



BLOWVACC TWIN LOBE ROTARY AIR BLOWER INSTRUCTION MANUAL

INSTALLATION | OPERATION | MAINTENANCE INSTRUCTION



**ROOTS BLOWERS MANUFACTURER
BLOWVACC ENTERPRISES**

BLOWVACC TRANSMISSION PVT. LTD.

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Blowvacc Roots Blower/Pumps means reliability, availability and maintainability. BLOWVACC is committed to supplying our customers with reliable products manufactured with state of the art technologies.

We are working to provide you better product and services

TO GET THE MOST FROM YOUR BLOWVACC BLOWER

- 1.0 Make sure proper oil levels are maintained in the gear end and grease/oil in the drive end.
- 2.0 Check oil level and grease every 40 hours of operation. Loss of oil or grease should be replenished.
- 3.0 First oil change should be done within the first 100 operating hours and thereafter every 1000 hours or more often, if oil gets dirty.
- 4.0 Check belt tension every two week. Too tight belts would cause premature bearing failure while too loose belts would cause overheating of belts and pulleys.
- 5.0 Check regularly for any knocking or abnormal sound. High frequency sound indicates bearing trouble. Knocking sound indicates rotor timing upset. Contact "Blowvacc" for necessary adjustments.
- 6.0 Clean air filter every two week by reverse airflow. Choked filter would result in excessive power consumption and overheating of blower. Replace filter every three months or earlier.
- 7.0 Check and clean air silencer every month.

NOTICE



Blowvacc Blowers are meant for indoor installation or should be protected from direct rain and sunlight, if installed outdoor.



DANGER

Failure to observe these notices could result in injury or death of personal.



- Keep fingers and clothing away from blower inlet and discharge ports, revolving belts, pulleys, drive coupling etc.
- Do not use the air discharged from this unit for breathing - not suitable for human consumption.
- Do not loosen or remove the oil filter plug, drain plugs, covers or break any connections, etc., in the air or oil system until the unit is shut down and the air pressure has been relieved.
- Electric shock can and may be fatal.
- Open main, disconnect switch, tag and lockout before working on the control.
- Disconnect the Blower unit from its power source, tag and lockout before working on the Unit.



Safety is everybody's business and is based on your good use of common sense. All situations or circumstances cannot always be predicted and covered by established rules. Therefore, use your past experience, watch out safety hazards and be cautious. Some general safety precautions are given below.





WARNING



Failure To Observe These Notices Could Result In Damage To Equipment.

- Stop the unit if any repairs or adjustments on or around the Blower are required.
- Disconnect the Blower unit from its power source, tag and lockout before working on the unit.
- Do not operate unit if safety devices are not operating properly. Check periodically.
- Avoid bypassing safety devices.



BLOWVACC TWIN LOBE ROOTS BLOWER WORKING PRINCIPLE



POSITION-1



POSITION-2



POSITION-3



POSITION-4

Blowvacc Twin Lobe Rotary Compressors/Blowers are positive displacement units, whose pumping capacity is determined by size, operating speed and pressure conditions. It employs two Twin Lobe impellers mounted on parallel shafts, rotating in opposite direction within a casing closed at the ends by side plates. As the impellers rotate, air is drawn into one side of the casing and forced out of the opposite side against the existing pressures. The differential pressure developed, therefore, depends upon the resistance of the connected system. The Blowers, being positive displacement type, do not develop pressure within the casing but the discharge pressure depends upon the system resistance / back pressure. Effective sealing of the compressor inlet area from the discharge area is accomplished by use of very small operational clearance, eliminating the need of any internal lubrication of the lobes. A pair of accurately machined alloy steel, hardened and ground timing gears maintain clearances between the impellers, during rotation. The air, thus delivered, is 100% OILFREE

Adequate size piping and large radius bends ensure minimum line losses resulting in higher efficiency and low power consumption. Sudden change in pipeline cross section should also be avoided.

To change capacity, it is necessary either to change speed (energy saving) or vent some of the air into atmosphere (not energy saving). The air must not be recirculated from the discharge to suction as it may result in over heating. No attempt should ever be made to control the capacity of compressor by means of throttle valves in the intake or discharge piping. This increases the power load on the motor and may seriously damage the compressor. There is an increase in the discharge air temperature due to heat of compression. As a thumb rule the discharge air temperature increases @ 10 C for every 0.1 Kg/cm² of Δ above the inlet temperature.

INTRODUCTION - YOUR KEY TO TROUBLE FREE SERVICE

Thank you for investing in Blowvacc quality. Your Blowvacc Blower is a precision-engineered blower that has been carefully manufactured and thoroughly tested at the state-of-the-art Blowvacc Blowers factory.

The purpose of this manual is to help you properly install, operate and maintain your Blowvacc Blower. It is essential that you review all sections of this manual in preparation for installing your blower. Follow the instructions carefully and you will be rewarded with trouble free Blowvacc service.....year in and year out.

WHERE TO CALL FOR BLOWVACC BLOWER ASSISTANCE:

For prompt professional Blowvacc service always contact your authorized Blowvacc Distributor First. If you do not know your authorized Blowvacc Distributor, contact the numbers below for immediate assistance.

BLOWVACC CUSTOMER SERVICE / FACTORY SERVICE DEPARTMENT



Head Office :

O-15, Old Industrial Area,
Near Civil Hospital Bahadurgarh-124507 (HRY.)
Ph. : 01276-242331, 9215407120, 9466078330
E-mail : blowvaccblower@gmail.com
Website : www.blowvacc.com

Work Office :

Old Industrial Area,
E-32, Near Civil Hospital,
Bahadurgarh-124507 (Haryana)
M : 9253084099

EQUIPMENT CHECK & STORAGE

EQUIPMENT CHECK:

On uncrating, check the packing slip carefully to be sure all the parts have been received. All accessories are listed as separate items on the packing slip. After every item on the packing slip has been checked off, unpack carefully. Register a claim with the carrier for lost or damaged equipment.

STORAGE :

Your Blowvacc Blower was packed at the factory with adequate protection to permit normal storage for upto three (3) months. If the unit is to be stored under adverse conditions or extended period of time, the following additional measures should be taken to prevent damage.

- 1 Store the Blower in a clean, dry area.
- 2 Make certain inlet and discharge air ports are tightly covered to prevent foreign material from entering the air box.
- 3 All exposed, non-painted surfaces should be protected against rust and corrosion.
- 4 Provide adequate protection to avoid accidental /mechanical damage.
- 5 In high humidity or corrosive environments, additional measures may be required to prevent rusting of the Blower internal surfaces.
- 7 Rotate the Blower shaft (10 to 25 turns) monthly during storage. Inspect the Blower shaft (near shaft seal area) monthly and spray with rust inhibitor if needed.
- 8 For long-term storage (over six (6) months) contact Blowvacc Customer Care for recommendations.

WARNING



- Blower inlet & outlet are temporarily capped to keep out dirt and other contaminants during shipment. These covers must be removed before start-up.
- Keep them intact during the period of storage.

Blowvacc Blowers are internally and externally treated to protect against normal atmospheric corrosion. Prior to installation remove covers from Blower inlet and discharge openings and inspect internals. If the cleaning is required, clean the internals thoroughly using any commercial solvent (e.g. Kerosene). Continue this procedure until the unit is visibly clean. Check the drive shaft by rotating manually to ensure the impellers turn freely at all points. No internal adjustment is generally required.



WARNING

- Rotating components will cause severe injury in case of personal contact-keep hands away from blower inlet and discharge ports.



INSTALLATION

LOCATION:

If possible, install the Blower in a well-lit, clean, dry place with plenty of room for inspection and maintenance. Protection from direct sunlight and rainwater is required. Effect of location on driver and accessory equipment must also be considered.

FOUNDATIONS:

For permanent installations we recommend concrete foundations be provided, and the equipment must be leveled, free of all strains, and anchored so no movement will occur during setting of grout. After grout has completely hardened, a recheck is necessary to compensate for shrinkage etc. If required add shims under Blower feet before final tightening of foundation bolts to remove strain from the Blower housing. Blower assembly can be mounted on Anti Vibration Pads and directly placed on leveled concrete surface.



WARNING



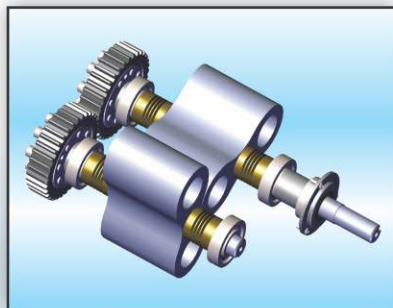
- Handling of the equipment needs to be accomplished with care, and in compliance with safe practices.



DRIVE INSTALLATION

DIRECT DRIVE (COUPLED) :

On the direct connected units, alignment and lubrication of couplings to specifications of the coupling manufacturer is very important. When mounted drives are supplied from the factory, proper alignment has been established before shipment. However, during shipping, handling and installation, it is likely that the alignment has been disturbed and final adjustment must be made before start up. A flexible type coupling should always be used to connect the driver and blower shaft.



BELT DRIVE:

Belt drives must be carefully aligned. Motor and blower pulleys must be parallel to each other and in the same plane. Belt tension should be carefully adjusted to the belt manufacturers recommendation using a belt tension gauge. Check tension frequently during the first day of operation.



The location of pulley on the Blower shaft greatly affects the stress in the shaft. The optimum blower pulley positioning is as close as possible to the blower drive shaft bearing cover, to minimize overhung loads.

PIPING:

Inlet and discharge connections on all blowers are large enough to handle maximum volumes with minimum friction loss. Reducing the pipe diameter on either inlet or discharge will only create additional line loss and increase the overall differential pressure and input power. Avoid sharp bends in the suction and discharge line. Use adequate size pipe with large radius bends. This would keep pipeline pressure losses to bare minimum. As a thumb rule the line size should be such that the air velocity is in the range of 20-25 m/sec. Gate valves, nozzles etc. should be avoided, since they cause turbulence and have not much utility. If at all they must be used, ensure they are sized properly.

WARNING



- Over tightened belts lead to heavy bearing loads and shaft deflections and may result in premature failure of bearings/shafts.

WARNING



All system piping must be cleaned internally before connecting to the Blower.



APPLICATION

Water Treatment Plants for backwashing of filter/mixed beds.

Effluent Treatment Plants for diffused aeration and agitation of effluent

Sewage Treatment Plants for diffused aeration and agitation of sewage

Cement Plants for blending, aeration, fluidization and conveying

Aquaculture for maintaining the dissolved oxygen level

Chemical for blending, aeration, fluidization and conveying

Electroplating Plants for oil free air agitation of electrolyte

Paper Plants for knife edge coating, drying, conveying and vacuum pickup.

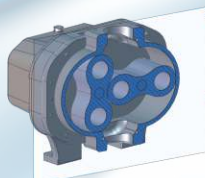
Yarn Drying for vacuum/pressure drying.

Polyester Chip Conveying & Drying for transfer of polyester chips and other similar materials.

Bag Filters for reverse cleaning of filter bags.

Pneumatic Conveying for vacuum, pressure and combination conveying of cereals, cement, husk, baggase. granules, powders and other similar material.

Regeneration of Dryers & Molecular Sieves



AUXILIARY EQUIPMENT

The auxiliary items that might be required under various operating conditions are :-

SILENCERS:

The need for silencer depends on Blower speed and pressure as well as sound level requirements in the general surroundings. Silencers should be mounted as close to the blower as possible.

SUCTION FILTER:

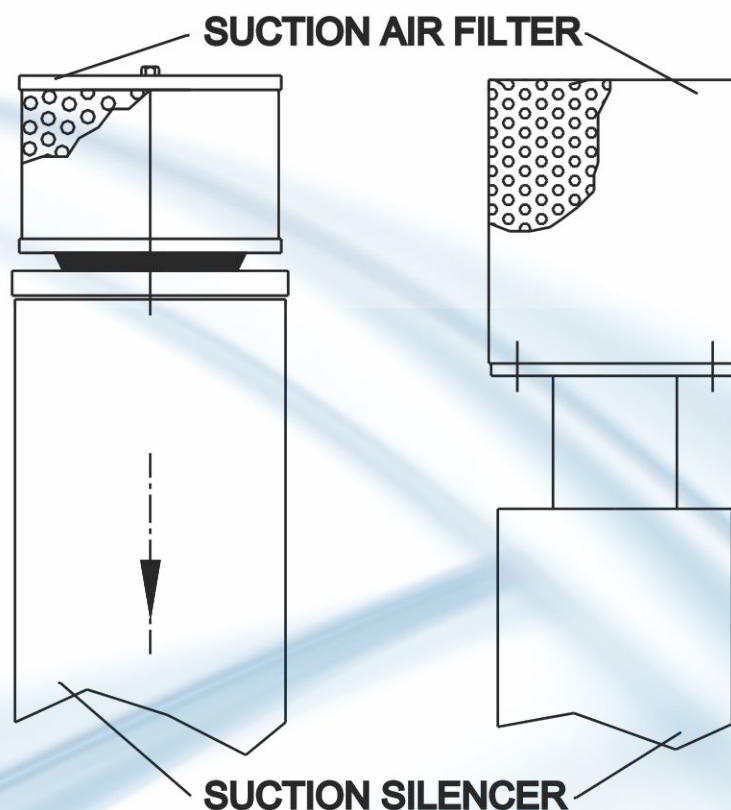
An inlet filter is generally recommended, especially in dusty locations, as it safeguards the machine against dirt and dust. The filter should be periodically checked for choking. Choking of filter would result in pressure drop across it thereby increasing the load on the Blower marked by increase in power intake. The filter element should be regularly cleaned by reverse jet of air. The pressure drop across the filter should not exceed 100mm WG. Replace filter every three months.

WARNING



- Choking of suction filter leads to increase load on the blower. Replace filter every three months. Servicing the air filter is one of the most important maintenance operations to be performed periodically to ensure long blower life.

Clean Air Filter every two week by reverse air flow. Choked filter would result in excessive power consumption and overheating of the blower. Replace filter every three months or earlier, if inspection so demands. Check and clean Air Silencer every month.



AUXILIARY EQUIPMENT

PRESSURE RELIEF VALVE :

A pressure relief valve is necessary in the discharge pipe to protect against any overloading in the discharge line. In case of discharge line pressure exceeding the set limits, the valve cap pops up, discharging air into atmosphere.

NOTICE



- Relief valve should be placed as close as possible to the Blower discharge. They are not meant to discharge full capacity and therefore cannot be taken as safeguard against total blockage.

NON-RETURN VALVE (Optional)

Non-return valve may be fitted close to the discharge port to prevent the compressor from running in the reverse direction, when switched off under load conditions. In multiple blower installations when two or more units discharge into a common header, use of non return valves is recommended. One non-return valve should be located in each blower discharge line. Properly installed, they will protect against damage from reverse rotation caused by air back flow through an idle blower.

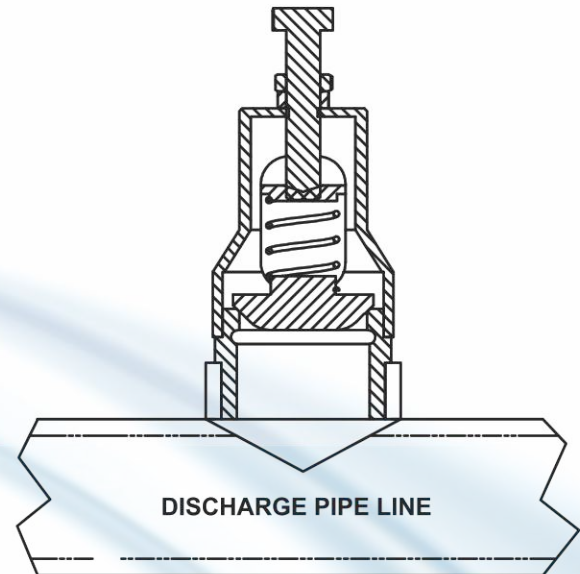
MEASURING AND MONITORING DEVICES:

Pressure gauge is supplied along with the supply and it is recommended to connect it to the discharge pipe line, close to the blower, to ensure that the system pressure is within the Blower rated pressure. However, U-Tube Mercury manometer may be used for more accurate observations. Special measuring and monitoring systems can be connected as per the individual requirement.

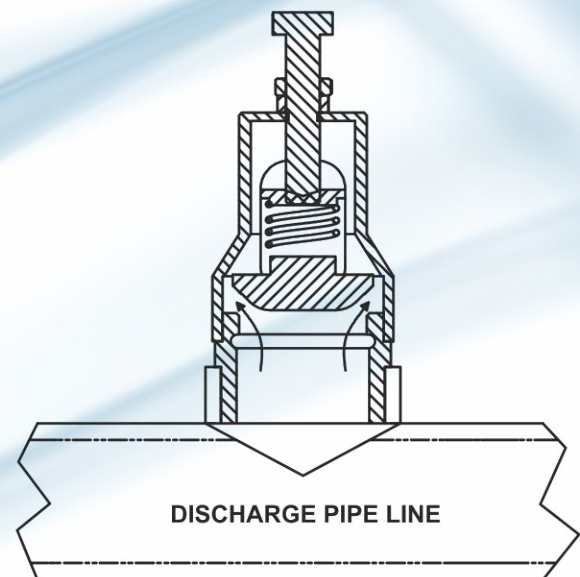


SAFETY RELIEF VALVE

Fig: Relief Valve Operation Illustration



RELIEF VALVE NORMAL POSITION

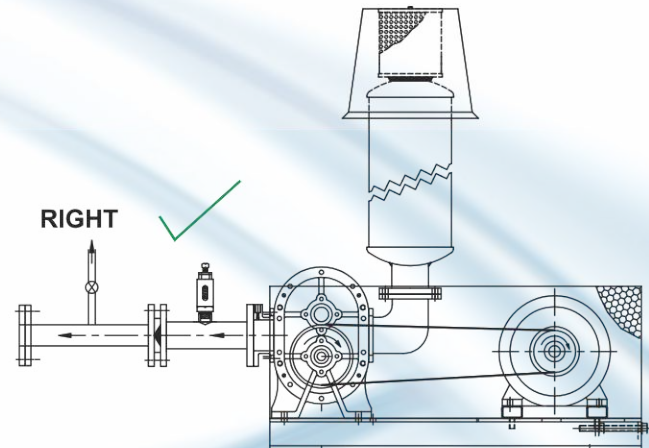
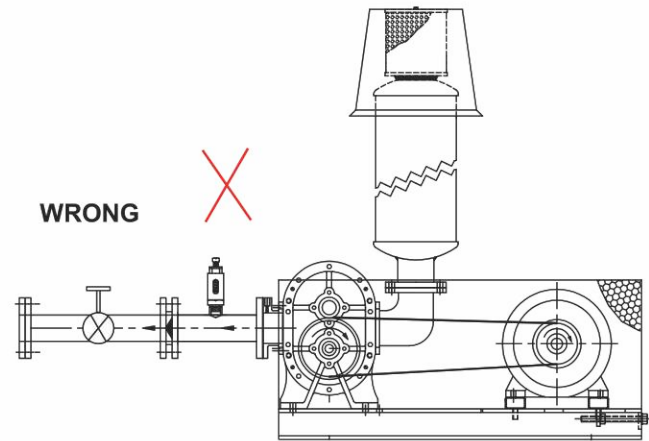


RELIEF VALVE OVERLOADED POSITION

CAPACITY CONTROL:

The capacity of the blower can be varied by changing the blower speed, however, confirmation to the input power and maximum speed must be made prior to doing so. No valves should be put into the suction / discharge line to regulate the air capacity. One may, however, vary the discharge air capacity by venting out some of the air into atmosphere. Refer illustration below.

CAPACITY CONTROL



BLOWVACC Twin Lobe Rotary Air Blowers have a very simple yet effective lubrication systems. At the gear end, the timing gear teeth are lubricated by being partially submerged in oil. A good grade industrial type, rust oxidation and foam inhibited non-detergent gear oil (of medium viscosity) is recommended. The oil level indicator is provided at the back of the gear cover to monitor oil level. The oil should be periodically checked and fresh oil added as required to maintain proper level.

WARNING



- First oil change should be done within first 100 operating hours and thereafter, complete oil change is recommended after about 1000 operating hours or earlier in inspection so indicates.



During Complete Oil Change Old Oil Should Be Drained, Gear Cover Flushed And Then New Oil Added

WARNING

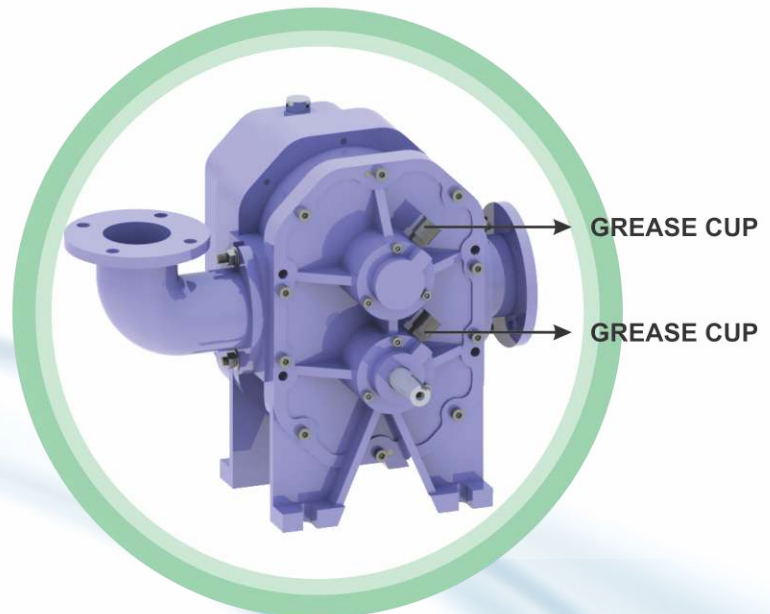
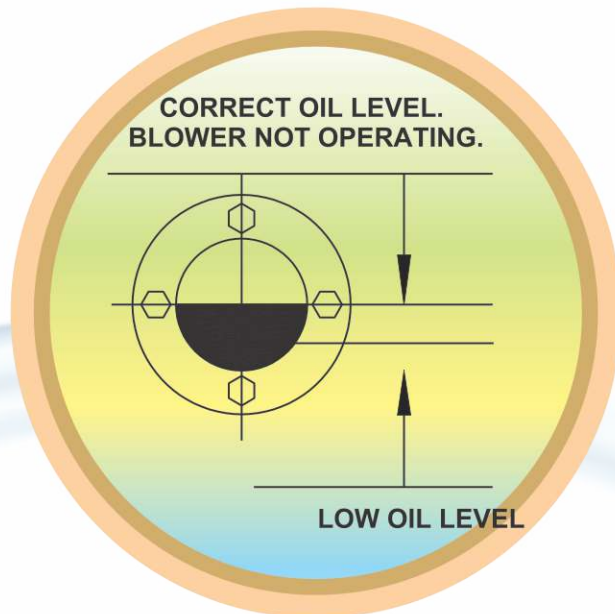


- The recommended oil grade is Shell Spirax S2 G 90 / Indian Oil Servo Gear HP 90 / Castrol Hypoy EP 90 / HP Gear Oil EP 90 / MAK Spirol EP 90 / Indian Oil Servo Gear Super 90. Recommended grease grade is Castrol AP2 / AP3.

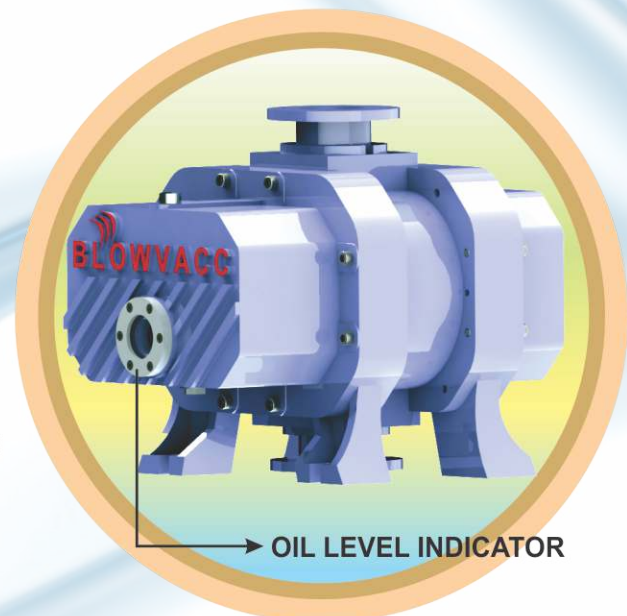
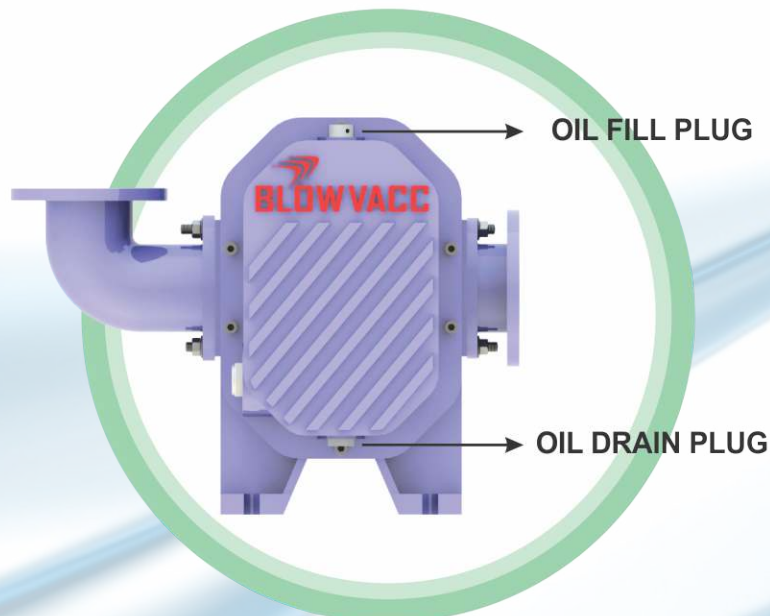


The Blower drive end bearings are OIL / GREASE Lubricated. A weekly check for oil, under normal conditions, ensure longer blower life. Refer Lubrication diagram as shown below.

LUBRICATION DIAGRAM



LUBRICATION POINTS FOR DIFFERENT BLOWER CONFIGURATIONS



WARNING

- Do not overfill. This will cause excessive heating of the gears and may damage the unit.



SPARES & CONSUMABLES

Recommended Spares: Bearings, lip seals/labyrinth seals & gaskets. **Consumables** such as filters, vee-belts, lubricating oil & grease do not form a part of spares.



BEARINGS



VEE BELTS



BLOWVACC

**Spares and
Consumables**



SEALS



**90 No.
Gear Oil**

GEAR OIL



SILENCERS & FILTERS



SPARES & ACCESSORIES

Retain your advantages with factor genius replacement parts & accessories. All parts meet original manufacturing specifications and tolerances for guaranteed fit and function.

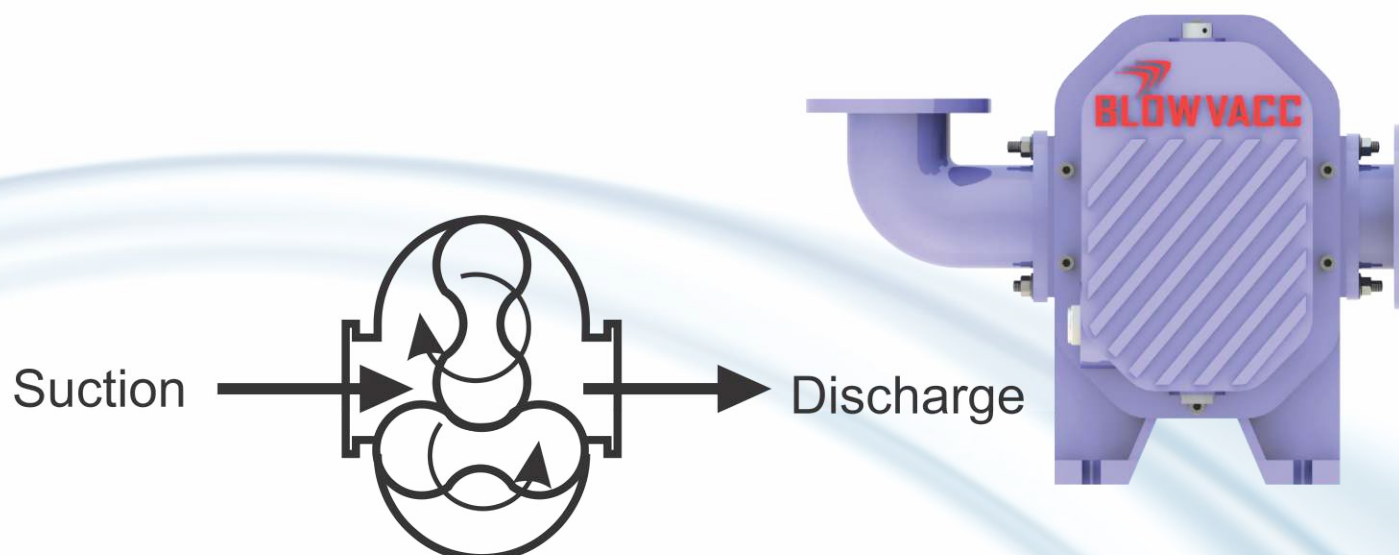
- Readily available.
- Fast delivery.
- Guaranteed fit and function.
- Service kit for routine product maintenance.



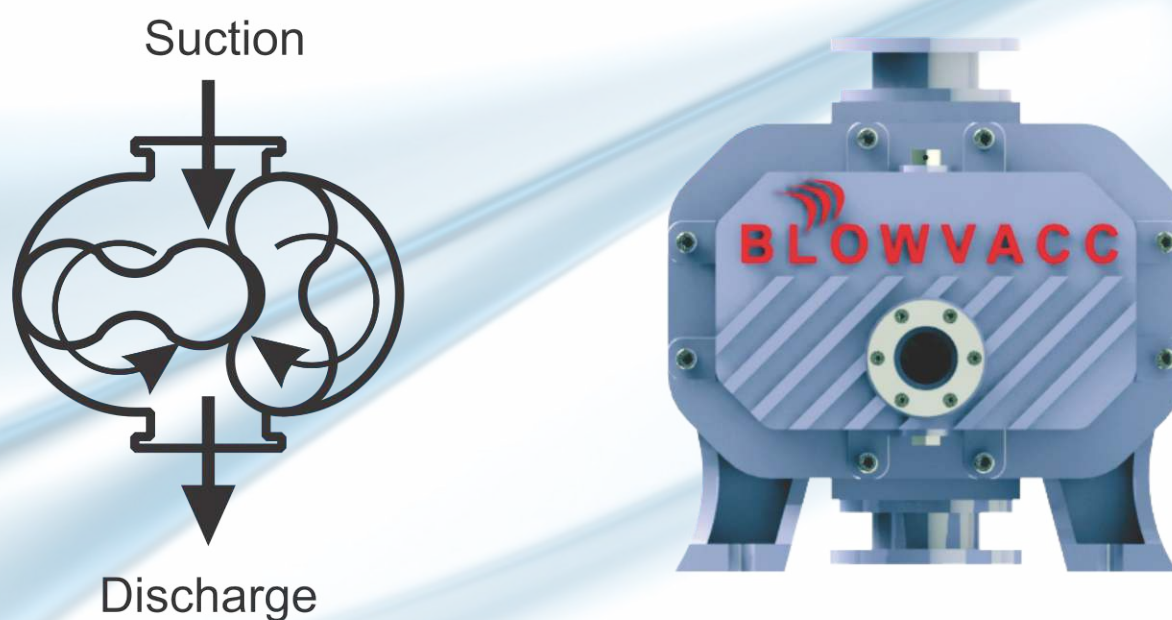
ORIENTATION OF BLOWERS

All blower models are available in specific orientations (based on direction of flow of air/gas). Broadly they may be Horizontal flow and Vertical flow.

HORIZONTAL FLOW ORIENTATION



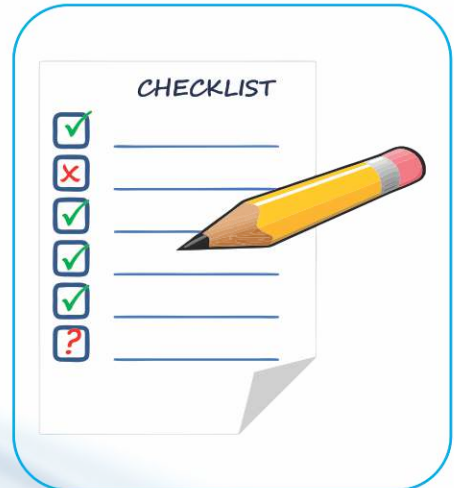
VERTICAL FLOW ORIENTATION



BLOWER STARTUP CHECKLIST

VERTICAL FLOW ORIENTATION

This startup procedure should be followed during the initial installation and after any shutdown periods or after the blower has been worked on or moved to a new location. It is suggested that the steps be followed in sequence and checked off in the boxes provided.



- Check the unit and all piping for foreign materials and clean if required.
- Check the flatness of the feet and alignment of the drive. Feet that are bolted down in a bind can cause distortion of the casing, disturbing the internal clearances.
- If blowers are V belts driven, Check the belt tension and alignment. Over-tensioned belts create heavy bearing loads, which leads to premature failure. Mis-aligned V belts can cause the impellers to rub against the side plates, resulting in overheating and jamming on operation. Misaligned couplings can cause premature bearings / shaft failures.
- Be sure adequate drive guards are in place to protect the operator from severe personal injury from incidental contact.
- Check the unit for proper lubrication. Proper oil level cannot be overemphasized. Too little oil will ruin bearings and gears. Too much oil will cause overheating and can ruin gears and cause other damage. Ensure both drive end & driven end are properly lubricated.
- With motor locked out, turn the drive shaft by hand to be certain that impellers do not bind.
- "Jog" the unit with the motor a few times to check direction of rotation and be certain it turns freely and smoothly.
- Start the unit and operate for 15 minutes at no load. During this time check for abnormal noise and other indications of interference.
- Apply the load and observe the unit for one hour. Check frequently for abnormal noise / over heating / overloading during the first day of operation. If malfunctions occur, do not continue to operate. Problems such as knocking impellers can cause serious damage if the unit is operated without correction.

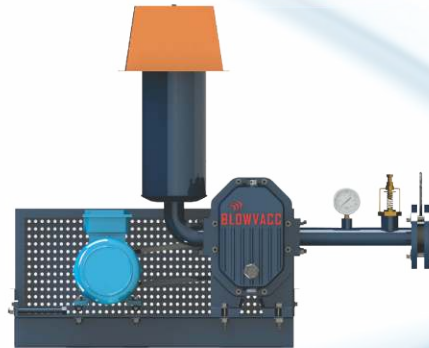


NOTE TO INPUT POWER



The input power to the blower motor is proportional to the Blower speed and system back pressure. When operating at the rated speed, too high or too low power intake indicates change in differential pressure across the blower inlet and discharge port. During installation ensure the differential pressure does not exceed the rated pressure as increase in differential pressure would result in overheating / overloading of the blower. It is advised that when process has attained equilibrium the input power to the blower (or input current) may be recorded and change in this reading would indicate change in load conditions. Increase in power intake would result due to:

1. Suction filter getting choked
2. Suction / Discharge silencer getting choked
3. Suction / Discharge line valve, if any, not functioning / closed
4. Change in system parameters.



TROUBLE SHOOTING

Even though Blowvacc Blowers are well designed and manufactured, there may be times when servicing will be required due to normal wear, the need for adjustment, or various external causes. In general, major repairs are to be considered beyond the scope of maintenance work and should be performed at the factory or by factory trained people.

The design of the blower is basically simple and many repair operations are straight forward but the work should be done by personal with good mechanical experience. Some operations involve extra care, patience and a degree of precision work. Well-qualified personnel, should only undertake adjustment and setting of internal clearances, as improper setting may cause serious damage to the blower.

Whenever the equipment needs attention, the operator or repairman should locate the cause and correct the trouble quickly. The trouble-shooting "Fault Chart" is provided to assist the mechanic in those respects.

FAULT CHART

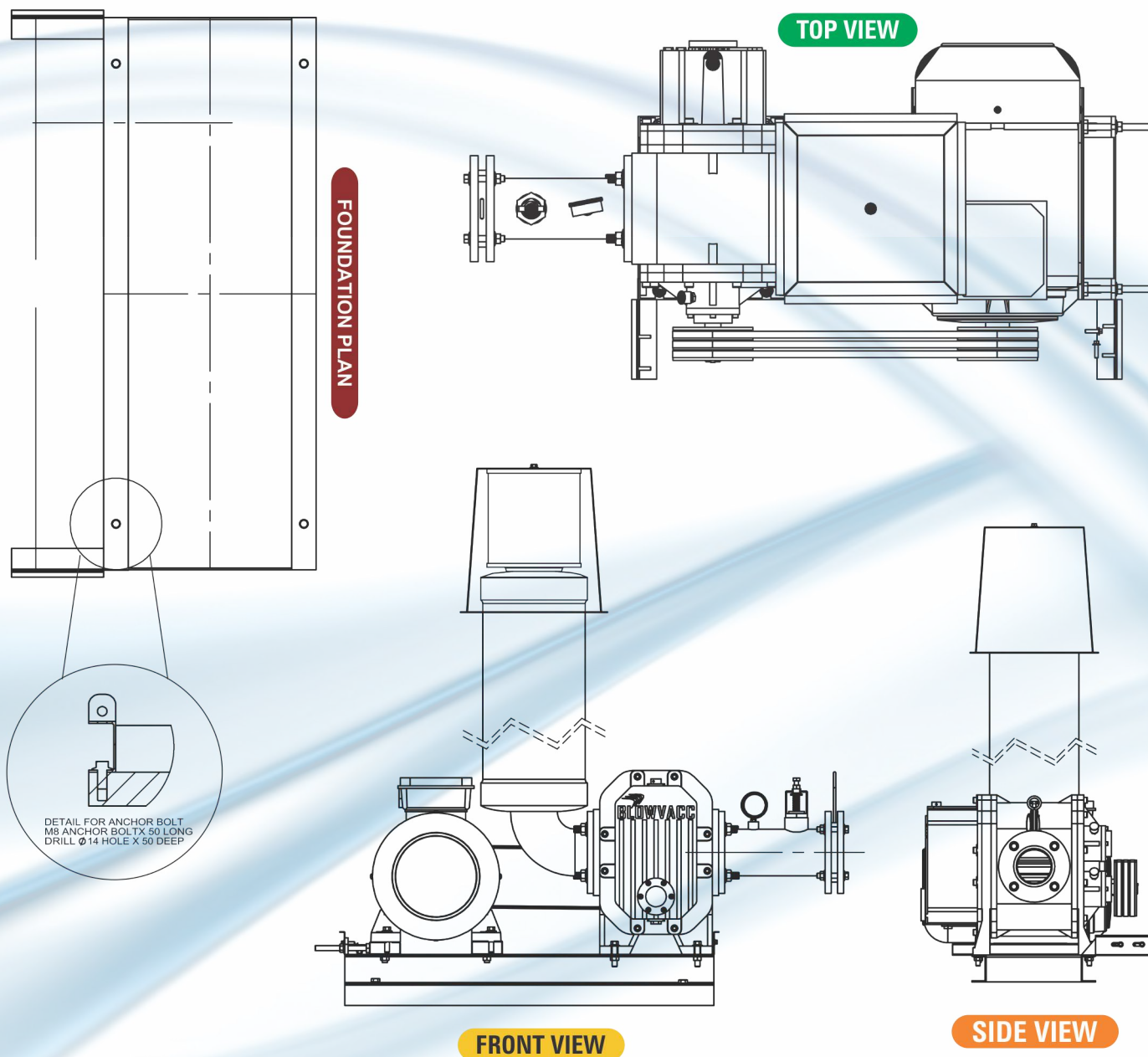
SYMPTOMS	PROBABLE CAUSE	REMEDY
No air flow	<ul style="list-style-type: none"> • Speed too low . • Wrong direction of rotation. • Obstruction in piping. 	<ul style="list-style-type: none"> • Check speed and verify as per recommendations. • Check for correct direction of rotation. • Check suction and discharge line for any obstruction.
Low Capacity	<ul style="list-style-type: none"> • Speed too low . • Excessive pressure. • Discharge line leaks. 	<ul style="list-style-type: none"> • Check speed, belt drive slippage. • Check the line pressure. • Check up for open flow path.
Excessive power consumption of blower	<ul style="list-style-type: none"> • Speed too high. • Differential pressure across the suction and discharge openings too high • Impellers rubbing 	<ul style="list-style-type: none"> • Correct the speed. • Check line pressure with rated pressure. Check & Clean filter and silencer. Check for any obstruction in the suction and discharge line. • Check the impellers for any hot spots / rubbing marks. If observed, reset impeller timing. This operation requires skill and patience. if in doubt, contact BLOWVACC
Overheating of bearings and gears / blower	<ul style="list-style-type: none"> • Inadequate lubrication. • Differential pressure across the suction and discharge opening too high. • Coupling misalignment. • Belt slippage / Overtightened belts. • Too much oil in gear case. • Worn impeller, clearances too high. • Internal contact. 	<ul style="list-style-type: none"> • Check for oil level and replace dirty oil. • Check line pressure with rated pressure. Check & clean filter and silencer. Check for any obstruction in the suction and discharge. • Check alignment and realign. • Adjust belt tension • Correct oil level. • Replace impellers. • Reset clearances.
Vibration	<ul style="list-style-type: none"> • Drive misalignment. • Impeller rubbing (Distant knocking sound would be observed). • Worn bearings / gears. • Loose pulley / coupling. 	<ul style="list-style-type: none"> • Check alignment. • Check for hot points. Recheck blower alignment and mounting, Recheck impeller timing. • Check and replace the bearings / gears. • Check if pulley / coupling is loose on shaft. Check key.
Blower jams after running for a short period.	<ul style="list-style-type: none"> • Insufficient axial clearances. • Differential pressure across suction & discharge high, resulting in over heating & subsequent jamming, due to thermal expansion. 	<ul style="list-style-type: none"> • Correct clearances. • Correct differential pressures.
Blower makes heavy knocking sound on running	<ul style="list-style-type: none"> • Unit out of time. • Distortion due to improper mounting or pipe strains. • Differential pressure across the suction and discharge openings too high • Worn bearings / gears. 	<ul style="list-style-type: none"> • Retime impellers. • Check mounting alignment and relieve pipe strains. • Check gauge readings across the suction and discharge ends. • Check and replace the bearings / gears.
Oil leaking out of oil fill hole	<ul style="list-style-type: none"> • Excessive oil level. • Oil seal leakage. 	<ul style="list-style-type: none"> • Correct oil level. • Check and replace gear end oil seals.
Traces of oil in blower casing	<ul style="list-style-type: none"> • Oil seal leakage. 	<ul style="list-style-type: none"> • Check and replace oil seals.

ACCESSORIES LAYOUT FOR BLOWVACC BLOWERS

G.A. drawing for a typical Blowvacc Blower. G.A. drawing of your particular Blowvacc Blower was issued alongwith P.O. Acknowledgment, You may request for another copy of the same giving reference of P.O. No. & Date and Blower Model & Serial Number.

Note:

1. Direction Of Rotation Clockwise As Viewed.
2. Protect From Direct Sunlight & Rain.



INDUSTRIES SERVED



**We want you to focus
on your process and leave
all your maintenance
& service issues on us.**



- Water Treatment Plants
- Effluent Treatment Plants
- Sewage Treatment Plants
- Cement Plants

- Aquaculture
- Chemical Plants
- Electroplating Plants
- Paper Plants

- Yarn Drying
- Polyester Chip Conveying & Drying
- Bag Filters
- Regeneration of Dryers & Molecular Sieves
- Pneumatic Conveying

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**PRODUCT RANGE : ROOTS BLOWER, OIL FREE BLOWER, AQUA CULTURE BLOWER, VACCUM BOOSTER,
BLOWER SYSTEMS, VACCUM SYSTEMS, ACCOUSTIC HOOD, ETP/STP BLOWER**