National Vacuum Equipment, Inc.

Owner's Manual

B500 Tri-Lobe Blower

Challenger Series
VACUUM PUMPS & BLOWERS

MADE IN THE USA

Designed. Built. Supported in the USA.

800-253-5500 | www.natvac.com

B500 Blower

Owner's Record

Date of Purchase: _____

Purchased from: _____

Serial Number: _____

Revision: 3 (Release) August 2020

Weights and measurements are for reference only.

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Weights and measurements are for reference only.

INTRODUCTION

General Information

About National Vacuum Equipment

Congratulations! You now own a quality vacuum/pressure blower proudly manufactured in the U.S.A. by National Vacuum Equipment, Inc. You have not only acquired a superior piece of equipment from a qualified dealer, you have hired a team of vacuum experts. We stand ready to work with your dealer to answer your questions and provide you with the information necessary to keep your equipment in peak working condition. Thank you for putting your trust in National Vacuum Equipment.

Our Mission

We are dedicated to the production and wholesale distribution of quality vacuum system products at a reasonable price, on a timely basis. We are a "one-stop shop" for manufacturers and distributors of vacuum equipment.

Our History

National Vacuum Equipment, Inc. was founded in 1980 by Bruce Luoma. The Company started as a retailer of vacuum pumps. Soon after it started, the Company secured the rights to exclusive distribution of the Battioni vacuum pumps in North America. This helped the Company to evolve into its current status as a wholesale supplier. To reach the goal of becoming a full service supplier of vacuum system components, the Company began fabrication of its own line of components, purchased and developed its own line of vacuum pumps and blowers, and began purchasing for resale, various valves and accessories.
Today, NVE has full service machine, fabrication and powder-coating shops complete with CNC-controlled production equipment designed for close tolerance work. The company has a highly trained staff, all of whom are dedicated to quality.

LIMITED WARRANTY

Warranty
National Vacuum Equipment, Inc. guarantees that the product it provides is free of manufacturer defects, including; materials and workmanship. Equipment must be installed by a trained and qualified installer according to guidelines established by National Vacuum Equipment, Inc. Properly installed and maintained product is warranted for a period of one (1) year subject to the following conditions:

1. A properly completed warranty registration card must be received by us within 30 days of sale to end user for blower sales to be considered warrantable. Or use the QR code on the right to fill out warranty registration online (https://natvac.com/warranty-registration/). All blowers received for warranty consideration must retain the original NVE serial number tag.
2. The one (1) year period shall begin the day the product is shipped from our warehouse, unless we are provided with an authentic copy of the original resale invoice, in which case the one (1) year period shall begin at such invoice date.
3. The covered product must be used in an application for which it was intended. We do not recommend our product for particular uses or applications.
4. Damage caused by improper use or lack of proper maintenance is not warrantable.
5. Manufacturer's liability under this, or any other warranty whether expressed or implied, is limited to repair of or at the manufacturers' option, replacement of parts which are shown to have been defective when shipped.
6. Manufacturer's liability shall not be enforceable for any product until National Vacuum Equipment, Inc. has been paid in full for such product.
7. Manufacturer's liability for incidental and consequential damage is hereby excluded to the full extent permitted by law.
8. Manufacturer's liability as stated herein cannot be altered except in writing signed by an officer of National Vacuum Equipment, Inc.
9. Certain products provided by National Vacuum Equipment, Inc. are covered by their respective manufacturers' warranties (e.g., engines used in the NVE engine drive packages). These products are not covered by the National Vacuum Equipment, Inc. Manufacturers' Warranty.
10. Equipment must be installed by a trained and qualified installer according to guidelines established by National Vacuum Equipment, Inc.

Warranty Procedures
Should a potential warranty situation arise, the following procedures must be followed:

- Contact your dealer immediately upon the occurrence of the event and within the warranty period.
- Customer must receive a return goods authorization (RGA) before returning product.
- All serial-numbered products must retain the NVE serial number tag to be qualified for warranty.
- Product must be returned to NVE intact for inspection before warranty will be honored.
- Product must be returned to NVE freight prepaid in the most economical way.
- Credit will be issued for material found to be defective upon our inspection, based upon prices at the time of purchase.

DISCLAIMER

The information presented in this owner's manual is accurate per the date of publication. National Vacuum Equipment reserves the right to make product design and documentation material changes without notice.
Furthermore, National Vacuum Equipment is not obligated to implement the aforementioned alterations into already manufactured equipment. Should any discrepancy in documentation or design arise, contact should be made with National Vacuum Equipment for clarification. The information presented in this manual is meant for reference only. This manual cannot represent every possible application for this NVE product. Thus, it is the installer and/or end user's responsibility to ensure the system is designed, installed, operated, and maintained in a safe manner. Furthermore, this manual is applicable only to the NVE product(s) documented herein. It is not applicable to the entire system of which the NVE product is a component of. Thus, the system designer should be consulted for proper, safe, and efficient operation of any system containing NVE components. Damage caused by operation with improper drive system specifications are not warrantable. NVE cannot assume any responsibility for damage and/or injury resulting from improper system operation.

CONDITION OF SALES

To view NVE's Condition of Sales, scan the QR Code to the right of this text with your phone's camera or visit https://natvac.com/ordering-information/

SAFETY INSTRUCTIONS

National Vacuum Equipment considers safety an essential component in the use of its products. There is no replacement for proper training of personnel who will be in contact with NVE products. This manual should be thoroughly read and understood prior to installing, operating, maintaining, or servicing the NVE product documented herein. Furthermore, as this NVE product is only a component in an engineered system, the system designer and any affiliated documentation should also be consulted. Equipment safety decals should also be referenced and kept in a clean, and easily visible condition. Contact NVE for replacement labels if needed.

⚠ WARNING

It is the installer's and end user's responsibility to read and understand the inclusions of this, affiliated manuals, and related documentation before operating the associated equipment.

⚠ WARNING

Failure to operate any system containing NVE components according to OEM specifications and proper training can result in serious injury or death! ALWAYS provide all users with proper training.

This symbol is a "safety attention symbol" and appears with most safety statements in this manual. Pay special attention to these symbols and associated text as they highlight a hazard that, if not avoided, can result in equipment damage, injury, and/or death.

Weights and measurements are for reference only.

SAFETY INSTRUCTIONS

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates a hazardous situation which can cause damage to machine, personal property, and/or the environment, or cause the equipment to operate improperly.

Safety Precautions

It is vitally important that safety considerations be implemented in the operation and service of this and other NVE products. While outlining every safety precaution is beyond the scope of this manual, some of the most important precautions include the following:

⚠ WARNING

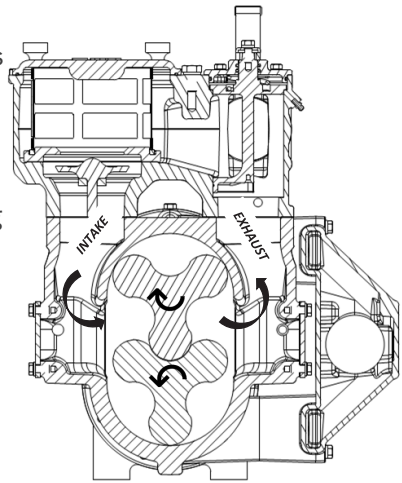
It is the installer's and end user's responsibility to read and understand the inclusions of this, affiliated manuals, and documentation before operating the associated equipment.

- The blower and associated drive system include rotating components. Before any service, ensure the equipment is locked out and that accidental startup cannot occur. Also, ensure proper guarding is present on the components.
- This blower and associated components operate at elevated temperatures that can cause severe burns. Be sure equipment is cool before conducting any service or maintenance operations.
- Never operate the system without adequately sized and functional pressure relief valves in position. This blower is capable of producing pressures above most tank manufacturers' specifications.
- Use suitable lifting equipment to lift & move the blower/blower package. Improper lifting can cause injury and/or damage to the equipment.
- Do not expose any part of your body to vacuum. This blower is capable of producing vacuum levels that can cause serious injury.
- Never disconnect any fittings/hoses with the blower operating.
- Ensure that appropriate Personal Protective Equipment is being worn when operating and/or servicing the equipment.
- This system must not be used to convey explosive, toxic, dangerous, or unstable gases.
- System should only be operated and/or serviced by properly trained individuals. NVE cannot be held responsible for damage and/or injury caused by improper equipment use.
- Ensure all operating limitations are understood and followed in the installation, operation, and maintenance of the entire system.

B500 TRI-LOBE BLOWER

NVE B500
TRI-LOBE BLOWER

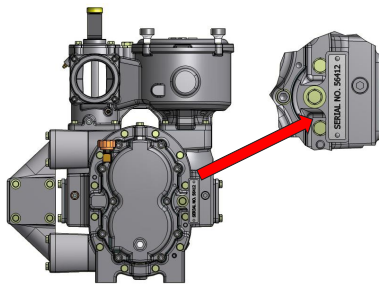
General Blower Operation



NVE B500 positive displacement blowers operate with two tri-lobe rotors to reduce pulsation levels. These are ballast ported machines, which limits the continuous vacuum levels that can be attained. These blowers operate on the principal of the opening and closing of “pockets” that trap air and convey from the intake port to the exhaust port. The opening of the lobes creates a vacuum that pulls air into the intake of the blower. The air is then trapped between the rotor lobes and the housing and conveyed to the exhaust port where, by the lobes coming together, forces the air out the exhaust port. Timing gears control the positions of the two rotors relative to each other and maintain precision clearances inside the machine. This allows the unit to operate without lubrication inside the pumping chamber. The airflow capacity of the machine (in Actual Cubic Feet/Minute) is nearly proportional to the rotational speed of the machine and is nearly indirectly proportional to the pressure differential across the machine.

Location of Serial Number

Each NVE B500 blower will have a stainless-steel blower tag bolted to the non-drive endplate of the blower as shown in the figure to the right. This serial number should be referenced in any contact with NVE regarding the unit. This will allow the specifics of the unit in question to be determined as well as all build information.



SPECIFICATIONS

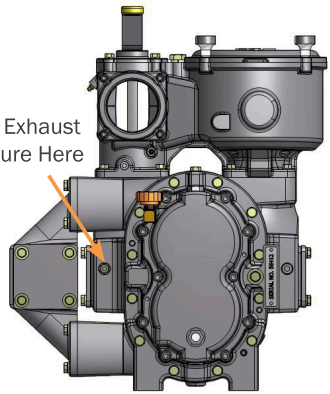
Operating Environment

The NVE B500 blower is designed to move atmospheric air. Do NOT use this blower to move explosive, toxic, or corrosive gases. Do NOT operate the blower in an area with explosive gases. Contamination in the intake air must be filtered and/or separated from the air by means of an intake filter, moisture trap and/or a cyclonic filter. These filtration and separating devices must be regularly maintained to ensure proper operation of the blower. Excessive pressure drop across these devices can cause overheating of this blower. The blower package should be shielded from excessive sources of dust and debris. A special emphasis should be placed on the atmospheric outlet location of the system as this becomes the inlet of the blower when running in pressure mode. The blower exterior should be kept clean to promote maximum heat transfer to the surrounding air.

Operating Limits

The NVE B500 is a ballast ported machine. The ballast inlet of the machine must be positioned and protected from ingesting debris, fluid, or explosive gases. Ballast air is injected into the blower when the pressure inside the blower at the ballast port is below atmospheric pressure. Due to its ballast porting, the B500 is considered a continuous duty machine at the rated RPMs. However, several limiting considerations must be checked for. This blower must be operated within all limits at all times. This typically means the blower performance is limited by the exhaust temperature and the temperature rise over ambient temperature for the blower.

As a general rule, higher machine input speeds, higher ambient air temperatures, and longer operation times will result in higher blower operation temperatures. The system should be designed to result in a continuous blower exhaust temperature not exceeding 370°F or 280°F over ambient temperature (whichever is lower). This measurement should be made on the exhaust side of the blower housing.



Input Speed	Exhaust Temperature	Δ Pressure	Inlet Vacuum
2200-2400*	280ºF over ambient or 370ºF	15 PSI +	≈ 24” Hg (Corrected) +

* RPMs up to 2600 are acceptable pending exhaust temperatures are tested and found to be within specifications shown above. + This should only be used as a reference. The system must be calibrated so that the blower exhaust temperature does not exceed the rating shown in the table above.

+ This is dependent on many factors and may cause actual inlet vacuum to vary from the value presented above. Ultimate inlet vacuum is dependent on several factors but blower RPM will play the greatest role. Higher relative RPM ranges will produce higher ultimate inlet vacuum levels.

Weights and measurements are for reference only.

Performance (Reference Only)

B500		Vacuum (Inches of Mercury)							Pressure (PSI)				
RPM		0	4	10	15	18	20	22	24	25	5	10	15
	HP	3.7	4.9	9.2	13.8	16.2	17.7	19.7	N/A	N/A	11.1	18.0	26.2
2000	TORQUE	10.3	13.5	25.4	36.2	42.6	46.5	50.7	N/A	N/A	29.2	47.1	68.7
	CFM	370											
	HP	4.7	5.7	10.6	15.4	18.0	19.7	21.5	N/A	N/A	12.0	19.7	28.8
2200	TORQUE	11.2	13.7	25.3	36.8	43.1	47.1	51.3	N/A	N/A	28.7	47.1	68.8
	CFM	406											
	HP	5.7	6.5	11.7	17.1	20.0	21.8	23.7	25.4	N/A	13.8	22.6	32.4
2400	TORQUE	12.4	14.2	25.6	37.4	43.7	47.8	51.9	55.7	N/A	30.1	49.6	70.9
	CFM	431											
	HP	6.9	7.3	12.8	18.8	21.9	23.9	26.0	28.0	28.5	15.2	24.7	35.0
2600	TORQUE	13.9	14.7	25.9	37.9	44.2	48.3	52.5	56.5	57.6	30.8	50.0	70.8
	CFM	478											

Performance of your NVE B500 blower may deviate from the aforementioned data for numerous reasons. These reasons include things such as: ambient temperature, oil condition, bearing condition, cleanliness of the media being pumped, etc. Thus, the performance values presented above should only be used for reference purposes. Actual operating conditions may vary and it is the system designer's responsibility to account for these variations.

Depending on the specifics of a given application, it may be required to break the ultimate vacuum of the B500 to keep it from overheating. Always set up the vacuum system to keep blower exhaust temperatures at or below 280°F over ambient or 370°F (whichever is lower).

Airflow Control

The airflow rate of the blower can be adjusted by changing the speed of the blower. This can be accomplished by changing the PTO ratio, the gearbox ratio, pulley ratio (on belt drives), hydraulic pump/motor displacement, or driving engine speed. The blower input speed is nearly proportional to the airflow of the machine.

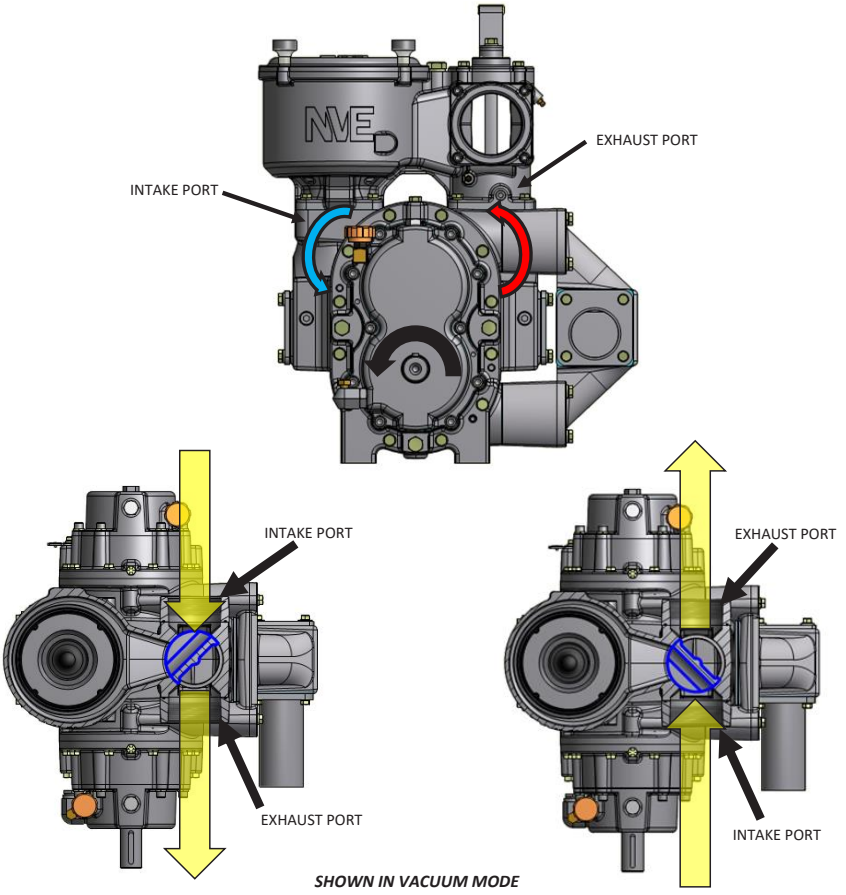
Sound Level

It is recommended the operator monitor the blower while running and listen for resonances (increased levels of noise) that may occur at certain RPMs and operate the blower at speeds above or below the resonance speeds to reduce excess noise. Resonance areas are dependent on many factors and tend to be application specific.

The noise level of the blower will increase with higher levels of vacuum and RPM. To minimize noise, operate the blower at the minimum speed and vacuum level required to achieve the desired performance.

Rotation & Airflow

Either port can be used for intake and exhaust connection to the blower. However, the handle position for vacuum and pressure will vary accordingly. In the “vacuum” position, the four way valve must be positioned to connect the intake port to the intake connection (the tank). The following graphics portray this hookup and airflow information as it relates to the B500 blower.



SHOWN IN VACUUM MODE

Weights and measurements are for reference only.

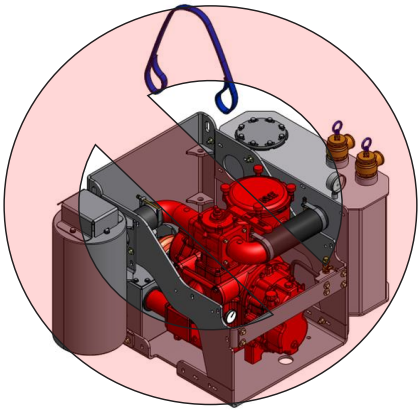
Handling

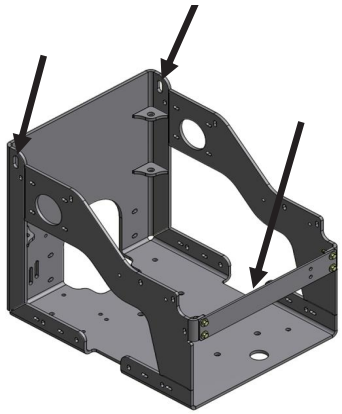
When unpacking the blower or blower package from the skid, verify the packing list matches the product supplied and that no visible damage has occurred during shipping. In the event damage has occurred, first file a claim with the carrier and then contact NVE for assistance.

Keep all intake and exhaust ports covered to prevent accidental ingestion of materials into the blower.

Use an appropriately sized lift strap for the weight of the blower or package being lifted.

Do NOT use lift points on the blower to pick up blower packages. The blower was not designed to be used as a pick point for packages. Damage to the blower and/or package will likely result. The blower stand includes lifting pockets and a cross member that can assist in lifting the package. It is the users' responsibility to ensure a safe lifting procedure for any NVE package.





⚠ CAUTION

Improper handling of the blower can cause blower damage and/or dropping of the blower. Ensure the load is balanced before picking.

The dry weights of the B500 and associated packages are given in the table below:

DESCRIPTION	PART NUMBER	DRY WEIGHT
Blower, B500, Low Shaft, CCW, Manifold	131-B500-LSM	382 LBS
B500 Frame Mount Gearbox Drive, RH MT & Exhaust Silencer Package	147-B500-001	774 LBS
B500 Frame Mount Gearbox Drive, Exhaust Silencer Package	147-B500-002	701 LBS
B500 Frame Mount Gearbox Drive, LH MT & Exhaust Silencer Package	147-B500-003	780 LBS
B500 Frame Mount Hydraulic Adapter, RH MT & Exhaust Silencer Package	147-B500-004	735 LBS
B500 Frame Mount Hydraulic Adapter, Exhaust Silencer Package	147-B500-005	664 LBS
B500 Frame Mount Hydraulic Adapter, LH MT & Exhaust Silencer Package	147-B500-006	742 LBS

Table 1: B500 Blower & Packaging Dry Weights

Preservation

Keep all intake, ballast, and exhaust port coverings in place to prevent debris or liquids from entering blower. Reapply rust preventative oil to all metal parts, including the pumping chamber every six months or more frequently if the relative humidity is greater than 80%.

While in storage, rotate the shaft three to four revolutions every two weeks to keep gears coated in oil.

Before installing a blower that has been stored for any length of time, remove the intake and exhaust covers and inspect the rotors and cylinders to insure the absence of rust. In addition, remove the oil fill plug on drive oil tank and inspect the gear for any evidence of rust.

⚠ WARNING

Use a rust preventative oil with a flash point over 400°F. Drain oil prior to putting unit in service.

NOTICE

Dispose of used rust preventative oil according to local and EPA regulations in an environmentally friendly manner.

Weights and measurements are for reference only.

Limitations of Use

LIMITATION OF USE	REASON FOR LIMITATION AND/ OR RISK	CORRECTIVE ACTIONS
Operation of the blower in an explosive environment.	Fire and/or explosion can result.	DO NOT USE
Using blower to move explosive, toxic, or dangerous gases.	Fire and/or explosion can result. Pollution of the environment. Health and injury risks to operator(s).	
Liquid drawn into blower intake.	Blower seizure, damage to blower, and possible ejection of parts.	Install a moisture trap or cyclonic separator before the intake port of the blower. If liquid is suspect in the blower, remove before starting blower.
Operation with the ballast port blocked or restricted.	Overheating of blower. Eventual catastrophic failure of blower. Potential Fire.	Remove any blockage and eliminate any restriction in the ballast system.
Operation with exhaust port blocked off or restricted.	Overheating & potentially dangerous system pressure.	Remove blockage and minimize restriction in the exhaust circuit.
Rotation of the blower in the wrong direction.	Damage to the blower.	Change the direction of rotation of the drive. (Jog blower to confirm correct rotation at first startup).
Operation of blower in excess of recommended speed.	Overheating & potential seizure of blower. Blower damage & ejection of parts possible.	Operate the blower within the recommended speed range.
Operation of blower below minimum speed.	Potential seizure of blower. Blower damage & ejection of parts possible.	
Operating at excessively hot inlet & atmospheric conditions.	Overheating of blower. Eventual catastrophic failure of blower.	Monitor the blower operating temperature & adjust intake vacuum and/or RPM to get operating temperatures within specification. Keep blower & intake filter clean.
Operation at excessively hot ballast air temperatures.	Overheating of blower. Eventual catastrophic failure of blower. Potential Fire.	Obtain the coolest air possible for ballast intake. Ensure hot exhaust air is not being recirculated.
Operating at excessively cold inlet & atmospheric conditions.	Damage to, and potential seizure of, the blower. Ejection of parts possible.	Review precautions in cold weather conditions. Use recommended lubrication.
Operating above the exhaust temperature upper limit.	Overheating of blower. Potential fire. Damage to, and potential seizure of, the blower.	Reduce intake vacuum level. Reduce the blower speed. Remove restrictions in intake & exhaust circuits (inlet filter!)
Operation of drive with excessive misalignment.	Damage to, and potential seizure of, the blower. Ejection of parts possible.	Remove misalignment & replace wearing components in drive system.

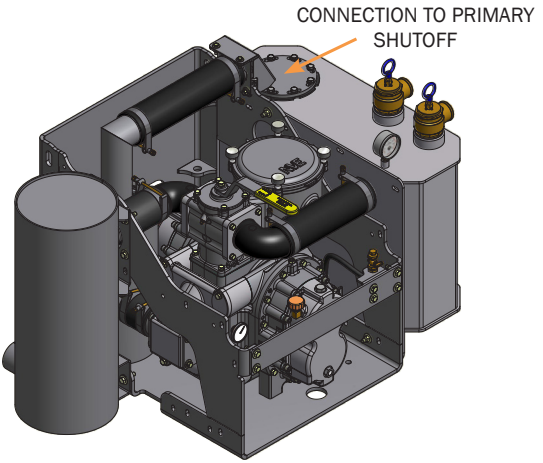
INSTALLATION CONSIDERATIONS

Any B500 blower package should be bolted to the frame of the truck in a sufficient manner. Maintaining locations should include stand corners on the stand should be flat against the frame rail of the truck. Ensure there are no bolts or rivets between the mounting surface. Truck manufacturers' should be consulted for proper mounting. NVE cannot take responsibility for the mounting of any NVE product.

The exhaust discharge of the blower silencer should be considered in the installation of the package. Remember, this becomes the intake when the blower is operated in pressure mode, so ensure hot and/or dirty air is not going to be pulled into the silencer (and ultimately the blower).

Any ballast cooled blower will be sensitive to the condition (cleanliness and temperature) of the ballast air. Ensure ballast inlets are positioned to pull the coolest, cleanest air possible. Avoid ballast inlet location where any hot exhaust air (from the blower or truck/components) can be pulled into the blower's ballast system.

The moisture trap, if equipped, should be plumbed to the primary



*Read "Plumbing and Piping" (Page 22) section of this manual for proper plumbing selection

Fill out the blower registration form and email to sales@natvac.com.

Fill out the installation check list & warranty validation form and email to sales@natvac.com.

Belt Drive System

The B500 blower is able to accommodate a V-Belt drive system. It is recommended to mount the prime mover on the intake side of the blower. This prevents unloading of the blower bearings at low load levels and also helps reduce the moment load on the bearings. The pulley should be mounted as close to the oil sump cover of the blower as possible (with a minimum ¼" gap). Some method of belt tension adjustment must be installed to take up belt wear. Belts should be matched to insure uniform torque transmission. Belts should be replaced in sets. Due to the inherently higher hub loads generated, synchronous drive systems should not be used on a B500 blower.

⚠ WARNING

Belts and pulleys must be fully guarded to prevent entanglement and ejection of parts.

⚠ CAUTION

Excessive or insufficient belt tension could damage the blower and/or prime mover.

Regularly check all bushing fasteners for proper torque, especially after initial run in or after any belt drive service.

A belted drive specialist should be consulted for design review of a belted drive system incorporating NVE components.

Gearbox Drive System

Many B500 blower packages supplied by NVE include a 1:2 (speed up) right angle gearbox. If using an NVE package with this gearbox, remember that PTO output speed will need to be 1/2 of desired blower input speed. The gearbox incorporated on the respective NVE B500 packages can be flipped 180º so either input rotation can be accommodated. Double check that the orientation of the gearbox will produce the correct blower rotation. The "snout" of the gearbox will be the "high" rotation speed.

Drive Shaft System

The driveshaft system is a critical component in regards to effective and safe operation of any system containing NVE components. Failure to correctly specify a proper driveshaft system can cause system damage and potentially dangerous situations. Furthermore, improper driveshaft systems can result in non-warrantable damage to NVE components. Thus, a drive line specialist should be consulted to specify the proper driveshaft system for the blower application based on application specific parameters. These parameters include the horsepower, RPM, and length of the driveshaft. U-joint operating angles at each end of the shaft must always be within manufacturers' specifications to prevent yoke bearing failure and excessive bearing stresses on the gearbox and blower. NEVER exceed the manufacturers' maximum recommended driveshaft angles for the specific application. Damage to the blower will occur.

U-joint operating angles on each end of a driveshaft should always be equal within manufacturers' specifications of each other to cancel angle induced vibration. The driveline specialist will design this system from a torque transfer and geometric approach to optimize the performance of the system. The drive shaft must also be balanced to manufacturers' specification. This is true for a replacement driveshaft as well. Also, ensure the yokes on both ends of the driveline are in phase.

Symptoms of driveshaft system issues include, but are not necessary limited to, the following:

Driveline vibration
Blower and/or gearbox vibration
Premature wear/failure of couplers (typ. elastomeric hub)
Excessive end play in universal joints
Loose, missing, or damaged fasteners on gearbox bracket
Loose, missing, or damaged fasteners on the blower
Loose, missing, or damaged driveline fasteners
Broken/missing driveline components

⚠ WARNING

A drive shaft loop should be used to catch the shaft in the event of failure and to prevent the ejection of parts.

Drive shafts represent rotating parts and pose entanglement hazards.

NEVER approach a rotating system.

It is recommended that overload protection be incorporated on the driveline.

⚠ WARNING

Improper drive system specifications can cause failure of associated components including, but not limited to, gearboxes, couplers, and internal blower components. NVE reserves the right to reject warranty claims due to operation with improper drive system specifications.

Diesel Engine Precautions

⚠ CAUTION

This blower should not be operated with a diesel engine running at low RPMs. Diesel engines at low RPMs are capable of producing damaging torque pulses that can cause rotor lobe contact and/or accelerated wear of bearings and gear components.

When driving the blower with a diesel engine, it is recommended to bring the engine up to normal operating RPM and then engage the blower via a clutch. The blower should be started under a “no load” condition (i.e. neutral valve position).
Use caution when using a diesel engine that is significantly oversized for the operating point of the blower. Doing so can result in inertial mismatch, excess torsional vibrations at low RPMs, and possible blower lobe contact.
With increased regulation in regards to diesel engines, NVE strongly recommends consulting a diesel engine specialist

to assist in the design of a diesel driven system using NVE components.
Ensure diesel engine exhaust is not increasing the intake and/or ambient air conditions of, or around, the blower. Overheating of the blower could occur.

Direct Coupler Installation & Alignment
Reference the coupler manufacturers' installation instructions to ensure proper install of the coupler system. Ensure coupler specifications conform to the HP/torque relationship of the blower/prime mover. It is the installer's responsibility to ensure proper drive system installation and alignment.

⚠ CAUTION

Do NOT use a hammer to slide couplers onto, or off of, the blower shaft as this may result in blower damage.

Failure to properly align couplers can cause premature wear of the blower bearings, coupler components, and other drive system members.

Couplers should be routinely inspected for wear and replaced according to manufacturers' recommendations.

⚠ WARNING

Couplers must be guarded to prevent entanglement and ejection of parts.

Hydraulic Drive
The B500 can be driven with an appropriated sized, and matched, hydraulic system utilizing a motor with an SAE B two or four bolt face. NVE offers B500 packages with hydraulic adapters. It is the installer's responsibility to design the hydraulic system including the hydraulic motor and associated couplers to connect to the blower.

⚠ WARNING

Couplers must be guarded to prevent entanglement and ejection of parts.

Weights and measurements are for reference only.

⚠ CAUTION

A hydraulic specialist should be consulted in the design of the hydraulic system.

Failure to properly align couplers can cause premature wear of the blower bearings, coupler components, and hydraulic motor.

Plumbing and Piping

Do not hang plumbing from blower flanges. Use isolating flanges or isolating hose to couple blower to piping to prevent dead weight from hanging off blower and to allow for thermal expansion. Failure to do so may result in rotor contact with housing and/or premature wear and/or leaking of connection points. Use only clean piping that is free of dirt, scale, cuttings, weld spatter, and foreign materials of any kind.

The intake and exhaust system can be plumbed with 3”or larger hose. The hose should be rated for the maximum exhaust temperature of the blower. Incorrect specification of hose could result in hose failure and possible overheating of the blower. Hose on the intake side of the blower must be vacuum rated up to maximum desired system vacuum. The intake components, and blower itself, should not be subjected to excessive heat sources.

⚠ WARNING

Incorrect specifications on plumbing components can cause failure of the blower, ejection of parts, and/or expelling of dangerously hot air/media.

A specialist should be consulted in the selection of plumbing components.

RECOMMENDED ACCESSORIES

Exhaust Silencer
Positive displacement blowers are inherently noisy due to their design. NVE offers compatible silencers for the exhaust system of the B500 blower to reduce decibel levels in the operating environment. If using a non-OEM silencer, it should be tested for effectiveness by running at the desired vacuum level and RPM and monitoring exhaust gas temperature with the blower running for at least one hour. The blower should not exceed specified exhaust gas temperatures. Be sure the exhaust silencer is not restricted at free (maximum) air flow as this could cause damaging back pressure in the blower.

⚠ WARNING

Discharge from the exhaust silencer can reach temperatures capable of causing injury.

The exhaust silencer and associated plumbing pose a burn hazard during, and after, operation.

Maintain an air gap around the exhaust silencer and associated plumbing.

Intake Filter
NVE offers an intake filter manifold for the B500 blower. It includes a stainless steel mesh type filter that is designed to maximize efficiency and keep unwanted, and potentially damaging, debris from being ingested into the pumping chamber. An improperly sized, or excessively dirty filter can cause actual inlet vacuum of the blower to rise above specification and can cause the blower to overheat. It is good practice to keep a spare filter on hand for emergency use.

⚠ CAUTION

A clogged inlet filter can cause the blower to overheat.

Keep the inlet filter clean.

Replace the filter if damaged.

4-Way Valve
The B500 blower features an integral 4-way valve in the blower manifold. Thus, this blower is capable of vacuum and pressure modes right from the factory.

⚠ WARNING

This blower is capable of producing dangerous pressure levels that may exceed the limits of the tank (and other system components) to which it is attached.

It is the system designer's responsibility to install properly sized and positioned relief valves into the system.

Inlet Check Valve
The B500 blower features an integral inlet check valve in the blower housing. This check valve is always on the intake side of the blower (whether in pressure or vacuum mode). This feature prevents the blower from spinning backwards should the system be disengaged with vacuum in the unit being evacuated. Jog the system at first startup to verify the blower is rotating in the correct direction.

⚠ WARNING

Spinning the blower in the wrong direction will close the inlet check valve and can produce dangerous pressures inside the blower.

Primary Shutoff
A primary shutoff is to be used with the blower as a first line of defense to prevent liquid from entering the blower. It is critical that an appropriately sized primary shutoff is used. Contact NVE for assistance with selecting the shutoff.

Secondary Shutoff/Moisture Trap
The secondary shutoff or moisture trap should also be appropriately sized for the airflow application. Contact NVE for assistance with selecting the shutoff. Many B500 blower packages come standard with a moisture trap installed.

OPERATION

Preliminary Checks on Stored Units
Before operating a B500 blower that has been stored for any length of time, remove the intake and exhaust port covers and inspect the rotors and cylinders to verify the absence of rust. Make sure nothing falls into the pumping chamber when the covers are removed.

Remove the oil fill plug on the drive side of the blower. Inspect the timing gears for the presence of any rust. If any inclusions are noticed in the gear oil, the gear oil should be replaced prior to putting the unit into service.

Verify the blower spins by hand. Due to the positive lip seals in the B500 blower, there will be resistance to rotation. This is normal.

Initial Start Up
Verify the blower is setup to spin in the correct direction. At first start up, jog the blower to confirm rotation.

Verify all connections between the plumbing system and the blower flanges are in place and tight.

Blower should be started in a “no-load” condition.

Blower speed should be ramped up slowly to minimize system shock.

⚠ CAUTION

Do not rotate the blower in the reverse direction.

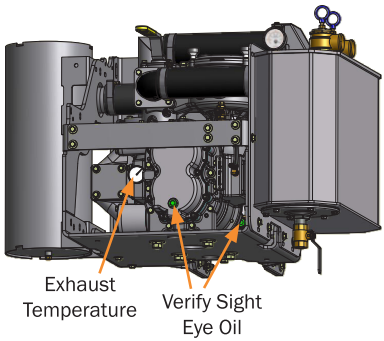
Hot shift PTOs are not recommended in driving the blower.

Set the vacuum relief system to keep the blower exhaust temperature at a maximum of 280°F above ambient air temperature (or 370°F – whichever is lower). This is dependent on many factors, but should be around 24 inches of mercury.

During the first eight (8) hours of operation, special attention should be paid to the unit to ensure there are no vacuum leaks, oil leaks, vibrations, or strange noises.

Prior To Regular Start Up

Verify oil levels through the sight eyes on both ends of the blower. Oil level should be in range of ¾ full to just under full of both sight-eyes. If near the top of the sight eye, a small air bubble should be present at the top of the sight eye.



Verify all guards are in place.

Blower should be started under a “no load” condition and input

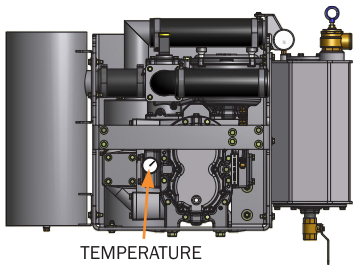
⚠ WARNING

NEVER operate the blower system without all guards in place.

Operators must wear PPE including, but not limited to, eye and hearing protection as noises levels can exceed 85 dB.

Operating the Blower

After starting blower under “no load” condition and bringing up to operating RPM, the four-way valve handle can then be placed in either vacuum or pressure mode. Put the handle fully in pressure or vacuum. Never feather the four-way valve on the blower to regulate vacuum or pressure. This allows hot exhaust air to be pulled into the intake of the blower and will quickly overheat the blower. Blower exhaust temperature is usually the first sign of trouble in a blower. If the temperature rate is abnormal or the operating temperature is high, shut the system down in a quick safe manner. Strange noises also are an indicator of trouble. Regularly monitor the blower exhaust temperature via the included exhaust temperature gauge (see above graphic). The blower exhaust temperature should not exceed 280ºF over ambient or 370ºF.



Check the appropriate parameters listed in the maintenance schedule under the Maintenance section of this owner’s manual.

⚠ CAUTION

Improper operation of the blower can cause equipment failure and/or injury.

Feathering the four-way valve between vacuum and pressure will overheat the blower.

Do not operate the blower outside of the recommended temperature and/or RPM ranges.

Blower system should only be operated by trained individuals.

Stopping the Blower

Before stopping the blower system, all vacuum or pressure should be removed from the blower (if possible). This reduces the system shock of the shutdown. Furthermore, this system should not be used to hold vacuum and/or pressure when the system is not engaged.

⚠ CAUTION

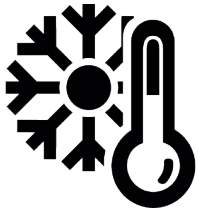
Remove vacuum and/or pressure from the blower system before disengaging.

Do NOT keep vacuum and/or pressure on the blower system while disengaged.

Do NOT transport the system with vacuum and/or pressure present.

Weights and measurements are for reference only.

Cold Weather Operating



NOTICE

During very cold weather conditions, always warm the blower before operating at full rated vacuum or pressure.

Damage to the blower can result from operating for short intervals to near rated exhaust temperatures in very cold weather conditions.

If using a coupler system with a rubber jaw or sleeve in shear applications in extremely cold weather, take note that elastomeric materials become stiffer in cold weather. This results in a reduction of the shear protection in the event of a lock up of the blower because the jaw or sleeve can handle more torque before giving way.

If hydraulically driving the blower, allow the hydraulic fluid to warm up before operating the blower at full load. Use the correct viscosity of hydraulic oil for the operating temperature as recommended by the manufacturer of your system. Contact a hydraulic specialist to determine optimal system design for cold weather environments.

Before starting blower, verify the shaft rotates freely by hand. Water can condense and freeze in the blower cylinder without warning causing a stall condition at start up.

Check the intake filter and air intake daily. If snow is present, check the air intake more frequently.

Do NOT thin out the oil in the gear cases with any other fluids such as Kerosene. Use the recommended oil for the operating temperatures.

A suitable, safe, and compatible flushing fluid can also be used in cold weather applications to keep the blower pumping chamber lubricated and “freeze-protected”. A fluid specialist should be consulted to determine and appropriate flushing fluid product and procedure. Flushing between jobs and at the end of the day can help reduce the chances of moisture inside the pumping chamber of the blower from “freezing up”

If temperatures are so cold that the blower cannot warm up, enclose the blower allowing for sufficient clearance from parts to prevent contact with hot or moving components.

MAINTENANCE

Before Beginning Maintenance

Before beginning any maintenance procedure, the system must be shut down and locked out to eliminate the possibility of accidental startup. Most systems that include NVE components have rotating members that can cause entanglement, injury, and/or death. Many NVE components also obtain high levels of temperature during, and for a period after operation. The entire system must be allowed to cool below 100°F before beginning any service procedure. Also, all pressure or vacuum must be removed from the system before beginning maintenance.

⚠ DANGER

Lock out equipment before beginning any maintenance procedure. Rotating equipment can cause entanglement, injury and/or death.

Allow all system components to cool below 100°F before beginning any maintenance procedure. Severe burns are possible.

Safely remove all pressure/vacuum from the system before beginning any maintenance procedure. Injury/death can occur.

Procedure for Removal of Pressure Retaining Device

1. Make certain all pressure is relieved from system prior to loosening any device/component.
2. Four-way valve should be in neutral position.
3. Check vessel gauge and ensure absence of pressure.
4. Only LOOSEN all mechanical holding devices.
5. Wiggle lid, cap, or component to ensure the absence of pressure.

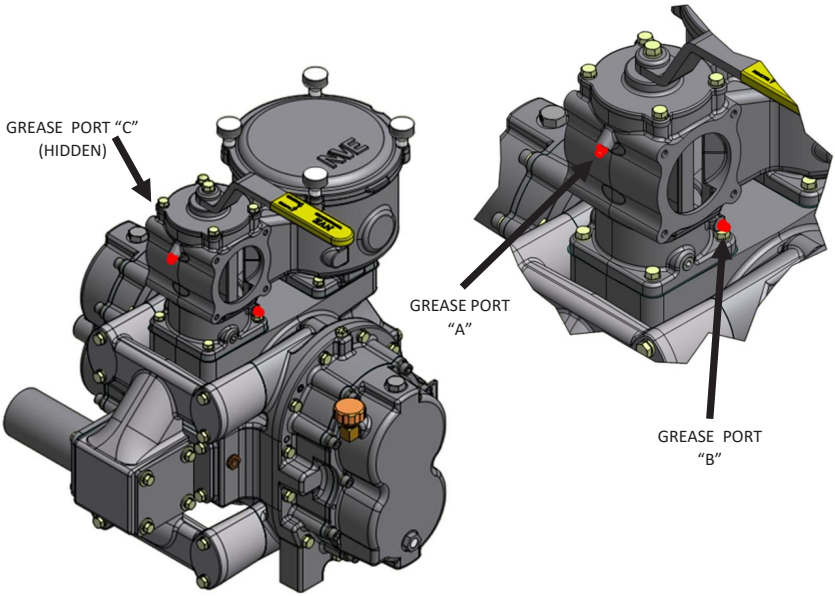
NOTICE

Only properly trained personnel should service systems containing NVE components.

Weights and measurements are for reference only.

Four-Way Valve Maintenance

The B500 blower features an integral 4-way valve in the blower manifold. This valve should be greased in regular intervals. This prevents rusting of the valve and allows the valve to operate in a smooth and reliable manner. Greasing should be part of a routine maintenance program for this blower. There are three grease ports on the B500 manifold (see graphic below). Only two of these ports actually require grease (Ports “B” and “C” are in communication with each other). These are standard style grease fittings. Do not over grease the valve. A small amount of grease is all that is necessary to sufficiently grease the plug.



⚠ WARNING

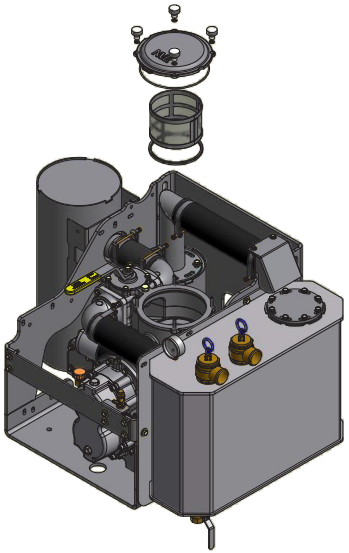
Ensure system is free of vacuum and pressure before beginning any maintenance.

Allow blower and system components to cool below 100°F before beginning any maintenance.

Intake Filter Maintenance

As mentioned previously, the B500 blower features an integral final filter. This filter should be regularly inspected and cleaned. When operating in pressure mode, a clogged filter can starve the blower of air and cause catastrophic overheating in a short time frame. NEVER operate the blower in pressure mode with a clogged inlet filter. If damaged, the filter should be immediately replaced. It is good practice to keep a spare filter on hand for emergencies. The maintenance process is outline below:

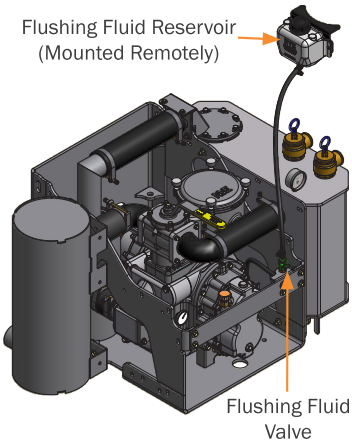
1. Ensure the absence of vacuum/pressure in the entire system.
2. Using the proper pressure retaining device removal process, remove the four thumb screws securing the filter cover.
3. Place thumb screws and fasteners in a safe place and remove the filter cover (the o-ring under the filter cover will likely remain in place).
4. Remove the filter, clean/replace as necessary
5. Inspect the square cut o-ring (120-064-030) and the filter cover o-ring (120-064-035). Replace if necessary.
6. Reverse the above procedure to reassemble.



Weights and measurements are for reference only.

Flushing The B500 Blower

Most Challenger B500 packages come standard with a flushing valve package installed. Most packages are supplied with a remote flushing fluid kit. This allows the system designer the freedom to mount the reservoir in various positions. Consult NVE manual (NVE-0001) “Flushing Fluid Kit Installation Recommendations” for guidance on installing the kit. NVE recommends NOT storing flushing fluid inside the reservoir. Add the fluid to the reservoir immediately before flushing and empty the reservoir during the flushing procedure.



1. Make sure the flushing fluid valve is closed.
2. Pour desired amount (typically 6-8 oz) of appropriate flushing fluid into the reservoir.
3. Engage the blower to run in neutral at the lowest RPM setting (minimum of 2000 RPM).
4. Open the flushing fluid valve to completely drain fluid from the reservoir.
5. Close the flushing fluid valve.
6. Place the four-way valve in respective position depending on application (see “a” and “b” below).

   a) Placing the four-way valve in vacuum mode sends the fluid out the exhaust silencer.

   b) Placing the four-way valve in pressure mode sends the fluid into the moisture trap and possibly upstream including into the vessel being evacuated.
   It is up to the system designer and/or operator to decide where the flushing. Fluid should end up.
7. Disengage and safety shutdown the system.
8. Remove pressure/vacuum from the entire system.
9. Drain affected components.

   a) The exhaust silencer if option “a” was taken.

   b) The moisture trap (and other upstream components) if option “b” was.

⚠ WARNING

Do NOT store flushing fluid in the reservoir.

Do NOT inject flushing fluid into a shutdown system.

Do NOT flood the blower with flushing fluid.

Do NOT run the blower for extended periods with the four-way valve in neutral position.

Do NOT inject flushing fluid into a “hot” blower.

Changing Sump Gear Oil

Recommended Oils For Blower Sumps (Synthetic Only)				
Ambient Temperature °F (°C)	**Type**	**Viscosity**	**Pour Point**	**Color**
Above 90°F (32°C)	Summit Syngear SH-7320 Mobile SHC 632	ISO 320	-40 (-40) -40 (-40)	Clear Orange
32° F to 90° F (0° C to 32° C)	Summit Syngear SH-7220 Mobile SHC 630	ISO 220	-45 (-43) -41 (-42)	Clear Orange
0°F to 32° F (-18°C to 0°C)	Summit Syngear SH-7150 Mobile SHC 629	ISO 150	-60 (-51) -45 (-43)	Clear Orange
Below 0° F (-18°C)	Summit Syngear SH-7100 Mobile SHC 627	ISO 100	-60 (-51) -45 (-43)	Clear Orange

**Ambient temperature is the temperature of the space where the blower is located or enclosed.*

Approximate Oil Capacities

Approximate Oil Capacity For Blower Sumps			
Blower	**Drive End (oz.)**	**Non-Drive End (oz.)**	**Total (oz.)**
B500	6.5	6.0	12.5

**Amounts are approximate and should be used as reference only. Use sight-eyes!*

Changing Sump Gear Oil

The B500 blower features positive lip sealing technology to keep sump oil from being pulled into the pumping chamber of the blower. Thus, both sumps are vented to atmosphere. The oil sumps should be serviced according to the maintenance schedule under the Maintenance Section of this owner's manual. The oil change process is detailed in the procedure below.

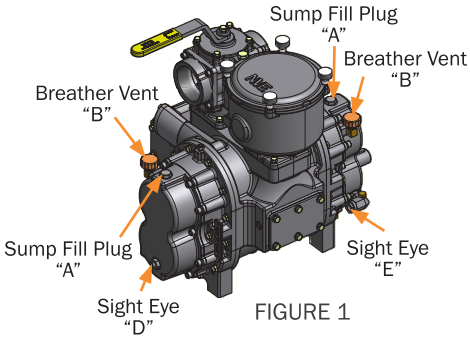


FIGURE 1

Step #1: Remove the oil sump fill ("A") plug from the non-drive end of the blower (7/8" Wrench).

Step #2: Remove the magnetic oil drain plug ("C") from the bottom of the oil sump and allow the oil to drain completely (5/16" Hex).

Step #3: Inspect the magnetic drain plug ("C") for metallic debris. Some debris is normal, but if amount is excessive contact NVE.

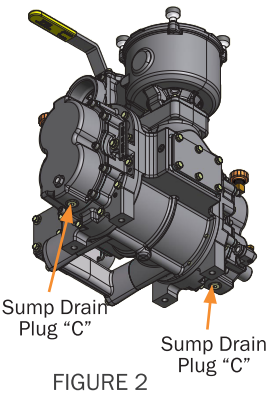


FIGURE 2

Step #4: Reinstall the magnetic drain plug ("C") in the non-drive sump (5/16" Hex).

Step #5: Insert a funnel into the hole in the top of the non-drive sump (Sump Plug "A") and slowly pour the recommended gear oil until the liquid nearly fills the sight eye ("D") on the non-drive end of the blower. The breather vent ("B") will allow the sump to vent.

Step #6: Do not overfill the blower sump, a slight air gap should be visible at the top of the sight eye ("D").

(SEE FIGURE #3)

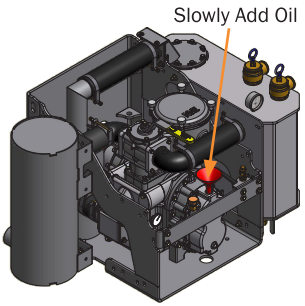


FIGURE 3

Step #7: Reinstall the oil sump fill plug (“A”) on the non-drive end of the blower. (7/8” Wrench)

Step #8: Remove the oil sump fill (“A”) plug from the drive end of the blower. (7/8” Wrench)

Step #9: Remove the magnetic oil drain plug (“C”) from the bottom of the drive end oil sump and allow the oil to drain completely. (5/16” Hex)

Step #10: Inspect the magnetic drain plug (“C”) for metallic debris. Some debris is normal, but if amount is excessive, contact NVE.

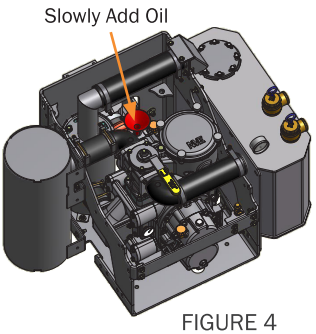


FIGURE 4

Step #11: Reinstall the magnetic drain plug (“C”) into the drive end sump. (5/16” Hex)

Step #12: Insert a funnel into the hole in the top of the drive sump (Sump Plug “A”) and slowly pour the recommended gear oil until the liquid nearly fills the sight eye (“E”) on the drive end of the blower. The breather vent (“B”) will allow the sump to vent.

Do not overfill the blower sump, a slight air gap should be visible at the top of the sight eye (“E”).

Step #13: Reinstall the oil sump fill plug (“A”) on the drive end of the blower. (7/8” Wrench)

Step #14: Verify accurate oil levels in both sight-eyes and monitor for leaks.

Weights and measurements are for reference only.

Relief Valves General Considerations

Relief valve position and quantity are vital in the consideration in the safe and efficient operation in a system containing the Challenger B500 blower. This blower is limited in its continuous duty pressure levels, and in some scenarios, its continuous duty vacuum levels. Furthermore, the vessel that the blower is connected to may have its own, independent limitations. The blower, the vessel, and any associated components must be considered together but may also require their own dedicated protection devices. Remember, the Challenger B500 must be protected from producing excessively high-pressure levels. The B500, is generally capable of producing pressures over tank manufacturers' specifications. Thus, the size, type, and location of pressure relief valves are a vitally important consideration regarding safety. There are also certain applications that may require the B500 system to include a vacuum relief valve to limit the continuous duty exhaust temperatures to be within blower specifications. The blower exhaust temperature is the ultimate tell-tale of what a given application will allow the B500 system to operate.

Many NVE Challenger B500 packages come standard with pressure relief valves installed in the moisture trap. These are NOT factory adjusted and may or may NOT be adequate for a given application. NVE assumes no responsibility for the location, type, quantity, or adjustment of any system relief devices. It is the system designer's responsibility to specify, install, adjust, and service any relief valve device.

In general, it is important to think about the function of pressure relief valves in regard to their location in the system. If an obstruction occurs between the blower and the attached vessel, pressure will build before the restriction. Thus, having a pressure relief as close to the blower as possible will minimize this potential risk by relieving this pressure to keep within safe operating levels. This doesn't necessarily mean that the vessel is protected adequately from this location. Vessel manufacturers should be consulted for proper protections in both vacuum and pressure modes. Adequately protecting the Challenger B500 blower does not necessarily mean that the attached vessel and/or associated components is/are adequately protected. NVE makes no attempt to offer specifications and/or guidance on proper vessel vacuum and pressure protection.

⚠ WARNING

Relief valves are a vital component to system safety and proper operation.

Relief Valve Setting Instructions

Pressure Relief Valve

⚠ WARNING

Pressure relief valves should only be adjusted and/or serviced by trained individuals.

Pressure relief valves are not pre-set. They must be properly set at time of install.

Improperly set/installed pressure relief valves can cause potentially dangerous system pressures to be generated.

NVE assures no responsibility of quantity and/or setting of any pressure relief valves on any associated system.

Pressure Relief Valve Adjustment Procedure

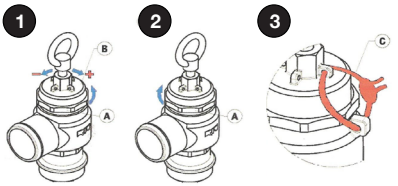
Picture #1

Step #1: Unscrew lock nut "A."

Step #2: Turn the spring-tightener "B."

CW = Increased Pressure

CCW = Decreased Pressure



Picture #2

Step #3: Once desired pressure is obtained, retighten lock nut "A."

Picture #3

Step #4: Fix the setting by using the rings "C" that are situated on the body and the spring-tightener.

NOTICE

Only properly trained personnel should service systems containing NVE components.

Weights and measurements are for reference only.

Vacuum Relief Valve

⚠ WARNING

Vacuum relief valves should only be adjusted and/or serviced by trained individuals.

Vacuum relief valves are NOT factory set by NVE. They must be properly set at time of package install.

NVE assumes no responsibility of quantity and/or setting of any vacuum relief valves on any associated system.

Improperly set/installed vacuum relief valves can cause potentially dangerous blower exhaust temperatures to be generated that can lead to catastrophic blower/system failure.

Vacuum Relief Valve Adjustment Procedure

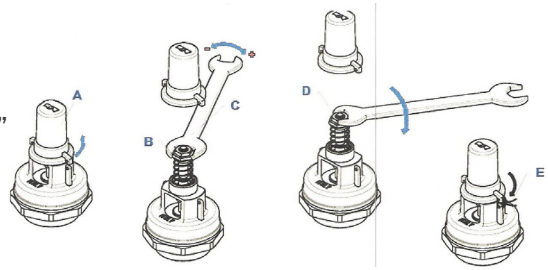
Step #1: Remove the protection cap "A."

Step #2: Turn the spring-tightener "B" through a spanner "C."

CW = Increased Vacuum

CCW = Decreased Vacuum

Step #3: Once desired vacuum level is obtained, screw down the lock nut "D."



Step #4: Screw down the protection cap and fix it using the rings "E" that are situated on the valve body and on the cap.

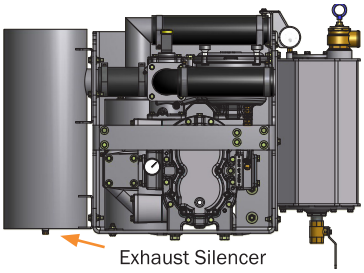
NOTICE

Only properly trained personnel should service systems containing NVE components.

Generalized Maintenance and Inspection

1. Drain the exhaust silencer via the ¼" NPT plug on the bottom. This should be checked at least weekly and anytime carryover is suspected.

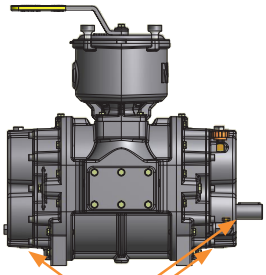
   (FIGURE 1)



(FIGURE 1)

2. Verify the absence of leaks around the drive and non-drive oil sumps and around the input shaft of the blower.

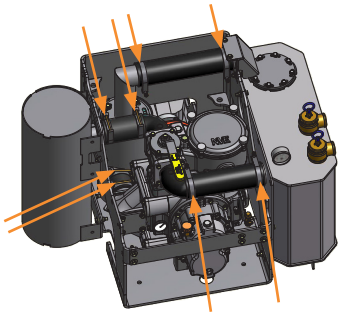
   (FIGURE 2)



(FIGURE 2)

3. Inspect all hose connections for damage and clamp tightness. This includes the blower to exhaust silencer connection, the blower to the moisture trap connection (if present) and the multiple ballast system connections.

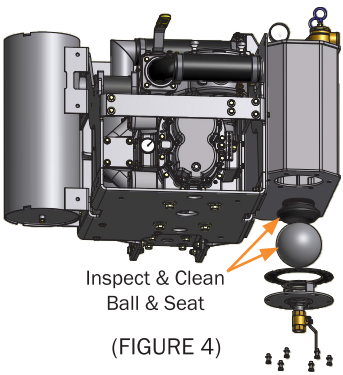
   (FIGURE 3)



(FIGURE 3)

4. Inspect and clean moisture trap ball and seat. After locking system out and removing all vacuum/pressure from the system, remove inspection/ drain cover on the bottom of the moisture trap using the "Procedure for Removal of Pressure Retaining Device". The ball can then be removed and cleaned. The seat will also be exposed inside the open cavity for cleaning (it can also be removed by loosening the clamp if desired).

   (FIGURE 4)

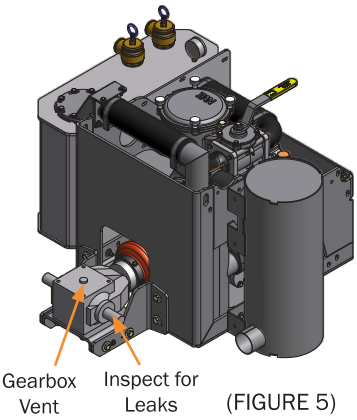


(FIGURE 4)

Weights and measurements are for reference only.

5. Inspect the gearbox for any oil leaks and for proper oil level on a routing basis. Inspect & clean the vent plug that is in the top of the gearbox case. Drain & change the gearbox oil as required. The fill level of the gearbox is to the center of the shafts. The gearbox bracket hardware should be inspected for looseness. Any PTO shaft should also be inspected for excessive play in u-joints and slip yokes. Slip yokes and u-joints should also be greased.

(FIGURE 5)



(FIGURE 5)

6. Routinely inspect any drive system couplers for wear and excessive play. Any damaged coupler should be replaced immediately.

(FIGURE 5)

Maintenance Schedule

Disclaimer: This maintenance schedule is meant to be a reference only. Many applications will require more frequent maintenance (and some less). It is up to the operator to look over this schedule and amend it to fit their application based on its' specifics.

Maintenance Schedule						
Check	Parameter	Frequency				Comments
		Hr	Dy	Wk	Mn	
Visual	Pressure		1			Blower Running
	Temperature		1			
	Noise		1			
Lubrication	Oil Level		1			Blower Shutdown
	Oil Leakage			1		
	Oil Change-Initial	400				
	Oil Change-Normal	800				
	Four-Way Valve			1		
Filter	Vacuum		1			<1 in Hg
	Clogging			1		Depending on Application
Right Angle Gearbox	Oil Change-Initial	50				Blower Shutdown
	Oil Change-Normal	500				
Moisture Trap/ Secondary	Drain Fluid		1			
Inspection	Driveline			1		
	Couplers			1		

Weights and measurements are for reference only.

Clean Out Procedure If Flooded

1. Remove the inlet filter and exhaust silencer.
2. Remove the timing cover plates on the sides of the blower.
3. With high pressure water, clean intake and exhaust areas.
4. Have an assistant slowly turn the input shaft as you clean the lobes with water.
5. Run the blower at the lowest speed possible and continue to spray water into the inlet of the machine until the discharge shows only clean water.
6. With the blower running, spray a small amount of penetrating oil into the intake and run until no liquid comes out the exhaust. DO NOT SPRAY OIL INTO THE BLOWER WITH THE SILENCERS IN PLACE.
7. Disassemble and clean the manifold/4-way valve assembly. Allow to dry then reassemble.
8. If the blower was flooded, it is highly probable the exhaust silencer has material in it as well. Clean it out as best you can. Drain all fluids from the silencer and allow it to dry.
9. When everything is clean and dry, reassemble the manifold and silencers. Make sure flange bolts on the blower are tightened evenly.

Rebuilding

Rebuilding is beyond the scope of this owner's manual and should be performed only by trained technicians. Consult an authorized distributor or NVE to arrange rebuilding of the blower.

Maintenance Notes	
Date	Comments

Weights and measurements are for reference only.

TROUBLESHOOTING

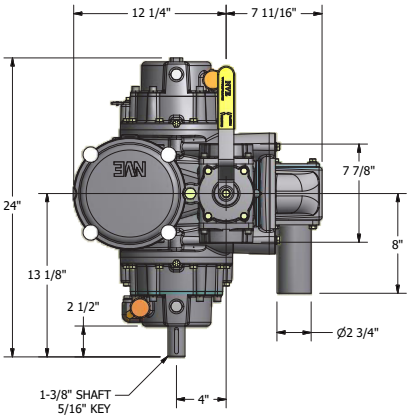
Operating Problem	Probable Cause (Next Table)
Blower does not spin by hand.	A, B, C, K, M, N, V, AG
Inlet vacuum is not what's expected.	D, E, G, H, AA, AB, AC, AD
Outlet pressure is not what's expected. STOP THE BLOWER TO PREVENT DAMAGE.	E, F, AB
Outlet temperature is not what's expected. **STOP THE BLOWER TO PREVENT DAMAGE.**	B, C, D, E, G, H, J, K, W, X, AA, AB, AC, AE, AH, AJ, AK
Prime mover (engine or motor) is laboring excessively when driving blower.	A, B, C, E, F, H, K, L, M, N, T, U, V, AA, AB, AG, AH
Oil or liquid leaking from blower.	L, P, R, S, AE
Oil temperature is high.	B, D, E, F, J, K, W, X, AE, AH, AJ, AK
Blower is creating unusual noises or vibrations. STOP THE BLOWER TO PREVENT DAMAGE.	A, B, C, D, E, F, G, H, K, M, N, T, U, V, Y, Z, AB, AC, AD, AG, AH, AL
Oil mist is visible in exhaust.	K, L, W, X, AE, AH
Excessive air is pushing out ballast port.	AL

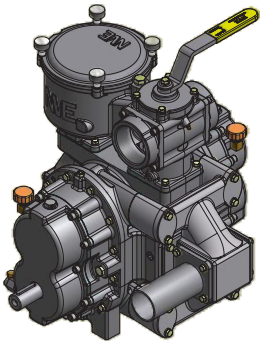
	Probable Cause	Remedy
A	Rotors are contacting each other.	Stop the blower immediately and check the internal clearances of the blower.
B	Deposit build up on cylinder wall.	Clean the cylinder walls and rotors.
C	Object was ingested into the blower.	Remove the object, clean the internal walls of blower and check the internal clearances.
D	Inlet plumbing or filter is clogged.	Check and clean the inlet plumbing and filter.
E	Blower not at correct RPM.	Verify blower RPM and adjust accordingly.
F	Exhaust plumbing clogged.	Clean exhaust plumbing and silencers.
G	Rotors are worn.	Verify internal clearances and replace or rebuild as necessary.
H	Vacuum relief valve improperly set or failed.	Measure system vacuum, reset or replace vacuum relief valve as necessary (Follow safety guidelines).
J	Inlet temperature out of specification.	Verify inlet temperature is within specification and adjust accordingly.
K	Bearings worn.	Rebuild blower.
L	Oil level too high.	Check required oil level in each tank and remove oil as necessary.
M	Coupler or belts not aligned.	Check alignment and correct as necessary.
N	Improper belt tension.	Check belt tension and correct as necessary.
P	Oil sump gaskets worn.	Replace the oil sump gaskets/rebuild blower.

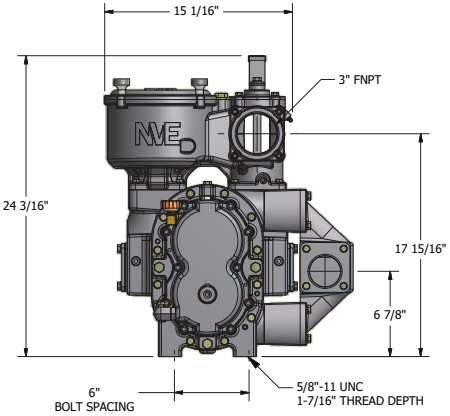
	Probable Cause	Remedy
R	Oil sump shaft seal worn.	Replace the shaft seal for the oil sump.
S	Faulty oil tank plugs or sight-eyes.	Replace the plugs and/or sight-eyes. Use thread sealer on all NPT threads.
N	Improper belt tension.	Check belt tension and correct as necessary.
P	Oil sump gaskets worn.	Replace the oil sump gaskets/rebuild blower.
R	Oil sump shaft seal worn.	Replace the shaft seal for the oil sump.
S	Faulty oil tank plugs or sight-eyes.	Replace the plugs and/or sight-eyes Use thread sealer on all NPT threads.
T	Blower operated at excessive angle.	Verify blower is as level as possible during operation.
U	Blower operated at excessive driveline angle.	Check driveline angle and correct as necessary.
V	Gearbox bearings worn.	Rebuild/replace gearbox.
W	Oil too thick.	Use correct synthetic viscosity oil.
X	Oil is foaming.	Use correct type of synthetic oil.
Y	Operating diesel engine at too low of an RPM causing torque pulses.	Increase engine RPM and adjust drive ratios accordingly. Use a vibration dampened drive shaft.
Z	Improperly balanced driveshaft.	Inspect driveshaft and balance as required.
AA	Moisture trap or shutoff is full and closed off.	Empty the moisture trap or shutoff of fluid.
AB	Plugged or collapsed hose (not always visible from the outside of the hose).	Unplug and/or replace hose.
AC	Four-way valve is not in full vacuum position or has debris not allowing proper position.	Clean four-way valve and/or position properly.
AD	Vacuum leaks on tank or fittings.	Repair leaks as necessary.
AE	Plugged sump vents.	Clean or replace the sump vents.
AF	Four-way valve sticks and/or is difficult to move.	Grease the four-way valve and adjust as necessary.
AG	Rotors fell out of time.	Rebuild blower.
AH	Rotor and endplate are contacting.	Rebuild blower.
AL	Ballast system is blocked or restricted.	Inspect ballast system and remove any blockage/obstruction.
AK	Ballast system is pulling in air with elevated temperature.	Place ballast system inlet away from heat sources. Obtain coolest air possible.
AL	Ballast check valve has failed or is contaminated.	Disassemble ballast check system and clean or replace as necessary.

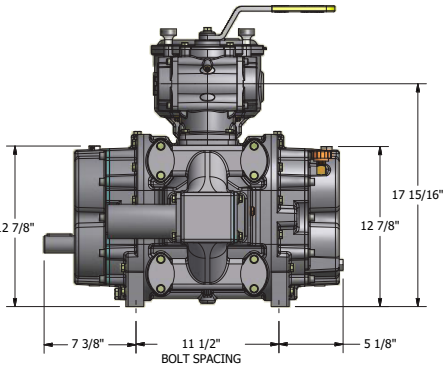
Weights and measurements are for reference only.

B500 Blower | Dimensions Diagram









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