

UNITED BLOWER, INC.
1198 AIRPORT DRIVE
BALL GROUND, GA 30107
PHONE (770) 479-3000
FAX (770) 479-3111
Email: sales@unitedblower.com

Comparison of:

United Blower (UBI), Aerzen, Kaeser & Gardner Denver (GD)

Blower, Package and Acoustical Enclosure

Aerzen, and Kaeser are European P.D. blower system manufacturers and import most components/systems from their overseas factory; UBI and GD* manufacture their blower systems in the USA. All four manufacturers have a “European” style package which is very compact and include many vastly improved design features. Most consulting engineers and owners specify and prefer the “European” style P.D. package.

The following information reviews the similarities and differences for the: blower, package and acoustical enclosure as manufactured by UBI, Aerzen, Kaeser, and Gardner Denver.

A – Blowers:

UBI, Aerzen and Kaeser produce a complete range of high quality P.D. blowers, superior in design and construction compared to two lobe versions. GD produces limited sizes of blowers incorporating a helical impeller. This Heliflow series has some similar quality characteristics to those stated above.

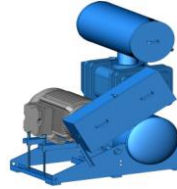
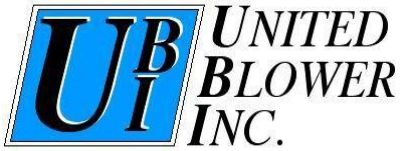
The most important P.D. Blower components are:



1. Rotors:

All quality PD blowers utilize a three lobe impeller with incorporated progressive pulsation channels to reduce noise, pulsation force and overall vibration. Shafts are forged from AISI 1043 steel whereas the impeller is made of ductile iron, then dynamically balanced per ISO 1940 ANSI S2.19CG3. GD offers a helical flow impeller set without progressive pulsation channels.

*Gardner Denver has its own factory package called the IQ, which is seldom sold. GD also owns Robuschi (Italy) which manufacture the “Robox”. This is sold through some reps. GD also has a major distributor, Universal Blower Pak who build an in-house (Indiana) somewhat



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European style package. UBI will address primarily the latter, as that is what is seen most often in specifications



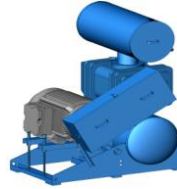
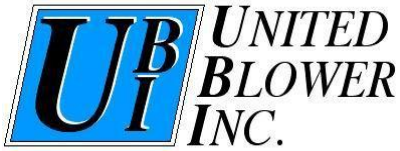
2. Casing:

All casings incorporating three lobe impellers, also include pulsation channels, except GD who provide a twisted three lobe impeller in lieu of straight cut with pulse control. These channels are cut into the inside discharge section of the casing, allowing pressurized discharge air to infiltrate the oncoming low pressure air pocket. Such a process allows the oncoming pocket to be partially pressurized before it hits the full discharge pressure. This reduce the implosion force which is the noise characteristics of a PD blower. The net result is a lower pulsational force, lower noise level and lesser vibration. The casings are heavily ribbed to maintain their structural integrity even at 15 PSIG service, casing integrity is tested to 35 PSIG.



3. Timing Gears:

The industry preferred design is called a helical timing gear. Helical gears are quieter and transfer higher power loads for the same gear size. UBI, Aerzen, and GD include helical gears. Kaeser includes spur gears. By using superior helical gears, the bearings must be designed for both axial and radial loads. Gear teeth are hardened then ground manufactured to AGMA 12 standards with a safety factor of 1.7.

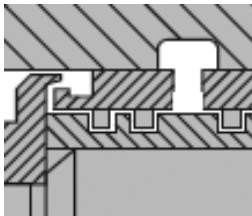


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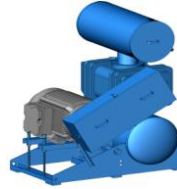
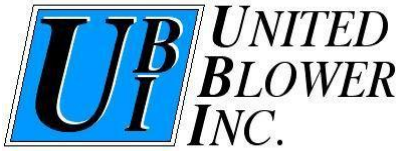
4. Bearings and Shafts:

On premium blowers, B10 bearing life is routinely advertised as 100,000 hours. UBI uses the SKF brand heavy duty spherical roller bearings incorporated into each machine. In comparison with other like manufacturers and like size blowers, the shaft diameters offered by UBI are always at least 10% larger. In addition, UBI typically selects a slow running blower (larger model) to meet a given specification. This automatically means that a larger shaft diameter and thus bearing size is utilized. Specifications that require 30,000 to 50,000 B10 bearing life do not represent a significant lifespan for continuous running applications.

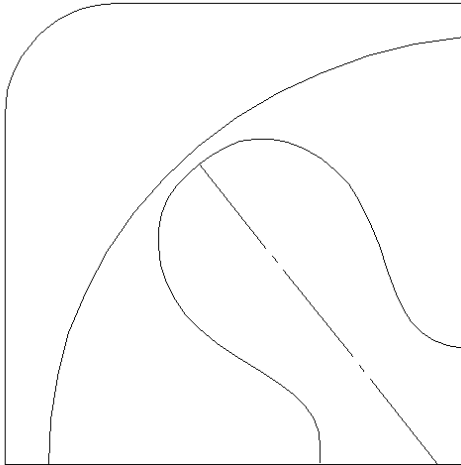


5. Air and Oil Seals:

All quality blowers include “piston ring” air and oil seals. In total either 12 or 16 piston rings are used. Piston ring seals are far superior in sealing ability and seal life compared to Viton “lip” seals (oil seals) and “labyrinth” seals (air seals), because they are of non-contacting design. This type of seal only gets clogged when the air filter is not effective. See section “B” packages -item H, for further discussion on filter importance and efficiency.



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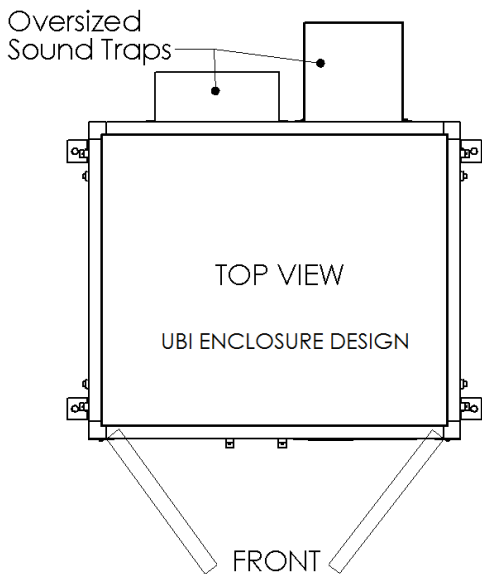


6. Clearances:

All P.D. blowers must provide clearances between rotors as well as clearances between rotors and casing. Because of the heavy duty construction of UBI, Aerzen, Kaeser and GD Heliflow blowers, these clearances are very small. With the blower running under load (heat) these clearances can be less than 0.003 inch. These clearances are only possible with the inclusion of three lobe impellers and heavily ribbed casings. Tight clearances improve blower efficiency dramatically and make blowers operate much cooler (less slip). UBI, Kaeser and Aerzen routinely install blowers onto silencer bases using only the flange as a mounting surface, further proving the integrity of the casing. GD does not engage in this practice.

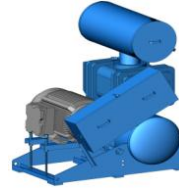
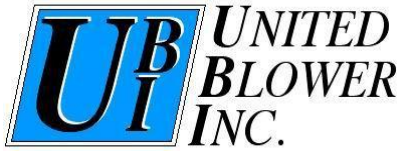
B – Packages:

UBI, Kaeser and Aerzen produce a complete range of high quality PD blower packages, superior in design and construction compared to any USA manufacturer. The quality and features of the GD offering depends on which GD source is used. Premium “European Style” compact blower packages typically feature the following:

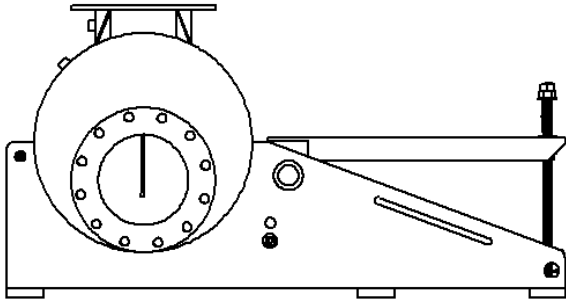


1. Compact Footprint Design:

Three lobe blowers with pulse control channel design as well as the GD Heliflow offering allows inlet and discharge silencers to be appreciably smaller than in the past. This creates the opportunity for a rectangular footprint at least 1/3 smaller in floor space than a traditional elevated package.

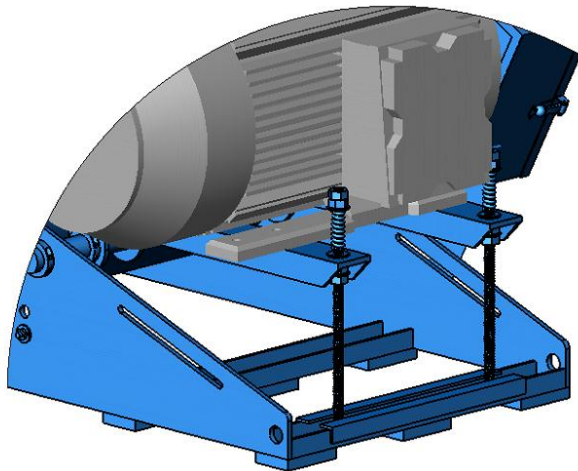


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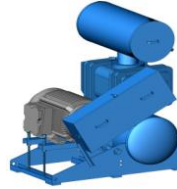
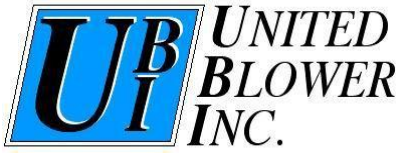
2. Common Base/ Discharge Silencer:

This design is extremely heavy duty as it must support the weight of the blower and inlet filter silencer, but also the weight of the motor plus tension base arms. Internally, acoustical packing has been eliminated. Pack material in the past has found its way downstream which could clog fine bubble diffusers. The pack material has been substituted with noise cancelling flow channels without adding appreciable pressure drop.

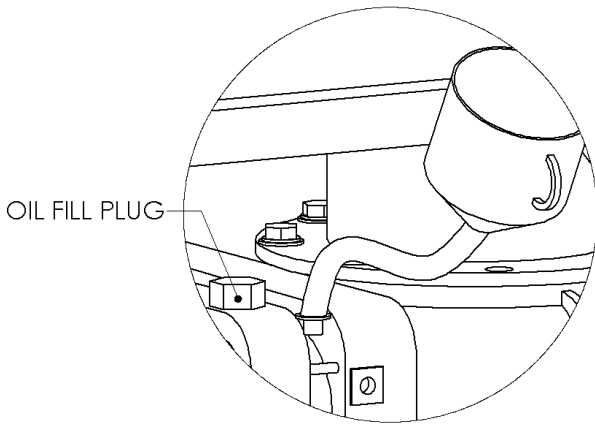


3. Automatic Belt Tension:

Most European style system manufacturers incorporate automatic belt tensioning which relies on the motors weight to exert downward force, pivoting about a heavy duty cross shaft. Only UBI also uses dual high tension adjustment springs that can be used to dial in the exact tension desired. The belt tension will remain constant due to the dual springs uncoiling as the belts stretch. Unlike others, UBI places its motor to the left of the blower. This allows the selection of a US sourced F1 standard junction box (40HP and above) motor. As the motor runs, a very slight uplifting force occurs due to the motors rotational pull. This slight upward force provides a guarantee to the operator that once the v-belts are tensioned to the correct value while the drive is at rest, no overtensioning is possible. Contrarily, when the motor is to the right of the blower, (Aerzen, Kaeser, GD) there exists a motor cantilever force due to the motor's weight, plus rotational downward force. Whether springs are included or not, there is no way to guarantee that over tensioning could NOT occur. UBI's side access sound enclosures allow easy access to both tension springs.



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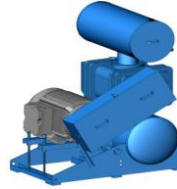
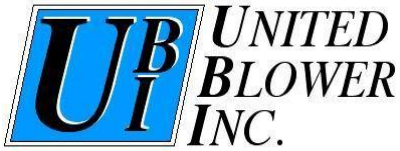
3. Oil Changes:

Oil changes on conventional P.D. blower packages were messy and a demanding task. On UBI's Quiet Pulse package design, oil drains, fill plugs and sight glasses are now easy to access or be seen. Both oil sumps can now be connected with flexible industrial hydraulic rubber hose drain lines with a sealing cap. These hoses are brought to the front of the blower package for easy draining. The fill on UBI packages is still done directly into the blower. This is facilitated due to the fully removeable side panel of the enclosure. Other designs which incorporate external or one point fill locations rely on hoses and hydraulic oil movement to ensure correct oil filling. These can be subject to kinks, breaks and air gaps that affect the accuracy.



4. Inlet filter element change:

Easy access to filter elements, make an element change extremely easy without the use of tools. United Blower's design makes it even possible to partially inspect the blower internals, such as rotors and end plates, with the filter element removed. The filter media is 99% efficient on 2 micron particles. The washable media of competitors is typically a much more course fiber mesh, achieving only 75% efficiency on 25 micron particles. Dirt passing thru the course mesh can lodge in the piston ring seals of the blower.



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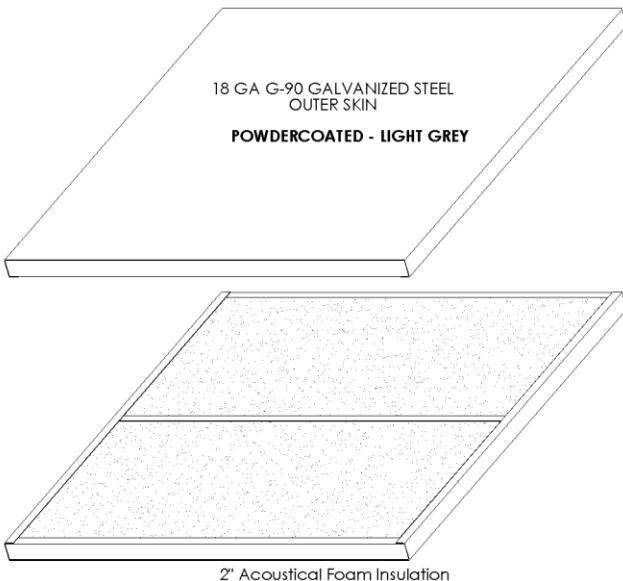


5. Complete assembly:

The blower package and acoustical enclosure are mounted on a sub base, (complete with oil drip pan) Therefore, the complete blower package is shipped to site as one assembled package. The contractor only needs to connect discharge pipe and power. All instruments are pre-mounted, depending on which accessories are included, UBI's competitors have similar designs but none have dedicated heavy duty forklift tube slots as offered by UBI.

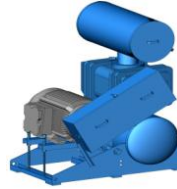
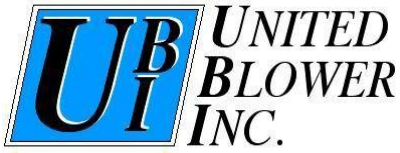
C – Noise Enclosure:

All four manufacturers produce a complete range of engineered and high quality acoustical enclosures. The most important components of acoustical enclosures are: noise attenuation, heat removal and control, and access for easy maintenance. Quality blower manufacturers should supply the noise enclosure to assure system responsibility. The main components of acoustical enclosures are:

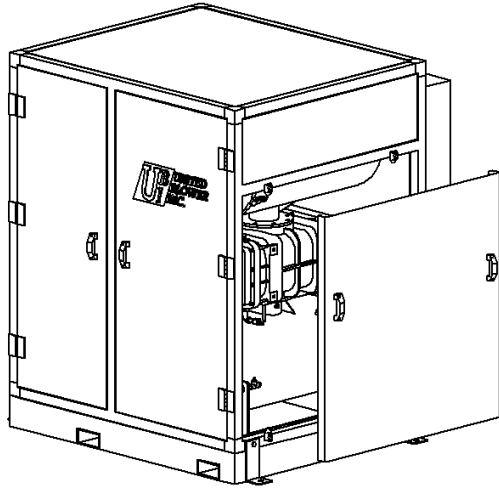


1. Sound Attenuation:

A heavy gauge galvanized steel, powder coated outer skin provides structural integrity. In order not to damage the galvanized steel, no welding is allowed. All panels, corners, flashing, etc. are bolted together. UBI's panels are filled with 2-inch-thick poly urethane foam for sound absorption, or can be upgraded to 2" mineral wool with perforated metal. UBI's competitors typically do not offer a mineral wool and perforated liner option. Aluminum non painted exterior skins provide less noise attenuation and are subject to field abuse (scrapes/dents) as well as chalking over time.

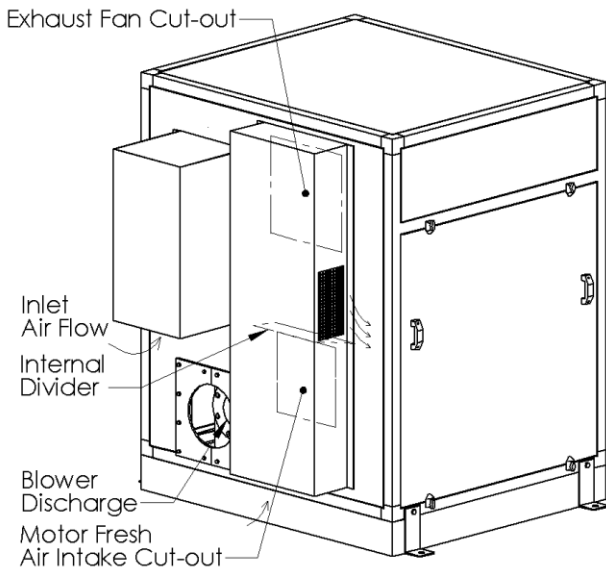


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2. Access:

Depending on size (weight) enclosures should be equipped to facilitate maintenance and removal of blower and/or motor, through either hinged front panels and/or via two removable side panels (only offered by UBI). All routine maintenance is done from the front. However, the side access is very popular with operators and maintenance personnel.

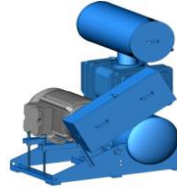
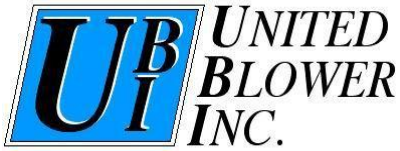


3. Sound Traps:

All incoming air and exhaust air must go thru sound traps to reduce noise emission. All sound traps are designed to prevent direct "line of site". All traps are also foam lined and equipped with grills to prevent bird entry. Sound traps are externally located in order to give maximum space inside the enclosure. All other manufacturers provide internal sound traps.

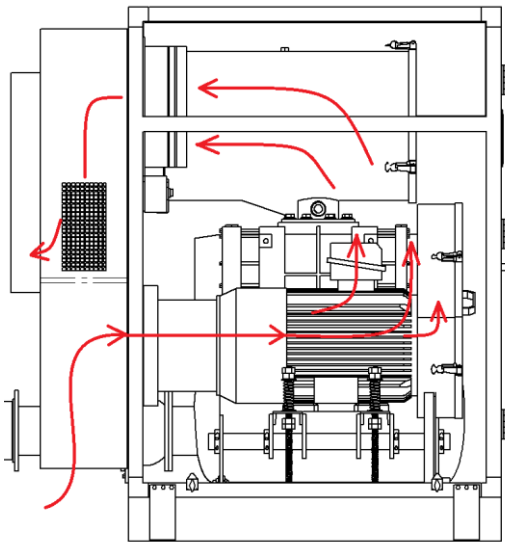
4. To maintain an inside temperature of 20-25° F above ambient, each enclosure must be equipped with one or more exhaust fans. These fans must have their own 120 volt, single phase fractional HP motors; prewired to a common junction box. Fans must be

thermostatically controlled to turn on/off as required. Blower shaft driven fans are not recommended. Many P.D. blowers are VFD driven, therefore the exhaust air volume reduces when the blower slows down and creates the most heat.



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5. Some competitors offer 3600 RPM motors which means the motor shaft and thus blower are turning quite fast. Their argument is that the shaft mounted fan will always be turning fast enough even at slow VFD speeds. The downside is that the 2 pole motor is provided with a smaller shaft bearing than that of an 1800 RPM (4 Pole) motor which UBI consistently uses.



6. Each TEFC motor has its own cooling fan. Each motor fan end is ducted to the sound enclosure backwall where there is a fresh air entry directly entering the motor fan end grill, from the outside (see sketch). The motor's fan is "pulling" in fresh air across the motor fins. This airflow hits the open expanded metal of the guard, so the flow across the motor is pulling heat away from the heavily worked drive end bearing. Meanwhile, the separate high velocity enclosure exhaust fan, "pulls" out hot air which is situated above the motor.

7. Despite providing the larger left and right removable sound enclosure panels, UBI also includes a left and right upper fixed panel on its acoustical enclosure for mounting instruments and any specified PLC controlled panels. The HMI in these panels can display temperature, pressure, vacuum and even maintenance reminders. Typically, UBI's PLC panel will communicate through Modbus or other common protocol, to the plant SCADA system.

Conclusion:

UBI, Aerzen, Kaeser and to some extent Gardner Denver provide the best engineered P.D. blower systems. United Blower should be considered equal if not superior in some respects, to any of these named competitors.