model(s)	Part No.	Price
Oil Mist Eliminator with oil return	D25BCS	LH-18956	Call
Oil Mist Eliminator with oil return	D40BCS, D65BCS	LH-18957	Call
Clamp for KF25 Flange	D25B	QF25-100-C	Call
Viton® Centering Ring for KF25 Flange	D25B	QF25-100-SRV	Call
Clamp for KF40 Flange	D40B, D65B	QF40-150-C	Call
Viton Centering Ring for KF40 Flange	D40B, D65B	QF40-150-SRV	Call
Diffoil 20 (1 quart)	All Trivac® Series Pumps	DIFFOIL20BL	Call
Diffoil 20 (1 gallon)	All Trivac Series Pumps	DIFFOIL20CA	Call
Fomblin 14/6 Oil (1 kg)	All Trivac Series Pumps	MFY14/6BB	Call
Fomblin 14/6 Oil (8 kg)	All Trivac Series Pumps	MFY14/6CA	Call
Minor Repair Kit	D25BCS	LH-19731	Call
Minor Repair Kit	D40BCS, D65BCS	LH-19732	Call
Minor Repair Kit	D40BCS, D65BCS (Fomblin-prepped)	LH-19742	Call
Major Repair Kit	D25BCS	LH-899541	Call
Major Repair Kit	D40BCS	LH-899542	Call
Major Repair Kit	D65BCS	LH-899543	Call

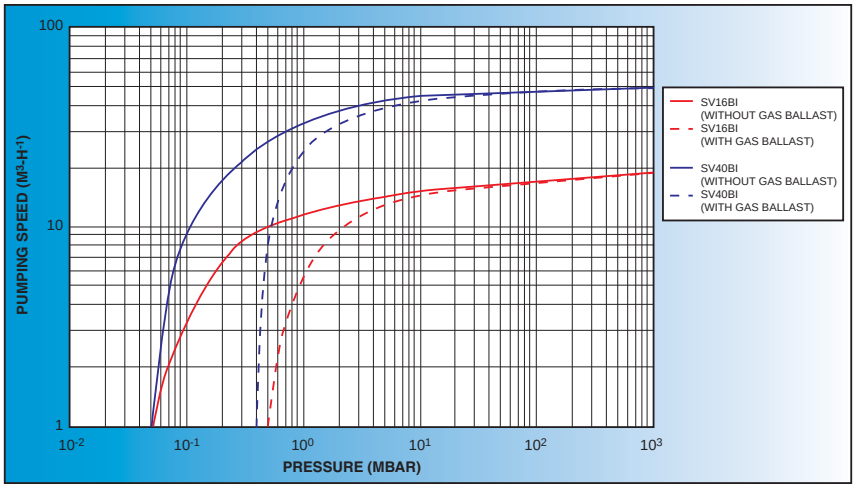
NOTE: One charge of Fomblin Oil or Diffoil-20 included with each pump.

➤ Rotary Vane Pumps

■ Oerlikon Leybold–SOGEVAC® SV–BI Series

BI-16 and BI-40

The BI series maintains all the features of the single-stage B series pumps with a better ultimate pressure and high pumping speed stability at low pressure.



Oerlikon Sogevac® BI Series Specifications

Description	SV 16 BI	SV 40 BI
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60Hz (m^3/hr. @ 50 Hz)	12.1 (18)	29.5 (42)
Ultimate Pressure — Torr (mbar)	3.75×10^{-2} (5×10^{-2})	3.75×10^{-2} (5×10^{-2})
Motor Power — HP (kW)	0.88 (0.55)	1.8 (1.1)
Oil capacity — Quarts (Liters)	0.53 (0.5)	1.1 (1)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	1	2
Pump Weight (with oil) — lbs. (kg)	59.5 (27)	99 (45)
Inlet Flange	KF25	KF40
Exhaust Outlet Flange	KF25	KF40
Certifications	CE	CE

Pumps			
Model	Voltage & Phases	Part No.	Price
SV16BI	230 VAC, 50/60 Hz, 1-Ø	LH-960286	**Call**
SV16BI	230–460 VAC, 50/60 Hz, 3-Ø	LH-960281	**Call**
SV28BI	115 VAC, 50/60 Hz, 1-Ø	LH-960278	**Call**
SV28BI	180–264 VAC, 50/60 Hz, 1-Ø	LH-960277	**Call**
SV28BI	170–506 VAC, 50/60 Hz, 3-Ø	LH-960273	**Call**
SV40BI	230-460 VAC, 60 Hz, 3-Ø	LH-960341	**Call**
SV40BI	230-400 VAC, 50 Hz, 3-Ø	LH-960331	**Call**

Pump Accessories			
Description	For Pump Model(s)	Part No.	Price
Demister Element	SV16BI, SV28BI	LH-71416340	**Call**
Demister Element	SV40BI	LH-71421180	**Call**

➤ Rotary Vane Pumps

■ Oerlikon Leybold Coarse Vacuum (Sogevac® SV Series—Small to Medium)

Sogevac SV Series:

These compact and extremely easy-to-operate rotary coarse vane pumps are designed for continuous operation over the working pressure range from atmosphere to less than 1 Torr (29.9 in. Hg).

Additional Components:

- Integral demister in the oil casing filters oil aerosols and returns coalesced oil to the fluid sump
- Relief valve prevents pressure buildup should the demisting filters become clogged
- External spin-on filter (featured on all models except SV16B and SV25B) removes particulates before the oil recirculates
- Feature internal mounted fans for air-cooling
- Models SV16B and SV25B have single-phase (115 VAC or 230 VAC) or three-phase (208/230/460 VAC) motors
- Models SV40B and SV65B through SV1200 have three-phase, NEMA T.E.F.C. 208/230/460 VAC, 60 Hz motors

Oerlikon Sogevac® SV Series Specifications

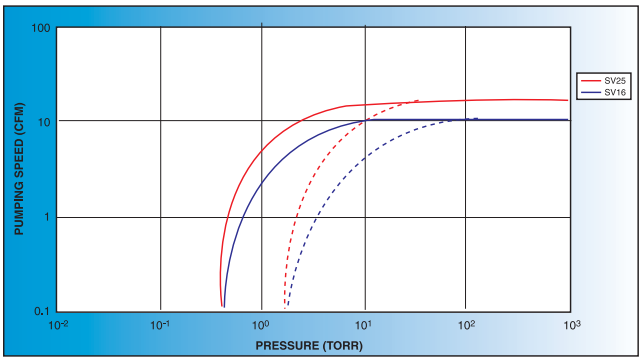
Description	SV10B	SV16B	SV25B	SV40B	SV65B
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50Hz)	7.7 (11)	11.2 (16)	18.3 (26)	31.2 (44)	41.8 (59)
Ultimate Pressure — Torr (mbar)	0.75 (1)	4×10^{-1} (5×10^{-1})	4×10^{-1} (5×10^{-1})	4×10^{-1} (5×10^{-1})	4×10^{-1} (5×10^{-1})
Motor Power — HP (kW)	1 (0.55)	1 (0.75)	1 (0.75)	2 (1.1)	2.5 (1.5)
Oil Capacity — Quarts (Liters)	0.53 (0.5)	0.52 (0.49)	0.52 (0.49)	1.04 (0.98)	2.12 (2)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	1	N/A	N/A	2	4
Pump Weight — lbs. (kg)	44.1 (20)	45.3 (20.5)	60 (27)	99.3 (45)	114.8 (52)
Inlet Flange	¾" Female NPT	¾" Female NPT	¾" Female NPT	1¼" Female NPT	1¼" Female NPT
Exhaust Outlet Flange	¾" Female NPT	¾" Female NPT	¾" Female NPT	1¼" Female NPT	1¼" Female NPT
Overall Dimensions (L x W x H) — in. (mm)	— —	12.4 x 7.8 x 11.1 (315 x 199 x 281)	14 x 10.8 x 9.7 (356 x 275 x 246)	18.9 x 11.2 x 10.4 (480 x 284 x 265)	18.9 x 12.6 x 10.4 (480 x 320 x 264)
Noise Level — dB(A)	64	66	67	63	64
Certifications	CE	CE	CE	CE	CE
Recommended Mist Eliminator	Has Internal Demister	Has Internal Demister	Has Internal Demister	Has Internal Demister	Has Internal Demister

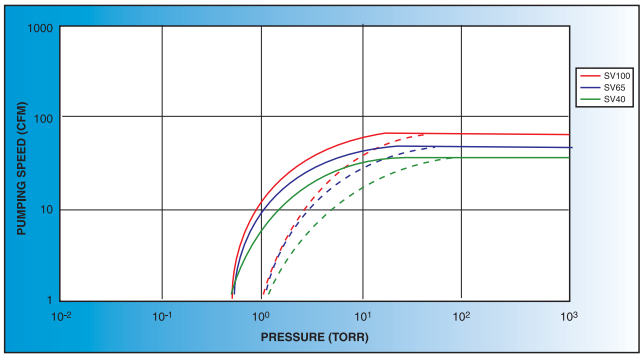
* These SV Series pumps can be prepped with Fomblin oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Turn the page for continued Sogevac SV Series—Small to Medium info! ➤

➤ Rotary Vane Pumps

■ Oerlikon Leybold Coarse Vacuum (Sogevac® SV Series—Small to Medium)





Pumps			
Model	Voltage & Phases	Part No.	Price
Sogevac SV10B	115 VAC, 60 Hz, 1-Ø	LH-960110	Call
Sogevac SV10B	230 VAC, 50/60 Hz, 1-Ø	LH-960105	Call
Sogevac SV16B	115 VAC, 60 Hz, 1-Ø	LH-960170	Call
Sogevac SV16B	230 VAC, 50/60 Hz, 1-Ø	LH-960165	Call
Sogevac SV16B	208–230/460 VAC, 60 Hz, 3-Ø	LH-960160	Call
Sogevac SV25B	115 VAC, 60 Hz, 1-Ø	LH-960261	Call
Sogevac SV25B	230 VAC, 50/60 Hz, 1-Ø	LH-960257	Call
Sogevac SV25B	208–230/460 VAC, 60 Hz, 3-Ø	LH-960253	Call
Sogevac SV40B	230/460 VAC, 50/60 Hz, 3-Ø	LH-960314	Call
Sogevac SV65B	230/460 VAC, 50/60 Hz, 3-Ø	LH-960414	Call

Pump Accessories			
Description	For Pump Model(s)	Part No.	Price
Male to KF40 Adapter	SV25B, SV40B	QF40XMNPT12	Call
Clamp for KF40 Flange	SV25B, SV40B	QF40-150-C	Call
Viton® Centering Ring for KF40 Flange	SV25B, SV40B	QF40-150-SRV	Call
Major Repair Kit	SV25B	LH-971423100	Call
Major Repair Kit	SV40B	LH-971427650	Call
Major Repair Kit	SV65B	LH-71420420	Call

➤ Rotary Vane Pumps

Oerlikon Leybold Coarse Vacuum (Sogevac® SV Series—Large)

REMAN PUMPS
See Pages 16-2-16-3.

Sogevac SV Series:

These compact and extremely easy-to-operate rotary coarse vane pumps are designed for continuous operation over the working pressure range from atmosphere to less than 1 Torr (29.9 in. Hg).

Additional Components:

- Integral demister in the oil casing filters oil aerosols and returns coalesced oil to the fluid sump
- Relief valve prevents pressure buildup should the demisting filters become clogged
- External spin-on filter removes particulates before the oil recirculates
- Feature internal mounted fans for air-cooling
- Larger sizes (SV585, SV630, and SV1200) include cooling radiators
- Models SV100B through SV1200 have three-phase, NEMA T.E.F.C. 208/230/460 VAC, 60 Hz motors

Oerlikon Sogvac® SV Series (Large) Specifications

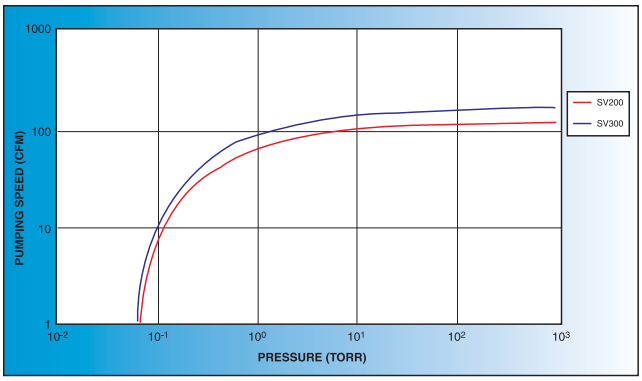
	SV100B	SV200	SV300	SV500	SV630	SV1200
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50Hz)	68.9 (97.5)	129.5 (180)	200 (280)	336 (570)	494.8 (700)	677 (1,150)
Ultimate Pressure — Torr (mbar)	4×10^{-1} (5×10^{-1})	5×10^{-1} (7×10^{-1})	5×10^{-1} (7×10^{-1})	7.5×10^{-1} (1)	6×10^{-2} (8×10^{-2})	8×10^{-2} (1.1×10^{-1})
Motor Power — HP (kW)	4.8 (2.2)	6.2 (4)	8.5 (5.5)	15 (11)	25 (15)	30 (22)
Oil Capacity Quarts (Liters) —	2.12 (2)	9.5 (9)	12.1 (11.5)	37 (35)	24.3 (33)	63 (60)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	4	18	23	70	46	120
Standard Oil Type	TKO-700	TKO-700	TKO-700	TKO-700	TKO-700	TKO-700
Pump Weight — lbs. (kg)	194.3 (88)	341.8 (155)	430 (195)	1,389 (630)	1,435 (650)	3,021 (1,370)
Inlet Flange	1¼" Female NPT	2" Female NPT	2" Female NPT	4" ANSI	4" ANSI	6" ANSI
Exhaust Outlet Flange	1¼" Female NPT	2" Female NPT	2" Female NPT	4" ANSI	4" ANSI	6" ANSI
Overall Dimensions (L x W x H) — in. (mm)	29.7 x 15.7 x 11.4 (755 x 400 x 290)	37 x 21.1 x 16.3 (940 x 535 x 415)	42.5 x 21.1 x 16.3 (1,080 x 535 x 415)	60.7 x 35.2 x 31.5 (1,543 x 894 x 800)	59.5 x 35.8 x 29.1 (1,510 x 909 x 740)	65.4 x 39.6 x 41.3 (1,660 x 1,005 x 1,050)
Noise Level — dB(A)	64	73	74	71	72	78
Certifications	CE	CE	CE	CE	CE	CE
Recommended Mist Eliminator	Has Internal Demister	Has Internal Demister	Has Internal Demister	Has Internal Demister	Has Internal Demister	Has Internal Demister

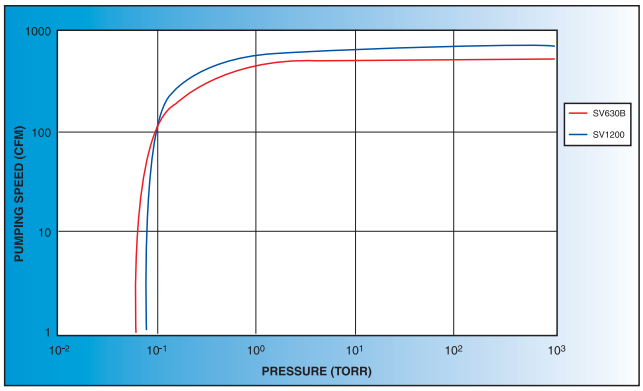
* These SV100B–SV1200 Series pumps can be prepped with Fomblin oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Turn the page for continued Sogevac SV Series—Large info! ➤

➤ Rotary Vane Pumps

Oerlikon Leybold Coarse Vacuum (Sogevac® SV Series—Large)

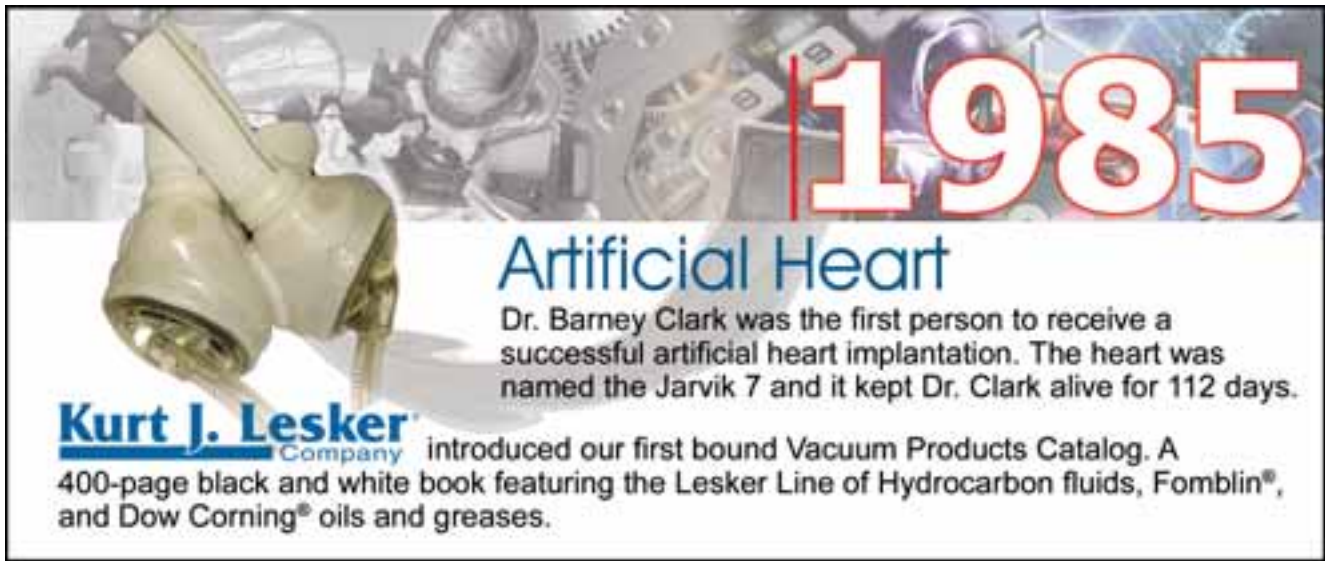




Model	Pumps Voltage & Phases	Part No.	Price
Sogevac SV100B	230/460 VAC, 50/60 Hz, 3-Ø	LH-960514	**Call**
Sogevac SV200	230/460 VAC, 50/60 Hz, 3-Ø	LH-95027	**Call**
Sogevac SV300	230/460 VAC, 50/60 Hz, 3-Ø	LH-95031	**Call**
Sogevac SV500	230/460 VAC, 50/60 Hz, 3-Ø	LH-95657	**Call**
Sogevac SV630	230/460 VAC, 50/60 Hz, 3-Ø	LH-95665	**Call**
Sogevac SV1200	230/460 VAC, 50/60 Hz, 3-Ø	LH-95070	**Call**

NOTE: One charge of TKO-700 included with each pump.

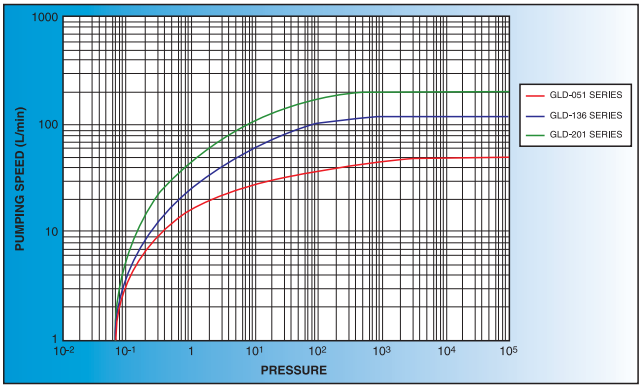
Description	Pump Accessories For Pump Model(s)	Part No.	Price
TKO-700 Oil (1 gallon)	SV100, SV200, SV300, SV500, SV630, SV1200	TKO700G1	**Call**
TKO-700 Oil (5 gallon)	SV100, SV200, SV300, SV500, SV630, SV1200	TKO700G5	**Call**
Major Repair Kit	SV100B	LH-971427680	**Call**
Major Repair Kit	SV200	LH-71436190	**Call**
Major Repair Kit	SV300	LH-71436200	**Call**
Major Repair Kit	SV500	LH-71419360	**Call**
Major Repair Kit	SV630	LH-71405390	**Call**
Major Repair Kit	SV1200	LH-71234800	**Call**



➤ Rotary Vane Pumps

ULVAC® GLD Series

- Combine high performance, low vibration, and low noise
- Gas ballasting for solvent vapor removal
- Forced oil supply offers optimum lubrication during pumpdown
- Anti-suckback device protects the chamber during power failure



ULVAC GLD Series Specifications

Description	GLD-040	GLD-136	GLD-201	GLD-280
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	1.7 (2.4)	5.7 (8.1)	8.5 (12)	11.8 (16.8)
Ultimate Pressure — Torr (mbar)	5×10^{-4} (6.7×10^{-4})	5×10^{-4} (6.7×10^{-4})	5×10^{-4} (6.7×10^{-4})	5×10^{-4} (6.7×10^{-4})
Motor Power — HP (kW)	0.27 (0.2)	0.54 (0.4)	1 (0.75)	1 (0.75)
Oil Capacity — Quarts (Liters)	0.84 (0.79)	1.04 (0.98)	1.16 (1.1)	1.16 (1.1)
Standard Oil Type	Ulvac Oil R-2	Ulvac Oil SMR-100	Ulvac Oil SMR-100	Ulvac Oil R-7
Pump Weight — lbs. (kg)	35.5 (16)	57 (26)	62 (28)	75.5 (32)
Inlet Flange	KF25	KF25	KF25	KF25
Exhaust Outlet Flange	KF25	KF25	KF25	KF25
Overall Dimensions (L x W x H) — in. (mm)	16.8 x 5.9 x 8.8 (427 x 150 x 229)	19.2 x 6.7 x 9.8 (488 x 170 x 250)	20.3 x 6.7 x 9.8 (516 x 170 x 250)	23 x 7.1 x 10.7 (586 x 182 x 271)
Noise Level — dB(A)	66	66	72	72
Certifications	CE	CE	CE	CE
Recommended Mist Eliminator	PFEGL910QF25	PFEGL915QF25	PFEGL915QF25	PFEGL915QF25

Model	Pumps Voltage & Phases	Part No.	Price
GLD-040	100–115/200–230 VAC, 50/60 Hz, 1-Ø	ULGLD-040	**Call**
GLD-136A	200–240/380–460 VAC, 50/60 Hz, 3-Ø	ULGLD-136A	**Call**
GLD-136C	100–115/200–230 VAC, 50/60 Hz, 1-Ø	ULGLD-136C	**Call**
GLD-201A	200–240/380–460 VAC, 50/60 Hz, 3-Ø	ULGLD-201A	**Call**
GLD-201B	100–115/200–230 VAC, 50/60 Hz, 1-Ø	ULGLD-201B	**Call**
GLD-280A	200–240/380–460 VAC, 50/60 Hz, 3-Ø	ULGLD-280A	**Call**
GLD-280B	100–115/200–230 VAC, 50/60 Hz, 1-Ø	ULGLD-280B	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	All GLD Series Pumps	PFEGL915QF25	**Call**
Cast Clamp for KF25 Flange	All GLD Series Pumps	QF25-100-C	**Call**
Viton® Centering Ring for KF25 Flange	All GLD Series Pumps	QF25-100-SRV	**Call**
Repair Kit	GLD-040	ULGLD040MAK	**Call**
Repair Kit	GLD-051	ULGLD051MAK	**Call**
Repair Kit	GLD-136, GLD-136A, GLD-36C	ULGLD136MAK	**Call**
Repair Kit	GLD-201, GLD-201A, GLD-201B	ULGLD201MAK	**Call**

➤ Rotary Vane Pumps

■ Pfeiffer HenaLine™

The HenaLine Innovations:

- Single-stage oil-sealed rotary vane pump
- Oil mist separator, oil return and safety valves are integrated as standard equipment.

Pfeiffer HenaLine Specifications

Description	Hena 25	Hena 60	Hena 100	Hena 200	Hena 300	Hena 400	Hena 630	Hena 1000
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	17.65 (25)	44.7 (63)	70.6 (100)	141 (200)	221.9 (300)	282.5 (400)	447 (630)	706 (1000)
Ultimate Pressure – Torr (mbar)	0.15 (0.2)	0.15 (0.2)	0.15 (0.2)	0.15 (0.2)	0.15 (0.2)	0.15 (0.2)	0.15 (0.2)	0.3 (0.4)
Motor Power — HP (kW)	2.68 (1.1)	2.95 (1.8)	4 (2.5)	7.4 (5.5)	10 (7.5)	20.1 (11)	24.8 (15)	40.2 (22)
Oil Capacity — Quarts (Liters)	1.06 (1)	2.11 (2)	2.11 (2)	6.9 (6.5)	6.9 (6.5)	12.68 (12)	15.85 (15)	31.7 (30)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	2	4	4	13	13	24	30	60
Standard Oil Type	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19
Pump Weight — lbs. (kg)	97 (44)	137 (62)	163 (74)	375 (170)	474 (215)	1025 (465)	1367 (620)	2381 (1080)
Inlet Flange	KF40	KF40	KF40	ISO100-K	ISO100-K	ISO100-K	ISO100-K	ISO160-K
Exhaust Outlet Flange	KF40	KF40	KF40	ISO100-K	ISO100-K	ISO100-K	ISO100-K	ISO100-K
Noise Level — dB(A)	63	66	68	74	76	79	79	82

Model	Voltage and Phase	Part No.	Price
Hena 25	100–120VAC, 1Ph, 60 Hz	PKD02207	**Call**
Hena 25	220–240VAC, 1Ph, 60 Hz	PKD02222	**Call**
Hena 25	220–240VAC, 1Ph, 50 Hz	PKD02212	**Call**
Hena 25	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02200	**Call**
Hena 60	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02300	**Call**
Hena 100	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02350	**Call**
Hena 200	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02400	**Call**
Hena 300	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02450	**Call**
Hena 400	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02500	**Call**
Hena 630	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02600	**Call**
Hena 1000	190–210/380–420VAC, 3Ph, 50/60 Hz	PKD02700	**Call**

*NOTE: For additional information including pump curves and specs, visit **www.lesker.com**.*

➤ Rotary Vane Pumps

■ Welch® Standard and Chemstar

Welch: Belt-Drive Standard Vane Pumps

The low pump speed and belt drive combine to reduce operating wear and temperature, thereby reducing maintenance and oil vapor backstreaming. Use these pumps for all general purpose roughing and backing applications that demand longevity.

The low pump speed and "decoupling" of the belt drive makes this 1399 pump run cooler than equivalent direct-drive pumps. The reduced wear increases the operating life and the reduced temperature decreases backstreaming. Used for vacuum distillations, glove box transfers, residual solvent removal, and resin degassing.

Welch: Belt-Drive Chemstar Pump

These N-01 pumps are versions of 1376, 1400, and 1402 pumps, modified to make all vital parts corrosion resistant. The oil case is Teflon® coated; fluorocarbon seals and gaskets are used throughout; and many internal components are made from stainless steel. The large, low volume and slow speed enable this pump to accept high contamination levels even in dusty environments. We recommend these pumps for many dirty applications with corrosive gases.

KJLC offers pump repair kits for all pumps (prices available upon request), and pump repair service.

Welch Standard and Chemstar Specifications

Description	1400	1405	1402	1376	1397	1374	1399	1399N	1400N	1402N	1376N
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Chemical Series Hydrocarbon Oil	Chemical Series Hydrocarbon Oil	Chemical Series Hydrocarbon Oil	Chemical Series Hydrocarbon Oil
Displacement – CFM @ 60 Hz	0.9	3.2	5.6	10.6	17.7	23	1.2	1.2	0.9	5.6	10.6
Ultimate Pressure – Torr (mbar)	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	1.5×10^{-2} (1.9×10^{-2})	1.5×10^{-2} (1.9×10^{-2})	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})	1×10^{-4} (1.3×10^{-4})
Motor Power – HP (kW)	0.33 (0.25)	0.5 (0.37)	0.5 (0.37)	1 (0.75)	1 (0.75)	1.5 (1.12)	0.33 (0.25)	0.33 (0.25)	0.33 (0.25)	0.5 (0.37)	1 (0.75)
Oil Capacity – Quarts (Liters)	0.62 (0.59)	2.25 (2.1)	2.25 (2.1)	2.5 (2.4)	1.25 (1.2)	1.25 (1.2)	0.5 (0.47)	0.5 (0.47)	0.62 (0.59)	2.25 (2.1)	2.5 (2.4)
Fomblin® Charge Estimate* – kg (1 liter = 1.96 kg)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	1.5	4.5	5
Standard Oil Type	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19	TKO-19	Diffoil-20	Diffoil-20	Diffoil-20	Diffoil-20
Pump Weight – lbs. (kg)	58 (26)	112 (51)	112 (51)	156 (71)	205 (93)	220 (100)	51 (23)	63 (28.6)	58 (26)	112 (51)	156 (71)
Inlet and Outlet Flange	$^{7}/_{16}$" hose barb	$^{7}/_{16}$" hose barb	$^{13}/_{16}$" hose barb	$^{13}/_{16}$" hose barb	$1^{5}/_{8}$" hose barb	$1^{5}/_{8}$" hose barb	$^{7}/_{16}$" hose barb	$^{7}/_{16}$" hose barb	QF16	QF25	QF25
Inlet and Outlet Thread Type	$^{3}/_{4}$", 20 tpi	1", 20 tpi	1", 20 tpi	1", 20 tpi	1.75", 20 tpi	1.75", 20 tpi	$^{3}/_{4}$", 20 tpi	$^{3}/_{4}$", 20 tpi	$^{3}/_{4}$", 20 tpi	1", 20 tpi	1", 20 tpi

Turn the page for continued Welch Standard & Chemstar info! ➤

➤ Rotary Vane Pumps

■ Welch® Standard and Chemstar (continued)

Model	Description	Part No.	Price
1374	DuoSeal® Unmounted Pump	SW1374	Call
1374B-01	DuoSeal, 115VAC, 60 Hz, 1Ph	SW1374B-01	Call
1374M-01	DuoSeal, 230/460VAC, 60 Hz, 3Ph	SW1374M-01	Call
1376	DuoSeal Unmounted Pump	SW1376	Call
1376B-01	DuoSeal, 115VAC, 60 Hz, 1Ph	SW1376B-01	Call
1376C-03	DuoSeal, 220VAC, 50 Hz, 1Ph, without CE mark	SW1376C-03	Call
1376M-01	DuoSeal, 230/460VAC, 60 Hz, 3Ph	SW1376M-01	Call
1376N	Chemstar Unmounted Pump	SW1376N	Call
1376N-01	Chemstar, 115VAC, 60 Hz, 1Ph	SW1376N-01	Call
1376N-49	Chemstar, 220VAC, 50 Hz, 1Ph without CE mark	SW1376N-49	Call
1376N-60	Chemstar, 230VAC, 60 Hz, 1Ph	SW1376N-60	Call
1380	DuoSeal Unmounted Pump	SW1380	Call
1380B-01	DuoSeal, 115VAC, 60 Hz, 1Ph	SW1380B-01	Call
1397	DuoSeal Unmounted Pump	SW1397	Call
1397B-01	DuoSeal, 115VAC, 60 Hz, 1Ph	SW1397B-01	Call
1397C-03	DuoSeal, 220VAC, 50 Hz, 1Ph without CE mark	SW1397C-03	Call
1397M-01	DuoSeal, 230VAC, 60 Hz, 3Ph	SW1397M-01	Call
1399	DuoSeal Unmounted Pump	SW1399	Call
1399B-01	DuoSeal, 115VAC, 60 Hz, 1Ph	SW1399B-01	Call
1399C-02	DuoSeal, 220VAC, 50 Hz, 1Ph with Schuko Plug	SW1399C-02	Call
1399N-01	DuoSeal, 115VAC, 60 Hz, 1Ph with Pump Plate	SW1399N-01	Call
1400	DuoSeal Unmounted Pump	SW1400	Call
1400B-01	DuoSeal, 115VAC, 60 Hz, 1Ph	SW1400B-01	Call
1400C-02	DuoSeal, 220VAC, 50 Hz, 1Ph without CE mark	SW1400C-02	Call
1400N-01	Chemstar, 115VAC, 60 Hz, 1Ph with Schuko Plug	SW1400N-01	Call
1400N-50	Chemstar, 220VAC, 50 Hz, 1Ph with Schuko Plug	SW1400N-50	Call
1402	DuoSeal Unmounted Pump	SW1402	Call
1402B-01	DuoSeal, 115VAC, 60 Hz, 1Ph	SW1402B-01	Call
1402C-01	DuoSeal, 230VAC, 60 Hz, 1Ph	SW1402C-01	Call
1402C-02	DuoSeal, 220VAC, 50 Hz, 1Ph with Schuko Plug/CE	SW1402C-02	Call
1402M-01	DuoSeal, 230/460VAC, 60 Hz, 3Ph	SW1402M-01	Call
1402N	Chemstar Unmounted Pump	SW1402N	Call
1402N-01	Chemstar, Mounting Pump, 115VAC, 60 Hz, 1Ph	SW1402N-01	Call
1402N-50	Chemstar, 220VAC, 50 Hz, 1Ph with Schuko Plug	SW1402N-50	Call
1402N-60	Chemstar, Mounting Pump, 230V, 60 Hz, 1Ph	SW1402N-60	Call
1405	DuoSeal Unmounted Pump	SW1405	Call
1405B-01	DuoSeal, Mounting Pump, 115VAC, 60 Hz, 1Ph	SW1405B-01	Call
1405C-02	DuoSeal, Mounting Pump, 230VAC, 50 Hz, 1Ph with CE	SW1405C-02	Call

Description	Pump Accessories For Pump Model(s)	Part No.	Price
1417 Exhaust Filter	1399, 1400, 1400N	SW1417	Call
1417L Replacement Element	1417 Housing	SW1417L	Call
1417A Directional Exhaust Filter	1376, 1380, 1402, 1405, 1402N,1376N	SW1417A	Call
1417G Replacement Element	1417A Housing	SW1417G	Call
1417B Directional Exhaust Filter	1374, 1397	SW1417B	Call
1417H Replacement Element	1417B Housing	SW1417H	Call
TKO19 Oil (1 quart)	All Standard Welch pumps	TKO19Q1	Call
TKO19 Oil (1 gallon)	All Standard Welch pumps	TKO19G1	Call
Diffoil-20 (1 quart)	All Chemstar pumps	DIFFOIL20BL	Call
Diffoil-20 (1 gallon)	All Chemstar pumps	DIFFOIL20CA	Call

➤ Rotary Vane Pumps

■ Varian Rotary Vane Pumps

DS Series:

- World motors, suitable for all voltages and frequencies
- Forced air cooling
- Two-stage pumps

HS 452 and HS 652:

The pumps employ an innovative frequency converter technology that delivers optimal and consistent performance under any combination of input power voltage and frequency, worldwide.

Varian Rotary Vane Specifications

Description	DS42	DS102	DS202	DS302	DS402	DS602	HS452	HS652
Chemistry	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	1.6 (2.3)	4 (5.7)	6.8 (9.6)	10 (14.2)	14.5 (20.5)	21.4 (30.2)	16.1 (27.3)	23.8 (40.3)
Ultimate Pressure — Torr (mbar)	3×10^{-3} (4×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})	1.5×10^{-3} (2×10^{-3})
Motor Power — HP (kW)	0.54 (0.4)	0.74 (0.45)	0.74 (0.45)	0.74 (0.45)	1.2 (0.75)	1.2 (0.75)	0.67 (0.5) Three Phase Only	0.67 (0.5) Three Phase Only
Oil Capacity — Quarts (Liters)	0.63 (0.6)	0.53 (0.5)	0.63 (0.6)	0.63 (0.6)	1.06 (1)	1.06 (1)	1.06 (1)	1.06 (1)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	1	1	1	1	2	2	2	2
Standard Oil Type	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pump Weight — lbs. (kg)	24 (11)	48 (22)	55 (25)	55 (25)	77 (35)	77 (35)	73 (33)	73 (33)
Inlet Flange	KF16	KF25	KF25	KF25	KF25	KF25	KF25	KF25
Exhaust Outlet Flange	KF25	KF25	KF25	KF25	KF25	KF25	KF25	KF25
Certifications	UL, CE, CSA	UL, CE, CSA	UL, CE, CSA	UL, CE, CSA	UL, CE, CSA	UL, CE, CSA	UL, CE, CSA	UL, CE, CSA
Recommended Mist Eliminator	V9499388	V9499395	V9499395	V9499395	V9499395	V9499395	V9499392	V9499392

* These Varian pumps can be prepped with Fomblin® oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

Pumps

Description	Part No.	Price
DS 42 pump with 100–100VAC motor	V9499308	**Call**
DS 42 pump with 220–240VAC motor	V9499309	**Call**
DS 102 pump with 1 Phase Worldwide Motor (100–120/200–240 ±10%, 50/60 Hz)	V9499315	**Call**
DS 202 pump with 1 Phase Worldwide Motor (100–120/200–240 ±10%, 50/60 Hz)	V9499320	**Call**
DS 302 pump with 1 Phase Worldwide Motor (100–120/200–240 ±10%, 50/60 Hz)	V9499325	**Call**
DS 402 pump with 1 Phase Worldwide Motor (100–120/200–240 ±10%, 50/60 Hz)	V9499330	**Call**
DS 402 pump with 3 Phase Worldwide Motor (200–220/380–415 ±10% at 50 Hz or 200–230/460 ±10% at 60 Hz)	V9499331	**Call**
DS 602 pump with 1 Phase Worldwide Motor (100–120/200–240 ±10%, 50/60 Hz)	V9499335	**Call**
DS 602 pump with 3 Phase Worldwide Motor (200–220/380–415 ±10% at 50 Hz or 200–230/460 ±10% at 60 Hz)	V9499336	**Call**
HS 452 Smart Pump	V9499360	**Call**
HS 652 Smart Pump	V9499365	**Call**

Cables and Accessories

Model	Compatible Pumps	Part No.	Price
Oil Mist Eliminator	DS42	V9499388	**Call**
Oil Mist Eliminator	DS102, DS202, DS302, DS402, DS602	V9499395	**Call**
Oil Mist Eliminator	HS452, HS652	V9499392	**Call**
Minor Maintenance Kit (contains all valves, O-rings, and seals)	DS102, DS202, DS302	V9499370	**Call**
Minor Maintenance Kit (contains all valves, O-rings, and seals)	DS402, DS602, HS452, HS652	V9499371	**Call**
Major Maintenance Kit (contains everything in the minor kit plus vanes)	DS102	V9499380	**Call**
Major Maintenance Kit (contains everything in the minor kit plus vanes)	DS202, DS302	V9499381	**Call**
Major Maintenance Kit (contains everything in the minor kit plus vanes)	DS402, DS602, HS452, HS652	V9499382	**Call**
Power Cable, European plug, 2 m	All DS/HS Series Pumps	V9499396	**Call**
Power Cable, USA plug, 2 m	All DS/HS Series Pumps	V9499397	**Call**
Power Cable, UK plug, 2 m	All DS/HS Series Pumps	V9499398	**Call**

➤ Rotary Piston Pumps

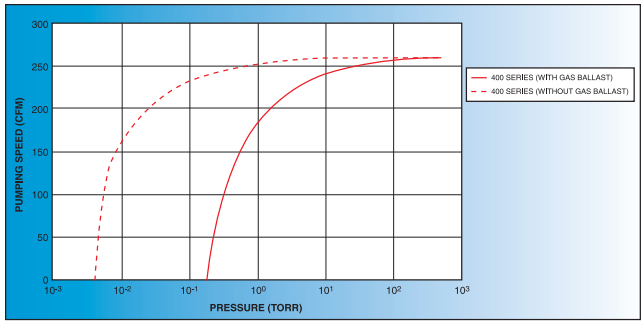
■ KJLC® Stokes® Replacement 412 Series

Direct replacement for Stokes Pumps. These pumps offer the performance and reliability of their Stokes counterparts, yet at a fraction of the price.

REMAN PUMPS
See Pages 16-2–16-3.

Applications:

- Vacuum heat treating
- Vacuum brazing
- Vacuum coating
- Transformer drying
- Degassing
- Shelf drying
- Vacuum casting
- E-beam welding



KJLC Stokes Specifications

Description	412 Series
Chemistry	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	300 (425)
Ultimate Pressure — Torr (mbar)	1 x 10^{-3} (1.3 x 10^{-3})
Motor Power — HP (kW)	10 (7.46)
Oil Capacity — Quarts (Liters)	48 (46)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	90
Standard Oil Type	TKO-750
Pump Weight — lbs. (kg)	1,750 (794)
Inlet Flange	4" ASA
Exhaust Outlet Flange	3" NPT
Overall Dimensions (L x W x H) — in. (mm)	40.25 x 20.75 x 51.75 (1,022 x 527 x 1,314)
Noise Level — dB(A)	84
Certifications	UL®
Recommended Mist Eliminator	KV0582460000

*These KJLC pumps can be prepped with Fomblin oil for pumping oxygen. Contact us at **pumps@lesker.com** for details.

*NOTE: This is just a sample of the Rotary Piston Pumps offered by the Kurt J. Lesker Company. Other sizes are available, please call or email us at **www.pumps@lesker.com** for more details.*

NOTE: We also have a vast inventory of spare parts for our Replacement Series rotary piston pumps that are 100% compatible with their equivalent Stokes models.

Model	Pumps Voltage & Phases*	Part No.	Price
KJLC 412	230/460 VAC, 60 Hz, 3-Ø	KJL-412H	**Call**

* Other voltage and phase motors available upon request. Please contact us at **pumps@lesker.com** for pricing and availability.

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Oil Mist Eliminator	KJLC412	KV058246000	**Call**
TKO-750 Oil (5 gallon)	KJLC412	TKO750ULTG5	**Call**
TKO-750 Oil (55 gallon drum)	KJLC412	TKO750ULTG55	**Call**

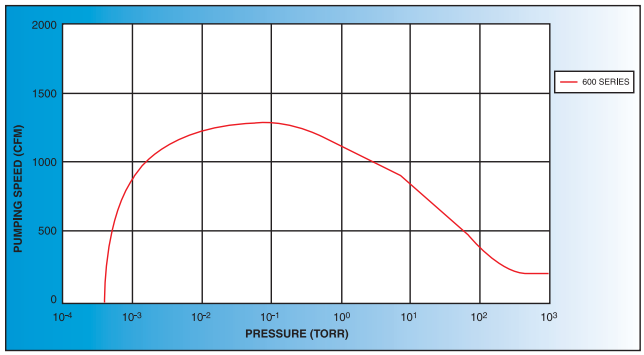
■ KJLC® Stokes® Replacement 615 Series

Direct replacement for Stokes model 615. These pumps offer the performance and reliability of their Stokes counterparts, yet at a fraction of the price.

- Dynamically balanced impellers
- Integral bypass eliminates the need for pressure control switches between the roughing pump and the booster pump

Applications:

- Vacuum heat treating
- Vacuum brazing
- Vacuum coating
- Transformer drying
- Degassing
- Shelf drying
- Vacuum casting
- E-beam welding



*NOTE: We also have a vast inventory of spare parts for our Replacement Series rotary piston pumps that are 100% compatible with their equivalent Stokes models. E-mail **pumps@lesker.com** for more details.*

NOTE: Stand and belt guard not included.

KJLC Stokes 615 Series Specifications

Description	615 Series
Chemistry	Standard Series Hydrocarbon Oil
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	1,300 (2,210)
Motor Power — HP (kW)	7.5 (5.6)
Oil Capacity — Quarts (Liters)	2 (1.9)
Fomblin® Charge Estimate* — kg (1 liter = 1.96 kg)	4
Standard Oil Type	TKO-1170
Pump Weight — lbs. (kg)	615 (279)
Inlet Flange	8" ASA
Exhaust Outlet Flange	8" ASA

* Other voltage and phase motors available upon request. Please contact us at **pumps@lesker.com** for pricing and availability.

Model	Pumps Voltage & Phases	Part No.	Price
KJLC 615	230/460 VAC, 60 Hz, 3-Ø	KJL-615	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
TKO-1170 Oil (1 gallon)	KJLC 615	TKO1170CA	**Call**

➤ Pump Selection Guide

PUMP SPEED

The following chart is a quick-reference guide that split all oil-sealed mechanical pumps into two categories: standard and chemical. It then arranges the pumps by displacement within each category. Refer to the corresponding product page for more detailed information on a particular pump model.

Model	Manufacturer	Technology	Chemistry	Displacement L/min	Displacement CFM (m^3/hr.)	Ultimate Pressure Torr (mbar)	Ultimate Pressure Pascal	See Page(s)
IDP-3	VARIAN	Scroll	Standard	50	2.1 (3)	2.5×10^{-1} (3.3×10^{-1})	3.3×10^{-1}	4-46
XDS5	EDWARDS	Scroll	Standard	83	3.5 (5)	5×10^{-2} (7×10^{-2})	7 (10)	4-42
SH-110	VARIAN	Scroll	Chemical	94	4 (5.6)	5×10^{-2} (6.6×10^{-2})	6.6 (10)	4-46
DIS-090	ULVAC	Scroll	Standard	90	3.8 (5.4)	3.8×10^{-2} (5×10^{-2})	5 (10)	4-44
DISL-100	ULVAC	Scroll	Standard	98	4.2 (5.9)	3.8×10^{-1} (5×10^{-1})	5×10^{-1}	4-45
XtraDry150	PFEIFFER VACUUM	Piston	Standard	107	4.5 (6.4)	7.5×10^{-2} (1×10^{-1})	1×10^{-1}	4-49
XDS10	EDWARDS	Scroll	Standard	153	6.5 (9.2)	5×10^{-2} (7×10^{-2})	7 (10)	4-42
TriScroll 300	VARIAN	Scroll	Standard	208	8.8 (12.5)	1×10^{-2} (1.3×10^{-2})	1.3 (10)	4-46
XtraDry250	PFEIFFER VACUUM	Piston	Standard	188	8 (11.3)	5.25 (10) (7 x (10)	7×10^{-2}	4-49
ACP15	adixen	Rotary Lobe	Standard	193	8.2 (11.6)	3.7×10^{-2} (5×10^{-2})	5 (10)	4-52
DIS-251	ULVAC	Scroll	Standard	250	10.6 (15)	1.2×10^{-2} (1.6×10^{-2})	1.6 (10)	4-44
EcoDryM15	œrlikon leybold vacuum	Piston	Standard	222	9.4 (13.3)	4.1×10^{-3} (5.5×10^{-2})	5.5 (10)	4-48
HSP-280	Kurt J. Lesker Company	Scroll	Standard	238	10.1 (14.3)	5×10^{-2} (7×10^{-2})	7 (10)	4-47
EcoDryM20	œrlikon leybold vacuum	Piston	Standard	307	13 (18.4)	6×10^{-1} (8×10^{-1})	(8×10^{-1})	4-48
TriScroll 600	VARIAN	Scroll	Standard	417	17.7 (25)	7×10^{-3} (9.3×10^{-3})	9.3×10^{-1}	4-46
DISL-500	ULVAC	Scroll	Standard	463	18.2 (25.8)	7.5×10^{-2} (1×10^{-1})	1×10^{-1}	4-45
ACP28	adixen	Rotary Lobe	Standard	377	16 (22.6)	2.3×10^{-2} (3×10^{-2})	3 (10)	4-52
DIS-501	ULVAC	Scroll	Standard	500	21.2 (30)	7.5×10^{-3} (1×10^{-2})	1 (10)	4-44
ACP40	adixen	Rotary Lobe	Standard	517	22 (31)	2.3×10^{-2} (3×10^{-2})	3 (10)	4-52

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Chemistry	Displacement L/sec	Displacement CFM (m^3/hr.)	Ultimate Pressure Torr (mbar)	Ultimate Pressure Pascal	See Page(s)
XDS35i	EDWARDS	Scroll	Standard	590	25 (35.4)	8 x 10^{-3} (1 x 10^{-2})	1 (10)	4-42
Chemical								
LDPC015	Kurt J. Lesker Company	Diaphragm	Chemical	7	0.53 (0.4)	1.5 (2)	200	4-50
LDPC020	Kurt J. Lesker Company	Diaphragm	Chemical	15	0.65 (0.9)	6 (8)	800	4-50
DTC-22	ULVAC	Diaphragm	Chemical	18	0.8 (1.1)	7.5 (1 x 10^{-1})	1 x 10^{-3}	4-51
LDPC035	Kurt J. Lesker Company	Diaphragm	Chemical	31	1.3 (1.8)	1.5 (2)	200	4-50
LDPC040	Kurt J. Lesker Company	Diaphragm	Chemical	33	1.48 (2)	6 (8)	800	4-50
DTC-41	ULVAC	Diaphragm	Chemical	40	1.7 (2.4)	7.5 (1 x 10^{-1})	1 x 10^{-3}	4-51
DTC-60	ULVAC	Diaphragm	Chemical	58	2.5 (3.5)	7.5 (1 x 10^{-1})	1 x 10^{-3}	4-51
LDPC080	Kurt J. Lesker Company	Diaphragm	Chemical	68	2.9 (4.51)	1.5 (2)	200	4-50
LDPC0125	Kurt J. Lesker Company	Diaphragm	Chemical	105	4.43 (6.3)	6 (8)	800	4-50
DTC-120	ULVAC	Diaphragm	Chemical	118	5 (7.1)	7.5 (1 x 10^{-1})	1 x 10^{-3}	4-51
SP250	œrlikon leybold vacuum	Screw	Chemical	4,583	194 (275)	3.8 x 10^{-3} (1 x 10^{-2})	1 (10)	4-53
SP630	œrlikon leybold vacuum	Screw	Chemical	8,750	371 (525)	7.5 x 10^{-3} (1 x 10^{-2})	1 (10)	4-53

➤ Scroll Pumps

■ Edwards XDS Series

- Bearings are isolated from the vacuum environment by a patented XDS bearing shield

XDS:

- Ultimate vacuum of 8 x 10^{-3} Torr
- Inverter-driven motor worldwide voltage, low power consumption, remote speed selection
- PFPE based tip seals, easily field replaceable, no special tools needed
- For roughing chambers prior to cryopumping
- For backing normal turbo and hybrid turbo pumps
- General rough pumping applications in clean (non-corrosive) conditions

Edwards XDS Series Specifications

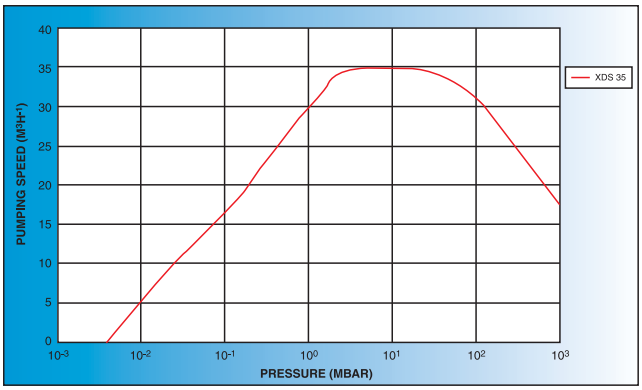
Description	XDS5	XDS10	XDS35i
Chemistry	Standard	Standard	Standard
Displacement — CFM (m^3/hr.)	3.5 (4.8)	6.5 (9.3)	25 (43)
Ultimate Pressure — Torr (mbar)	5 x 10^{-2} (7 x 10^{-2})	5 x 10^{-2} (7 x 10^{-2})	8 x 10^{-3} (1 x 10^{-2})
Motor Power — HP (kW)	0.4 (0.3)	0.4 (0.3)	0.8 (0.6)
Pump Weight — lbs. (kg)	51 (23)	54 (24.5)	105 (48)
Inlet Flange	KF25	KF25	KF40
Exhaust Outlet Flange	KF25	KF25	KF25
Overall Dimensions (L x W x H) — in. (mm)	16.8 x 9.8 x 11.3 (427 x 249 x 288)	16.8 x 9.8 x 11.3 (427 x 249 x 288)	18.7 x 13.1 x 15.6 (476 x 333 x 397)
Noise Level — dB(A)	55	55	57
Certifications	CE	CE	CE

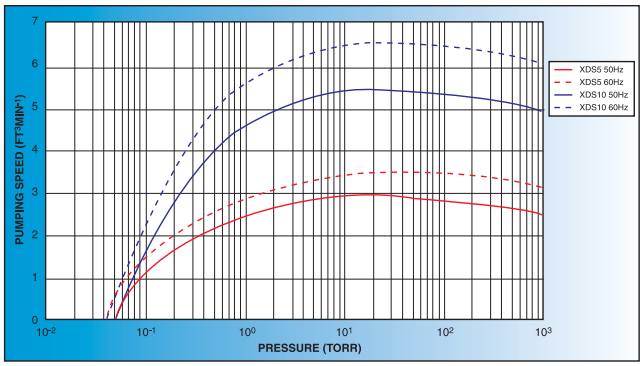
Model	Pumps Voltage & Phases	Part No.	Price
XDS5	115/230 VAC (wired for 115), 50/60 Hz, 1-Ø	ED-A72401906	**Call**
XDS5	115/230 VAC (wired for 230), 50/60 Hz, 1-Ø	ED-A72401903	**Call**
XDS5	100/200 VAC (wired for 200), 50/60 Hz, 1-Ø	ED-A72401904	**Call**
XDS10	115/230 VAC (wired for 115), 50/60 Hz, 1-Ø	ED-A72601906	**Call**
XDS10	115/230 VAC (wired for 230), 50/60 Hz, 1-Ø	ED-A72601903	**Call**
XDS10	100/200 VAC (wired for 200), 50/60 Hz, 1-Ø	ED-A72601904	**Call**
XDS35i	100–120/200–230 VAC (wired for 230), 50/60 Hz, 1-Ø	ED-A73001983	**Call**

NOTE: *These pumps are not suitable for liquids, dust-laden gases, or corrosive gases.*

NOTE: *Power cable included.*

➤ Scroll Pumps





Description	Pump Accessories For Pump Model(s)	Part No.	Price
Exhaust Silencer for XDS35I	XDS35I	ED-A50597001	Call
Exhaust Silencer	XDS5, XDS10 Series Pumps	ED-A50597000	Call
Power Supply Cable (2m) with Plug (U.K.)	All XDS Series Pumps	ED-A50505000	Call
Power Supply Cable (2m) with Plug (Northern Europe)	All XDS Series Pumps	ED-A50506000	Call
Power Supply Cable (2m) with Plug (North America/Japan)	All XDS Series Pumps	ED-A50507000	Call
Power Supply Cable (2m) without Plug	All XDS Series Pumps	ED-A50508000	Call
Clamp for KF16 Flange	All XDS Series Pumps	QF16-075-C	Call
Viton® Centering Ring for KF16 Flange	All XDS Series Pumps	QF16-075-SRV	Call
Clamp for KF25 Flange	All XDS Series Pumps	QF25-100-C	Call
Viton Centering Ring for KF25 Flange	All XDS Series Pumps	QF25-100-SRV	Call
Clamp for KF40 Flange	All XDS Series Pumps	QF40-150-C	Call
Viton Centering Ring for KF40 Flange	All XDS Series Pumps	QF40-150-SRV	Call
Replacement Tip Seal Kit	XDS5 and XDS10	ED-A72601805	Call
Replacement Tip Seal Kit	XDS35i	ED-A73001801	Call

NOTE: *These pumps are not suitable for liquids, dust-laden gases, or corrosive gases.*

NOTE: *Power cable included.*

➤ Scroll Pumps

■ ULVAC® Standard—DIS Series

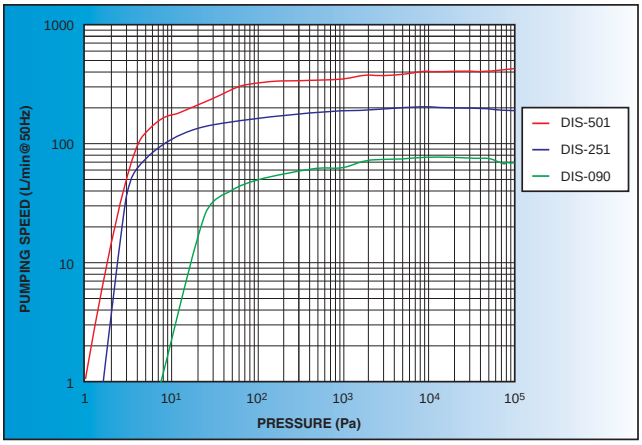
Excellent alternatives to medium oil-sealed rotary vane pumps.

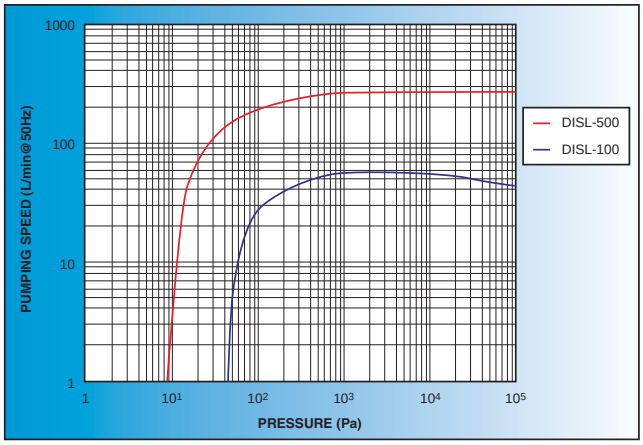
- Absolutely oil-free
- Ideal for applications where any possible contamination of the vacuum system by pump oil cannot be tolerated
- Little routine maintenance—no oil changes, no filter or foreline trap replacement, and no oil waste disposal
- DISL Series features increased moisture-handling capabilities

OEM "Drop-In" Replacements:

- Mechanically comparable to Edwards ESDP12, GVSP30 and other manufacturer's—call for cross-reference

NOTE: *These pumps are not suitable for liquids, dust-laden gases, or corrosive gases.*





ULVAC DIS Series Specifications

Description	DIS-090	DIS-251	DIS-501
Chemistry	Standard Series	Standard Series	Standard Series
Displacement — CFM (m^3/hr.)	3.8 (5.4)	10.6 (15)	21.2 (30)
Ultimate Pressure — Torr (mbar)	3.8×10^{-2} (5×10^{-2})	1.2×10^{-2} (1.6×10^{-2})	7.5×10^{-3} (1×10^{-2})
Motor Power — HP (kW)	0.2 (0.15)	0.54 (0.4)	0.54 (04)
Pump Weight — lbs. (kg)	30.8 (14)	50.7 (23)	96.8 (44)
Inlet Flange	KF25	KF25	KF40
Exhaust Outlet Flange	KF16	KF16	KF25
Overall Dimensions (L x W x H) — in. (mm)	12.1 x 8.4 x 8.9 (308 x 214 x 225)	15.7 x 9.9 x 13.2 (400 x 252 x 336)	17.4 x 11.4 x 15.6 (443 x 290 x 397)
Noise Level — dB(A)	52	58	62
Certifications	CE	CE	CE

■ ULVAC® Industrial—DISL Series

DISL-100

DISL-500

ULVAC DISL Series Specifications

Description	DISL-100	DISL-500
Chemistry	Standard Series	Standard Series
Displacement — CFM (m^3/hr.)	4.2 (6)	18.2 (25.8)
Ultimate Pressure — Torr (mbar)	3.8×10^{-1} (5×10^{-1})	7.5×10^{-2} (1×10^{-1})
Motor Power — HP (kW)	0.4 (0.3)	1.48 (1.1)
Pump Weight — lbs. (kg)	33 (15)	115 (52)
Inlet Flange	KF25	KF25
Exhaust Outlet Flange	KF16	KF25
Overall Dimensions (L x W x H) — in. (mm)	13.8 x 8.7 x 9.3 (350 x 220 x 237)	20 x 12.5 x 14.2 (503 x 318 x 361)
Noise Level — dB(A)	59	65
Certifications	CE	CE

NOTE: *These pumps are not suitable for liquids, dust-laden gases, or corrosive gases.*

Model	Pumps Voltage & Phases	Part No.	Price
DIS-090	100–120/200–240 VAC, 50/60 Hz, 1-Ø	ULDIS-090	**Call**
DIS-251	100–120/200–240 VAC, 50/60 Hz, 1-Ø	ULDIS-251	**Call**
DIS-501	100–120/200–240 VAC, 50/60 Hz, 1-Ø	ULDIS-501	**Call**
DISL-100	100–120/200–240 VAC, 50/60 Hz, 1-Ø	ULDISL-100	**Call**
DISL-500	230/380 VAC, 50/60 Hz, 3-Ø	ULDISL-500	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Clamp for KF16 Flange	All DIS/DISL Series Pumps	QF16-075-C	**Call**
Viton® Centering Ring for KF16 Flange	All DIS/DISL Series Pumps	QF16-075-SRV	**Call**
Clamp for KF25 Flange	All DIS/DISL Series Pumps	QF25-100-C	**Call**
Viton Centering Ring for KF25 Flange	All DIS/DISL Series Pumps	QF25-100-SRV	**Call**
Clamp for KF40 Flange	All DIS/DISL Series Pumps	QF40-150-C	**Call**
Viton Centering Ring for KF40 Flange	All DIS/DISL Series Pumps	QF40-150-SRV	**Call**
Replacement Tip Seal Kit	DIS-90	ULDIS090TSK	**Call**
Replacement Tip Seal Kit	DIS-251	ULDIS250TSK	**Call**
Replacement Tip Seal Kit	DIS-501	ULDIS500TSK	**Call**
Replacement Tip Seal Kit	DISL-100	ULDISL100TSK	**Call**
Replacement Tip Seal Kit	DISL-500	ULDISL500TSK	**Call**
Minor Repair Kit	DIS-90	ULDIS090MIK	**Call**
Minor Repair Kit	DIS-251	ULDIS250MIK	**Call**
Minor Repair Kit	DIS-501	ULDIS500MIK	**Call**
Minor Repair Kit	DISL-100	ULDISL100MIK	**Call**
Minor Repair Kit	DISL-500	ULDISL500MIK	**Call**
Major Repair Kit	DIS-90	ULDIS090MAK	**Call**
Major Repair Kit	DIS-251	ULDIS250MAK	**Call**
Major Repair Kit	DIS-501	ULDIS500MAK	**Call**

➤ Scroll Pumps

■ Varian Scroll Pumps

IDP-3 Dry Scroll Pump

This oil-free vacuum pump is the smallest scroll pump made for general vacuum applications. It produces a pump speed of 60 liters/min. with base pressure of 250 millitorr.

- Hermetic design with fully isolated motor and bearings
- No mechanisms subject to catastrophic failure

SH-110 Dry Scroll Pump

Dry, hermetic scroll pump. This single-stage pump produces speeds of 110 L/m (on 60 Hz power), with an ultimate pressure of 50 mtorr (0.07 mbar). The SH-110 pump conforms with CE, CSA, and Semi S2-0200 requirements.

- Moveable exhaust port for flexibility in tight spaces
- High pumping speed at high pressure enables fast pumpdown
- Universal 100–239 VAC power for easy installation worldwide
- Automatic air ballast for effective handling of moisture

IDP-3

TriScroll 600

TriScroll™ 300 Pump and TriScroll 600 Pump

Multi-stage dry vacuum pumps.

- Unique TriScroll design
- Bearing purge port
- Automatic ballast port

Varian Scroll Pump Specifications

Description	IDP-3	SH-110	TriScroll 300	TriScroll 600
Chemistry	Standard Series	Standard Series	Standard Series	Standard Series
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	2.1 (3)	5 (5.4)	8.8 (12.6)	17.7 (25.2)
Ultimate Pressure Torr (mbar)	0.25 (0.33)	0.05 (0.066)	0.01 (0.013)	0.007 (0.0093)
Motor Power — HP (kW)	0.16 (0.12)	0.25 (0.19)	0.75 (0.56)	1 (0.76)
Pump Weight — lbs. (kg)	21 (9.5)	43 (19)	57 (26.4)	70 (32)
Inlet Flange	KF16	KF25	KF25	KF40
Exhaust Outlet Flange	¼" Female NPT (KF16 adapter included)	¼" Female NPT (KF16 adapter included)	¼" Female NPT (KF16 adapter included)	⅜" Female NPT (KF25 adapter included)
Noise Level — dB(A)	55	56	68	68
Certifications	CE, CSA	CE, CSA	UL®, CE, CSA	UL, CE, CSA

Model	Part No.	Price
IDP-3, 220 VAC, 50/60 Hz	VIDP3A01	**Call**
IDP-3, 115 VAC, 60 Hz	VIDP3B01	**Call**
IDP-3, 100 VAC, 50/60 Hz	VIDP3C01	**Call**
IDP-3 with Hour Meter, 220 VAC, 50/60 Hz	VIDP3A11	**Call**
IDP-3 with Hour Meter, 115 VAC, 60 Hz	VIDP3B11	**Call**
IDP-3 withHour Meter, 100 VAC, 50/60 Hz	VIDP3C11	**Call**
IDP-3 Scroll Module	VIDP3	**Call**
SH-110 Single-Scroll Pump	VSH01101UNIV	**Call**
TriScroll 300 Dry Scroll Primary Pump, Single Phase Motor, US Cord	VPTS03001UNIV	**Call**
TriScroll 300 Dry Scroll Primary Pump, Single Phase Motor, Euro Cord	VPTS03001UNIVEU	**Call**
TriScroll 300 Dry Scroll Primary Pump, Single Phase Motor, UK Cord	VPTS03001UNIVUK	**Call**
TriScroll 300 Dry Scroll Primary Pump, Three Phase Motor	VPTS03003UNIV	**Call**
TriScroll 600 Dry Scroll Primary Pump, Single Phase Motor, US Cord	VPTS06001UNIV	**Call**
TriScroll 600 Dry Scroll Primary Pump, Single Phase Motor, Euro Cord	VPTS06001UNIVEU	**Call**
TriScroll 600 Dry Scroll Primary Pump, Single Phase Motor, UK Cord	VPTS06001UNIVUK	**Call**
TriScroll 600 Dry Scroll Primary Pump, Three Phase Motor	VPTS06003UNIV	**Call**

Cables and Accessories

Description	Part No.	Price
Tip Seal Replacement Kit for IDP3	VIDP3TS	**Call**
Europe, 10 A, 220–230 VAC, 2.5 m*	V656494220	**Call**
Denmark, 10 A, 220–230 VAC, 2.5 m*	V656494225	**Call**
Switzerland, 10 A, 230 VAC, 2.5 m*	V656494235	**Call**
UK/Ireland, 13 A 230 VAC, 2.5 m*	V656494250	**Call**
India, 10 A, 220-250 VAC, 2.5 m*	V656494245	**Call**
Israel, 10 A, 230 VAC, 2.5 m*	V656494230	**Call**
Japan, 12 A, 100 VAC, 2.3 m*	V656494240	**Call**
North America, 15 A, 125 VAC, 2.0 m*	V656458203	**Call**
North America, 10 A, 230 VAC, 2.5 m*	V656494255	**Call**
Tip SealReplacement Kit for SH-110	VSH0110TS	**Call**
Exhaust Silencer Kit for SH-110	VSH0110EXSLR	**Call**
Maintenance Kit for TriScroll 300	VPTSS0300MK	**Call**
Maintenance Tool Kit for TriScroll 300, TriScroll 600	VPTSS0600TK	**Call**
Replacement Tip Seal Set for TriScroll 300	VPTSS0300TS	**Call**
Maintenance Kit for TriScroll 600	VPTSS0600MK	**Call**
Replacement Tip Seal Set for TriScroll 600	VPTSS0600TS	**Call**

** **NOTE:** These cables will fit the IDP3 and SH100 pumps.*

➤ Scroll Pumps

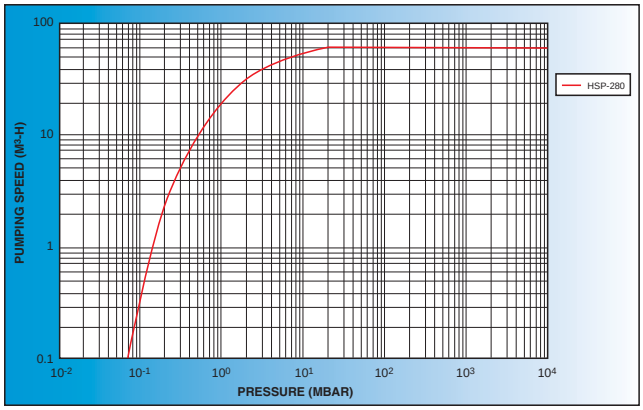
■ KJLC® Chemically Resistant Scroll Pumps

HPS-280:

- Single-stage
- PTFE based proprietary fluorocarbon impregnated coating on all wetted parts makes these pumps chemically resistant
- Drive mechanisms and bearings are isolated from the vacuum environment, protecting them from any damaging chemical vapors
- Integrated gas ballast and the unique vertical design enables condensates to easily flow through the exhaust port located at the bottom of the pump on each cycle of the scroll
- Conforms with CE requirements

Tested for Chemical Resistance Against:

- Methanol
- Acetone
- Toluol
- Ethanol
- Toluene
- Acrylic Acid
- Trifluoroethanoic Acid
- Trifluoroacetic Acid
- Ethylene
- Chloroform
- Benzene
- Isopropanol



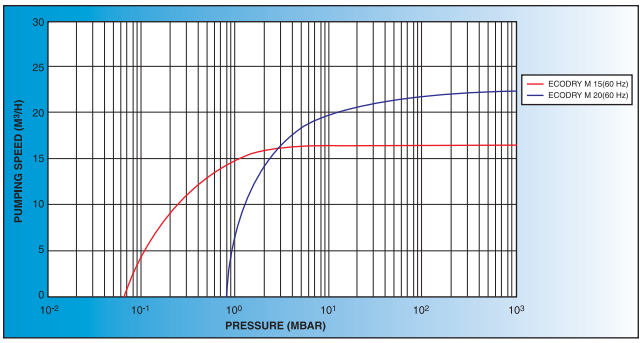
Dimensions (W/D/H)	Voltage	Ultimate Pressure (mbar)	Pumping Speed m³/hr. / l/min.	Part No.	Price
470/320/440 mm	115V	7×10^{-2}	17.2/287	HSP-280-1	**Call**
470/320/440 mm	230V	7×10^{-2}	17.2/287	HSP-280-2	**Call**

➤ Rotary Piston Pumps

■ Oerlikon Leybold EcoDry Series

Completely dry, positive displacement piston pumps.

- Smaller pumps
- The EcoDry-M15 has a pumping speed of 9.4 cfm; the EcoDry-M20 pumping speed is 13 cfm
- No grease lubricated bearings in the vacuum section
- The low number of parts and the low operating speed make the minimum maintenance interval of 20,000 hours possible, depending on application
- Can be mounted vertically or horizontally
- Low friction coating (PTFE/Thermoplastic) for durability



Oerlikon EcoDry Specifications

Description	EcoDry M15	EcoDry M20
Chemistry	Standard	Standard
Displacement — CFM (m^3/hr.)	9.4 (16)	13 (22)
Ultimate Pressure — Torr (mbar)	4.1×10^{-2} (5.5×10^{-2})	6×10^{-1} (8×10^{-1})
Motor Power — HP (kW)	0.38 (0.28)	0.38 (0.28)
Pump Weight — lbs. (kg)	103.8 (47)	103.8 (47)
Inlet Flange	KF25	KF25
Exhaust Outlet Flange	KF25	KF25
Overall Dimensions (L x W x H) — in. (mm)	23.5 x 7.2 x 14 (598 x 182 x 356)	23.5 x 7.2 x 14 (598 x 182 x 356)
Noise Level — dB(A)	59	59
Certifications	CE	CE

Model	Pumps Voltage & Phases	Part No.	Price
EcoDry M15	90–264 VAC, 50/60 Hz, 1-Ø	LH-130005	**Call**
EcoDry M20	90–264 VAC, 50/60 Hz, 1-Ø	LH-130015	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Exhaust Silencer	All EcoDry Series Pumps	LH-130050	**Call**
Vibration Isolator	All EcoDry Series Pumps	LH-130051	**Call**
Clamp for KF25 Flange	All EcoDry Series Pumps	QF25-100-C	**Call**
Viton® Centering Ring for KF25 Flange	All EcoDry Series Pumps	QF25-100-SRV	**Call**

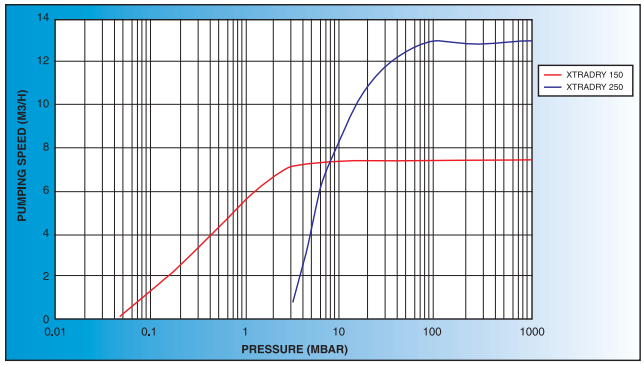
➤ Rotary Piston Pumps

■ *Pfeiffer XtraDry™ Series*

- Innovative piston/cylinder design ensures hydrocarbon-free operation and avoids particle emissions

Features:

- Unique double-sealed design prevents air inrush while in operation or stopped
- Same pumping speed for both light and heavier gases, such as Nitrogen and Argon
- Variable speed control that's controllable via Pfeiffer turbopumps
- Slow start feature



Pfeiffer XtraDry Series Specifications

Description	XtraDry150	XtraDry250
Chemistry	Standard	Standard
Displacement — CFM (m^3/hr.)	4.5 (7.5)	8 (13)
Ultimate Pressure — Torr (mbar)	7.5×10^{-2} (1×10^{-1})	5.25 (7)
Motor Power — HP (kW)	0.74 (0.55)	0.74 (0.55)
Pump Weight — lbs. (kg)	66 (30)	66 (30)
Inlet Flange	KF25	KF25
Exhaust Outlet Flange	KF25	KF25
Overall Dimensions (L x W x H) — in. (mm)	15.9 x 14 x 12.1 (403 x 355 x 308)	15.9 x 14 x 12.1 (403 x 355 x 308)
Noise Level — dB(A)	65	65
Certifications	CE	CE

Pumps

Model	Voltage & Phases	Part No.	Price
XtraDry 150	230 VAC, 50/60 Hz, 1-Ø	POP01150	**Call**
XtraDry 150	115 VAC, 50/60 Hz, 1-Ø	POP01151	**Call**
XtraDry 250	230 VAC, 50/60 Hz, 1-Ø	POP01160	**Call**
XtraDry 250	115 VAC, 50/60 Hz, 1-Ø	POP01161	**Call**

Pump Accessories

Description	For Pump Model(s)	Part No.	Price
TCX 10 Speed Control (for Pfeiffer Turbo pumps with drive electronics TC600/750)	All XtraDry Series Pumps	PO003307-X	**Call**
TCX 20 Speed Control (for Pfeiffer Turbo pumps with drive electronics TCP350)	All XtraDry Series Pumps	PO003363-X	**Call**
Interconnect Cable (1M)	All XtraDry Series Pumps	PO003346	**Call**
Interconnect Cable (3M)	All XtraDry Series Pumps	PO003347	**Call**
Clamp for KF25 Flange	All XtraDry Series Pumps	QF25-100-C	**Call**
Viton® Centering Ring for KF25 Flange	All XtraDry Series Pumps	QF25-100-SRV	**Call**

*NOTE: Pfeiffer's XtraDry pumps are for clean, dry applications only. Please contact **pumps@lesker.com** for more information.*

➤ Diaphragm Pumps

■ KJLC® PTFE Protected Diaphragm Pumps (Chemical Resistant)

Diaphragm pumps are used worldwide in industrial and R&D applications requiring oil-free vacuum between atmospheric pressure and 1 mbar.

Diaphragm Pumps Chemically Resistant

Chemically resistant diaphragm pump models are fully suited to applications where aggressive solvents and acid vapor are present. The diaphragms and other wetted parts are made from compounds of PTFE, PP, and PVDF. The pumping and connection heads are carbon fiber reinforced with a small electrical conductivity. This prevents electrostatic loading and minimizes the danger of igniting gas mixtures in the pump by electrostatic discharge.

- Two-stage chemically resistant diaphragm pumps for pressure as low as 8 mbar
- Three-stage chemically resistant diaphragm pumps for pressure as low as 2 mbar
- 10,000 hour service intervals
- Chemically resistant
- Wetted parts from PTFE or PTFE compounds
- Self-cleaning valve design
- Oil-free reducing downtime and operating costs

Protected Diaphragm Pump Specifacations

Description	LDPC020	LDPC040	LDPC125	LDPC015	LDPC035	LDPC080
Chemistry	PTFE Protected Chemical Series	PTFE Protected Chemical Series	PTFE Protected Chemical Series	PTFE Protected Chemical Series	PTFE Protected Chemical Series	PTFE Protected Chemical Series
Displacement — CFM (m^3/hr.)	0.59 (1)	1.38 (2.3)	4	0.47	1.2	2.7
Ultimate Pressure— Torr (mbar)	6 (8)	6 (8)	6 (8)	1.5 (2)	1.5 (2)	1.5 (2)
Motor Power — HP (kW)	0.08 (0.06)	0.24 (0.18)	0.24 (0.18)	0.08 (0.06)	0.12 (0.09)	0.24 (0.18)
Pump Weight — lbs. (kg)	14.3 (6.5)	24.6 (11.2)	40 (18.3)	17.4 (7.9)	22.7 (10.3)	40.3 (18.3)
Inlet Flange	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8
Exhaust Outlet Flange	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8	Hose Barb NW8
Certifications	CE	CE	CE	CE	CE	CE

Model	Motor Voltage	Part Number	Price
LDPC020	115 VAC, 50/60 Hz	LDPC020	**Call**
LDPC020	230 VAC, 50/60 Hz	LDPC020-2	**Call**
LDPC040	115 VAC, 50/60 Hz	LDPC040	**Call**
LDPC040	230 VAC, 50/60 Hz	LDPC040-2	**Call**
LDPC125	115 VAC, 50/60 Hz	LDPC125	**Call**
LDPC125	230 VAC, 50/60 Hz	LDPC125-2	**Call**
LDPC015	115/230 VAC, 50/60 Hz	LDPC015	**Call**
LDPC035	115 VAC, 50/60 Hz	LDPC035	**Call**
LDPC035	230 VAC, 50/60 Hz	LDPC035-2	**Call**
LDPC080	115 VAC, 50/60 Hz	LDPC080	**Call**
LDPC080	230 VAC, 50/60 Hz	LDPC080-2	**Call**

➤ Diaphragm Pumps

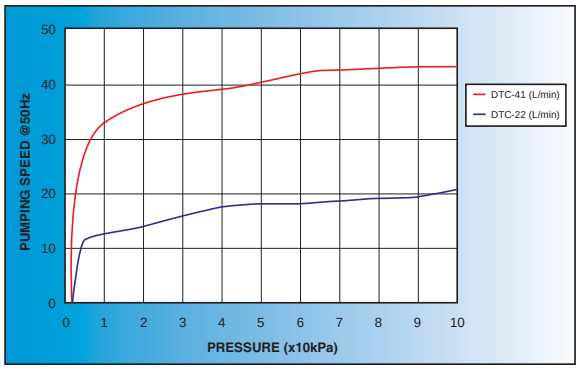
■ ULVAC® Chemical—DTC Series

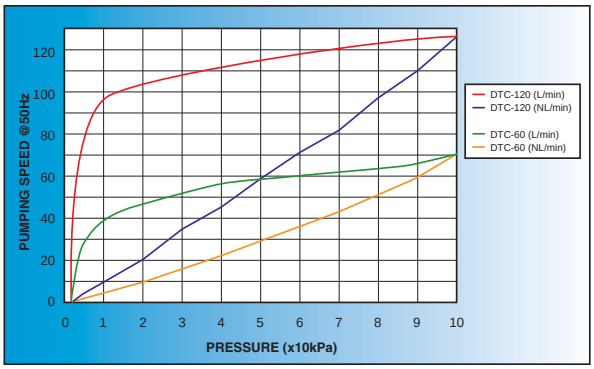
ULVAC DTC Series diaphragm pumps feature integral forced-air cooling. They have two-stage Teflon® diaphragms that are ideal for pumping corrosive gases and organic solvents.

- Only Teflon (PTFE) components are exposed to vacuum—ideal for corrosive applications
- Designed to back most hybrid turbo pumps

Applications:

- Rotary evaporator
- Evaporating system
- Vacuum concentrator
- Vacuum filtration
- Vacuum drying systems
- Laser-gas circulation





ULVAC DTC Series Specifications

Description	DTC-22	DTC-41	DTC-60	DTC-120
Chemistry	Chemical	Chemical	Chemical	Chemical
Displacement — CFM (m^3/hr.)	0.8 (1.2)	1.7 (2.4)	2.5 (3.6)	5 (7.2)
Ultimate Pressure — Torr (mbar)	7.5 (10)	7.5 (10)	7.5 (10)	7.5 (10)
Motor Power — HP (kW)	0.067 (0.05)	0.13 (0.1)	0.27 (0.2)	0.54 (0.4)
Pump Weight — lbs. (kg)	16 (7.3)	23.1 (10.5)	39.6 (18)	59.4 (27)
Inlet Flange	9 mm Hose	9 mm Hose	14 mm Hose	16 mm Hose
Exhaust Outlet Flange	9 mm Hose	9 mm Hose	14 mm Hose	16 mm Hose
Overall Dimensions (L x W x H) in. (mm)	11.4 x 5.6 x 8 (289 x 142 x 202)	13.3 x 6.1 x 8.5 (337 x 155 x 217)	13.4 x 6.2 x 9.5 (340 x 158 x 242)	16.2 x 8 x 11.8 (411 x 203 x 300)
Noise Level — dB(A)	54	53	65	72
Certifications	CE	CE	CE	CE

Model	Pumps Voltage & Phases	Part No.	Price
DTC-22	115 VAC, 50/60 Hz, 1-Ø	ULDTC-22-1	**Call**
DTC-22	230 VAC, 50/60 Hz, 1-Ø	ULDTC-22-2	**Call**
DTC-41	115 VAC, 50/60 Hz, 1-Ø	ULDTC-41-1	**Call**
DTC-41	230 VAC, 50/60 Hz, 1-Ø	ULDTC-41-2	**Call**
DTC-60	115 VAC, 50/60 Hz, 1-Ø	ULDTC-60-1	**Call**
DTC-60	230 VAC, 50/60 Hz, 1-Ø	ULDTC-60-2	**Call**
DTC-120	115 VAC, 50/60 Hz, 1-Ø	ULDTC-120-1	**Call**
DTC-120	230 VAC, 50/60 Hz, 1-Ø	ULDTC-120-2	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Repair Kit	DTC-22	ULDTC22MAK	**Call**
Repair Kit	DTC-41	ULDTC41MAK	**Call**
Repair Kit	DTC-60	ULDTC60MAK	**Call**
Repair Kit	DTC-120	ULDTC120MAK	**Call**

➤ Rotary Lobe Pumps

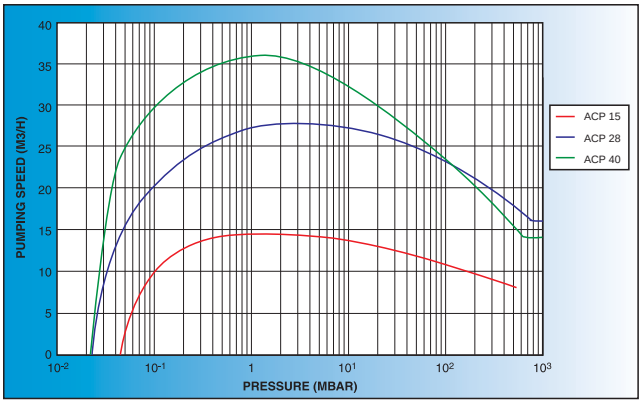
■ Adixen™ (Alcatel®) ACP Series

Design incorporates the Adixen multi-stage Roots-type pumping concept.

- Frictionless pumping module is optimized for operation without internal lubricant
- For applications requiring high levels of cleanliness and reliability

Features:

- Compact design for easy integration into existing systems
- Optional remote control operation available using Sub-D connector
- Digital timer for accumulated operational hours for ease of maintenance
- Air-cooled operation requires no external water connections



NOTE: The Adixen ACP pumps are for clean, dry applications only.

Adixen ACP Series Specifications

Description	ACP 15	ACP 28	ACP 40
Chemistry	Standard	Standard	Standard
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	8.2 (14)	16 (27)	22 (37)
Ultimate Pressure — Torr (mbar)	3.7×10^{-2} (5×10^{-2})	2.3×10^{-2} (3×10^{-2})	2.3×10^{-2} (3×10^{-2})
Motor Power — HP (kW)	0.8 (0.6)	1.6 (1.2)	1.6 (1.2)
Pump Weight — lbs. (kg)	50.6 (23)	73.7 (33.5)	83.6 (38)
Inlet Flange	KF25	KF25	KF40
Exhaust Outlet Flange	KF16	KF25	KF25
Overall Dimensions — (L x W x H) — in. (mm)	19.8 x 8 x 10.9 (504 x 202 x 276)	24 x 7.3 x 12.2 (610 x 185 x 310)	25 x 7.3 x 12.2 (634 x 185 x 310)
Certifications	CE, CSA, UL®	CE, CSA, UL	CE, CSA, UL

Model	Pumps Voltage & Phases	Part No.	Price
ACP 15	90–254 VAC, 50/60 Hz, 1-Ø	AV-V5SATSMFAF	**Call**
ACP 15G (with gas purge)	90–254 VAC, 50/60 Hz, 1-Ø	AV-V5GATSRFAF	**Call**
ACP 28	100–230 VAC, 50/60 Hz, 1-Ø	AV-V6SATSFAMF	**Call**
ACP 28G (with gas purge)	100–230 VAC, 50/60 Hz, 1-Ø	AV-V6GATSFABF	**Call**
ACP 40	100–230 VAC, 50/60 Hz, 1-Ø	AV-V8SACSFAMF	**Call**
ACP 40G (with gas purge)	100–230 VAC, 50/60 Hz, 1-Ø	AV-V8GACSFABF	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Exhaust silencer	ACP15, ACP28, ACP40	AV-109873	**Call**
Sound enclosure	ACP15	AV-111968	**Call**
Sound enclosure	ACP28, ACP40	AV-112637	**Call**
Clamp for KF16 Flange	All ACP Series Pumps	QF16-075-C	**Call**
Viton® Centering Ring for KF16 Flange	All ACP Series Pumps	QF16-075-SRV	**Call**
Clamp for KF25 Flange	All ACP Series Pumps	QF25-100-C	**Call**
Viton Centering Ring for KF25 Flange	All ACP Series Pumps	QF25-100-SRV	**Call**
Clamp for KF40 Flange	All ACP Series Pumps	QF40-150-C	**Call**
Viton Centering Ring for KF40 Flange	All ACP Series Pumps	QF40-150-SRV	**Call**

Oerlikon Leybold ScrewLine Series

A dry-compressing screw-type vacuum pump designed to meet the special needs of industrial applications.

The ScrewLine family of pumps was developed in view of the special requirements of industrial applications. The innovative design enables these pumps to be used where reliable, compact, and low maintenance vacuum solutions are demanded.

- Minimum downtime, maximum availability, highly rugged
- The only vacuum pump in the industrial market with a cantilevered bearing arrangement
- Monitoring through SP Guard
- Highly tolerant of particles and vapors
- Low cost of ownership
- Ideal alternative to all oil-sealed and dry compressing vacuum systems

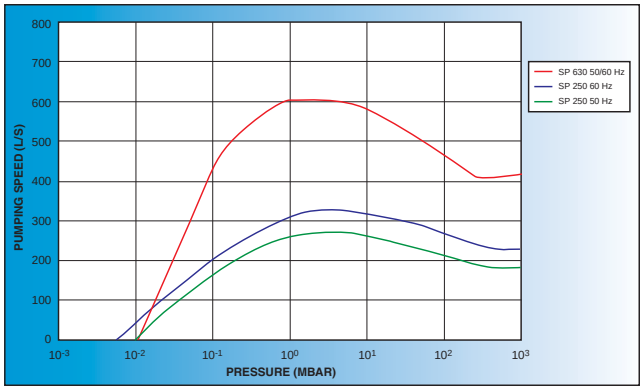
ScrewLine SP630

Features:

- Rugged, bearing-free dry pump screw design
- Effective pumping speeds, even at low pressures
- Modular design enables easy integration of roots booster pumps

Applications:

- Industrial furnaces
- Coating technology
- Load lock chambers
- Metallurgical systems
- Packaging technology
- Drying processes
- Degassing
- Research and development
- Lamp and tube manufacturing
- Automotive industry
- Packaging industry
- Space simulation



Oerlikon ScrewLine Series Specifications

Description	SP250	SP630
Chemistry	Chemical	Chemical
Displacement — CFM @ 60 Hz (m^3/hr. @ 50 Hz)	177 (250)	371 (630)
Ultimate Pressure — Torr (mbar)	7.5×10^{-3} (1×10^{-2})	7.5×10^{-3} (1×10^{-2})
Motor Power — HP (kW)	7.9 (5.9)	20 (15)
Pump Weight — lbs. (kg)	992 (450)	1,166 (530)
Inlet Flange	ISO63-K	DN100
Exhaust Outlet Flange	ISO63-K	DN100
Overall Dimensions — (L x W x H) — in. (mm)	5.1 x 20.9 x 34.6 (1,350 x 530 x 880)	64.2 x 26 x 34.6 (1,630 x 660 x 880)
Noise Level — dB(A)	75	75
Certifications	CE	CE

Pumps

Model	Voltage & Phases	Part No.	Price
ScrewLine SP630 with Gas Ballast (Manual Operation)	190–240/380–480 VAC, 60 Hz, 3-Ø	LH-117008	**Call**
ScrewLine SP630 with Gas Ballast (Solenoid Operation)	190–240/380–480 VAC, 60 Hz, 3-Ø	LH-117106	**Call**
ScrewLine SP250 with Gas Ballast (Manual Operation)	190–240/380–480 VAC, 60 Hz, 3-Ø	LH-115001	**Call**
ScrewLine SP250 with Gas Ballast (Solenoid Operation)	190–240/380–480 VAC, 60 Hz, 3-Ø	LH-115002	**Call**

Pump Accessories

Description	For Pump Model(s)	Part No.	Price
Exhaust Silencer	All SP630 ScrewLine Pumps	LH-119001	**Call**
Dust Filter	All SP630 ScrewLine Pumps	LH-95172	**Call**
DN100 to ISO100-K Flange Adapter	All SP630 ScrewLine Pumps	LH-26750	**Call**

➤ Pump Selection Guide

PUMP SPEED

The following chart is a quick-reference guide that splits all turbo pumps into three categories: standard, chemical, and magnetically levitated. It then arranges the pumps by displacement within each category. Refer to the corresponding product page for more detailed information on a particular pump model.

Model	Manufacturer	Technology	Inlet Flange	Pumping Speed (N_2, L/sec.)	Ultimate Pressure* Torr	mbar	Pascal	See Page(s)
Standard Series Pumps								
MDP5011	adixen	Molecular Drag	ISO63-K	7.5	7.5×10^{-7}	1×10^{-6}	1×10^{-4}	4-62
HiPace™ 10	PFEIFFER VACUUM	Turbo-Drag Hybrid	ISO25-K	10	3.75×10^{-5}	5×10^{-5}	5×10^{-3}	4-75
ATH31	adixen	Turbo-Drag Hybrid	ISO63-K or 4½" CF	30	7.5×10^{-9}	1×10^{-8}	1×10^{-6}	4-63
ATH31+	adixen	Turbo-Drag Hybrid	ISO63-K or 4½" CF	30	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-63
TURBOVAC 50	œrlikon leybold vacuum	Turbomolecular	KF40	33	3.75×10^{-9}	5×10^{-9}	5×10^{-7}	4-71
HiPace™ 80	PFEIFFER VACUUM	Turbo-Drag Hybrid	KF40	35	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75
EXT75DX	EDWARDS	Turbo-Drag Hybrid	KF40	42	3.75×10^{-9}	5×10^{-9}	5×10^{-7}	4-67
TURBOVAC 50	œrlikon leybold vacuum	Turbomolecular	ISO63-K	55	3.75×10^{-9}	5×10^{-9}	5×10^{-7}	4-71
EXT75DX	EDWARDS	Turbo-Drag Hybrid	ISO63-K or 4½" CF	61	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-67
SL80	œrlikon leybold vacuum	Turbo-Drag Hybrid	ISO63-K or 4½" CF	65	1.5×10^{-10}	2×10^{-10}	2×10^{-8}	4-73
HiPace™ 80	PFEIFFER VACUUM	Turbo-Drag Hybrid	ISO63-K or 4½" CF	67	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-75
Turbo-V 81-M	VARIAN	Turbo-Drag Hybrid	4½" CF	77	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-80
Turbo-V 81-T	VARIAN	Turbo-Drag Hybrid	4½" CF	77	3.75×10^{-9}	5×10^{-9}	5×10^{-7}	4-80
ATP80	adixen	Turbomolecular	ISO63-K or 4½" CF	80	3.75×10^{-9}	52×10^{-9}	5×10^{-7}	4-60
ATP100	adixen	Turbomolecular	100 ISO-K or 6" CF	100	3.75×10^{-9}	5×10^{-9}	5×10^{-7}	4-60
ATP150	adixen	Turbomolecular	100 ISO-K or 6" CF	140	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-60

*Ultimate pressure listed using metal seals.

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Inlet Flange	Pumping Speed (N_2, L/sec.)	Ultimate Pressure* Torr	mbar	Pascal	See Page(s)
TURBOVAC 151	œrlikon leybold vacuum	Turbomolecular	ISO100-K or 6" CF	145	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-71
ATH200I	adixen	Turbo-Drag Hybrid	ISO100-K or 6" CF	200	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-63
EXT255DX	EDWARDS	Turbo-Drag Hybrid	ISO100-K or 6" CF	220	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-67
nEXT240H	EDWARDS	Turbo-Drag Hybrid	ISO100-K or 6" CF	240	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-67
HiPace™ 300	PFEIFFER VACUUM	Turbo-Drag Hybrid	ISO63-K, ISO100-F or 6" CF	260	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-75
SL300	œrlikon leybold vacuum	Turbo-Drag Hybrid	ISO100-K or 6" CF	270	1.5×10^{-10}	2×10^{-10}	2×10^{-8}	4-73
Turbo-V 301 Navigator	VARIAN	Turbo-Drag Hybrid	8" CF	280	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-80
nEXT300H	EDWARDS	Turbo-Drag Hybrid	6" CF	300	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-67
TURBOVAC 361	œrlikon leybold vacuum	Turbomolecular	ISO100-K or 6" CF	345	7.50×10^{-11}	1×10^{-10}	1×10^{-8}	4-71
HiPace™ 400	PFEIFFER VACUUM	Turbo-Drag Hybrid	ISO100 or 6" CF	355	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-75
nEXT400H	EDWARDS	Turbo-Drag Hybrid	8" CF	400	7.50×10^{-11}	1×10^{-10}	1×210^{-8}	4-67
TURBOVAC 361	œrlikon leybold vacuum	Turbomolecular	ISO160-K or 8" CF	400	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-71
ATP400	adixen	Turbomolecular	ISO160-K or 8" CF	400	6×10^{-9}	8×10^{-9}	8×10^{-7}	4-60
EXT556H	EDWARDS	Turbo-Drag Hybrid	ISO160-K or 8" CF	540	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-67
Turbo-V 551 Navigator	VARIAN	Turbo-Drag Hybrid	8" CF	550	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-80
HiPace™ 700	PFEIFFER VACUUM	Turbo-Drag Hybrid	ISO160-K or ISO160-K or 8" CF	685	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-75
Turbo-V 701 Navigator	VARIAN	Turbo-Drag Hybrid	10" CF	690	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-80
SL700	œrlikon leybold vacuum	Turbo-Drag Hybrid	ISO160-K or 8" CF	690	1.5×10^{-9}	2×10^{-9}	2×10^{-7}	4-73
ATP900	adixen	Turbomolecular	ISO200-K or 10" CF	900	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-60
HiPace™ 1200	PFEIFFER VACUUM	Turbomolecular	ISO200-K or ISO200-F or 10" CF	1,250	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75

*Ultimate pressure listed using metal seals.

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Inlet Flange	Pumping Speed (N_2, L/sec.)	Ultimate Pressure* Torr	mbar	Pascal	See Page(s)
HiPace™ 1500	PFEIFFER VACUUM	Turbomolecular	ISO250-K or ISO250-F or 12" CF	1,450	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75
HiPace™ 1800	PFEIFFER VACUUM	Turbomolecular	ISO200-K or ISO200-F	1,450	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75
HiPace™ 2300	PFEIFFER VACUUM	Turbomolecular	ISO250-K or ISO250-F or 12" CF	1,900	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75
Corrosive Series Pumps								
MDP5011CP	adixen	Molecular Drag	ISO36-K	7.5	7.5×10^{-6}	1×10^{-5}	1×10^{-3}	4-62
ATH31C	adixen	Turbo-Drag Hybrid	QF40 or 2.75" CF	26	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-63
ATH31C	adixen	Turbo-Drag Hybrid	ISO63-K or 4.5" CF	30	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-63
ATP80C	adixen	Turbomolecular	ISO63-K or 4.5" CF	80	3.75×10^{-9}	5×10^{-9}	$5x 10^{-7}$	4-60
ATP100C	adixen	Turbomolecular	ISO100-K or 6" CF	100	3.75×10^{-9}	5×10^{-9}	5×10^{-7}	4-60
ATP150C	adixen	Turbomolecular	ISO100-K or 6" CF	140	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-60
HiPace™ 300C	PFEIFFER VACUUM	Turbomolecular	ISO100 or 6" CF	245	7.5×10^{-9}	1×10^{-8}	1×10^{-6}	4-75
ATH300CI	adixen	Turbo-Drag Hybrid	6" CF	250	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-63
ATH300CI	adixen	Turbo-Drag Hybrid	8" CF	300	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-63
ATP400C	adixen	Turbomolecular	ISO160-K or 8" CF	400	6×10^{-9}	8×10^{-9}	8×10^{-7}	4-60
ATP900C	adixen	Turbomolecular	ISO200-K or 10" CF	900	3.75×10^{-10}	5×10^{-10}	5×10^{-8}	4-60
HiPace™ 1200C	PFEIFFER VACUUM	Turbomolecular	ISO200-K or ISO200-F or 10" CF	1,250	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75
HiPace™ 1500C	PFEIFFER VACUUM	Turbomolecular	ISO250-K or ISO250-F or 12" CF	1,450	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75
HiPace™ 1800C	PFEIFFER VACUUM	Turbomolecular	ISO200-K or ISO200-F	1,450	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75
HiPace™ 2300C	PFEIFFER VACUUM	Turbomolecular	ISO250-K or ISO250-F	1,900	7.5×10^{-8}	1×10^{-7}	1×10^{-5}	4-75

*Ultimate pressure listed using metal seals.

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Inlet Flange	Pumping Speed (N_2, L/sec.)	Ultimate Pressure* Torr	mbar	Pascal	See Page(s)
Maglev Series Pumps								
203LM	SHIMADZU	Turbo-Drag Hybrid	ISO100-K 6" CF	190	1×10^{-10}	1.3×10^{-10}	—	4-78
STP-L301	EDWARDS	Turbomolecular	ISO100-K or 6" CF	260	10^{-8}	10^{-8}	10^{-6}	4-69
STP-iX455	EDWARDS	Turbomolecular	ISO100-K or 6" CF	300	10^{-10}	10^{-10}	10^{-8}	4-69
STP-301	EDWARDS	Turbomolecular	ISO100 or 6" CF	300	10^{-10}	10^{-10}	10^{-8}	4-69
W300iP/W300P	œrlikon leybold vacuum	Turbo-Drag Hybrid	ISO100-K or 6" CF	300	10^{-10}	10^{-10}	10^{-8}	4-74
303LM	SHIMADZU	Turbo-Drag Hybrid	ISO160-K 8" CF	320	1×10^{-10}	1.3×10^{-10}	—	4-78
ATH ATH500M	adixen	Turbo-Drag Hybrid	ISO100-F 6" CF	340	6×10^{-9}	8×10^{-9}	8×10^{-7}	4-65
W400iP/W400P	œrlikon leybold vacuum	Turbo-Drag Hybrid	ISO100-K or 8" CF	365	10^{-10}	10^{-10}	10^{-8}	4-74
ATH ATH500M	adixen	Turbo-Drag Hybrid	ISO160-F 8" CF	500	6×10^{-9}	8×10^{-9}	8×10^{-7}	4-65
403LM	SHIMADZU	Turbo-Drag Hybrid	ISO160-K 8" CF	420	1×10^{-10}	1.3×10^{-10}	—	4-78
STP-iX455	EDWARDS	Turbomolecular	ISO100-K or 8" CF	450	10^{-10}	10^{-10}	10^{-6}	4-69
W600iP/W600P	œrlikon leybold vacuum	Turbo-Drag Hybrid	ISO160-K or 8" CF	550	10^{-10}	10^{-10}	10^{-8}	4-74
W700iP/W700P	œrlikon leybold vacuum	Turbo-Drag Hybrid	ISO200-K or 10" CF	590	10^{-10}	10^{-10}	10^{-8}	4-74
STP603	EDWARDS	Turbomolecular	ISO160-K or 8" CF	650	10^{-10}	10^{-10}	10^{-8}	4-69
W830	œrlikon leybold vacuum	Turbo-Drag Hybrid	8" CF	900	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-74
STP1003	EDWARDS	Turbomolecular	ISO200-K or 10" CF	1,000	10^{-10}	10^{-10}	10^{-8}	4-69
W1300	œrlikon leybold vacuum	Turbo-Drag Hybrid	10" CF	1,170	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-74
ATH 1300M/1300MT	adixen	Turbo-Drag Hybrid	ISO200-F or 10" CF	1,250	6×10^{-9}	8×10^{-9}	8×10^{-7}	4-65

*Ultimate pressure listed using metal seals.

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Inlet Flange	Pumping Speed (N_2, L/sec.)	Ultimate Pressure* Torr	mbar	Pascal	See Page(s)
ATH 1600M/1600MT	adixen	Turbo-Drag Hybrid	ISO250-F 12" CF	1,500	4.5×10^{-9}	6×10^{-9}	6×10^{-7}	4-65
W2200	œrlikon leybold vacuum	Turbo-Drag Hybrid	12" CF	1,800	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-74
2003LM	SHIMADZU	Turbo-Drag Hybrid	ISO250-K	2,000	1×10^{-11}	1.3×10^{-11}	—	4-78
2203LM	SHIMADZU	Turbo-Drag Hybrid	ISO250-K 12" CF	2,050	1×10^{-9}	1.3×10^{-9}	—	4-78
ATH 2303M/2300MT	adixen	Turbo-Drag Hybrid	ISO250-F 12" CF	2,100	3×10^{-9}	4×10^{-9}	4×10^{-7}	4-65
W2800	œrlikon leybold vacuum	Turbo-Drag Hybrid	12" CF	2,400	7.5×10^{-11}	1×10^{-10}	1×10^{-8}	4-74
3203LM	SHIMADZU	Turbo-Drag Hybrid	ISO320-F	3,200	1×10^{-9}	1.3×10^{-9}	—	4-78
Maglev Corrosive Series Pumps								
203LMC	SHIMADZU	Turbo-Drag Hybrid	ISO100-K 6" CF	190	1×10^{-8}	1.3×10^{-8}	–	4-78
STP-L301C	EDWARDS	Turbomolecular	ISO100 or 6" CF	260	10^{-8}	10^{-8}	10^{-6}	4-69
STP301C	EDWARDS	Turbomolecular	ISO100 or 6" CF	300	10^{-9}	10^{-9}	10^{-7}	4-69
303LMC	SHIMADZU	Turbo-Drag Hybrid	ISO160-K 8" CF	320	1×10^{-8}	1.3×10^{-8}	—	4-78
403LMC	SHIMADZU	Turbo-Drag Hybrid	ISO160-K 8" CF	420	1×10^{-8}	1.3×10^{-8}	—	4-78
STPH451C	EDWARDS	Turbomolecular	ISO160-F or 8" CF	450	10^{-9}	10^{-9}	10^{-7}	4-69
STP603C	EDWARDS	Turbomolecular	ISO160-F or 8" CF	650	10^{-9}	10^{-9}	10^{-7}	4-69
STPA803C	EDWARDS	Turbomolecular	ISO160-F or 8" CF	800	10^{-9}	10^{-9}	10^{-7}	4-69
STP1003C	EDWARDS	Turbomolecular	ISO200-F or 10" CF	1,000	10^{-9}	10^{-9}	10^{-7}	4-69
STPA1303C	EDWARDS	Turbomolecular	ISO200-F or 10" CF	1,300	10^{-9}	10^{-9}	10^{-7}	4-69
STPA1603C	EDWARDS	Turbomolecular	ISO200-F or 10" CF	1,600	10^{-9}	10^{-9}	10^{-7}	4-69

*Ultimate pressure listed using metal seals.

➤ Pump Selection Guide

PUMP SPEED

Model	Manufacturer	Technology	Inlet Flange	Pumping Speed (N_2, L/sec.)	Ultimate Pressure* Torr	mbar	Pascal	See Page(s)
2003LMC	SHIMADZU	Turbo-Drag Hybrid	ISO250-K 12" CF	2,000	1×10^{-8}	1.3×10^{-8}	—	4-78
2203LMC	SHIMADZU	Turbo-Drag Hybrid	ISO250-K 12" CF	2,050	1×10^{-9}	1.3×10^{-9}	—	4-78
HiPace™ 2400MC	PFEIFFER VACUUM	Turbomolecular	ISO250-F or ISO250-K	2,100	7.5×10^{-10}	1×10^{-9}	1×10^{-7}	4-77
STPA2203C	EDWARDS	Turbomolecular	ISO250-F or 12" CF	2,200	10^{-8}	10^{-8}	10^{-6}	4-69
STP-XA2703C	EDWARDS	Turbomolecular	ISO250-F or VG250	2,650	10^{-9}	10^{-9}	10^{-7}	4-69
HiPace™ 3400MC	PFEIFFER VACUUM	Turbomolecular	ISO320-F	2,950	7.5×10^{-10}	1×10^{-9}	1×10^{-7}	4-77
3203LMC	SHIMADZU	Turbo-Drag Hybrid	ISO320-F	3,200	1×10^{-9}	1.3×10^{-9}	—	4-78
STP-XA3203C	EDWARDS	Turbomolecular	ISO320-F or VG300	3,200	10^{-9}	10^{-9}	10^{-7}	4-69
STP-XA4503C	EDWARDS	Turbomolecular	VG300	3,800	10^{-9}	10^{-9}	10^{-7}	4-69
STP-XA4503C	EDWARDS	Turbomolecular	ISO320-F	4,000	10^{-9}	10^{-9}	10^{-7}	4-69
STP-XA4503C	EDWARDS	Turbomolecular	VG350	4,300	10^{-9}	10^{-9}	10^{-7}	4-69

*Ultimate pressure listed using metal seals.

➤ Turbo Single Stage Pumps

■ Adixen™ (Alcatel®) ATP Series

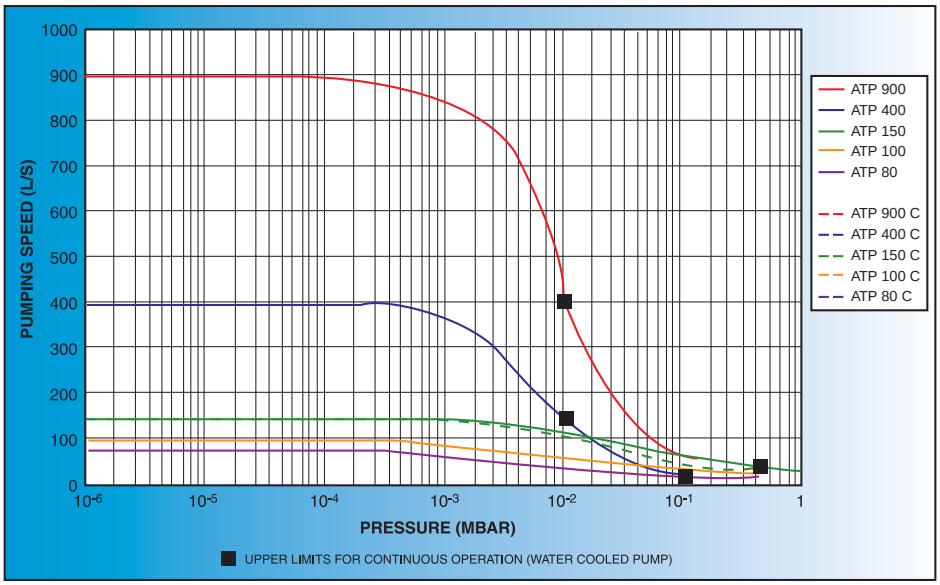
Two series of turbomolecular single-stage pumps available:

- **Standard**—For pumping inert gases
- **"C"**—Designed to operate in corrosive environments

All versions include grease-lubricated, ceramic ball bearings that enable easy maintenance because the bearings can be re-lubricated in the field at scheduled intervals. Bearings can also be replaced in the field because Adixen turbo pumps do not require rotor re-balancing after a bearing change. The use of ceramic ball bearings minimizes bearing temperature by reducing friction and reduces the centrifugal forces exerted on the bearing cage by a factor of two. In addition to reliable performance and easy maintenance, these ceramic bearing pumps offer the versatility of operation in any orientation.

■ Adixen™ ATP Series

- Features models with pumping speeds from 80L/sec. to 900L/sec.
- Produces a clean vacuum down to 10^{-10} Torr range
- Suitable for a wide variety of applications in industry and R&D



Adixen ATP Specifications

Description	ATP 80/80C	ATP 100/100C	ATP 150/150C	ATP 400/400C	ATP 900/900C
Pumping Speed — (N_2, L/sec.)	80	100	140	400	900
Compression Ratio: N_2	8.0×10^7	8.0×10^7	7.0×10^8	7.0×10^8	1.0×10^9
Compression Ratio: He	2.5×10^3	2.5×10^3	1.2×10^4	1.5×10^4	2.0×10^4
Compression Ratio: H_2	3.0×10^2	3.0×10^2	1.0×10^3	1.0×10^3	2.0×10^3
Inlet Flange	ISO63-K or 4½" CF	ISO100-K or 6" CF	ISO100-K or 6" CF	ISO160-K or 8" CF	ISO200-K or 10" CF
Foreline Flange	KF25	KF25	KF25	KF40	KF40
Ultimate Pressure — Torr (mbar)	3.7×10^{-9} (5×10^{-9})	3.7×10^{-9} (5×10^{-9})	3.8×10^{-10} (5×10^{-10})	6×10^{-10} (8×10^{-10})	3.8×10^{-10} (5×10^{-10})
Pump Weight — lbs. (kg)	11.7 (5.3)	11.7 (5.3)	14.3 (6.5)	19.8 (9)	40.8 (18.5)
Maximum Foreline Pressure — Torr (mbar)	1.5×10^{-1} (2×10^{-1})	2.3×10^{-1} (3×10^{-1})	3×10^{-1} (4×10^{-1})	1.5×10^{-1} (2×10^{-1})	2.3×10^{-1} (3×10^{-1})
Minimum Pumping Speed of Backing Pump — CFM (m^3/hr)	3.8 (5.4)	3.8 (5.4)	3.8 (5.4)	10.6 (15)	14.6 (20.7)
Cooling Method	Air or Water	Air or Water	Air or Water	Air or Water	Air or Water
Orientation	Any (360°)	Any (360°)	Any (360°)	Any (360°)	Any (360°)

➤ Turbo Single-Stage Pumps

Model	Inlet Flange	Pumps Cooling Method	Part No.	Price
ATP 80	ISO63-K	Air	AV-F12111	Call
ATP 80	ISO63-K	Water	AV-F12121	Call
ATP 80	4½" CF	Air	AV-F12211	Call
ATP 80	4½" CF	Water	AV-F12221	Call
ATP 100	ISO100-K	Air	AV-G13111	Call
ATP 100	ISO100-K	Water	AV-G13121	Call
ATP 100	6" CF	Air	AV-G13211	Call
ATP 100	6" CF	Water	AV-G13221	Call
ATP 150	ISO100-K	Air	AV-H13111	Call
ATP 150	ISO100-K	Water	AV-H13121	Call
ATP 150	6" CF	Air	AV-H13211	Call
ATP 150	6" CF	Water	AV-H13221	Call
ATP 400	ISO160-K	Air	AV-I14111	Call
ATP 400	ISO160-K	Water	AV-I14121	Call
ATP 400	8" CF	Air	AV-I14211	Call
ATP 400	8" CF	Water	AV-I14221	Call
ATP 900	ISO200-K	Air	AV-K15111	Call
ATP 900	ISO200-K	Water	AV-K15121	Call
ATP 900	10" CF	Air	AV-K15211	Call
ATP 900	10" CF	Water	AV-K15221	Call
ATP 80C	ISO63-K	Air	AV-F22111	Call
ATP 80C	ISO63-K	Water	AV-F22121	Call
ATP 80C	4½" CF	Air	AV-F22211	Call
ATP 80C	4½" CF	Water	AV-F22221	Call
ATP 100C	ISO100-K	Air	AV-G23111	Call
ATP 100C	ISO100-K	Water	AV-G23121	Call
ATP 100C	6" CF	Air	AV-G23211	Call
ATP 100C	6" CF	Water	AV-G23221	Call

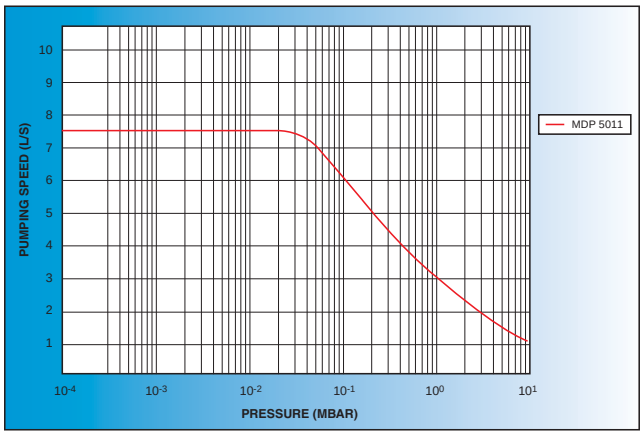
Model	Inlet Flange	Pumps (continued) Cooling Method	Part No.	Price
ATP 150C	ISO100-K	Air	AV-H23111	Call
ATP 150C	ISO100-K	Water	AV-H23121	Call
ATP 150C	6" CF	Air	AV-H23211	Call
ATP 150C	6" CF	Water	AV-H23221	Call
ATP 400C	ISO160-K	Air	AV-I24111	Call
ATP 400C	ISO160-K	Water	AV-I24121	Call
ATP 400C	8" CF	Air	AV-I24211	Call
ATP 400C	8" CF	Water	AV-I24221	Call
ATP 900C	ISO200-K	Air	AV-K25111	Call
ATP 900C	ISO200-K	Water	AV-K25121	Call
ATP 900C	10" CF	Air	AV-K25211	Call
ATP 900C	10" CF	Water	AV-K25221	Call

Description	Pump Accessories For Pump Model(s)	Part No.	Price
ACT 200T Controller (85–264 VAC, 50/60 Hz)	ATP 80, ATP 100	AV-101932	Call
ACT 600TH Controller (85–264 VAC, 50/60 Hz)	ATP 150, ATP 400, ATH 300	AV-111692	Call
ACT 1000T Controller (85–264 VAC, 50/60 Hz)	ATP 900	AV-102021	Call
Interconnect Cable for:			
200T Controller (3.5 m)	ATP 80, ATP 100	AVA460422035	Call
600TH/1000T Controller (3.5 m)	ATP 150, ATP 400, ATP 900	AVA461237035	Call
600TH/1000T Controller (5 m)	ATP 150, ATP 400, ATP 900	AVA461237050	Call
600TH/1000T Controller (10 m)	ATP 150, ATP 400, ATP 900	AVA461237100	Call
600TH/1000T Controller (20 m)	ATP 150, ATP 400, ATP 900	AVA461237200	Call
Mains Power Cable			
(U.S. Plug)	All ATP Series Pumps	AV-14487	Call
(Europe Plug)	All ATP Series Pumps	AV-103566	Call
(U.K. Plug)	All ATP Series Pumps	AV-104411	Call
Inlet Screen for:			
4½" CF Flange (2.5 mm)	ATP 80	AV-063115	Call
ISO-63 Flange (2.5 mm)	ATP 80	AV-063000	Call
6" CF Flange (2.5 mm)	ATP 100, ATP 150	AV-056845	Call
ISO-100 Flange (2.5 mm)	ATP 100, ATP 150	AV-056844	Call
8" CF Flange (2.5 mm)	ATP 400	AV-056928	Call
ISO-160 Flange (2.5 mm)	ATP 400	AV-056942	Call
10" CF Flange (2.5 mm)	ATP 900	AV-063159	Call
ISO-200 Flange (2.5 mm)	ATP 900	AV-063158	Call
Vent Valve			
115 VAC, 50/60 Hz (KF25 Flanged)	ATP 80, ATP 100, ATP 150	AV-063089	Call
240 VAC, 50/60 Hz (KF25 Flanged)	ATP 80, ATP 100, ATP 150	AV-063177	Call
24 VDC (KF25 Flanged)	ATP 80, ATP 100, ATP 150	AV-108348	Call
115 VAC, 50/60 Hz (KF40 Flanged)	ATP 400	AV-063099	Call
240 VAC, 50/60 Hz (KF40 Flanged)	ATP 400	AV-063478	Call
24 VDC (KF40 Flanged)	ATP 400	AV-108349	Call
12 VDC (KF40 Flanged)	ATP 900	AV-101923	Call
Clamp for:			
KF25 Flange	All ATP Series Pumps	QF25-100-C	Call
KF40 Flange	All ATP Series Pumps	QF40-150-C	Call
Viton® Centering Ring for:			
KF25 Flange	All ATP Series Pumps	QF25-100-SRV	Call
KF40 Flange	All ATP Series Pumps	QF40-150-SRV	Call

➤ Molecular Drag Pumps

■ Adixen™ (Alcatel®) MDP Series

- Features three stages
- First stage—turbo-like stage that uses a fast-moving row of blades to strike gas molecules into the pump, ensuring maximum conductance while increasing the pump's overall pumping speed
- Second stage—includes a ribbed drum (the main operating mechanism of the pump; see the Technical Notes at the beginning of this section)
- Third stage—a stage with a dynamic seal that enables the pump to operate with high exhaust pressures



Model MDP 5011:

- Offers low pumping speed for applications that demand the fast evacuation of a small-volume chamber and an oil-free environment—for example, a small load lock
- Used as an intermediate backing pump for a high-speed turbomolecular pump

The drag pump's compression ratio (CR) acts as a multiplier for the turbo pump's CR. For example:

- If, for H_2, the turbo pump's CR is 10^3 and the drag pump's CR is 10^3, the combination has a CR of 10^6. That is, if the H_2 partial pressure in the drag pump's foreline is 10^{-4} Torr, then the partial pressure in the chamber is 10^{-10} Torr.

The drag pump's ability to accept high gas throughput, its ruggedness, and resistance to damage when suddenly vented to air, give it the advantage in applications such as:

- The freeze-drying of specimens
- The pumping of sample stages in the microscopy and spectrometry of biological samples

Adixen MDP Series Specifications

Description	MDP 5011	MDP 5011 CP
Pumping Speed — (N_2, L/sec.)	7.5	7.5
Compression Ratio: N_2	1.0×10^9	1.0×10^6
Compression Ratio: He	2.0×10^4	250
Compression Ratio: H_2	1.0×10^3	50
Inlet Flange	ISO63-K	ISO63-K
Foreline Flange	KF16	KF16
Ultimate Pressure — Torr (mbar)	7.5×10^{-7} (1×10^{-6})	7.5×10^{-6} (1×10^{-5})
Pump Weight — lbs. (kg)	6.6 (3)	6.6 (3)
Maximum Foreline Pressure — Torr (mbar)	30 (40)	3.75 (5)
Minimum Pumping Speed of Backing Pump — CFM (m^3/hr)	0.59 (1)	0.59 (1)
Cooling Method	Air or Water	Air or Water
Orientation	Any (360°)	Any (360°)

Pumps

Model	Inlet Flange	Cooling Method	Part No.	Price
MDP 5011 (100/115 VAC, 50/60 Hz)	ISO63-K	Air	AV-795602	Call
MDP 5011 (200/230 VAC, 50/60 Hz)	ISO63-K	Air	AV-795601	Call
MDP 5011	ISO63-K	Water	AV-795604	Call
MDP 5011CP (100/115 VAC, 50/60 Hz)	ISO63-K	Air	AV-798073	Call
MDP 5011CP (200/230 VAC, 50/60 Hz)	ISO63-K	Air	AV-795650	Call
MDP 5011CP	ISO63-K	Water	AV-795652	Call

Pump Accessories

Description	For Pump Model(s)	Part No.	Price
ACT 100 Controller (115 VAC, 50/60 Hz)	MDP 5011	AV-111156	Call
ACT 100 Controller (230 VAC, 50/60 Hz)	MDP 5011	AV-111158	Call
Interconnect Cable for ACT 100 Controller (3.5 m)	MDP 5011	AVA461868035	Call
Interconnect Cable for ACT 100 Controller (5 m)	MDP 5011	AVA461868050	Call
Mains Power Cable for ACT Controllers (U.S. plug)	MDP 5011	AV-14487	Call
Mains Power Cable for ACT Controllers (European plug)	MDP 5011	AV-104411	Call
Mains Power Cable for ACT Controllers (U.K. plug)	MDP 5011	AV-103566	Call
Inlet Screen for ISO-63 Flange (2.5 mm)	MDP 5011	AV-063117	Call
Vent Valve (115 VAC, 50/60 Hz)	MDP 5011	AV-063171	Call
Vent Valve (240 VAC, 50/60 Hz)	MDP 5011	AV-063172	Call
Clamp for KF16 Flange	MDP 5011	QF16-075-C	Call
Viton® Centering Ring for KF16 Flange	MDP 5011	QF16-075-SRV	Call

ORDERING NOTE: Inlet screens, controllers, interconnect, and mains power cables for all MDP 5011 turbo pumps are sold separately.

➤ Turbo-Drag Hybrid Pumps

■ Adixen™ (Alcatel®) ATH Series

Weighing only 1.2 kg (2.6 lbs.) and able to fit into a 10 cm (4 in) cube, the ATH 31 is the smallest hybrid pump on the market. Its 30 L/sec pumping speed for N_2, outstanding compression ratios (up to 1.10^5 for H_2), and 24 VDC power supply make it ideal for portable analytical instruments. Like all Adixen hybrid pumps, this model enables mounting in any orientation. Adixen's "C" version of the ATH31 pump has gas purge and inverted dynamic seal to withstand the effects of pumping corrosive gases.

ATH 31:

- Includes one turbo stage and one drag-pump stage
- Backing pressure tolerance of up to 25 mbar
- Can be backed by a diaphragm pump
- Features one intermediate pumping port

ATH 31+:

- Includes one turbo stage and three drag-pump stages
- Offers higher compression ratios compared to ATH 31
- Excellent performance when pumping light gases
- Features two intermediate ports

ATH 31C:

- Includes one turbo stage, two drag-pump stages, and a purge that offers protection against corrosive gases
- Features one intermediate pumping port

NOTE: We recommend backing the ATH31+ and ATH31C with a diaphragm pump.

ATH 200(I):

- Includes an intermediate pumping port intended for continuous high vacuum applications, such as mass spectrometers (this extra port is situated between the inlet port and foreline flange)

ATH 300(CI):

- Intended for standard or corrosive applications
- Includes an intermediate pumping port intended for continuous high vacuum applications, such as mass spectrometers (this extra port is situated between the inlet port and foreline flange)

These pumps provide oil-free evacuation for ensured ultra-clean technology in a variety of applications

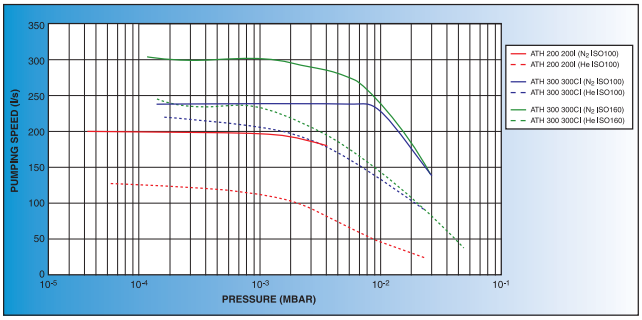
Adixen ATH Series Specifications

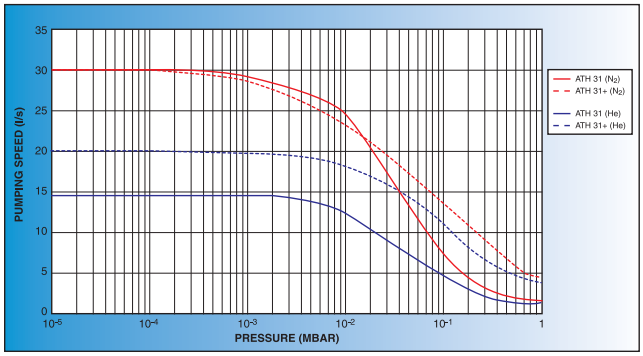
Description	ATH 31C	ATH 31+	ATH 31	ATH 200/200(I)	ATH 300/300(CI)
Pumping Speed — (N_2, L/sec.)	30	30	30	200	250
Compression Ratio: N_2	1.0×10^8	1.0×10^{11}	2.0×10^9	1.0×10^9	1.0×10^9
Compression Ratio: He	6.0×10^3	2.0×10^7	2.0×10^6	1.0×10^5	1.0×10^5
Compression Ratio: H_2	3.0×10^2	1.0×10^5	1.0×10^4	N/A	N/A
Inlet Flange	ISO63-K or 4 1/2" CF	ISO63-K or 4 1/2" CF	ISO63-K or 4 1/2" CF	ISO100-K or 6" CF	ISO100-K or 6" CF
Foreline Flange	KF16	KF16	KF16	KF16	KF25
Ultimate Pressure — Torr (mbar)	7.5×10^{-9} (1×10^{-8})	3.8×10^{-10} (5×10^{-10})	3.8×10^{-10} (5×10^{-10})	3.8×10^{-10} (5×10^{-10})	3.8×10^{-10} (5×10^{-10})
Pump Weight — lbs. (kg)	2.7 (1.2)	2.7 (1.2)	2.7 (1.2)	21.4 (12.2)	23.2 (14.4)
Maximum Foreline Pressure — Torr (mbar)	18.8 (25)	33.8 (45)	33.8 (45)	3 (4)	7.5 (10)
Minimum Pumping Speed of Backing Pump — CFM (m^3/hr)	0.59 (1)	0.59 (1)	0.59 (1)	6 (10)	6 (10)
Cooling Method	Air or Water	Air or Water	Air or Water	Air or Water	Air or Water
Orientation	Any (360°)	Any (360°)	Any (360°)	Any (360°)	Any (360°)

Turn the page for continued Adixen™ (Alcatel®) ATH Series info! ➤

➤ Turbo-Drag Hybrid Pumps

■ Adixen™ (Alcatel®) ATH Series





Model	Inlet Flange	Pumps Cooling Method	Part No.	Price
ATH 31	KF40	Ambient	AV-R81101	Call
ATH 31	2¾" CF	Ambient	AV-R81201	Call
ATH 31	ISO63-K	Ambient	AV-R82101	Call
ATH 31	4½" CF	Ambient	AV-R82201	Call
ATH 31	KF40	Water	AV-R81121	Call
ATH 31	2¾" CF	Water	AV-R81221	Call
ATH 31	ISO63-K	Water	AV-R82121	Call
ATH 31	4½" CF	Water	AV-R82221	Call
ATH 31+	KF40	Ambient	AV-R11101	Call
ATH 31+	2¾" CF	Ambient	AV-R11201	Call
ATH 31+	ISO63-K	Ambient	AV-R12101	Call
ATH 31+	4½" CF	Ambient	AV-R12201	Call
ATH 31+	KF40	Water	AV-R11121	Call
ATH 31+	2¾" CF	Water	AV-R11221	Call
ATH 31+	ISO63-K	Water	AV-R12121	Call
ATH 31+	4½" CF	Water	AV-R12221	Call
ATH 31C	KF40	Ambient	AV-R21101	Call
ATH 31C	2¾" CF	Ambient	AV-R21201	Call
ATH 31C	ISO63-K	Ambient	AV-R22101	Call
ATH 31C	4½" CF	Ambient	AV-R22201	Call
ATH 31C	KF40	Water	AV-R21121	Call
ATH 31C	2¾" CF	Water	AV-R21221	Call
ATH 31C	ISO63-K	Water	AV-R22121	Call
ATH 31C	4½" CF	Water	AV-R22221	Call
ATH 200	ISO100-K	Air	AV-S13C1100	Call
ATH 200	6" CF	Air	AV-S13D1100	Call
ATH 200	ISO100-K	Water	AV-S13C2100	Call
ATH 200	6" CF	Water	AV-S13D2100	Call
ATH 200(I)	ISO100-K	Air	AV-S1311100	Call
ATH 200(I)	6" CF	Air	AV-S1321100	Call
ATH 200(I)	ISO63-K	Air	AV-S1211100	Call
ATH 200(I)	ISO100-K	Water	AV-S1312100	Call
ATH 200(I)	6" CF	Water	AV-S1322100	Call
ATH 200(I)	ISO63-K	Water	AV-S1212100	Call
ATH 300	ISO100-K	Air	AV-C1311100	Call
ATH 300	6" CF	Air	AV-C1321100	Call
ATH 300	ISO160-K	Air	AV-C1411100	Call
ATH 300	8" CF	Air	AV-C1421100	Call
ATH 300	ISO100-K	Water	AV-C1312100	Call
ATH 300	6" CF	Water	AV-C1322100	Call
ATH 300	ISO160-K	Water	AV-C1412100	Call
ATH 300	8" CF	Water	AV-C1422100	Call
ATH 300 (CI)	ISO100-K	Air	AV-C2311100	Call
ATH 300 (CI)	6" CF	Air	AV-C2321100	Call
ATH 300 (CI)	ISO160-K	Air	AV-C2411100	Call
ATH 300 (CI)	8" CF	Air	AV-C2421100	Call
ATH 300 (CI)	ISO100-K	Water	AV-C2312100	Call
ATH 300 (CI)	6" CF	Water	AV-C2322100	Call
ATH 300 (CI)	ISO160-K	Water	AV-C2412100	Call
ATH 300 (CI)	8" CF	Water	AV-C2422100	Call

Description	Pump Accessories For Pump Model(s)	Part No.	Price
ACT 201H Controller (100–230 VAC, 50/60 Hz)	ATH 31	AV-108916	Call
ACT 202H Controller (100–230 VAC, 50/60 Hz)	ATH 200	AV-110787	Call
ACT 250 Controller (100–230 VAC, 50/60 Hz)	ATH 300	AV-108320	Call
ACT 600TH Controller (85–264 VAC, 50/60 Hz)	ATP 150, ATP 400, ATH 300	AV-111692	Call
Interconnect Cable for: ACT 201H/202H Controller to Pump 3.5 m	ATH 31, ATH 200	AVA460422035	Call
5 meter	ATH 31, ATH 200	AVA460422050	Call
ACT 250/600TH Controller to Pump 3.5 m	ATH 300	AVA461237035	Call
5 meter	ATH 300	AVA461237050	Call
Mains Power Cable for ACT Controllers (U.S. plug)	All ATH Series Pumps	AV-104411	Call
Inlet Screen for: 4½" CF Flange (2.5 mm)	ATH 31	AV-102662	Call
6" CF Flange (2.5 mm)	ATH 200, ATH 300	AV-056844	Call
ISO-63 Flange (2.5 mm)	ATH 31	AV-063117	Call
ISO-100 Flange (2.5 mm)	ATH 200, ATH 300	AV-056844	Call
KF40 Flange (2.5 mm)	ATH31	AV-102670	Call
2¾" CF Flange (2.5 mm)	ATH31	AV-102644	Call
ISO160-K (2.5 mm)	ATH300	AV-056942	Call
8" CF Flange (2.5 mm)	ATH300	AV-056928	Call
Water Cooling Kit	ATH 31	AV-107593	Call
Air Cooling Kit	ATH31, ATH31t, ATH31C	AV-107605	Call
Water Cooling Kit	ATH 200, ATH 300	AV-109259	Call
Vent Valve—115 VAC, 60 Hz KF16 Flanged	ATH 31, ATH 200	AV-063171	Call
KF25 Flanged	ATH 300	AV-063089	Call
Vent Valve 240 VAC, 50/60 Hz KF16 Flanged	ATH 31, ATH 200	AV-063172	Call
220 VAC, 50/60 Hz KF25 Flanged	ATH 300	AV-063177	Call
Clamp for: KF16 Flange	ATH 31, ATH 200	QF16-075-C	Call
KF25 Flange	ATH 300	QF25-100-C	Call
Viton® Centering Ring for: KF16 Flange	ATH 31, ATH 200	QF16-075-SRV	Call
KF25 Flange	ATH 300	QF25-100-SRV	Call

**ORDERING NOTE: Listed ACT controllers come with both U.S. and European mains power cable. U.K. cable sold separately.*

➤ Magnetically Levitated Pumps

■ Adixen™ (Alcatel®) ATH-M Series

The ATH-M series are hybrid magnetically levitated turbo pumps.

The ATH-M are free of bearing maintenance. Because the magnetic bearing of the ATH-M series is maintenance-free, the pumps can run for years without any interruption on a clean process. This gives the ATH-M series a significant cost of ownership advantage over ball bearing turbo pumps.

Heating/Cooling:

The MT model features a temperature management system that controls an integrated heater band. The heater band and water cooling maintain the pump internal surface at a constant temperature (up to 75°C) in order to minimize the condensation of by-products inside the pump.

Venting Valve:

The emergency venting valve opens in case of violent shocks or large air-inrushes. The valve brakes the rotor quickly and safely.

High throughput at high pressure:

The ATH-M are designed for high pressure and high throughput, but also provide a low ultimate pressure.

ACT 1300 M, and MagPower—compact and highly effective electronic monitoring:

All functions for monitoring the ATH-M are integrated into the controllers.

Landing—The pump's emergency backup bearings can withstand up to five hard landings at full speed in the rare event of an accidental cable disconnection or pressure rise. The controller also monitors the status of the backup bearing life.

*NOTE: Different flange types and sizes available, please call our office at **412.387.9200** or email us at **pumps@lesker.com** for more details.*

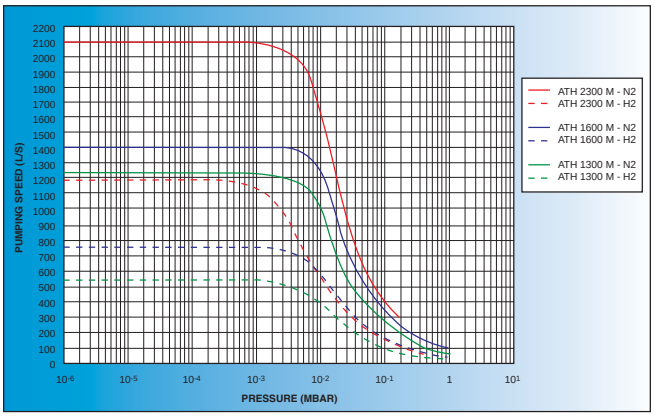
Adixen ATH-M Series Specifications

Description	ATH 500M/500MT	ATH 1300M/1300MT	ATH 1600M/1600MT	ATH 2300M/2300MT
Pumping Speed — (N_2, L/sec.)	500	1,250	1,500	2,100
Compression Ratio: N_2	8×10^6	1.0×10^7	6.0×10^7	1.0×10^9
Compression Ratio: He	1×10^4	2.0×10^3	8.0×10^3	3.0×10^4
Compression Ratio: H_2	2×10^2	1.0×10^2	3.0×10^2	3.0×10^3
Inlet Flanges	ISO160-K	ISO200-F	ISO250-F	ISO250-F
Foreline Flange	QF40	QF40	QF40	QF40
Ultimate Pressure — Torr (mbar)	1.4×10^{-8}	8.0×10^{-9}	6.0×10^{-9}	4×10^{-9}
Pump Weight — lbs. (kg)	37 (17)	75.5 (34)	78.3 (35.5)	102 (46)
Maximum Foreline Pressure — Torr (mbar)	1.5 (2.7)	1.125 (1.5)	1.125 (1.5)	1.125 (1.5)
Cooling Method	Water	Water	Water	Water
Orientation	Any	Any	Any	Any
Maximum Throughput (sccm, N_2)	4,000	3,000	2,500	2,500

Turn the page for continued Adixen™ (Alcatel®) ATH-M Series info! ➤

➤ Magnetically Levitated Pumps

■ Adixen™ (Alcatel®) ATH-M Series



Pumps			
Model	Inlet Flange	Part No.	Price
ATH 500M	ISO100K	AV-V2312100	Call
ATH 500M	ISO160F	AV-V2462100	Call
ATH 1300M	ISO160F	AV-M2462100	Call
ATH 1300M	ISO200F	AV-M2562100	Call
ATH 1600M	ISO200F	AV-P2562100	Call
ATH 1600M	ISO250F	AV-P2662100	Call
ATH 2303M	ISO250F	AV-X2662100	Call
ATH 2300MT	ISO200F	AV-Q6562100	Call
ATH 2300MT	ISO250F	AV-Q6662100	Call
ATP 2300M	ISO250F	AV-T2612100	Call
ATH 2800M	ISO250F	AV-U2662100	Call
ATH 2800MT	ISO250F	AV-U6662100	Call
ATH 3200M	ISO320F	AV-U2C62100	Call
ATH 3200MT	ISO320F	AV-U6C62100	Call

Accessories			
Description	Compatible Pump(s)	Part No.	Price
ACT 1300MController	ATH1300M, ATH1600M	AV-112123	Call
Magpower Controller	ATH2302M, ATH/ATP2300 series, ATH2800 series, ATH3200 series	AV-114679	Call
Power Cable, 3.5 m (pump to power supply)	ATH500M	AV-A331328035	Call
Power Supply, 230VAC to 48VDC	ATH500M	AV-114866	Call
Power Cord, 3.5 m (power supply to outlet) US 230 VAC Plug	ATH500M	AV-A332106035	Call
Interconnect Cable, 3.5 m (pump to controller)	ATH1300M, ATH1600M	AV-103719	Call
Heat Control Cable, 3.5 m, 110/120 VAC (MT pumps only)	ATH1300MT, ATH1600MT	AV-A328697B	Call
Heat Control Cable 3.5 m, 230 VAC (MT pumps only)	ATH1300MT, ATH1600MT	AV-A328698B	Call
Power Cord, 2.5 m US Plug 100–110 VAC	ATH1300M, ATH1600M	AV-A328406	Call
Power Cord, 2.5 m US Plug 200–240 VAC	ATH1300M, ATH1600M, ATH2303M, ATH2300M, ATH2300MT ATH2800M, ATH2800MT, ATH3200M, ATH3200MT	AV-802366	Call
Inlet Screen (included with pump)	DN160 flanged pumps	AV-107747	Call
Inlet Screen (included with pump)	DN200 flanged pumps	AV-107824	Call
Interconnect Cable, 2 m (pump to controller)	ATH2303M, ATH2300M, ATH2300MT ATH2800M, ATH2800MT, ATH3200M, ATH3200MT	AV-A215300020CD	Call
Water Valve Cable, 3.5 m (MT pumps only)	ATH2300MT, ATH2800MT, ATH3200MT	AV-A462401035	Call
Heater Band Cable, 3.5 m (MT pumps only)	ATH2300MT, ATH2800MT, ATH3200MT	AV-460082035	Call

*NOTE: The ATH 500M has an integrated controller so the necessary accessories are a power supply and power cord. The ATH 1300M, ATH 1600M, ATH 2303M, ATH 2300MT, and ATP 2300M are available with on-board controllers. Please call our office at **412.387.9200** or email us at **pumps@lesker.com** for more details. All other Adixen magnetically levitated pumps require a controller, interconnect cable (controller to pump), and power cable.*

Turbo-Drag Hybrid Pumps

Edwards EXT and nEXT Series

EXT:

- On-board control for running at reduced power
- Controller adds electronic braking, smart cooling fan, and automatic vent options
- Compatible with Edwards TIC Turbo and Instrument Controller, enabling you to add one or more vacuum gauges without the need of an additional display controller
- Gas purge port for process gas dilution to protect motor and lower bearing

nEXT:

- New range of hybrid bearing compound turbomolecular pumps
- Proven bearing technology (oil lubricated ceramic lower bearing with dry permanent magnetic upper bearing)
- Fully compatible with TIC controllers/bearings—nEXT pumps are all easily field-serviceable using a simple tool to change both the bearing and oil reservoir
- Innovative new suspension system means that no rebalancing of the rotor is required, eliminating the need for expensive jigs, fixtures, and measuring equipment during service

Features:

- Fully field-serviceable in minimal time without complex tooling or disassembly
- Compatible with Edwards TIC turbo and instrument controllers
- Inlet screen comes supplied as standard
- RoHS compliant and CSA/UL approved

Turn the page for continued Edwards EXT and nEXT Series info!

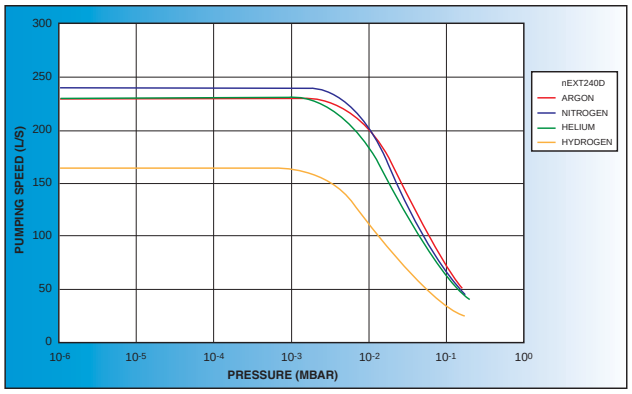
Edwards EXT and nEXT Series Specifications

Description	EXT75DX	EXT255DX	EXT556H	nEXT240D	nEXT300D	nEXT400D
Pumping Speed — (N_2, L/s)	61	220	540	240	300	400
Compression Ratio — N_2	1.0×10^{11}	1.0×10^{8}	$>10 \times 10^{10}$	1.0×10^{11}	1.0×10^{11}	1.0×10^{11}
Compression Ratio — He	1.0×10^{6}	1.0×10^{5}	1.0×10^{8}	3.0×10^{5}	1.0×10^{6}	1.0×10^{8}
Compression Ratio — H_2	5.0×10^{4}	1.6×10^{4}	1.0×10^{6}	1.0×10^{4}	5.0×10^{4}	5.0×10^{5}
Inlet Flange	4½" CF	6" CF	8" CF	6" CF	6" CF	8" CF
Foreline Flange	KF16	KF25	KF25	KF25	KF25	KF25
Ultimate Pressure Torr (mbar)	5.0×10^{-10} (6.6×10^{-10})	3.8×10^{-9} (5.0×10^{-9})	$<10 \times 10^{-10}$ ($<10 \times 10^{-10}$)	3.75×10^{-10} (5×10^{-10})	3.75×10^{-10} (5×10^{-10})	3.75×10^{-10} (5×10^{-10})
Maximum Foreline Pressure — Torr (mbar)	3 (4)	5.2 (7)	7.5 (10)	4.5 (6)	5 (6.75)	5.6 (7.5)
Cooling Method	Ambient Air (force air and water cooling available)	Ambient Air (force air and water cooling available)	Ambient Air (force air and water cooling available)	Ambient Air (force air and water cooling available)	Ambient Air (force air and water cooling available)	Ambient Air (force air and water cooling available)
Orientation	Vertical and upright through to 90%	Vertical and upright through to 90%	Vertical and upright through to 90%	Vertical and upright through to 90%	Vertical and upright through to 90%	Vertical and upright through to 90%

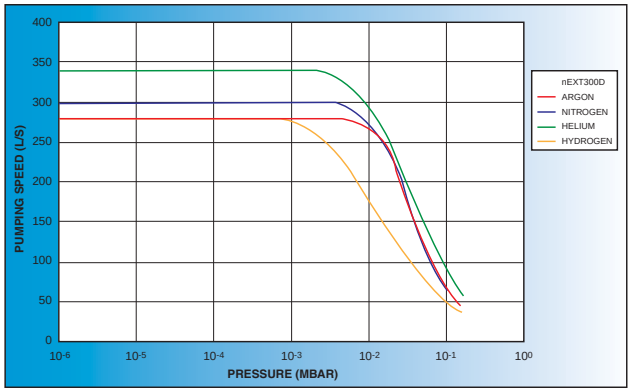
Pump	Inlet Flange	Part No.	Price
EXT75DX	DN63ISO	ED-B72241000	**Call**
	DN63CF	ED-B72242000	**Call**
	DN40NW	ED-B72243000	**Call**
	DN100ISO	ED-B72245000	**Call**
EXT255DX	DN100ISO-K	ED-B75311000	**Call**
	DN100CF	ED-B75312000	**Call**

➤ Turbo-Drag Hybrid Pumps

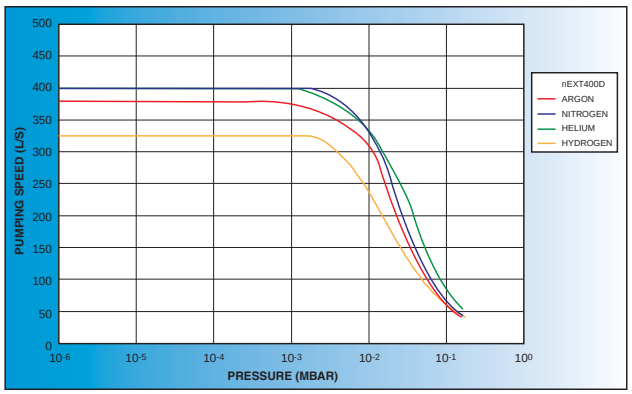
Edwards EXT and nEXT Series



Pump	Inlet Flange	Part No.	Price
nEXT240D	ISO100K	ED-B81200100	Call
nEXT240D	6" CF	ED-B81200200	Call
nEXT300D	ISO100K	ED-B82200100	Call
nEXT300D	6" CF	ED-B82200200	Call
nEXT400D	ISO160K	ED-B83200300	Call
nEXT400D	8" CF	ED-B83200400	Call



Description	Part No.	Price
Controllers		
TIC100Turbo and Instruments*	ED-D39721000	Call
TIC200 Turbo and Instruments*	ED-D39722000	Call
TIC Relay Box		
Small Backing Pump	ED-D39711805	Call
Coolers		
ACX75 Air Cooling Accessory	ED-B58053075	Call
ACX250 Air Cooling Accessory	ED-B58053160	Call
Vent Valve		
TAV5 Vent Valve	ED-B58066010	Call
Main Cables (suitable for TIC or relay box)		
UK 2m	ED-D40013025	Call
US 2m	ED-D40013120	Call
EUR 2m	ED-D40013030	Call
Interface Cables		
TIC logic interface cable	ED-D39700833	Call
TIC RS232 interface cable 2m	ED-D39700834	Call
XDD/DX/EXDC extension cable 2m	ED-D39700836	Call



Accessories (compatible with all nEXT series pumps)

Description	Part No.	Price
TIC200 Turbo and Instrument Controller	ED-D39722000	Call
nEXT Radial Fan	ED-B58053175	Call
nEXT Water Cooling	ED-B80000815	Call
nEXT Oil Cartridge Change Tool	ED-B80000812	Call
nEXT Bearing Change Tool	ED-B80000805	Call
nEXT Oil Cartridge	ED-B80000811	Call
nEXT Replacement Bearing Assembly	ED-B80000810	Call

➤ Magnetically Levitated Pumps

Edwards STP Series

- Qualified by all major semiconductors OEMs
- Used in all major semiconductors fabrication plants
- Installed base of more than 80000 units, 85% in the semiconductor industry

Features:

- Optimized for semiconductor process pressure
- Complete range from 300 to 4500ls^{-1}
- Application specific models
- Installation in any orientation
- Supported globally by Edwards

STP Range:

- High throughput series
- Holweck stage to provide advanced throughput performance
- Highest levels of throughput required by the next generation of semiconductor etch and CVD processes

Corrosion Resistant:

To ensure a high level of resistance to corrosion, the corrosion resistant (C) and high throughput (H-C) pumps have nicke-coated rotors/stators and pump internals suitable for ion implantation and plasma etching. Further enhanced levels of protection are available on request.

Nitrogen Purging:

The corrosion-resistant (C) pumps and the high throughput (H-C) pumps have a nitrogen purge facility, a constant flow of nitrogen through the pump dilutes corrosive gases, minimizing their damage to the pump's motor and sensor coils.

TMS System:

The Edwards Temperature Management System is available on a wide range of turbo pumps. It is designed to optimize the temperature within the pump, dramatically reducing the particular condensation within. This will not only considerably enhance the performance of the pump under harsh process conditions, but will also increase its operational life.

Edwards STP Series Specifications

Description	STP-L301/STP-L301C	STPH301C	STP301/STP301C	STP-iX455	STPH451C	STP603/STP603C
Pumping Speed — (N_2, L/sec.)	260	300	300	450	450	650
Compression ratio — N_2	1.0 x 10^8	1.0 x 10^8	1.0 x 10^8	1.0 x 10^8	1.0 x 10^8	1.0 x 10^8
Compression ratio — H_2	2.0 x 10^4	1.4 x 10^3	2.0 x 10^4	4.0 x 10^4	1.0 x 10^3	1.0 x 10^5
Inlet Flange	6" CF	6" CF	6" CF	8" CF	8" CF	8" CF
Foreline Flange	KF25	KF40	KF25	KF40	KF40	KF40
Ultimate Pressure Torr (mbar)	10^{-8} 10^{-8}	10^{-9} 10^{-9}	10^{-10} (10^{-9} for C version)	10^{-10}	10^{-9} 10^{-9}	10^{-10} (5 x 10^{-8} for C version)
Maximum Foreline Pressure — Torr (mbar)	1.0 x 10^{-1}	5	1.0 x 10^{-1}	5.0 x 10^{-1} (6.7 x 10^{-1})	5	—
Pump Weight — lbs. (kg)	28.7 (13)	33 (15)	24.25 (11)	35.5 (16)	33 (15)	68.4 (31)
Cooling Method	Natural Convection (water cooling optional)	Water	Natural Convection (water cooling optional)	Natural Convection	Water	Natural Convection (water cooling optional)
Orientation	Any	Any	Any	Any	Any	Any

Description	STPA803C	STP1003/STP1003C	STPA1303C	STPA1603C	STPA2203C	STP-XA2703C	STP-XZ3203C	STP-XA4503C
Pumping Speed — (N_2, L/s)	800	1,000	1,300	1,600	2,200	2,650	3,200	4,000
Compression Ratio — N_2	1.0 x 10^{-8}	1.0 x 10^{-8}	1.0 x 10^{-8}	1.0 x 10^{-8}	1.0 x 10^{-8}	1.0 x 10^{-8}	1.0 x 10^{-8}	1.0 x 10^{-8}
Compression Ratio — H_2	1.0 x 10^{-3}	1.0 x 10^{-5}	1.0 x 10^{-3}	7.0 x 10^{-3}	2.5 x 10^{-4}	6.0 x 10^{-3}	6.0 x 10^{-3}	6.0 x 10^{-3}
Inlet Flange	8" CF	10" CF	10" CF	10" CF	ISO250-F	ISO250-F	ISO250-F	ISO250-F
Foreline Flange	KF40	KF40	KF40	KF40	KF40	KF40	KF40	KF40
Ultimate Pressure Torr (mbar)	10^{-9} 10^{-9}	10^{-10} (5 x 10^{-8} for C version)	10^{-9} 10^{-9}	10^{-10} 10^{-9}	10^{-8}	10^{-10} 10^{-9}	10^{-10} 10^{-9}	10^{-10} 10^{-9}
Maximum Foreline Pressure — Torr (mbar)	2	0.1	2	2	3	2	2	2.66
Pump Weight — lbs. (kg)	86 (39)	68.4 (31)	86 (39)	77.2 (35)	134.5 (16)	165 (75)	—	231.5 (105)
Cooling Method	Water	Natural Convention (water cooling optional)	Water	Water	Water	Water	Water	Water
Orientation	Any	Any	Any	Any	Any	Any	Any	Any
Maximum Throughput (mbar l/s for N2)	—	—	—	—	1500	2300	2300	2800

Turn the page for continued Edwards STP Series info! ➤

Magnetically Levitated Pumps

Edwards STP Series

Pumps

Model	Inlet Flange	Part No.	Price
STP-iX455	6" CF	ED-PT640Z050	Call
STP-iX455	8" CF	ED-PT640Z060	Call
STP301	ISO100-K	ED-B74830020	Call
STP301	6" CF	ED-B74831010	Call
STP301C	ISO100-K	ED-B74871010	Call
STP301C	6" CF	ED-B74881010	Call
STP-L301	ISO100-K	ED-B75800090	Call
STP-L301	6" CF	ED-PT470Z000	Call
STP-L301C	ISO100-K	ED-B75800010	Call
STP-L301C	6" CF	ED-PT47AZ030	Call
STP603	ISO160-F	ED-B72102010	Call
STP603	8" CF	ED-PT390Z005	Call
STP603C	ISO160-F	ED-B72102020	Call
STP603C	8"CF	ED-PT39AZ002	Call
STP1003	ISO200-F	ED-PT390Z001	Call
STP1003	10" CF	ED-B72101040	Call
STP1003C	ISO200-F	ED-B72101030	Call
STP1003C	10" CF	ED-PT39AZ003	Call
STPH301C	ISO100-F	ED-B71901010	Call
STPH301C	6" CF	ED-PT340Z004	Call
STPH301CV (TMS)	ISO100-F	ED-PT3416001	Call
STPH301CV (TMS)	6" CF	ED-PT3416005	Call
STPH451C	ISO160-F	ED-B71901001	Call
STPH451C	8"CF	ED-PT340Z005	Call
STPH451CV (TMS)	ISO160-F	ED-PT3416007	Call
STPH451CV (TMS)	8"CF	ED-PT3416006	Call
STPA803C	ISO160-F	ED-B71801000	Call
STPA803C	8"CF	ED-B71805010	Call
STPA803CV (TMS)	ISO160-F	ED-PT3626000	Call
STPA803CV (TMS)	8"CF	ED-PT3626003	Call

Model	Inlet Flange	Part No.	Price
STPA1303C	ISO200-F	ED-B71802020	Call
STPA1303C	10" CF	ED-B71803000	Call
STPA1303CV (TMS)	ISO200-F	ED-PT3626005	Call
STPA1303CV (TMS)	10" CF	ED-PT3626004	Call
STPA1603C	ISO200-F	ED-B75100010	Call
STPA1603C	10" CF	ED-B75100100	Call
STPA1603CV (TMS)	ISO200-F	ED-PT4616004	Call
STPA1603CV (TMS)	10" CF	ED-PT4616005	Call
STPA2203C	ISO250-F	ED-PT4V0Z002	Call
STPA2203C	12" CF	ED-PT4V0Z003	Call
STPA2203CV (TMS)	ISO250-F	ED-PT4V66001	Call
STPA2203CV (TMS)	12" CF	ED-PT4V66002	Call
STP-XA2703C	ISO250-F	ED-PT660Z140	Call
STP-XA2703C	12" CF	ED-PT6610010	Call
STP-XA3203C	ISO250-F	ED-PT660Z050	Call
STP-XA3203C	12" CF	ED-PT660Z080	Call

Description:

iX — Integrated controller

C — Corrosive, semi-conductor rated

STPH — High throughput

STPA — Advanced high throughput

STP-X — High throughput and high flow for lighter gases

STP-L — Low vibration, for electron microscope and semicon

Accessories

Description	Compatible Pump(s)	Part No.	Price
SCU-800 Controller	STP603/1003 Series, STPH301/H451 Series , STPH803/H1303 Series, STPA803C/A1303 Series, STPA1603 Series	ED-PT49Z0Z00	Call
SCU-1500 Controller	STP-A2203/2503/2803/3003/3503, STP-F2203, STP-XA2703/3203, STP-XH2603/3203	ED-PT59Z0Z00	Call
SCU-1400 Controller	STP-A2203/2503/2803/3003/3503, STP-F2203, STP-XA2703/3203, STP-XH2603/3203	ED-YT72Z0Z00	Call
Connection Cable 5M	SCU-800, SCU-1500	ED-B75130020	Call
Power Cable 5M	SCU-800, SCU-1500	ED-PT49Y0A00	Call
Connection Cable 5M	SCU-1400	ED-B753030010	Call
Power Cable 5M	SCU-1400	ED-B753030020	Call

NOTE: Other cable lengths available please inquire.

➤ Turbo Single-Stage Pumps

Oerlikon Leybold Standard TMP TurboVac Series

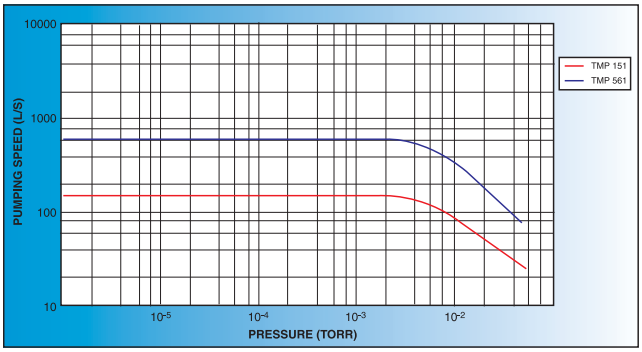
Features:

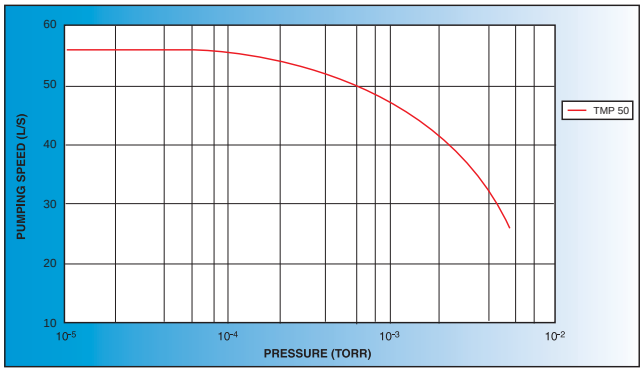
- Tapered blades reduce centrifugal force and are twisted to the optimum angle by a specially developed CNC machine
- Hub is machined from a forged, heat-treated billet of aluminum
- Grease-lubricated ceramic ball bearings

Grease-Lubricated Ceramic (Silicon Nitride) Ball Bearings:

- Lubricated with low-vapor pressure grease for entire service life
- Work in any mounting orientation
- No lubricant can enter the high-vacuum chamber, even if the pump is operated upside down
- Ceramic ball's low surface roughness, its hardness, and the fact that it can't micro-weld to the raceway improves the free running and longevity of the bearing
- Ball's low mass reduces centrifugal force, minimizing wear
- Lower expansion coefficient reduces the effects of temperature changes

REMAN PUMPS
See Pages 16-2–16-3.





Oerlikon Standard TMP TurboVac Series Specifications

Description	TMP50	TMP50	TMP151	TMP361	TMP361
Pumping Speed — (N_2, L/sec.)	33	55	145	345	400
Compression Ratio: N_2	2.0×10^7	2.0×10^7	1.0×10^9	1.0×10^9	1.0×10^9
Compression Ratio: He	5.0×10^2	5.0×10^2	2.0×10^4	2.0×10^4	2.0×10^4
Compression Ratio: H_2	1.0×10^2	1.0×10^2	8.0×10^2	8.0×10^2	8.0×10^2
Inlet Flange	KF40	ISO63-K or 4½" CF	ISO100-K or 6" CF	ISO100-K or 6" CF	ISO-K160 or 8" CF
Foreline Flange	KF16	KF16	KF25	KF25	KF25
Ultimate Pressure — Torr (mbar)	3.75×10^{-8} (5×10^{-8})	3.75×10^{-8} (5×10^{-8})	1×10^{-10} (1.3×10^{-10})	7.5×10^{-11} (1×10^{-10})	7.5×10^{-11} (1×10^{-10})
Pump Weight — lbs. (kg)	4.4 (2)	4.4 (2)	17 (8)	26 (12)	26 (12)
Maximum Foreline Pressure — Torr (mbar)	0.75×10^{-1} (1×10^{-1})	0.75×10^{-1} (1×10^{-1})	4×10^{-1} (5.3×10^{-1})	3.75×10^{-1} (5×10^{-1})	3.75×10^{-1} (5×10^{-1})
Minimum Pumping Speed of Backing Pump — CFM (m^3/hr.)	1.9 (3.3)	1.9 (3.3)	3 (5)	11.7 (19.8)	11.7 (19.8)
Cooling Method	Air or Water Available (cooling kits sold separately)	Air or Water Available (cooling kits sold separately)	Water Standard (air available)	Water Standard (air available)	Water Standard (air available)
Orientation	Any (360°)	Any (360°)	Any (360°)	Any (360°)	Any (360°)

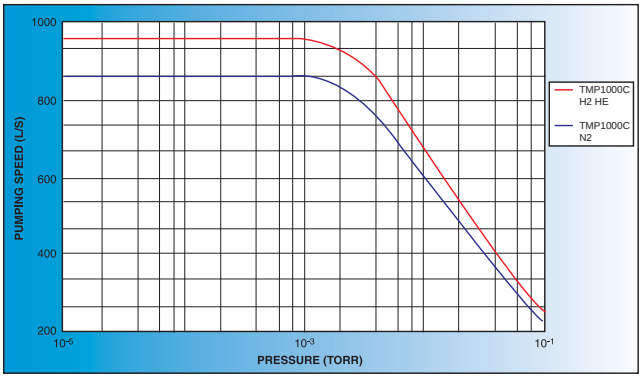
➤ Turbo Single-Stage Pumps

■ Oerlikon Leybold Chemical TMP Series

- TMP Chemical Series pumps are engineered for the aggressive environments of corrosive gas processes, such as reactive ion and ion beam etching and reactive sputtering

Oerlikon Chemical TMP Series Specifications

Description	TMP151C	TMP361C	TMP361C	TMP1000C	TMP1100C
Pumping Speed — (N_2, L/sec.)	145	345	400	1100	1050
Compression Ratio: N_2	1×10^9	1×10^9	1×10^9	1×10^9	1×10^5
Compression Ratio: He	2×10^4	2×10^4	2×10^4	5×10^4	N/A
Compression Ratio: H_2	8×10^2	3×10^3	3×10^3	2×10^3	1×10^4
Compression Ratio: Ar	8×10^2	8×10^2	8×10^2	2×10^3	1×10^4
Inlet Flange	ISO100-K or 6" CF	ISO100-K	ISO160-K	10" CF	ISO250-K
Foreline Flange	KF25	KF25	KF25	KF40	ISO63-K
Ultimate Pressure — Torr (mbar)	7.5×10^{-11} (1×10^{-10})	7.5×10^{-11} (1×10^{-10})	7.5×10^{-11} (1×10^{-10})	1×10^{-10} (1.3×10^{-10})	2.2×10^{-10} (3×10^{-10})
Pump Weight — lbs. (kg)	17 (8)	26 (12)	26 (12)	55 (25)	48 (22)
Maximum Foreline Pressure — Torr (mbar)	3.75×10^{-1} (5×10^{-1})	3.75×10^{-1} (5×10^{-1})	3.75×10^{-1} (5×10^{-1})	3.75×10^{-1} (5×10^{-1})	7.5×10^{-2} (1×10^{-1})
Minimum Pumping Speed of Backing Pump — CFM (m^3/hr.)	11.7 (19.8)	18.2 (30.8)	18.2 (30.8)	18.2 (30.8)	12.9 (22)
Cooling Method	Water Standard (air available)	Water Standard (air available)	Water Standard (air available)	Water Standard (air available)	Water Standard
Orientation	Any (360°)	Any (360°)	Any (360°)	Any (360°)	Any (360°)



Model	Pumps Inlet Flange	Part No.	Price
Standard (TMP Series)			
TMP50	KF40	LH-85400	**Call**
TMP50	ISO63-K	LH-85401	**Call**
TMP50	4½" CF	LH-85402	**Call**
TMP151	ISO100-K	LH-85631	**Call**
TMP151	6" CF	LH-85632	**Call**
TMP361	ISO100-K	LH-85670	**Call**
TMP361	ISO160-K	LH-85672	**Call**
TMP361	6" CF	LH-85671	**Call**
TMP361	8" CF	LH-85673	**Call**
Chemical (TMP Series)			
TMP151C	6" CF	LH-899252	**Call**
TMP151C	ISO100-K	LH-85635	**Call**
TMP361C	ISO100-K	LH-85675	**Call**
TMP361C	ISO160-K	LH-85677	**Call**
TMP1000C	10" CF	LH-11764	**Call**
TMP1100C	ISO250-K	LH800150V0032	**Call**

Description	Pump Accessories For Pump Model(s)	Part No.	Price
NT10 Controller (90–140 VAC)	TMP50	LH-85901	**Call**
TD20 Controller (100–240 VAC, 50/60 HZ)	TMP151, TMP361, TMP600, TMP1000, TMP1100	LH80075V005	**Call**
Interconnect Cable for:			
NT10 Controller to Pump (3 m)	TMP50	LH-12108	**Call**
NT10 Controller to Pump (5 m)	TMP50	LH-12109	**Call**
TD20 Controller to Pump (3 m)	TMP151, TMP361,TMP600, TMP1000, TMP1100	LH-85765	**Call**
TD20 Controller to Pump (5 m)	TMP151, TMP361, TMP600, TMP1000, TMP1100	LH-85766	**Call**
Water Cooling Kit	TMP50	LH-85408	**Call**
Air Cooling Kit:			
(110 VAC)	TMP50	LH-85406	**Call**
(110 VAC)	TMP151, TMP361	LH-89408	**Call**
(115 VAC)	TMP1000	LH-170016	**Call**
Vent Valve—115 VAC, 50/60 Hz (normally open/KF10 flanged)	All TMP Series Pumps	LH-899838	**Call**
Adaptive Viton Centering Ring for KF10 to KF16 Flange	All TMP Series Pumps	QF10-16-ASRV	**Call**
Power Cord for:			
TD20, US Plug, 118 VAC, 3 m	TMP151, TMP361,TMP600, TMP1000, TMP1100	LH99276513	**Call**
TD20, US Plug, 220 VAC, 3 m	TMP151, TMP361,TMP600, TMP1000, TMP1100	LH-800102V002	**Call**

➤ Turbo-Drag Hybrid Pumps

■ Oerlikon Leybold TurboVac SL Series

TurboVac SL 80

Technical Features:

- High pressure foreline tolerance
- Installation in any orientation

TurboVac SL 300

Technical Features:

- High pressure foreline tolerance
- Installation in any orientation
- Delayed venting through the frequency converter TURBO.CRIVE TD 400 (optional)
- Selection of interfaces, RS232 C, RS485 C, Profibus, Ethernet

TurboVac SL 700

Technical Features:

- Highest pumping speed in the DN 160 flange category
- Efficient convection cooling due to a large number of cooling fans
- Installation in any orientation
- Selection of interfaces, RS232 C, RS485 C, Profibus

Model	Pumps Inlet Flange	Part No.	Price
SL80	ISO63-K	LH-800002V3001	Call
SL300	ISO100-K	LH-800170V3005	Call
SL700	ISO160-K	LH-800051V3001	Call
SL80	4 1/2" CF	LH-800002V3002	Call
SL300	6" CF	LH-800170V3006	Call
SL700	8" CF	LH-800051V3002	Call

Oerlikon SL Series Specifications

Description	TurboVac SL80	TurboVac SL300	TurboVac SL700
Pumping Speed — (N_2, L/sec.)	65	270	690
Max Gas Throughput — N^2 (mbar*l/sec.)	2	2.9	5.6
Inlet Flange	4 1/2" CF	6" CF	8" CF
Foreline Flange	KF 16	KF 16	KF 16
Ultimate Pressure — Torr (mbar)	1.5×10^{-10} (2.0×10^{-10})	7.5×10^{-10} (1.0×10^{-9})	7.5×10^{-9} (1.0×10^{-8})
Maximum Foreline Pressure — Torr (mbar)	15(20)	6(8)	11.3 (15)
Pump Weight — lbs. (kg)	6.8 (3.1)	16.3 (7.4)	38.1 (17.3)
Minimum Recommended Pumping Speed of Backing Pump — CFM (m^3/hr.)	~2 (~3.3)	~3.5 (~6)	~9 (~15.5)
Cooling Method	Ambient Air (forced air and water cooling available)	Ambient Air (forced air and water cooling available)	Ambient Air (forced air and water cooling available)
Orientation	Any	Any	Any

Description	Compatible Pumps(s)	Part No.	Price
Electronic Frequency Converter, TD400	SL80, SL300	LH-80073V0002	Call
Electronic Frequency Converter, TD700	SL700	LH-80074V0001	Call
Mounting Bracket and Interconnect Cable, Side Mount	SL80	LH-800110V00005	Call
Mounting Bracket and Interconnect Cable, Side Mount	SL300	LH-800110V00006	Call
Mounting Bracket and Interconnect Cable, Side Mount	SL700	LH-800110V00007	Call
Power Supply and Controller, TURBO.CONTROL 300	SL80, SL300	LH-800100V0001	Call
Power Supply and cController, TURBO.CONTROL 700	SL700	LH-800101V0001	Call
Controller Power Cord, US Plug End	All Controllers	LH-99276513	Call
Controller Power Cord, UK Plug End	All Controllers	LH-800102V002	Call

Magnetically Levitated Pumps

Oerlikon Leybold MAG Series

Features:

- Lubricant-free, magnetically levitated rotor bearings make them completely oil-free when backed by a dry pump
- High foreline pressure tolerance gives them the ability to work with lower dry mechanical pumps
- Low pump profile designs for easy mounting
- High compression ratios for all gases
- Interactive rotor balancing ensures maximum uptime
- Self-tuning cables and frequency converters for ease of use
- Use extensively in applications requiring oil-free, ultra-clean, and ultra-high vacuums (corrosion-resistant version can also be used in corrosive gas production environments)
- Chemical series available for corrosive applications (LMC models)

Model	Inlet Flange	Part No.	Price
W300 iP	ISO100K	LH-410300V0505	Call
W400 iP	ISO160F	LH-410400V0505	Call
W600 iP	ISO160K	LH-410600V0505	Call
W600 iP	8" CF	LH-410600V0506	Call
W700 iP	ISO200K	LH-410700V0505	Call
W700 iP	10" CF	LH-410700V0506	Call
W1500CT	ISO200F	LH-400026V0002	Call
W1500CT	ISO250F	LH-400027V0002	Call
W830	8" CF	LH-400100V0041	Call
W830C	ISO160F	LH-400100V0005	Call
W1300	10" CF	LH-400110V0051	Call
W1300C	ISO250F	LH-400110V0021	Call
W2000C	12" CF	LH-400047V0001	Call
W2000CT	12" CF	LH-400047V0002	Call
W2200	12" CF	LH-400081V0061	Call
W2200C	12" CF	LH-400081V0021	Call
W2800	12" CF	LH-400006V0071	Call
W2800CT	ISO250F	LH-400000V0002	Call
W2800C	ISO250F	LH-400000V0001	Call
W3200CT	ISO320F	LH-400003V0002	Call

Oerlikon MAG Series Specifications

Description	W300P/300iP	W400P/400iP	W600P/600iP	W700P/700iP	W830	W830C	W1300	W1300C
Pumping Speed — (N_2, L/sec.)	300	365	550	590	900	700	1,170	1,220
Compression Ratio — N_2	2×10^9	2×10^9	2×10^9	2×10^9	1.5×10^8	5.0×10^7	1.5×10^8	1.0×10^8
Compression Ratio — H_2	3.2×10^3	3.2×10^3	3.2×10^3	3.2×10^3	NA	NA	NA	NA
Compression Ratio — He	9.2×10^4	9.2×10^4	9.2×10^4	9.2×10^4	NA	NA	NA	NA
Inlet Flange	6" CF	8" CF	8" CF	10" CF	8" CF	ISO160-F	10" CF	ISO250-F
Foreline Flange	KF16	KF16	KF25	KF25	KF40	KF40	KF40	KF40
Ultimate Pressure Torr (mbar)	10^{-10} (10^{-9})	10^{-10} (10^{-9})	10^{-10} (10^{-9})	10^{-10} (10^{-9})	7.5×10^{-11} (1.0×10^{-10})	7.5×10^{-9} (1.0×10^{-8})	7.5×10^{-11} (1.0×10^{-10})	7.5×10^{-9} (1.0×10^{-8})
Maximum foreline pressure — Torr (mbar)	6 (8)	6 (8)	4.5 (6)	6 (8)	0.15 (0.2)	1.5 (2)	0.15 (0.2)	1.5 (2)
Pump Weight — lbs. (kg)	26.5 (12)	26.5(12)	37.5 (17)	37.5 (17)	77.3 (35)	70.5 (32)	77.3 (35)	70.5 (32)
Cooling Method	Natural Convention (water cooling optional)	Natural Convention (water cooling optional)	Water	Water	Water	Water	Water	Water
Orientation	Any	Any	Any	Any	Any	Any	Any	Any

Description	1500CT	W1500CT	W2000C/W2000CT	W2200	W2200C	W2800	W2800C/W2800CT	W3200CT
Pumping Speed — (N_2, L/sec.)	1,220	1,220	1,650	1,800	2,000	2,400	2,650	3,200
Compression Ratio — N_2	$>1.0 \times 10^{-8}$	$>1.0 \times 10^{-8}$	$>1.0 \times 10^{-8}$	$>1.0 \times 10^{-8}$	$>1.0 \times 10^{-8}$	1.0×10^{-9}	1.0×10^{-8}	1.0×10^{-8}
Inlet Flange	ISO250-F	ISO250-F	ISO250-F	12" CF	ISO250-F	12" CF	ISO250-F	ISO320-F
Foreline Flange	KF40	—	KF40	KF40	KF40	KF40	KF40	KF40
Ultimate Pressure Torr (mbar)	7.5×10^{-9} 1.0×10^{-8}	7.5×10^{-9} 1.0×10^{-8}	7.5×10^{-9} 1.0×10^{-8}	7.5×10^{-11} 1.0×10^{-10}	7.5×10^{-9} 1.0×10^{-8}	7.5×10^{-11} 1.0×10^{-10}	7.5×10^{-9} 1.0×10^{-8}	7.5×10^{-9} 1.0×10^{-8}
Maximum Foreline Pressure — Torr (mbar)	1.2 (1.7)	1.95 (2.6)	2.6 (3.5)	1 (0.75)	1.5 (2)	2.25 (3)	1.5 (2)	1.5 (2)
Pump Weight — lbs. (kg)	70.5 (32)	70.5 (32)	150 (68)	132.5 (60)	106 (48)	165.5 (75)	141.5 (64)	141.0 (64)
Cooling Method	Water	Water	Water	Water	Water	Water	Water	Water
Orientation	Any	Any	Any	Any	Any	Any	Any	Any

➤ Turbo-Drag Hybrid Pumps

■ Pfeiffer Compact Turbo HiPace™

- Flexible designs enable customers to optimally match their specific applications to a specific pump model
- Integrated DC drive units and power supplies provide an added convenience by eliminating the guesswork often associated with purchasing a turbo pump setup

Features:

- High volumetric flow rate for light and heavy gases
- Rugged rotor bearing for reliability
- Water cooling
- Integrated sealing gas system to purge bearings
- Chemical versions available for corrosive gas handling (C models)

Pfeiffer Compact Turbo HiPace™ Specifications

Description	HiPace 10	HiPace 80	HiPace 300	HiPace300C	HiPace 400	HiPace 700	HiPace 1200/ 1200C	HiPace 1500/ 1500C	HiPace 1800/ 1800C	HiPace 2300/ 2300C
Pumping Speed — (N_2, L/sec.)	10	67	260	245	355	685	1,250	1,450	1,450	1,900
Compression Ratio — N_2	3.0×10^{-6}	1.0×10^{-11}	1.0×10^{-11}	1.0×10^{-6}	1.0×10^{-11}	1.0×10^{-11}	1.0×10^{-8}	1.0×10^{-8}	1.0×10^{-8}	1.0×10^{-8}
Compression Ratio — He	3.0×10^{-3}	1.3×10^{-7}	1.0×10^{-8}	2.2×10^{-3}	3.0×10^{-7}	3.0×10^{-7}	2.0×10^{-5}	2.0×10^{-5}	3.0×10^{-5}	3.0×10^{-5}
Compression Ratio — H_2	3.0×10^{-2}	1.4×10^{-5}	9.0×10^{-5}	3.0×10^{-2}	4.0×10^{-5}	4.0×10^{-5}	6.0×10^{-3}	6.0×10^{-3}	2.0×10^{-4}	2.0×10^{-4}
Compression Ratio — Ar	3.0×10^{-7}	1.0×10^{-11}	1.0×10^{-11}	1.0×10^{-7}	1.0×10^{-11}	1.0×10^{-11}	1.0×10^{-8}	1.0×10^{-8}	1.0×10^{-8}	1.0×10^{-8}
Inlet Flange	4 ½" CF	4 ½" CF	6" CF	6" CF	6" CF	8" CF	10" CF	12" CF	10" CF	12" CF
Foreline Flange	KF16	KF16	KF16	KF16	KF25	KF25	KF40	KF40	KF40	KF40
Ultimate Pressure Torr (mbar)	1.5×10^{-10} (2.0×10^{-10})	5.0×10^{-10} (6.6×10^{-10})	5.0×10^{-10} (6.6×10^{-10})	1.0×10^{-8} (1.3×10^{-8})	5.0×10^{-10} (6.6×10^{-10})	5.0×10^{-10} (6.6×10^{-10})	1.0×10^{-7} (1.3×10^{-7})	1.0×10^{-7} (1.3×10^{-7})	1.0×10^{-7} (1.3×10^{-7})	1.0×10^{-7} (1.3×10^{-7})
Maximum Foreline Pressure — Torr (mbar)	18.8 (25)	16.5 (22)	15 (20)	0.75 (1)	8.25 (11)	8.25 (11)	1.5 (2)	1.5 (2)	1.35 (1.8)	1.35 (1.8)
Pump Weight — lbs. (kg)	6.8 (3.1)	16.3 (7.4)	19.2 (8.7)	18.5 (8.4)	38.6 (17.5)	38.4 (17.4)	88.2 (40)	90.4 (41)	75 (34)	104 (47)
Cooling Method	Ambient Air (forced air and water cooling available)	Water (forced air cooling available)	Water (forced air cooling available)	Water (forced air cooling available)	Water (forced air cooling available)	Water (forced air cooling available)	Water (integrated)	Water (integrated)	Water (integrated)	Water (integrated)
Orientation	Horizontal Only	Any	Any	Vertical through 90 degrees, or 90 degrees through 180 degrees for upside down version	Any	Any	Vertical through 90 degrees, or 90 degrees through 180 degrees for upside down version	Vertical through 90 degrees, or 90 degrees through 180 degrees for upside down version	Vertical through 90 degrees, or 90 degrees through 180 degrees for upside down version	Vertical through 90 degrees, or 90 degrees through 180 degrees for upside down version
Maximum Throughput (mbar l/sec. for N_2)	0.15	1.3	14	17	6.5	6.5	20	20	20	20

Turn the page for continued Pfeiffer Compact Turbo (HiPace) info! ➤

➤ Turbo-Drag Hybrid Pumps

■ Pfeiffer Compact Turbo HiPace™ (continued)

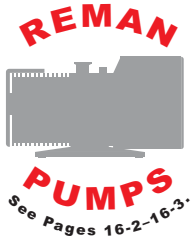
Model	Flange	Part No.	Price
HiPace 10	QF25	PMP03960	Call
HiPace 80	4.5" CF	PMP03941	Call
HiPace 300	ISO100F	PMP03902	Call
HiPace 300	6" CF	PMP03901	Call
HiPace 300C	ISO100F	PMP03907	Call
HiPace 400	ISO100F	PMP04025	Call
HiPace 400	6" CF	PMP04024	Call
HiPace 700	ISO160F	PMP03935	Call
HiPace 700	8" CF	PMP03934	Call
HiPace 1200	ISO200F	PMP03911	Call
HiPace 1200	10" CF	PMP03912	Call
HiPace 1200C	ISO200F	PMP03917	Call
HiPace 1200U (upside down version)	ISO200F	PMP03914	Call
HiPace 1200U (upside down version)	10" CF	PMP03915	Call
HiPace 1500	ISO250F	PMP04061	Call
HiPace 1500	12" CF	PMP04062	Call
HiPace 1500C	ISO250F	PMP04067	Call
HiPace 1500U (upside down version)	ISO250F	PMP04064	Call
HiPace 1500U (upside down version)	12" CF	PMP04065	Call
HiPace 1800	ISO200F	PMP04071	Call
HiPace 1800C	ISO200F	PMP04077	Call
HiPace 1800U (upside down version)	ISO200F	PMP04074	Call
HiPace 2300	ISO250F	PMP03921	Call
HiPace 2300	12" CF	PMP03922	Call
HiPace 2300C	ISO250F	PMP03927	Call
HiPace 2300U (upside down version)	ISO250F	PMP03924	Call

Description	Compatable Pump/Controller	Part No.	Price
DCU 110 Display Control Unit with Integrated Power Supply	HiPace 80	PMC01820	Call
Power Cable, 110 VAC	DCU110, DCU310, DCU400	P4564309ZE	Call
Connection cable, TC 110 to DCU110, 3 m Length	HiPace 80	PM061351-T	Call
TVF 005 Vent Valve	HiPace700	PMZ01290	Call
DCU310 Display Control Unit with Integrated power Supply	HiPace300	PMC01822	Call
Connection Cable, TC400 to DCU, 3 m Length	HiPace300, HiPace400, HiPace700	PM061352-T	Call
DCU400 Display Control Unit with Integrated Power Supply	HiPace400, HiPace700	PMC01823	Call
DCU002 Display Control Unit	HiPace1200, HiPace1500, HiPace1800, HiPace2300	PM061348-T	Call
Power Cable, 208 VAC	HiPace1200, HiPace1500, HiPace1800, HiPace2300	P4564039HB	Call

NOTE: The HiPace 80, 300, 400, and 700 have integrated on-board drive controllers, but no integrated power supply. The power supply is part of the associated DCU controller. The HiPace 1200, 1500, 1800, and 2300 have integrated on-board drive controllers and power supplies. This enables for the use of the DCU 002, a controller with no integrated power supply.

➤ Magnetically Levitated Pumps

■ Pfeiffer HiPace™ MC Turbopumps

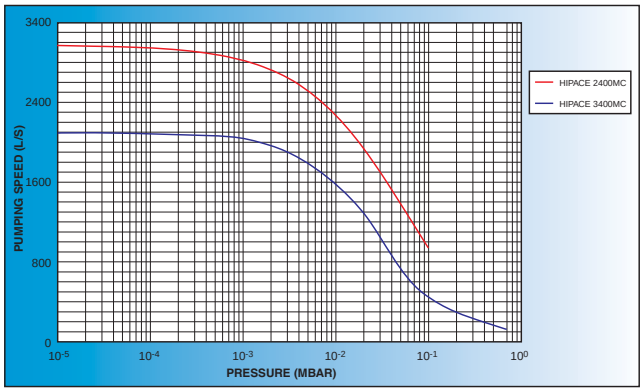


What is a HiPace MC?

- Magnetically levitated turbopump with integrated drive electronics

Advantages:

- Integrated drive electronics finally avoids cumbersome and costly cabling
- Suitable for industrial applications
- Inverted water cooling
- Highly reliable thanks to permanent rotor monitoring
- 5-axis active magnetic bearing
- Any desired installation orientation
- Coated rotors and integrated sealing gas valves make the HiPace MC pumps suitable for use with corrosive gases



Pfeiffer HiPace™ MC Turbopump Specifications

Description	HiPace 2400MC	HiPace 3400MC
Pumping Speed — (N_2, L/sec.)	2,100	2,950
Compression Ratio — N_2	1.0×10^9	1.0×10^9
Compression Ratio — He	2.0×10^5	4.0×10^5
Compression Ratio — H_2	1.0×10^4	4.0×10^4
Compression Ratio: Ar	1.0×10^9	1.0×10^9
Inlet Flange	12" CF	ISO320-F
Foreline Flange	KF40	KF40
Ultimate Pressure — Torr (mbar)	7.5×10^{-10} (1×10^{-9})	7.5×10^{-10} (1×10^{-9})
Maximum Foreline Pressure — Torr (mbar)	1.125 (1.5)	1.5 (2)
Cooling Method	Water	Water
Orientation	Any	Any

Model	Description	Flange	Part Number	Price
HiPace 2400MC	Includes Integrated Controller and On Board Power Supply	ISO250K	PMP03710	**Call**
HiPace 2400MC	Includes Iintegrated Controller and On Board Power Supply	ISO250F	PMP03711	**Call**
HiPace 2400MC	Includes Iintegrated Controller and On Board Power Supply	12" CF	PMP03712	**Call**
HiPace 3400MC	Includes Integrated TM3000 Drive Electronics; Power Supply, TPS1400, is Required and Must be Ordered Separately	ISO320F	PMP03501	**Call**

Description	Compatible Pumps	Part Number	Price
Power Cable, 208 VAC, NEMA 6-15 Plug End, 3 m	All MC Pumps	P4564309HB	**Call**
Power Cable, 230 VAC, Euro-style Safety Plug, 3 m	All MC Pumps	P4564309HA	**Call**
TSP 1400 Power Supply	HiPace 3400MC	PMC01760	**Call**
DCU 002 Display Control Unit	All MC Pumps	P061348-T	**Call**
Heating Jocket 230 VAC, Euro-style Safety Plug	HiPace 2400MC	PM061154-T	**Call**
Heating Jocket 208 VAC, NEMA 6-15 Plug End, 3 m	HiPace 2400MC	PM061155-T	**Call**

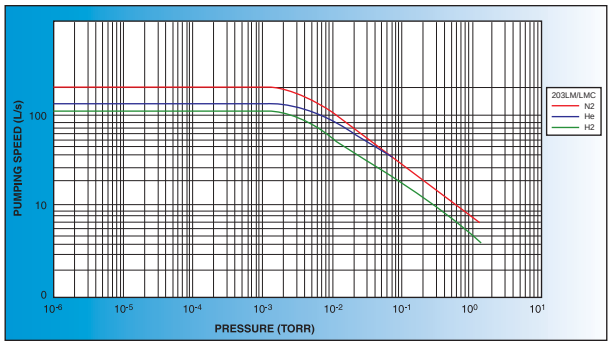
NOTE: These pumps are corrosive, Semi S2, F47, and E74 certified.

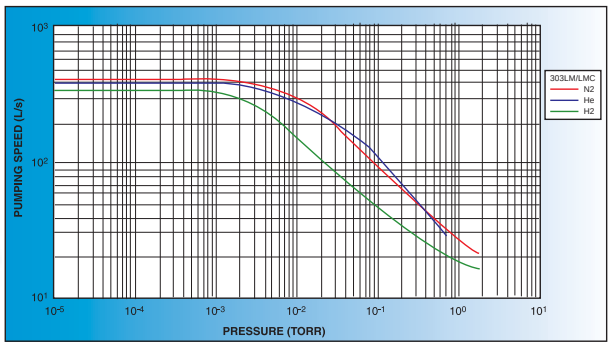
Magnetically Levitated Pumps

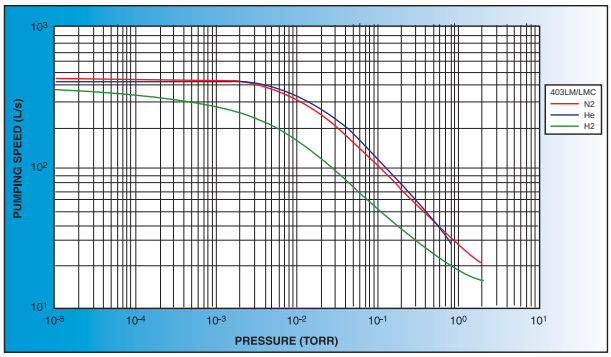
Shimadzu Mag-Lev—LM/LMC Series

Shimadzu's unique line of turbo molecular pumps combines the advantages of the high pumping speed associated with the turbo pump and the high foreline pressure acceptance of the drag pump. This unique blending of technologies results in a pump with much higher compression ratios than conventional turbo pumps, up to 10^{11} for N_2; and for some versions extends the fore-vacuum tolerance up to 30 Torr.

Their complete lack of hydrocarbon vapor, their reliability, their ability to accept particulate-laden gases, and their corrosion resistance are necessary requirements in the semiconductor process industry.







Features:

- Lubricant-free, magnetically levitated rotor bearings make them completely oil-free when backed by a dry pump
- High foreline pressure tolerance gives them the ability to work with lower cost dry mechanical pumps
- Low pump profile designs for easy mounting
- High compression ratios for all gases
- Interactive rotor balancing ensures maximum uptime
- Self-tuning cables and frequency converters for ease of use
- Use extensively in applications requiring oil-free, ultra-clean, and ultrahigh vacuums (corrosion-resistant version can also be used in corrosive gas production environments)
- Chemical series available for corrosive applications (LMC models)

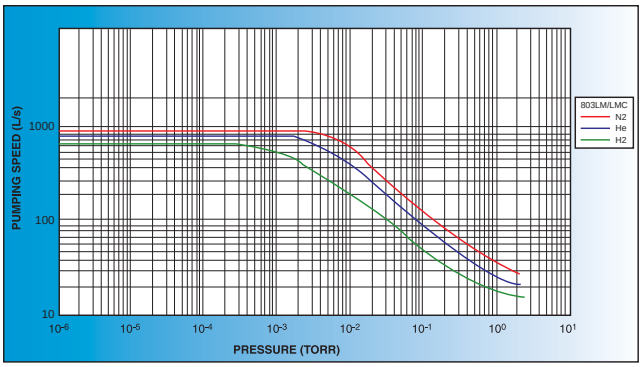
Applications:

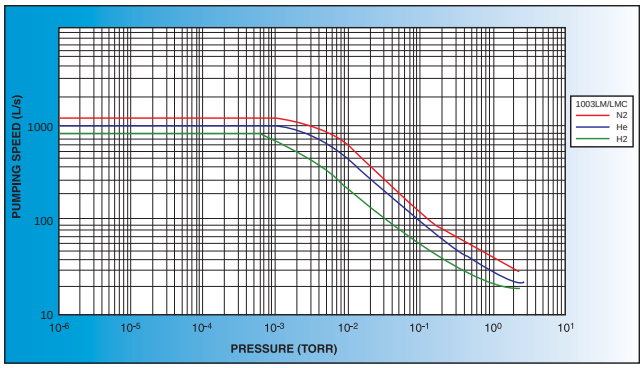
- Mass spectrometry
- SIMS
- Electron microscopy
- Surface science and analysis
- Special ultra-clean leak detection
- Particle accelerators
- Space simulation experiments
- Oxygen plasma etching processes
- Implant tools for semiconductor processes

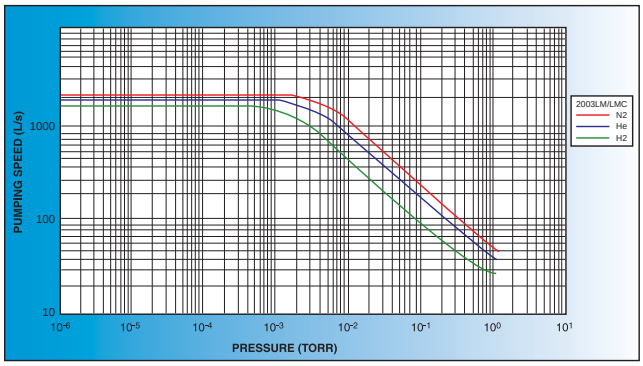
Shimadzu Mag-Lev LM/LMC Series Specifications

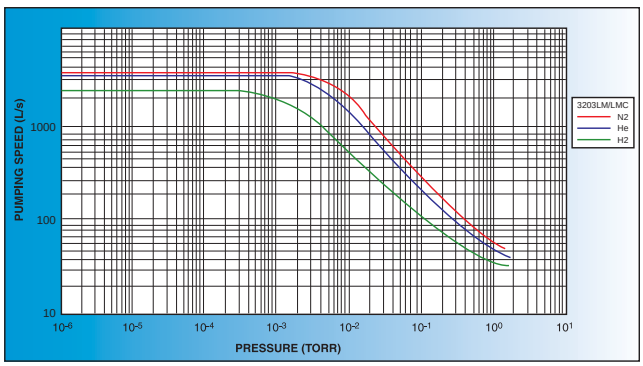
Description	203LM/LMC	303LM/LMC	403LM/LMC	803LM/LMC	1003LM/LMC	2003LM/LMC	3203LM/LMC
Pumping Speed — (N_2, L/sec.)	190	320	420	800	1,080	2,000	3,200
Compression Ratio — N_2	1.0×10^9	1.0×10^9	1.0×10^9	1.0×10^9	1.0×10^9	1.0×10^9	1.0×10^9
Compression Ratio — He	6.0×10^4	8.0×10^4	8.0×10^4	8.0×10^4	8.0×10^4	7.0×10^5	3.0×10^5
Compression Ratio — H_2	4.0×10^3	1.0×10^4	1.0×10^4	4.0×10^3	4.0×10^3	1.4×10^4	1.0×10^4
Inlet Flange	ISO100-K or 6" CF	ISO100-K or 6" CF	ISO160-K or 8" CF	ISO160-K or 8" CF	ISO200-F or 10" CF	ISO250-F or 12" CF	ISO320-F
Foreline Flange	KF25	KF25	KF25	KF40	KF40	KF40	KF40
Ultimate Pressure — Torr (mbar)	1×10^{-10} (1.3×10^{-10})	1×10^{-10} (1.3×10^{-10})	1×10^{-10} (1.3×10^{-10})	1×10^{-11} (1.3×10^{-11})	1×10^{-11} (1.3×10^{-11})	1×10^{-11} (1.3×10^{-11})	1×10^{-9} (1.3×10^{-9})
Pump Weight — lbs. (kg)	19.8 (9)	30.8 (14)	30.8 (14)	68.2 (31)	70.4 (32)	121 (55)	155 (70)
Maximum Foreline Pressure — Torr (mbar)	4 (5.3)	4 (5.3)	4 (5.3)	3 (4)	5 (6.6)	2 (2.6)	2 (2.6)
Minimum Pumping Speed of Backing Pump — CFM (m^3/hr.)	7 (12)	7 (12)	7 (12)	17.6 (29.9)	17.6 (29.9)	17.6 (29.9)	53 (90.1)
Cooling Method	Water	Water	Water	Water	Water	Water	Water
Orientation	Any (360°)	Any (360°)	Any (360°)	Any (360°)	Any (360°)	Any (360°)	Any (360°)

➤ Magnetically Levitated Pumps









Model	Pumps Voltage & Phases	Part No.	Price
TMP 203LM	6" CF	SM8144541	Call
TMP 203LM	ISO100-K	SM8144543	Call
TMP 203LMC	6" CF	SM8144551	Call
TMP 203LMC	ISO100-K	SM8144553	Call
TMP 303LM	6" CF	SM8143541	Call
TMP 303LM	ISO100-K	SM8143543	Call
TMP 303LMC	6" CF	SM8143551	Call
TMP 303LMC	ISO100-K	SM8143553	Call
TMP 403LM	8" CF	SM8145541	Call
TMP 403LM	ISO160-K	SM8145543	Call
TMP 403LMC	8" CF	SM8145551	Call
TMP 403LMC	ISO160-K	SM8145553	Call
TMP 803LM	8" CF	SM8145341	Call
TMP 803LM	ISO160-K	SM8145345	Call
TMP 803LMC	8" CF	SM8145351	Call
TMP 803LMC	ISO160-K	SM8145355	Call
TMP 1003LM	10" CF	SM8141041	Call
TMP 1003LM	ISO200-F	SM8141045	Call
TMP 1003LMC	10" CF	SM8141051	Call
TMP 1003LMC	ISO200-F	SM8141055	Call
TMP 2003LM	12" CF	SM8143941	Call
TMP 2003LM	ISO250-F	SM8143943	Call
TMP 2003LMC	12" CF	SM8143951	Call
TMP 2003LMC	ISO250-F	SM8143953	Call
TMP 3203LM	ISO320-F	SM7843043	Call
TMP 3203LMC	ISO320-F	SM7843053	Call

Description	Pump Accessories For Pump Model(s)	Part No.	Price
Power Supply			
EI-D 303/403M (110–120 VAC, 1-Øm 50/60 Hz)	203LM, 303LM, 403LM	SM7875801	Call
EI-D 303/403M (200–240 VAC, 1-Øm 50/60 Hz)	203LM, 303LM, 403LM	SM7875802	Call
EI-D 803/1003M (200–240 VAC, 1-Øm 50/60 Hz)	803LM, 1003LM	SM7868902	Call
EI-D 2003M (200–240 VAC, 1-Øm 50/60 Hz)	2003LM	SM7869102	Call
EI-D 3203M (200–240 VAC, 1-Øm 50/60 Hz)	3203LM	SM7868502	Call
Interconnect Cable for			
Power Supply to Pump (3 m)	All LM/LMC Series Pumps	SM7818703	Call
Power Supply to Pump (5 m)	All LM/LMC Series Pumps	SM7818705	Call
Power Supply to Pump (10 m)	All LM/LMC Series Pumps	SM7818710	Call
Power Supply to Pump (15 m)	All LM/LMC Series Pumps	SM7818715	Call
Power Supply to Pump (20 m)	All LM/LMC 803-3203 Series Pumps	SM7818720	Call
Motor Power Cable			
(3 m)	LM/LMC 803-3203	SM7640903	Call
(5 m)	LM/LMC 803-3203	SM7640905	Call
(10 m)	LM/LMC 803-3203	SM7640910	Call
(15 m)	LM/LMC 803-3203	SM7640915	Call
(20 m)	LM/LMC 803-3203	SM7640920	Call
Baking Heater			
(115V/100W)	LM/LMC 303-403	SM0014111	Call
(208V/200W)	LM/LMC 803-1003	SM7456918	Call
(208V/600W)	LM/LMC 2003-3203	SM7456915	Call
(115V/100W)	LM/LMC 203	SM0014101	Call

➤ Turbo-Drag Hybrid Pumps

■ Varian Turbo-V

- Wide pumping speed range: 70 to 690 l/sec.
- Very high foreline tolerance, foreline pressure as high as 18 mbar
- Controller “Plug & Pump” Ready-to-Use T-plus software
- With the 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, a well as check its temperature and gas load conditions. You can also monitor pump parameters over time, as well as do straightforward diagnostics directly on the vacuum system with a click of the mouse in the Windows® based environment
- Monolithic rotor
- The weight of the rotor is minimized, enabling installation of the pump in absolutely any position without compromising the pump performance
- The lighter the pump structure, the lower the stresses on the material and on the bearings themselves, resulting in longer pump life

*NOTE: Pump systems available; please contact **pumps@lesker.com** for pricing and details. Varian pumping systems include the pump, inlet screen, Navigator controller, mains cable, serial cable, sidemount bracket, and Navigator software*

*NOTE: Other flanges and SEM versions available; please contact us at **pumps@lesker.com** for more information.*

Model	Inlet Flange	Part No.	Price
Turbo-V 81-M	ISO63	V9698901	Call
Turbo-V 81-M	4½" CF	V9698903	Call
Turbo-V 81-M	KF40	V9698902	Call
Turbo-V 81-M	2¾" CF	V9698904	Call
Turbo-V 81-T	ISO63	V9698905	Call
Turbo-V 81-T	4½" CF	V9698907	Call
Turbo-V 81-T	KF40	V9698906	Call
Turbo-V 81-T	2¾" CF	V9698908	Call
Turbo-V 301	ISO100	V9698918	Call
Turbo-V 301	ISO160	V9698920	Call
Turbo-V 551	6" CF	V9698925	Call
Turbo-V 551	ISO160F	V9698944	Call
Turbo-V 701	10" CF	V9698945	Call

Description	Pump Accessories For Pump Model(s)	Part No.	Price
81-AG Controller with RS232/485	Turbo-V 81-M, Turbo-V 81-T	V9698989	Call
Turbo-V 301 Navigator Controller, 120/220 VAC	Turbo-V 301	V9698973	Call
Turbo-V 551 Navigator Controller, 120/220 VAC, 50/60 Hz	Turbo-V 551	V9698976	Call
Turbo-V 701 Navigator Controller, 120/220 VAC, 50/60 Hz	Turbo-V 701	V9698977	Call
Serial Cable and Software	Turbo-V 301 through Turbo-V 701	V9699883	Call
Mains Power Cable	Turbo-V 301 through Turbo-V 701	V9699958	Call

Varian Turbo-V Specifications

Description	Turbo-V 81 M	Turbo-V 81 T	Turbo-V 301 Navigator	Turbo-V 551 Navigator	Turbo-V 701 Navigator
Pumping Speed — (N_2, L/sec.)	77	77	280	550	690
Compression Ratio — N_2	5.0×10^8	7.0×10^8	7.0×10^8	1.0×10^9	1.0×10^9
Compression Ratio — He	8.0×10^4	3.0×10^3	1.0×10^5	1.0×10^7	1.0×10^7
Compression Ratio — H_2	7.0×10^3	3.0×10^2	1.0×10^4	1.0×10^6	1.0×10^6
Inlet Flange	4.5" CF	4.5" CF	8" CF	8" CF	10" CF
Foreline Flange	KF16	KF16	KF16	KF25	KF25
Ultimate Pressure — Torr (mbar)	3.75×10^{-10} (5.0×10^{-10})	3.75×10^{-9} (5.0×10^{-9})	3.75×10^{-10} (5.0×10^{-10})	7.5×10^{-11} (1.0×10^{-10})	7.5×10^{-11} (1.0×10^{-10})
Pump Weight — lbs. (kg)	6.6 (5)	5.9 (6.7)	17.6 (8)	51.6 (23.4)	54.2 (25.5)
Cooling Method	Ambient Air (Forced Air and Water Cooling Available)	Ambient Air (Forced Air and Water Cooling Available)	Ambient Air (Forced Air and Water Cooling Available)	Ambient Air (Water Cooling Available)	Ambient Air (Water Cooling Available)
Orientation	Any	Any	Any	Any	Any

➤ Pump Selection Guide

PUMP SPEED

The following chart is a quick-reference guide comparing the critical features of each model of our LION™ Series ion pumps. Refer to the corresponding product page for more detailed information on a particular pump model.

Model	Technology	Pumping Speed L/s (N_2)	Inlet Flange	See Page(s)
LION™ M	Noble Diode	0.2	DN 16, 1⅓" CFR	4-83 4-83
LION™ 3 	Diode	3	⅜" Copper Tube, 1⅓" CF, 2¾" CF	4-83
	Noble Diode	2		4-83
LION™ 10 	Diode	10	2¾" CF	4-83
	Noble Diode	8		4-83
LION™ 25 	Diode	20	DN 35, (2¾" CFF)	4-83
	Noble Diode	15		4-83
LION™ 45 	Diode	40	DN 63 (4¾" CFF)	4-83
	Noble Diode	35		4-83
LION™ 75 	Diode	75	DN 100 (6" CFF)	4-83
	Noble Diode	60		4-83
LION™ 101 	Diode	100	4½" CF	4-85
	Noble Diode	80		4-85
LION™ 153 	Diode	150	6" CF	4-87
	Noble Diode	120		4-87
LION™ 201 	Diode	200	6" CF	4-85
	Noble Diode	160		4-85

Kurt J. Lesker Company

➤ Pump Selection Guide

PUMP SPEED

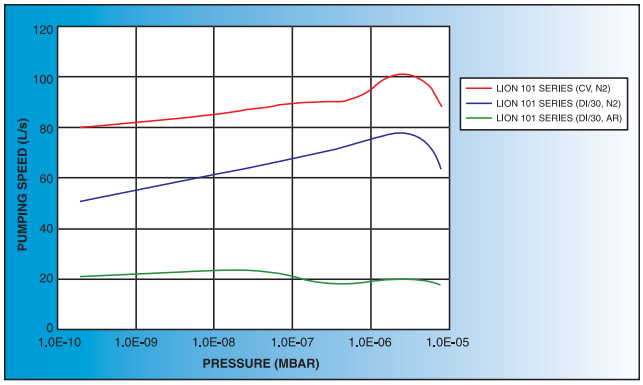
Model	Technology	Pumping Speed L/s (N_2)	Inlet Flange	See Page(s)
LION™ 303	Diode	300	8" CF	4-87
	Noble Diode	240		4-87
LION™ 301	Diode	300	8" CF	4-85
	Noble Diode	240		4-85
LION™ 401	Diode	400	8" CF	4-85
	Noble Diode	320		4-85
LION™ 402	Diode	400	8" CF	4-85
	Noble Diode	320		4-85
LION™ 601	Diode	600	8" CF	4-86
	Noble Diode	480		4-86
LION™ 602	Diode	600	8" CF	4-86
	Noble Diode	480		4-86
LION™ 603	Diode	600	DN 150 8" CFF	4-87
	Noble Diode	480		4-87
LION™ 802	Diode	800	8" CF	4-86
	Noble Diode	640		4-86
LION™ 1202	Diode	1,200	DN 150 8" CF	4-86
	Noble Diode	960		4-86

Small Footprint Ion Pumps

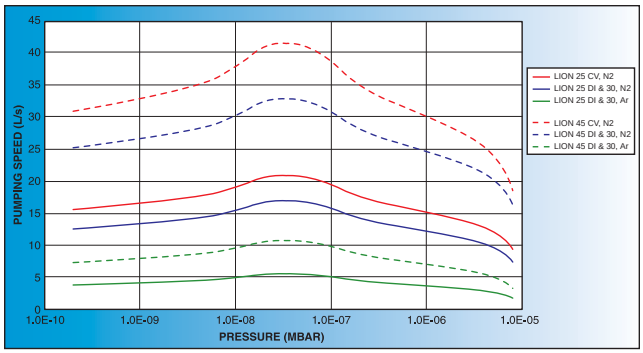
These pumps have the advantage of being mounted in any orientation without additional support.

- Each consists of a single pumping element or portions of an element
- Pumping of a single element remains constant throughout the range of these small pumps; however, conductance will vary based upon inlet port selection
- Can be retrofitted with Varian (old and new) style feedthrough for use with Varian controllers and cables

LION 10



LION 45



KJLC Small Footprint Ion Pump Specifications

Description	LION M	LION 3		LION 10		LION 25		LION 45		LION 75	
Pump Type	Noble Diode	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode
Nitrogen (N_2) Pumping Speed — L/sec.	0.2	3	2	10	8	20	15	40	35	75	60
Maximum Starting Pressure — Torr (mbar)	< 1 x 10^{-4}	< 1 x 10^{-4}		< 1 x 10^{-4}		< 1 x 10^{-4}		< 1 x 10^{-4}		< 1 x 10^{-4}	
Inlet Flange	1 1/3" Rotatable CF®	3/8" Cu Tube, 1 1/3" or 2 3/4" Rotatable CF, Horizontal or Vertical		2 3/4" Rotatable CF, Horizontal		2 3/4" or 4 1/2" Rotatable CF, Vertical		4 1/2" Rotatable CF, Horizontal or Vertical		6" Rotatable CF	
Ultimate Pressure — Torr (mbar)	< 10^{-11}	< 10^{-11}		< 10^{-11}		< 10^{-11}		< 10^{-11}		< 10^{-11}	
Pump Weight (with Ferrite Magnets) — lbs. (kg)	0.35 (0.8)	0.8 (0.35)		13 (6)		20 (9)		34 (16)		19 (42)	
Maximum Dimensions (L x W x H) — in. (mm)	2.0 x 1.65 x 1.86 (50.5 x 41.9 x 47.2)	8.2 x 8.9 x 5.1 (209 x 225 x 130)		1.8 x 1.8 x 4.3 (45 x 45 x 108)		8.2 x 8.9 x 5.1 (209 x 225 x 130)		4.2 x 4.4 x 7.5 (107 x 113 x 190)		10.9 x 9.53 x 5.12 (277 x 242 x 130)	

*ORDERING NOTE: See **pages 4-90 to 4-94** for controllers and cabling.*

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➤ KJLC® LION™ Series

*Choose the base unit, element type, feedthrough, bakeout heater, and Ti-Sub pump options. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: L010 D 2H S 1 N

Small Footprint Base Units	Part No. Prefix	Diode	Noble Diode
LION M	L00M	**N/A**	**Call**
LION 3	L003	**Call**	**Call**
LION 10	L010	**Call**	**Call**
LION 25	L025	**Call**	**Call**
LION 45	L045	**Call**	**Call**
LION 75	L075	**Call**	**Call**

*NOTE: Triode models available, please inquire at **pumps@lesker.com**.*

	Option Part No.	Additional Price	Compatible Pump(s)
Element Types			
Diode	D	**N/C** (included in base price above)	LION 3, LION 10, LION 25, LION 45, LION 75
Noble Diode	N	**N/C** (included in base price above)	All Small Footprint LION Series Pumps
Port Options			
3/8" Copper Tube	CU	**Call**	LION 3
1 1/3" CF (Horizontal)	1H	**N/C**	LION 3
1 1/3" CF (Vertical)	1V	**N/C**	LION M, LION 3
2 3/4" CF (Horizontal)	2H	**N/C**	LION 10, LION 45
2 3/4" CF (Vertical)	2V	**N/C**	LION 25, LION 45
4 1/2" CF (Vertical)	4V	**Call**	LION 25, LION 45, LION 75
4 1/2" CF & 2 3/4" CF Sideport	4D	**Call**	LION 45, LION 75
6" CF (Vertical)	6V	**Call**	LION 75
6" CF & 2 3/4" CF Sideport	6D	**Call**	LION 75
Feedthrough Options			
SAFECONN (New Style)	S	**N/C**	LION 10, LION 25, LION 45, LION 75
Perkin Elmer	P	**Call**	LION 25, LION 45, LION 75
Fisher	F	**Call**	LION 25, LION 45, LION 75
Varian StarCell®[1]	V	**Call**	LION 25, LION 45, LION 75
Old Varian Style[2]	O	**Call** for LION 3 and 10 **Call** for LION 25, 45, and 75	LION 3, LION 10, LION 25, LION 45, LION 75
5kV SHV	5	**N/C**	LION 3
Miini Feedthrough	M	**N/C**	LION M
Bakeout Heater Options			
None	N	**N/C**	
110 VAC Heater	1	(see table **below** for heater pricing)	LION 10, LION 25, LION 45, LION 75
208-240 VAC Heater	2	(see table **below** for heater pricing)	LION 10, LION 25, LION 45, LION 75
Ti-Sublimation Pump Option			
Not Available for Small Footprint Models	N	**N/A**	(none)

[1] New style has male nipple on top of feedthrough for interlock.

[2] Old style has female counter bore in tip of feedthrough (no interlock).

Bakeout Heater Options	Price
Bakeout Heater for LION 10	**Call**
Bakeout Heater for LION 25	**Call**
Bakeout Heater for LION 45	**Call**
Bakeout Heater for LION 75	**Call**

KJLC® LION™ Series

Low Profile Ion Pumps

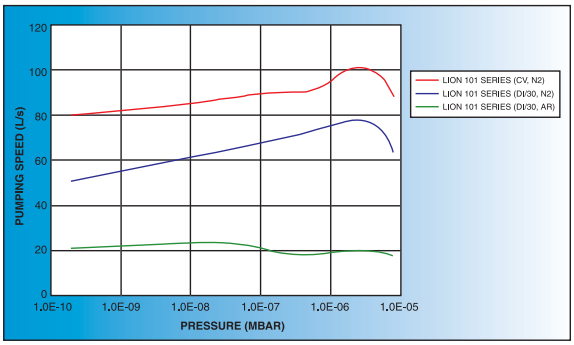
This unique space-saving design is achieved by orienting the elements vertically inside the body of the ion pump.

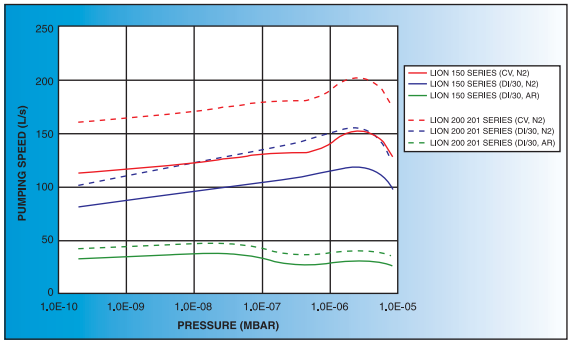
About Its Orientation:

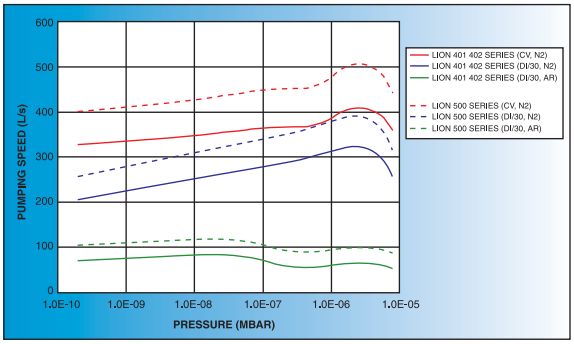
- Decreases the height of the ion pump to just under 12" (300 mm) for a single-port pump
- Creates a closed magnetic circuit that reduces stray magnetic fields by a factor of 10 near the ports of the ion pump

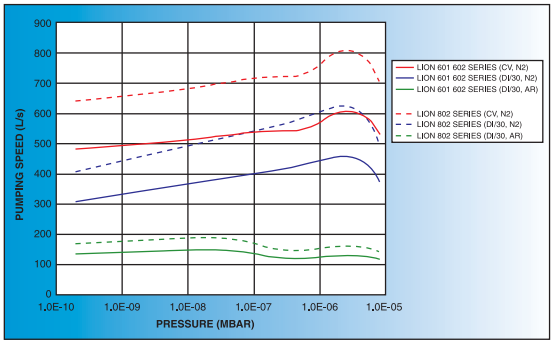
Additional Features:

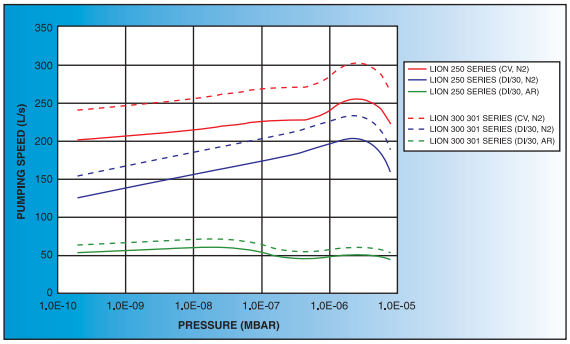
- Pumps can be configured with additional ports either on the opposite end or on the side of the pump body, enabling easy addition of a TSP system or alternative orientation on a UHV system
- Can be retrofitted with Varian (old and new) style feedthrough for use with Varian controllers and cables











Description	LION 101		LION 201		LION 301		LION 401		LION 402	
Pump Type	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode
Nitrogen (N_2) Pumping Speed — L/sec.	100	80	200	160	300	240	400	320	400	320
Maximum Starting Pressure — Torr (mbar)	< 1 x 10^{-4}		< 1 x 10^{-4}		< 1 x 10^{-4}		< 1 x 10^{-4}		< 1 x 10^{-4}	
Inlet Flange	6" or 8" CF, Single-Ended or Double-Ended		6" or 8" CF, Single-Ended or Double-Ended		8" CF, Single-Ended or Double-Ended		8" CF, Single-Ended or Double-Ended		8" CF Single-Ended, Double-Ended or 8" CF with 8" CF Sideport	
Ultimate Pressure — Torr (mbar)	< 10^{-11}		< 10^{-11}		< 10^{-11}		< 10^{-11}		< 10^{-11}	
Pump Weight (with Ferrite Magnets) — lbs. (kg)	65 (29)		112 (50)		145 (66)		148 (67)		210 (95)	
Maximum Dimensions (L x W x H) — in. (mm)	13 x 13 x 5 (32 x 325 x 128)		13 x 16 x 9 (325 x 413 x 233)		13 x 16 x 13 (325 x 413 x 325)		13 x 16 x 16 (325 x 413 x 413)		20 x 16 x 9 (527 x 413 x 233)	

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➤ KJLC® LION™ Series

*Choose the base unit, element type, feedthrough, bakeout heater, and Ti-Sub pump options. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: L201 N 6D S N C

Low Profile Base Units	Part No. Prefix	Diode	Noble Diode
LION 101	L101	**Call**	**Call**
LION 201	L201	**Call**	**Call**
LION 301	L301	**Call**	**Call**
LION 401	L401	**Call**	**Call**
LION 402	L402	**Call**	**Call**
LION 601	L601	**Call**	**Call**
LION 602	L602	**Call**	**Call**
LION 802	L802	**Call**	**Call**
LION 1202	L1202	**Call**	**Call**

*NOTE: Triode models available, please inquire at **pumps@lesker.com**.*

	Option Part No.	Additional Price	Compatible Pump(s)
Element Types			
Diode	D	**N/C** (included in base price above)	All Low Profile LION Series Pumps
Noble Diode	N	**N/C** (included in base price above)	All Low Profile LION Series Pumps
Port Options			
6" CF, Single-Ended	6S	**N/C**	LION 101, LION 201
6" CF, Double-Ended	6D	**Call**	LION 101, LION 201
8" CF, Single-Ended	8S	**N/C**	All Low Profile LION Series Pumps
8" CF, Double-Ended	8D	**Call**	All Low Profile LION Series Pumps
8" CF with 8" CF Sideport	8P	**Call**	LION 402, LION 602
Feedthrough Options			
SAFECONN SHV10 (Standard) (New Style)	S	**N/C**	All Low Profile LION Series Pumps
Perkin Elmer	P	**Call**	All Low Profile LION Series Pumps
Old Varian Style[1]	O	**Call**	All Low Profile LION Series Pumps
New Varian Style[2]	V	**Call**	All Low Profile LION Series Pumps
Fisher	F	**Call**	All Low Profile LION Series Pumps
Bakeout Heater Options			
None	N	**N/C**	All Low Profile LION Series Pumps
110 VAC Heater	1	(see table **below** for heater pricing)	All Low Profile LION Series Pumps
208-240 VAC Heater	2	(see table **below** for heater pricing)	All Low Profile LION Series Pumps
Ti-Sublimation Pump Option[3]			
None	N	**N/C**	All Low Profile LION Series Pumps
Ti-Sub Pump with Ambient Sputter Shield	A	**Call**	LION 201, LION 301, LION 401, LION 402, LION 601, LION 602, LION 802, LION 1202
Ti-Sub Pump with Cryoshroud	C	**Call**	LION 201, LION 301, LION 401, LION 402, LION 601, LION 602, LION 802, LION 1202

[1] Old style has female counter bore in tip of feedthrough (no interlock).
[2] New style has male nipple on top of feedthrough for interlock.
[3] Requires Double-Ended or Sideport Option.

*ORDERING NOTE: See **pages 4-90 to 94** for controllers and cabling.*

KJLC Low Profile Ion Pump Specifications

Description	LION 601		LION 602		LION 802		LION 1202	
Pump Type	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode
Nitrogen (N_2) Pumping Speed — L/sec.	600	480	600	480	800	640	1200	960
Maximum Starting Pressure — Torr (mbar)	$< 1 \times 10^{-4}$		$< 1 \times 10^{-4}$		$< 1 \times 10^{-4}$		$< 1 \times 10^{-4}$	
Inlet Flange	8" CF®, Single-Ended or Double-Ended		8" CF Single–Ended, Double-Ended or 8" CF with 8" CF Sideport		8" CF, Single-Ended or Double-Ended		8" CF, Single-Ended or Double-Ended	
Ultimate Pressure — Torr (mbar)	$< 10^{-11}$		$< 10^{-11}$		$< 10^{-11}$		$< 10^{-11}$	
Pump Weight (with Ferrite Magnets) — lbs. (kg)	266 (103)		270 (122)		280 (127)		206 (452)	
Maximum Dimensions (L x W x H) — in. (mm)	13 x 20 x 20 (325 x 513 x 513)		20 x 16 x 13 (513 x 413 x 325)		20 x 16 x 16 (513 x 413 x 413)		25.6 x 20.2 x 20.2 (650 x 513 x 513)	

Bakeout Heater Options	Price
Bakeout Heater for LION 101	**Call**
Bakeout Heater for LION 201	**Call**
Bakeout Heater for LION 301	**Call**
Bakeout Heater for LION 401	**Call**
Bakeout Heater for LION 402	**Call**
Bakeout Heater for LION 601	**Call**
Bakeout Heater for LION 602	**Call**
Bakeout Heater for LION 802	**Call**
Bakeout Heater for LION 1202	**Call**

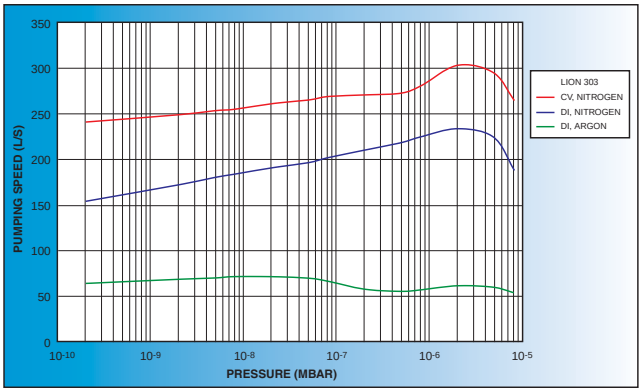
Tall Profile Ion Pumps

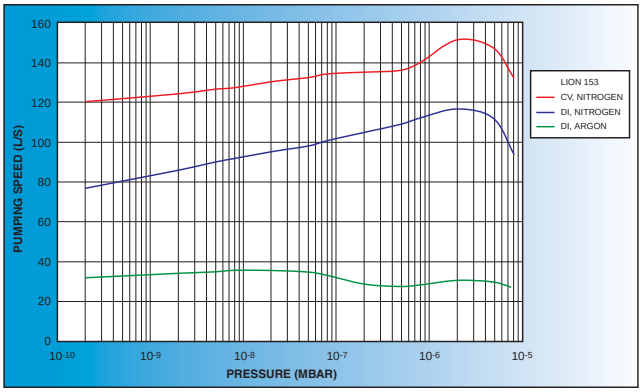
Unique design enables these pumps to fit in narrow areas by orienting the pumping elements horizontally inside the body of the ion pump.

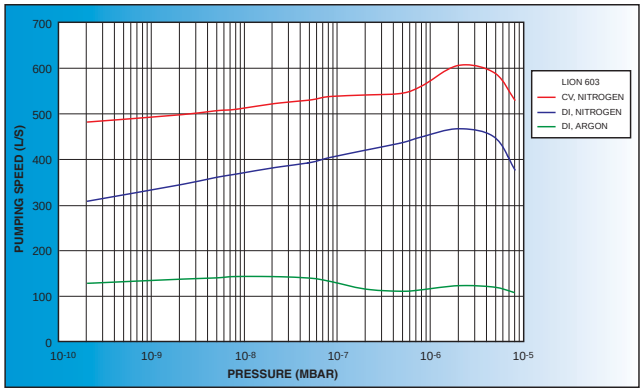
- Height of pump style fluctuates with the pumping speed, but the width remains consistently below 10" (250 mm)
- Pumps can be configured with additional ports either on the opposite end or on the side of the pump body, enabling easy addition of a TSP or NEG system or alternative orientation on a UHV system
- Similar dimensions to Varian Vaclon™ Plus pumps
- Can be retrofitted with Varian (old and new) style feedthrough for use with Varian controllers and cables

LION 153

LION 303







KJLC Tall Profile Ion Pump Specifications

Description	LION 153		LION 303		LION 603	
Pump Type	Diode	Noble Diode	Diode	Noble Diode	Diode	Noble Diode
Nitrogen (N_2) Pumping Speed — L/sec.	150	120	300	240	600	480
Maximum Starting Pressure — Torr (mbar)	< 1 x 10^{-4}		< 1 x 10^{-4}		< 1 x 10^{-4}	
Inlet Flange	6" CF Single-Ended, Double-Ended or 6" CF with 8" CF Sideport		8" CF Single-Ended, Double-Ended or 8" CF with 8" CF Sideport		8" CF Single-Ended, Double-Ended or 8" CF with 8" CF Sideport	
Ultimate Pressure — Torr (mbar)	< 10^{-11}		< 10^{-11}		< 10^{-11}	
Pump Weight (with Ferrite Magnets) — lbs. (kg)	79 (36)		145 (66)		109 (243)	
Maximum Dimensions (L x W x H) — in. (mm)	13.3 x 9.7 x 9 (338 x 247 x 231)		13.6 x 17.7 x 9 (345 x 450 x 231)		20.7 x 17.7 x 12 (526 x 450 x 305)	

Kurt J. Lesker Company

➤ KJLC® LION™ Series

*Choose the base unit, element type, feedthrough, bakeout heater, and Ti-Sub pump options. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: L603 D 8D S 2 A

Tall Profile Base Units	Part No. Prefix	Diode	Noble Diode
LION 153	L153	**Call**	**Call**
LION 303	L303	**Call**	**Call**
LION 603	L603	**Call**	**Call**

*NOTE: Triode models available, please inquire at **pumps@lesker.com**.*

	Option Part No.	Additional Price	Compatible Pump(s)
Element Types			
Diode	D	**N/C** (included in base price above)	All Tall Profile LION Series Pumps
Noble Diode	N	**N/C** (included in base price above)	All Tall Profile LION Series Pumps
Port Options			
6" CF, Single-Ended	6S	**N/C**	LION 153
6" CF, Double-Ended	6D	**Call**	LION 153
6" CF with8" CF Sideport	6P	**Call**	LION 153
8" CF, Single-Ended	8S	**N/C**	LION 303, LION 603
8" CF, Double-Ended	8D	**Call**	LION 303, LION 603
8" CF with 8" CF Sideport	8P	**Call**	LION 303, LION 603
Feedthrough Options			
SAFECONN (New Style)	S	**N/C**	All Tall Profile LION Series Pumps
Perkin Elmer	P	**Call**	All Tall Profile LION Series Pumps
Fisher	F	**Call**	All Tall Profile LION Series Pumps
Varian StarCell®[1]	V	**Call**	All Tall Profile LION Series Pumps
Old Varian[2]	O	**Call**	All Tall Profile LION Series Pumps
Bakeout Heater Options			
None	N	**N/C**	All Tall Profile LION Series Pumps
110 VAC Heater	1	(see table for heater pricing)	All Tall Profile LION Series Pumps
208–240 VAC Heater	2	(see table for heater pricing)	All Tall Profile LION Series Pumps
Ti-Sublimation Pump Option			
None	N	**N/C**	All Tall Profile LION Series Pumps
Ti-Sub Pump with Ambient Sputter Shield	A	**Call**	All Tall Profile LION Series Pumps
Ti-Sub Pump with Cryoshroud	C	**Call**	All Tall Profile LION Series Pumps

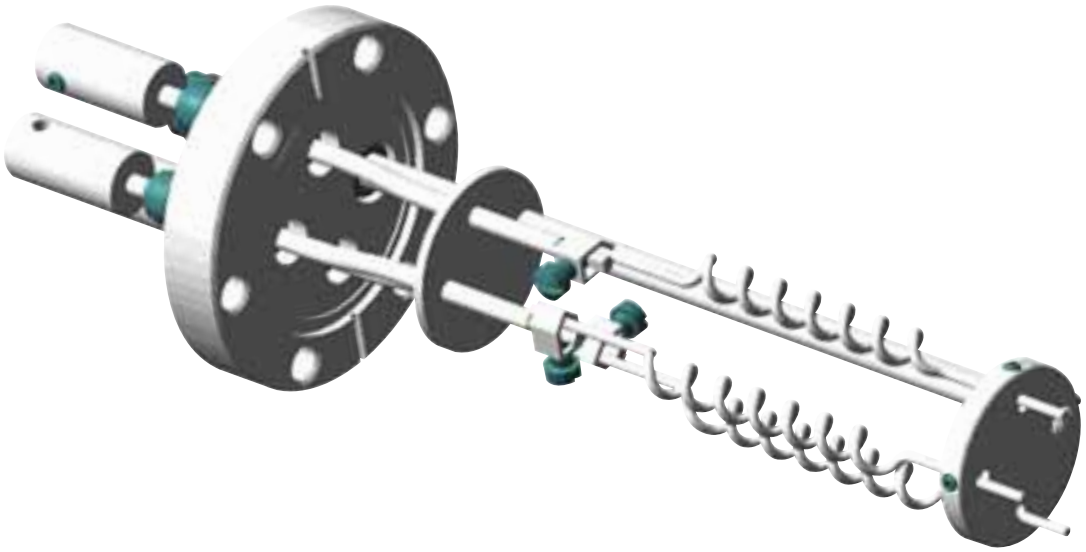
[1] New style has male nipple on top of feedthrough for interlock.
[2] Old style has female counter bore in tip of feedthrough (no interlock).

*ORDERING NOTE: See **pages 4-90 to 94** for controllers and cabling.*

Bakeout Heater Options	Price
Bakeout Heater for LION 153	**Call**
Bakeout Heater for LION 303	**Call**
Bakeout Heater for LION 603	**Call**

Ti-Sublimation Pumps

These Titanium Sublimation Pumps (TSPs) are offered as an integrated package when ordering our ion pumps.



- Excellent complement to our ion pump technology
- Can be mounted inside a majority of our ion pumps
- Unique spiral filament design enhances sublimation and lifetime
- Cryoshroud and ambient sputter shield offer substantial surface area for titanium adherence

*NOTE: Please refer to one of our three series of LION pumps for titanium sublimation pump ordering information. Spare filament for our TSPs sold **below**.*

Description	Part No.	Price
TSP Filament Kit (12/Kit)	LTSP-FILKIT	Call
Titanium Sublimation Pump (TSP)	LTSP	Call
Ambient Sputter Shield	LTSP-AS	Call
Liquid Sputter Shield	LTSP-CA	Call

*Choose the cable length for TSP Interconnect Cables to Controller. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: LTSP 15

	Part No. Prefix	Base Price
TSP Interconnect Cables to Controller		
LION TSP Communications Cable	LTSP	
	Option Part No.	**Additional Price**
Cable Length		
10 ft. (3 m)	03	Call
20 ft. (6 m)	06	Call
50 ft. (15 m)	15	Call

SPECIFICATIONS

Titanium Sublimation Pump

Filament Material — 85% titanium, 15% molybdenum
Filament Length (Total) [mm (in.)] — 219 (8.6)
Filament Length (Coiled) [mm (in.)] — 117 (4.6)
Filament Weight (grams) — 3.1-3.5
Filament Lifetime (hours) — 20, conditional operation
Maximum Current (amps) — 50 @ 8 VDC
Filaments per TSP — 3
Assembly Weight [kg (lbs.)] — 1 (2.2)

Ambient Sputter Shield

Surface Area [sq. mm (sq. in.)] — 132,000 (205)
Mounting Flange — NW 150 CFF (8")
Weight [kg (lbs.)] — 6 (13)

Liquid Cryoshroud

Surface Area [sq. mm (sq. in.)] — 88,000 (138)
Mounting Flange — NW 150 CFF (8")
Liquid Volume (liters) — 1.15
Weight [kg (lbs.)] — 8 (17.5)

➤ KJLC® LION™ Series—Controllers and Accessories

■ Small Pump Controller—SPCe Series

From low vacuum starts to unexpected vacuum events, an ion pump controller needs to deliver power from microamps to tens of milliamps at operational voltages. Our LION Series Controllers are capable of delivering the critical power needed to an ion pump while precisely monitoring the vacuum environment when power requirements are minimal in order to react within milliseconds to a situation. Critical reactant controls include varying power, shutting down the pump to avoid damage, and sending preprogrammed commands through various communications protocols.

Features:

- Provides a cost-effective solution for pumps <40 L/sec., or for operating larger pumps if thoroughly roughed or previously started
- Performs all startup, control, and monitor functions
- Microprocessor-based design provides flexibility and enables user to do several things at the same time
- Contains a programmable process control relay set point, a communications interface, and one high-voltage module
- Design—1/4 rack, 3.5" (2U) high design
- Can be configured to control Varian ion pumps
- CE listed

*Choose the input voltage, communications protocol, and polarity. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: LS 33P

Controllers Base Unit	Base Part No. Prefix	Base Price
LION Small Pump Controller	LS	Call
	Option Part No.	**Base Price**
Input Voltage		
US 110 VAC	1	Call
US 220 VAC	2	Call
EC 230 VAC	3	Call
UK 240 VAC[1]	4	Call
AU 230 VAC	5	Call
Communications		
RS232	2	N/C
RS422 (Apple®)	3	N/C
RS485	4	N/C
Polarity	3	N/C
Positive[2]	P	N/C
Negative[3]	N	Call

[1] The United Kingdom will soon be harmonizing with EC 230 VAC.
[2] All LION and Varian Diode/Noble Diode Pumps.
[3] Varian StarCell® or Triode.

KJLC SPCe Series Specifications

Description	LION SPCe Small Pump Controller
Maximum Number Pumps Can Operate	1
Recommended Maximum Pump Size — L/sec.	75
Input Voltage	110, 240 VAC, 24 VDC
Dimensions (H x W x D) — in. (mm)	3.4 x 5.6 x 8.2 (85.3 x 142.4 x 208)
Output Voltage (Open Circuit)	± 3.5 kV-7 kV, Programmable
Output Current (Short Circuit)	40 mA
Power (Maximum)	40 W
High Voltage Connector	1 King Type 1064-I
Front Panel Display	LED Digital Pressure (Pascal, mbar, Torr) Current Voltage
Output	Analog, 0 to 7 VDC Linear Proportional to Voltage; Analog, 0 to 15 VDC Linear Proportional to Current
Communications	RS232 (Standard), RS422, RS485, Ethernet
Weight — lbs. (kg)	3.3 (1.5)

Pump Accessories		
Description	Part No.	Price
19" Rackmount Kit	LS-19RACK	Call
110–240 VAC to 24 VDC Adapter*	LS24VDCADAPT	Call
24 VDC Adapter Panel Mount Plug Kit	LS-24VDCKIT	Call

*Included with all LION small pump (SPCe Series) controllers except 24 VDC only unit.

➤ KJLC® LION™ Series—Controllers and Accessories

Large Pump Controller—LPC Series

Large Pump Controller (LPC Series)

- Designed to be a low-cost, compact, yet very flexible ion pump controller
- Can operate up to four ion pumps simultaneously
- Can monitor pressure for one pump independently
- Contains a microprocessor, eight programmable set points and relays, RS communication interface, and one high-voltage module
- Design—half 19" rack, 5.25" (3U) high design
- Available with 120V or 220V inputs
- CE listed

*Choose the input voltage, communications protocol, TSP control, pump size, polarity, output connector, and number of pumps. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: LL52 NF 2

	Part No. Prefix	Base Price
LION Large Pump Controller	LL	Call
	Option Part No.	**Base Price**
Input Voltage		
US 110 VAC	1	N/C
US 220 VAC	2	N/C
EC 230 VAC	3	N/C
UK 240 VAC[1]	4	N/C
AU 230 VAC	5	N/C
Communications		
RS-232	2	N/C
RS-422 (Apple®)	3	N/C
RS-485	4	N/C
Ethernet	5	Call
Polarity		
Positive[2]	P	N/C
Negative[3]	N	N/C
Output Connector		
King SHV-10[4]	K	N/C
Fischer[5]	F	N/C
Number of Pumps		
1 LION Pump	1	N/C
2 LION Pumps	2	Call
3 LION Pumps	3	Call
4 LION Pumps	4	Call

[1] The United Kingdom will soon be harmonizing with EC 230 VAC.
[2] All LION and Varian Diode/Noble Diode Pumps.
[3] Varian StarCell® or Triode.
[4] Standard on LION and some Varian MiniVac and MicroVac controllers.
[5] Standard on Varian Dual and MiniVac and some MiniVac and MicroVac controllers. Optional on LION controllers.

Pump Accessories		
Description	Part No.	Price
19" Rackmount Kit	LL-19RACK	Call

KJLC LPC Series Specifications

Description	LION LPC Large Pump Controller
Maximum Number Pumps Can Operate	4
Recommended Maximum Pump Size — L/sec.	800
Input Voltage	110, 200–250 VAC, Factory Set
Dimensions (H x W x D) — in. (mm)	½ Standard Rack, 7 x 8.3 x 17.3 (177 x 211.4 x 440)
Output Voltage (Open Circuit)	± 5.6 kV, ± 7 kV (± 7 kV standard)
Output Current (Short Circuit)	100 mA, Factory Set
Power (Maximum)	200 W, Factory Set
High Voltage Connector	1–4 King Type 1064-I or Fischer Type 105
Front Panel Display	10 Line Touch Screen Pressure (Pascal, mbar, Torr) Current Voltage
Output	Analog, 0 to 7 VDC Linear Proportional to Voltage Analog, 0 to 10 VDC Logarithmic Proportional to Current
Communications	RS232 (Standard), RS422, RS485, Ethernet
Weight — lbs. (kg)	19 (8.4)

NOTE: 5,600V supply voltages and Remote High Voltage Enable Options are available upon request.

Kurt J. Lesker Company

➤ KJLC® LION™ Series—Controllers and Accessories

Multi-Pump Controller—MPC Series

From low vacuum starts to unexpected vacuum events, an ion pump controller needs to deliver power from microamps to hundreds of milliamps at operational voltages. Our LION Series Controllers are capable of delivering the critical power needed to an ion pump while precisely monitoring the vacuum environment when power requirements are minimal in order to react within milliseconds to a situation. Critical reactant controls include varying power, shutting down the pump to avoid damage, and sending preprogrammed commands through various communications protocols.

Features:

- Designed for maximum user flexibility
- Can monitor pressure for up to two pumps independently
- Can simultaneously operate up to four ion pumps and two Titanium Sublimation Pumps (TSP) or Non-Evaporable Getter (NEG) pumps
- Contains a microprocessor, eight programmable set points, RS communication interface, and two high-voltage modules
- Design—full 19" rack, 5.25" (3U) high
- Available with 120V or 220V inputs
- Can be configured to control Varian ion pumps
- CE listed

NOTE: 5,600V supply voltages and Remote High Voltage Enable Options are available upon request.

*Choose the base unit, input voltage, communications protocol, TSP control, pump size, polarity, output connector, and number of pumps. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: LM33 15 PK 3

	Part No. Prefix	Base Price
Base Unit for 1 or 2 Pumps	LM	Call
Base Unit for 3 or 4 Pumps[1]	LM2	Call
	Option Part No.	**Additional Price**
Input Voltage		
US 110	1	N/C
US 220	2	N/C
EC 230	3	N/C
UK 240[2]	4	N/C
AU 230	5	N/C
Communications		
RS232	2	N/C
RS422 (Apple®)	3	N/C
RS485	4	N/C
Ethernet	5	Call
TSP Control		
No TSP Controller	N	N/C
1 TSP Controller Installed[3]	1	Call
2 TSP Controllers Installed[4]	2	Call
Pump Size		
Use for Pumps < 300 L/sec.	1	N/C
Use for Pumps > 300 L/sec.	5	N/C
Polarity		
Positive[5]	P	N/C
Negative[6]	N	N/C
Output Connector		
King SHV-10[7]	K	N/C
Fischer[8]	F	N/C
Number of Pumps		
1 LION Pump	1	N/C
2 LION Pumps	2	Call
3 LION Pumps	3	Call
4 LION Pumps	4	Call

[1] You can operate up to 4 pumps off of a single High Voltage Section. Controller will start each pump in order to have enough power. You can use the second section to specify a Negative Polarity in order to operate 1 or 2 Varian StarCell® pumps and 1 or 2 Diode or Noble Diode pumps using the same controller.

[2] The United Kingdom will soon be harmonizing with EC 230 VAC.

[3] Includes Remote TSP Controller and 10 ft. (3 m) Controller-to-TSP Cable. Required TSP Communications Cable sold separately.

[4] Includes (2) Remote TSP Controllers and (2) 10 ft. (3m) Controller-to-TSP Cables. Required TSP Communications Cables sold separately.

[5] All LION and Varian Diode/Noble Diode Pumps.

[6] Varian StarCell® Pumps.

[7] Standard on LION and some Varian MiniVac and MicroVac controllers.

[8] Standard on Varian Dual and MiniVac, and some MiniVac and MicroVac controllers. Optional on LION controllers.

KJLC MPC Series Specifications

Description	LION MPC Multi-Pump Controller
Maximum Number Pumps Can Operate	4 + 2 TSP
Recommended Maximum Pump Size — L/sec.	1200
Input Voltage	110, 200–250 VAC, Factory Set
Dimensions (H x W x D) — in. (mm)	19" Standard Rack, 5.2 x 19 x 17.4 (132.5 x 482.6 x 441.3)
Output Voltage (Open Circuit)	± 5.6 KV, ± 7 kV
Output Current (Short Circuit)	100, 500 mA, Factory Set
Power (Maximum)	1,000 W, Factory Set
High Voltage Connector	1–4 King Type 1064-I or Fischer Type 105
Front Panel Display	10 Line Touch Screen Pressure (Pascal, mbar, Torr) Current Voltage
Output	Analog, 0 to 7 VDC Linear Proportional to Voltage; Analog, 0 to 10 VDC Logarithmic Proportional to Current
Communications	RS232 (Standard), RS422, RS485, Ethernet
Weight — lbs. (kg)	37 (16.8)

➤ KJLC® LION™ Series—Controllers and Accessories

Interconnect Cables

All ion pump controllers come with a mains power cable. Interconnect cables for TSP to controller, and ion pump to controller must be purchased separately.

*Choose the cable length, controller connector, and pump connector for Main Power Cables for Ion Pump to Controller. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: LHV 06 KK

	Part No. Prefix	Base Price
Mains Power Cables for Ion Pump to Controller		
LION High Voltage Cable	LHV	
	Option Part No.	**Additional Price**
Cable Length		
10 ft. (3 m)	03	**Call**
20 ft. (6 m)	06	**Call**
30 ft. (10 m)	10	**Call**
100 ft. (30 m)	30	**Call**
Controller Connector		
King SHV-10[1]	K	**N/C**
Fischer[2]	F	**Call**
Pump Connector		
SafeLION[3] (New Style)	S	**N/C**
King SHV-10	K	**N/C**
Fischer[4]	F	**Call**

[1] Typical on LION controllers.
[2] Typical on Varian controllers.
[3] Standard on LION pumps.
[4] Typical on Varian pumps.

*Choose the cable length for TSP Interconnect Cables to Controller. Next, compose the order code as shown, **below**.*

Example Configuration Part No.: LTSP 03

	Part No. Prefix	Base Price
TSP Interconnect Cables to Controller		
LION TSP Communications Cable	LTSP	
	Option Part No.	**Additional Price**
Cable Length		
10 ft. (3 m)	03	**Call**
20 ft. (6 m)	06	**Call**
50 ft. (15 m)	15	**Call**

Pump Accessories

Description	Part No.	Price
LION 10kV Connector Kit	LION-CONN	**Call**
KING 10kV Connector Kit	LKING-CONN	**Call**

Kurt J. Lesker Company

➤ Turbomolecular Packages

■ Edwards EXT/DX TIC Controlled Pumping Stations

REMAN PUMPS
See Pages 16-2-16-3.

Edwards combines the proven design of their EXT/DX Series turbo pumps with a backing pump in an integrated unit.

Features:

- Fully assembled turnkey pumping solution
- Turbo pump and backing pump with integrated TIC controller
- Rotary vane or scroll backing pumps available
- System start/stop from on-board controller
- Pumping and gauge control from integrated TIC controller
- RS232 and RS485 communication protocols available
- Integrated air-cooling kit
- Ultimate pressures to 5 x 10^{-10} mbar (CF flange models)

Applications:

- UHV systems
- Beam lines
- Load locks
- Surface science
- High-energy physics

Accessories:

- Gauge heads and cables (order separately)
- Oil mist eliminators (included)

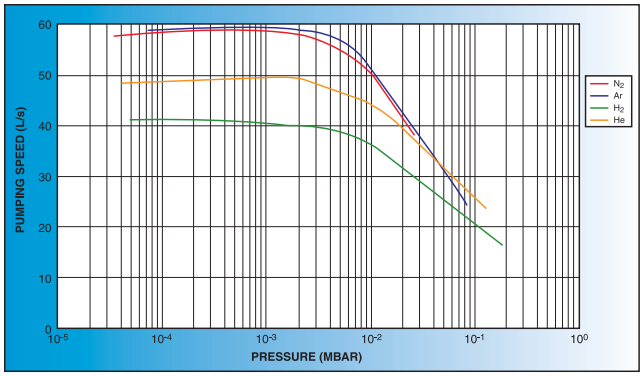
Pump Packages

Turbo Pump Model	Pumping Speed (N_2,L/sec.)	Inlet Flange	Backing Pump Model	Backing Pump Type	Part No.	Price
EXT75DX	65	ISO63-K	E2M1.5	Rotary Vane	ED-TM2212502	**Call**
EXT75DX	65	ISO63-K	XDS5	Scroll	ED-TM2B22832	**Call**
EXT75DX	65	4½" CF	E2M1.5	Rotary Vane	ED-TM3212502	**Call**
EXT75DX	65	4½" CF	XDS5	Scroll	ED-TM3B22832	**Call**
EXT225DX	220	ISO100-K	RV3	Rotary Vane	ED-TN4324532	**Call**
EXT225DX	220	ISO100-K	XDS5	Scroll	ED-TN4B24832	**Call**
EXT225DX	220	6" CF	RV3	Rotary Vane	ED-TN5324532	**Call**
EXT225DX	220	6" CF	XDS5	Scroll	ED-TN5B24832	**Call**

➤ Turbomolecular Packages

■ *Pfeiffer HiCube™ ECO Dry Pumping Stations*

Pfeiffer offers a low-cost compact turbo drag pumping station ideal for analytical and R&D applications.



Features:

- Modular design enables easy access to individual pumping components
- Complete, dry, high-vacuum pumping system backed by diaphragm pump
- Integrated turbo pump controller for ease of operation
- Plug-and-play design eliminates installation hassles and unnecessary cabling
- Integrated air-cooling kit
- DCU002 enables operation and connection of gauges
- Ultimate pressure of 1 x 10^{-7} mbar for ISO flanges and 1 x 10^{-10} for CF versions

Applications:

- Spectroscopy
- Tube manufacture
- Thermal evaporation and sputtering systems
- Surface science
- Laboratory applications
- Leak detection
- Small coating system

Pump Packages

Turbo Pump Model	Pumping Speed (N_2,L/sec.)	Inlet Flange	Backing Pump Model	Part No.	Price
HiCube80	67	4½" CF	Diaphragm	PMS03556	**Call**
HiCube80	67	ISO63-K	Diaphragm	PMS03555	**Call**

➤ Turbomolecular Packages

■ *Pfeiffer HiCube™ Classic Pumping Station*

Pfeiffer combines a turbo pump with an integrated controller and backing pump into a stable, closed-housing to form a fully automatic, turnkey pumping package for high-vacuum applications.

Based on their modular and customizable design, you can chose from a variety of pump configurations/combinations. Whether you need a dry or oil-lubricated backing pump, advanced interlocks, or different sizes of pumping speeds for your turbo, you can be sure to find the most economical and best performing combination to suit your needs.

Features:

- Modular design enables easy access to individual pumping components
- Pumping speeds available from 35 to 685 L/sec.
- Integrated turbo pump controller for ease of operation
- Backing pump vibrations isolated from main frame
- Plug-and-play design eliminates installation hassles and unnecessary cabling
- Remote control operation available for convenience
- Castors for convenience 2 locking

Applications:

- R&D
- Accelerators
- Analytical
- Surface science
- Vacuum and process technologies
- E-beam welding
- Leak detectors

NOTE: Other configurations available.

Pump Packages

Turbo Pump Model	Pumping Speed (N_2, L/sec.)	Inlet Flange	Backing Pump Model	Backing Pump Type	Part No.	Price
HiPace80	67	ISO63-K	MVP 015	Diaphragm	PMS2120100	**Call**
HiPace80	67	ISO63-K	DUO 2.5	Rotary Vane	PMS2132100	**Call**
HiPace80	67	4½" CF	MVP 015	Diaphragm	PMS2220100	**Call**
HiPace80	67	4½" CF	DUO 2.5	Rotary Vane	PMS2232100	**Call**
HiPace300	260	ISO100-K	MVP 040	Diaphragm	PMS2322100	**Call**
HiPace300	260	ISO100-K	DUO 5	Rotary Vane	PMS2334100	**Call**
HiPace300	260	6" CF	MVP 040	Diaphragm	PMS2422100	**Call**
HiPace300	260	6" CF	DUO 5	Rotary Vane	PMS2434100	**Call**
HiPace400	355	ISO100-K	MVP 070	Diaphragm	PMS2524100	**Call**
HiPace400	355	ISO100-K	DUO 5M	Rotary Vane	PMS2534100	**Call**
HiPace400	355	6" CF	MVP 070	Diaphragm	PMS2624100	**Call**
HiPace400	355	6" CF	DUO 5M	Rotary Vane	PMS2634100	**Call**
HiPace700	685	ISO160-K	MVP 070	Diaphragm	PMS2724100	**Call**
HiPace700	685	ISO160-K	DUO 5M	Rotary Vane	PMS2734100	**Call**
HiPace700	685	8" CF	MVP 070	Diaphragm	PMS2824100	**Call**
HiPace700	685	8" CF	DUO 5M	Rotary Vane	PMS2834100	**Call**

Repair Services

Pump Rebuild

Our OEM trained technicians service hundreds of pumps annually.
They handle routine maintenance to complete rebuilds of:

- Rotary vane and rotary piston pumps
- Roots booster pumps
- Turbomolecular pumps
- Diffusion pumps
- Diaphragm pumps
- Scroll pumps
- Ion pumps

See pages 16-2 to 3 in our Vacuum Service section for more information.

Pump Decontamination

Our Hazmat certified service technicians are trained to handle materials resulting from corrosive processes.

See page 16-10 in our Vacuum Service section for more information.

Kurt J. Lesker Company

REMANUFACTURED PUMPS

100 % Rebuilt and Certified

12 Month Warranty on All Pumps

Pump Exchange Program Available

Visit www.lesker.com/REMAN for Up-to-Date Inventory

Certified ISO 9001:2008 • ISO Certified

PUMP REPAIR SERVICES

Cryo Turbo Rotary Vane Scroll Rotary Piston
Ion Diffusion Screw Blower Dry Process