DEKKER

VACUUM TECHNOLOGIES, INC.

Installation Operation & Maintenance Manual

MAXIMA-C™

Large Capacity Liquid Ring Vacuum Pumps

Part No. 9983-0000-P03 Rev. A / January 2018

MAXIMA-C™

LARGE CAPACITY LIQUID RING VACUUM PUMPS

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DEKKER
VACUUM TECHNOLOGIES, INC.

THIS INSTALLATION, OPERATION, AND MAINTENANCE MANUAL MUST STAY WITH EQUIPMENT.

PLEASE REGISTER YOUR EQUIPMENT WARRANTY AND START-UP RECORD ONLINE AT *WWW.DEKKERVACUUM.COM*

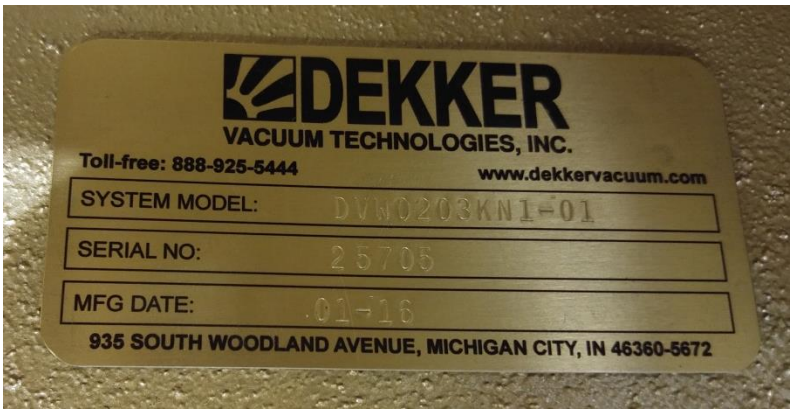
CUSTOMER SERVICE

Contact information

DEKKER
VACUUM TECHNOLOGIES, INC.
935 SOUTH WOODLAND AVENUE, MICHIGAN CITY, IN 46360-5672
TEL.: 219-861-0661 – FAX: 219-861-0662 – TOLL-FREE: 888-925-5444
Bus. Hours: 7:30 a.m. – 4:30 p.m. CST
Website: www.DEKKERvacuum.com
E-mail: AfterSales_Support@DEKKERvacuum.com

Order Information

When calling for service, parts or system information always have the pump or system model number and serial number(s) ready. Refer to the bill of lading or the gold-colored system information plate attached to the system (see image below).



Gold-colored system information plate

Parts should be purchased from the nearest authorized DEKKER Vacuum Technologies, Inc. (hereafter referred to as DEKKER) representative (visit www.dekkervacuum.com to find a distributor near you via the Distributor Locator) or from the vacuum pump system supplier. If, for any reason parts, cannot be obtained in this manner, contact the factory directly.

INTRODUCTION

The Maxima-C™ liquid ring vacuum pump has been designed to give you safe, reliable, trouble-free service, provided the basic maintenance and operation guidelines as set out in this manual are followed. Compared to other vacuum pumps, the Maxima-C liquid ring vacuum pump offers the advantages of no metal-to-metal contact between the impeller and cones. Grease lubricated bearings are mounted external to the pumping chamber, isolated by gland packing or mechanical shaft seals. This means that the pump requires no internal lubrication. However, a vacuum pump is a rotating piece of equipment and operators must exercise good judgment and follow proper safety procedures to avoid damage to the equipment or personal injury. Please review and follow all instructions in this manual before attempting to install, start, or operate equipment.

SAFETY

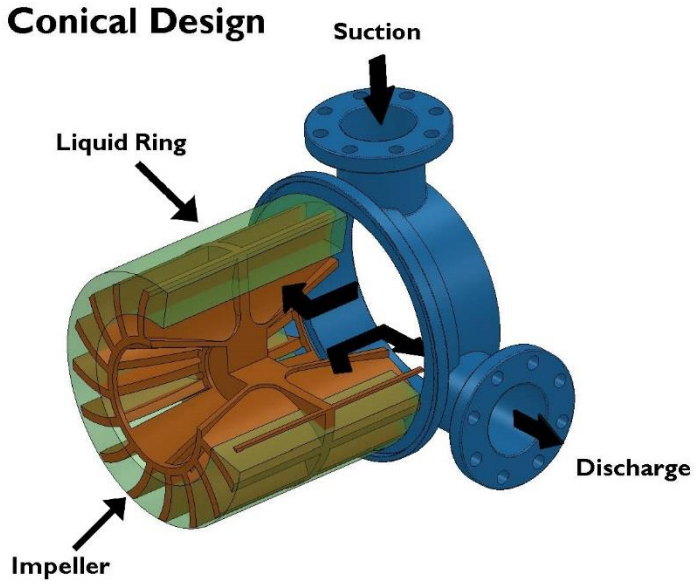
All vacuum pumps, systems and/or compressors (hereafter referred to as the Product) offered by DEKKER have been designed and manufactured for safe operation. However, the responsibility for safe operation rests with those who use and maintain these products. The safety department where the product is installed should establish a safety program based on OSHA, federal, state, and local codes. It is important that due consideration be given to hazards which arise from the presence of electrical power, hot liquids, harmful gases, and rotating equipment. Proper installation and care of protective devices is essential to safe system operation. These safety procedures are to be used in conjunction with the instructions contained in this manual.

WARNING: DO NOT PUMP OXYGEN or oxygen rich mixtures with these pumps - EXPLOSION HAZARDS!

THEORY OF OPERATION

The DEKKER Maxima-C large capacity liquid ring vacuum pump is a robust design which features conical porting. The cones are attached to the end housing of the pump and protrude into the impeller on both sides. Air and liquid enter the impeller axially verses horizontally. The primary benefit of this design is its ability to handle more seal liquid or liquid carryover through the suction. The Maxima-C features a shrouded impeller and heavy duty cones and bearings.

The impeller assembly is the only moving part which rotates freely in the casing without metal-to-metal contact which means no additional lubrication is required. The function of the sealing liquid is to create a liquid piston action used to produce vacuum and to remove the heat of compression. The impeller contains a series of blades that are shrouded at the sides forming a series of chambers. The chambers of the impeller are filled with water or oil that rotates with the contour of the casing. As the sealing liquid recedes from the impeller chamber, it is replaced by gas drawn from the inlet port. As the impeller rotates, the sealing liquid is forced back by the eccentric casing into the impeller chamber. The drawn gas is then compressed into the impeller chamber and discharged through the discharge port.



STORAGE

For short term storage (less than 3 months), do the following:

- Drain the seal fluid from the pump and piping.
- Store in a clean, dry environment with temperatures above freezing.
- Rotate shaft every 2 weeks by hand 2 ¼ turns to prevent pump from seizing.
- Stop shaft at least 90° opposite of the starting point.

For long term storage (greater than 3 months), do the following:

- Drain the seal fluid from the pump and piping.
- Store indoors (if possible). For storage outdoors, the pump must be covered with tarpaulin that will allow proper air circulation.
- Protect the pump from extreme temperatures and humidity.
- Avoid exposure to excessive dust, moisture, and vibration.

- Add rust inhibitor into the pump inlet and rotate the shaft by hand for several revolutions to coat the pump interior.
- Plug all open ports to keep out dirt and foreign objects.
- If equipped, slide the packing glands away from the stuffing box and remove the packing rings from pump. Coat the packing area of the shaft and all other exposed areas of the shaft with rust inhibitor. Seal the stuffing box from dirt with a radially split flexible gasket. Reinstall the packing glands.
- Remove the bearing cover cap screws and through bolts on both ends of the pump. Slide back bearing caps and completely fill cavities (both inside and outside of both ends) with suitable grease. Reinstall bearing caps with through bolts and cap screws.

  Note: Tag or label the pump that bearing housings are overfilled with grease. Prior to returning the pump to service, this excess grease must be removed. Failure to do so may result in excessive bearing heat and premature bearing failure.

- Rotate shaft every 2 weeks by hand 2 ¼ turns to prevent pump from seizing.
- Stop shaft at least 90° opposite of the starting point.

  Note: Do not remove or add any shims, which will affect rotor center.

INITIAL FREIGHT RECEIPT AND INSPECTION

Before a system ships from DEKKER, it is thoroughly tested, and will not be released unless it passes our Quality Control standards. All pumps are thoroughly inspected and are not released unless they pass our Quality Control standards. Once the product is received and signed for in Good Condition, DEKKER cannot be held accountable for undiscovered, unclaimed damage that is a result of freight transit. It is the responsibility of the receiver to thoroughly inspect and test the product for functionality upon delivery. The customer should take photos of the product as it arrives and send to DEKKER and the freight carrier if there are any issues. The party who selected the shipper is responsible for filing the freight claim. Failure to report these issues within the freight carriers' undiscovered damage window can result in non-acceptance of freight claims. DEKKER does keep photos of all systems, as shipped, to assist in freight claims. Report any damage immediately to AfterSales_Support@DEKKERvacuum.com.

Key items to inspect:

- Is the product received as requested? Are all parts, accessories, and components delivered?
- Was the skid or crating received in good condition? Check for cosmetic damage.
- Check wiring inside of control panel. Are all wires should be terminated and connections tight? (If applicable)
- Check control panel components. Are they tight on DIN rail and/or other mounts/fasteners?
- Are there any leaks or puddles around the pump? Specify hose, piping or housing leak.

System must be given an initial startup test as soon as possible after delivery. This is to ensure that the motor has not shifted out of alignment during transit as well as to verify that electrical components are functioning without fault – Variable Frequency Drive (VFD), Programmable Logic Controllers (PLC), panel cooling fans, transducers.

INSTALLATION

Overview

The design of the piping system, foundation layout, and plant location are the responsibility of the purchaser. DEKKER Vacuum Technologies, Inc. and its representatives may offer advice, but cannot assume responsibility for operation and installation design.

Please consult the factory or a specialist skilled in the design of plant layout, system piping design, and foundation design. The installer should carefully read this manual before installing the equipment. DEKKER or your authorized dealer can provide start up assistance in most instances for a fee. Contact DEKKER for hourly/daily service rates.

Unpacking

Upon receipt of pump or system, immediately inspect for signs of damage. Carefully remove packing or crating from around pump or system. Be sure to keep equipment in upright position.

Lifting

Lift the equipment carefully and with weight evenly distributed. DEKKER is not responsible for equipment that has been damaged through mishandling or dropping.

Location

Install the unit in a well ventilated and dust free area. The pump or system should be a minimum distance of 3 feet from surrounding walls to allow for checking fluid level, temperatures, pressures and general servicing.

Mounting

The pump or system must be installed on a level surface in the horizontal position. The foundation must be designed to support the total unit weight, without any settlement or crushing, be rigid and substantial enough to absorb any equipment vibration, maintain true alignment with any drive mechanism, and must permanently support the system baseplate at all points. The vacuum system must be leveled and secured with anchor bolts. Anchor bolts must be of adequate size to withstand the mechanical stresses exerted on it.

Systems 50 HP and larger should also be grouted into position per local codes. The foundation should be constructed to allow for ¾ to 1-½ inch of grout. The baseplate is set on shims and the grout is poured between the foundation and the baseplate. To have the required body to support the baseplate, grout should be at least ¾ inch thick.

The number and location of shims will be determined by the design of the baseplate. Firm support should be provided at points where weight will be concentrated and at the anchor bolt locations. Use enough, and large enough, shims to provide rigid support. Baseplates are usually designed with openings to allow pouring grout. When the baseplate has been shimmed, leveled, and the anchor bolts have been snugly tightened, a dam is constructed around the foundation to contain the grout. The dam level should be at least ½ inch above the top surface of the shims. Grout should be poured inside and around the outside of the baseplate and leveled. Allow the grout to dry for a minimum of 48 hours before tightening the anchor bolts.

Please note that the pump/motor coupling and V-belt units will need to be realigned prior to start-up, with the exception of monoblock units.

Ventilation

Locate the unit in an area with sufficient airflow and accessibility. To prevent excessive ambient temperature rise it, is imperative to provide adequate ventilation. Cooling is an important aspect of reliable equipment operation and it is therefore important to install the unit in a reasonably cool area where the temperature does not exceed 104°F (40°C). For higher ambient temperatures contact the factory.

Typical system operating temperature is between 140°-185°F. Minimum oil temperature should not be below 45°F.

Electrical Preparation

All system wiring is performed at the factory if a control panel is supplied and installed on the skid. Check area classification to ensure all electrical enclosures comply with code. Required customer wiring is minimal, but

should be done by a qualified electrician in compliance with OSHA, National Electric Code and any other applicable local electrical code concerning switches, fused disconnects, etc. DEKKER includes a wiring diagram in the control panel for use by the installer. DEKKER recommends a main disconnect switch be fitted between the vacuum system and the incoming power.

After the electrical wiring connections are completed check the incoming voltage to make sure the incoming voltage is the same as the vacuum system voltage. Line voltage should be within the voltage tolerance as specified on the motor or to local code. Check the system for proper motor rotation. The direction of rotation is marked by an arrow on the motor or pump housing. Jog the motor by pressing the ON button and then the OFF button. If the rotation is incorrect switch any two of the three main power leads (three phase power) on the contactor inside the control panel. Failure to do so could result in serious equipment damage.

WARNING: Install, ground, and maintain equipment in accordance with the National Electrical Code and all applicable federal, state and local codes.

Pipe Connection and Sizing

Before installation, remove all protective inserts on the pump suction and discharge. Piping connected to the system must be installed without imposing any strain on the system components. Improperly installed piping can result in misalignment, general operating problems, and pump failure. Use flexible connectors and vibration isolators where necessary. Piping must be cleaned of debris before installation.

Inlet Piping

Note: Install a temporary screen at the pump inlet flange at first start-up to protect the unit against carryover of pipe debris and weld slag. The screen must be removed after the initial run in period.

Inlet piping should be at least the size of the pump inlet. All piping should be independently supported and aligned to pump connections. No strain should be transmitted to the pump from the piping. Flexible expansion connectors between pump and piping are suggested. Install the pump as close as possible to the process to minimize losses due to the length of the suction line. If the pump has to be installed further away from the process, be sure the inlet piping is properly sized to minimize the overall line pressure drop. For more information, consult your dealer or call the factory.

Pumps operating in parallel on a common manifold must each have a manual or automatic isolation valve and a suitable check valve installed in the suction line close to the pump suction flange. This allows each individual pump to be isolated when it is not in operation. The minimum line size of the manifold should be equal to the sum of the individual pump pipe cross-sectional areas.

If the possibility exists that the pump inlet can become closed during operation, it will be essential to install some type of vacuum relief valve (anti-cavitation valve) so that air can enter the pump inlet. Never run a pump with a closed suction. This causes cavitation and may damage the pump.

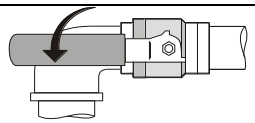
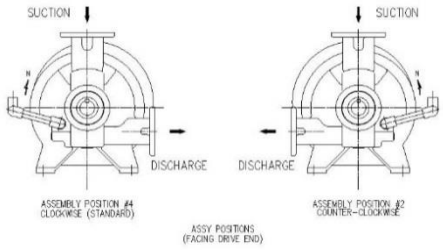
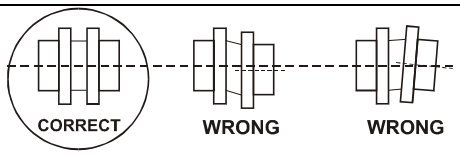
Discharge Piping

Discharge piping must be at least the size of the pump discharge. Do not discharge the exhaust gases from the pump into the area where the pump is installed. Vapors pulled over from the process could be hazardous. Install an exhaust line of at least the same diameter as the discharge connection of the pump.

Discharge piping should not run uphill unless the system is designed with appropriate safeguards.

For pumps operating in parallel on a common discharge, DEKKER recommends the installation of a suitable check valve close to the discharge flange of each unit. Discharge check valves should be a low differential pressure type with positive shutoff. For more information contact the factory. When discharging more than one pump in a common discharge line and/or over a long distance, oversize pipe accordingly.

START-UP PROCEDURES

1	Ensure all shipping plugs and/or paper covers are removed from system and tagging information is followed for successful startup.	
2	Ensure seal fluid isolation valve is open and verify proper flow.	
3	Jog the motor briefly and check direction of rotation. The correct direction of rotation is indicated on the pump housing. If direction is incorrect switch any two of the three leads at the power connection.	
4A	Check drive coupling alignment. Consult the factory for specific system size alignment.	

4A.1

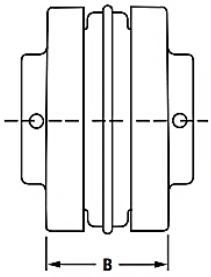


Figure 1
B Dimension

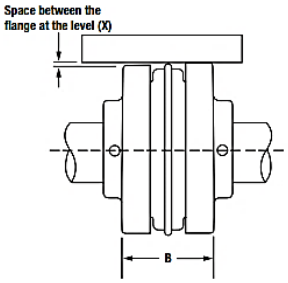


Figure 2
Parallel Measurement

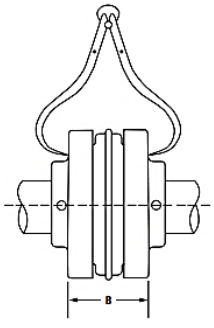


Figure 3
Angular Measurement

4B	For units utilizing V-belt drives, make sure the sheaves are properly installed and aligned before attempting to tension the drive. The V-belts should be placed over the sheaves and in the grooves without forcing them over the sides of the grooves. The tensioning steps below can be used for all types of V-belts, all cross sections and number of belts and all types of construction. **Avoid excessive heat** (140°F and higher); belt life will be shortened. **Never switch or mix belts** from one groove to another on the sheaves. **Do not use belt dressing**. Sheaves should remain free of oil and grease. **When replacing belts install an identical set.** For more specific V-belt tensioning guidelines consult factory. Sheave alignment should be checked by placing a straight edge or tight cord across the sheave faces so that it touches all four points of contact. Ordinarily, a misalignment of more than one-half of one degree (one eighth inch in one foot) will adversely affect belt life. Improper sheave alignment produces uneven wear on one side of the belt, causes the belt to roll over in the sheaves or throws the entire load on one side of the belt, stretching or breaking the cords on that side. **Tensioning a Drive - General Rules of Tensioning** 1. Ideal tension is the lowest tension at which the belt will not slip under peak load conditions. 2. Check tension frequently during the first 24-48 hours of run-in operation. 3. Over tensioning shortens belt and bearing life. 4. Keep belts free from foreign material which may cause slip. 5. Make V-Drive inspection on a periodic basis. Tension belt when slipping. Never apply belt dressing as this will damage the belt and cause early failure. 6. If the unit is idle for an extended period of time, the tension on the belts should be removed.	**Simple Tensioning Procedure** 1. Measure the span length. 2. At the center of the span apply a force (perpendicular to the span) large enough to deflect the belt 1/64", for every inch of span length. For example, one deflection of a 100 inch span would be 100/64 or 1-9/16 inches. 3. Compare the force you have applied with the values given in Table 4B.1 on the next page. If the force is between the values for normal tension, and 1-1/2 times normal tension, the drive tension should be satisfactory. A force below the value for normal tension indicates an under tensioned drive. If the force exceeds the value for 1-1/2 times normal tension, the drive is tighter than it needs to be. 4. After the proper operating tension has been applied to the belts, double check the following: A) Parallel position of the sheave shafts. B) Correct alignment of sheave grooves. ***Tensioning rules and procedure courtesy of Dodge PT Manual MN-4002***

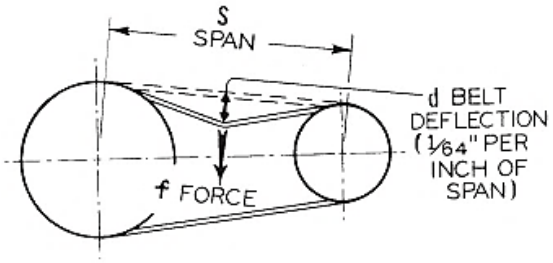
4B.1

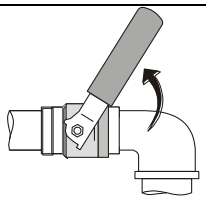
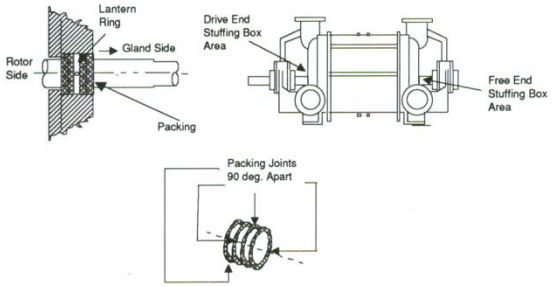
Tensioning Table

V-Belt Section	Small Sheave		Deflection Force			
	Speed Range	Diameter	1.0	1.5	2.0	4.0+
3VX	1200-3600	2.2	2.2	2.5	2.7	3
	1200-3600	2.5	2.6	2.9	3.1	3.6
	1200-3600	3	3.1	3.5	3.7	4.2
	1200-3600	4.1	3.9	4.3	4.5	5.1
	1200-3600	5.3	4.6	4.9	5.1	5.7
	1200-3600	6.9	5	5.4	5.6	6.2
5VX	1200-3600	4.4	6.5	7.5	8	9
	1200-3600	5.2	8	9	9.5	10
	1200-3600	6.3	9.5	10	11	12
	1200-3600	7.1	10	11	12	13
	900-1800	9	12	13	14	15
	900-1800	14	14	15	16	17
8VX	900-1800	12.5	18	21	23	25
	900-1800	14	21	23	24	28
	700-1500	17	24	26	28	30
	700-1500	21.2	28	30	32	34
	400-1000	24.8	31	32	34	36
5V	900-1800	7.1	8.5	9.5	10	11
	900-1800	9	10	11	12	13
	900-1800	14	12	13	14	15
	700-1200	21.2	14	15	16	17
8V	900-1800	12.5	18	21	23	25
	900-1800	14	21	23	24	28
	700-1500	17	24	26	28	30
	700-1200	21.2	28	30	32	34
	400-1000	24.8	31	32		36

Tensioning Table and installation image courtesy of Dodge PT Manual MN-4002

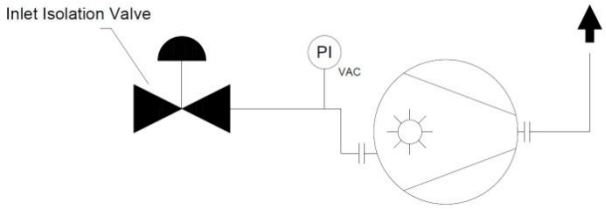
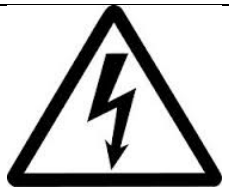
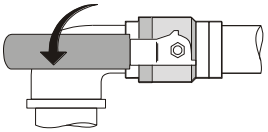
Notes:
1. Use approximately 130% of above values to tension a new set of belts.
2. Use closest sheave diameter for sizes not shown.



5	If the system contains an inlet valve in the vacuum line, set it to approximately 3/4 closed, and start pump. If valve is not supplied, one should be installed. After 3 minutes running time, slowly open valve completely.	
6	If applicable, loosen or tighten the packing glands to where there is approximately 60 drips/minute at the operating point. See Stuffing Box Packing section below for further instruction.	
7	Check the voltage and motor current. They should be within the specifications for the motor. Amperage should be checked at the Overload. **Note:** This test should also be performed under normal system operating conditions.	**DANGER: HIGH VOLTAGE!** **Lethal shock hazard present.** **USE EXTREME CAUTION!**

SHUT DOWN PROCEDURES

To stop the vacuum pump follow the procedure as outlined below.

1	Close the system inlet isolation valve	
2	Push the STOP button or turn switch to the OFF position.	
3	Ensure seal fluid isolation valve is closed. **Note:** Close the seal fluid isolation valve and the pump inlet isolation valve during extended periods of storage or when transporting. See Storage section for details. Open valves before starting system.	

MAINTENANCE

WARNING: Before attempting any maintenance such as changing the fluid, disconnect all power from the system by switching off the main breaker, isolate all energy sources and allow system to cool.

Pump Bearing Lubrication

DEKKER Maxima-C large capacity liquid ring vacuum pumps require lubrication every 6 months or 1500 hours of operation. Extreme operating conditions may require more frequent lubrication.

Greasing Bearings:

1. Get access to the bearing caps. This may require removal of the coupling/belt guard and coupling/sheave from the shaft.
2. Clean the exterior of the bearing caps and bearing housing with fresh, clean solvent. Remove as much dirt and debris as possible before removing the caps.
3. Remove the outer bearing caps from both ends of the pump, carefully keeping the free end shims intact.
4. Slide the inner bearing caps in toward the stuffing box/packing gland area.
5. Inspect the grease around the bearing looking for metal particles. Such particles may indicate a worn, failing bearing. If a bearing is damaged, it must be replaced with a new bearing.
6. Remove all used grease from the bearing caps, and wipe clean with a solvent.
7. Wipe away as much used grease as possible from the bearing housings and bearings.
8. Remove the plug(s) from the bearing housings and temporarily install one grease zerk.
9. With a hand operated grease gun, pump grease into the bearing, via the fitting, while slowly turning the shaft by hand. The old, used grease will be pushed out of the bearing and replaced with fresh, new grease. Continue this process until all of the old grease is expelled. Larger pumps have two (2) tapped holes in the inner bearing cap. By utilizing first one, then the other, for replenishing the grease, the process is faster and assures a more uniform distribution of the grease.
10. Wipe away all of the old grease. The bearings are now packed.
11. Inspect the grease seals or bearing isolators for damage and wear. Replace as necessary.
12. Fill the reservoirs of the bearing caps 1/2 - 2/3 full of grease.
13. Replace the caps, along with new gaskets, installing shims on the outer free end cap exactly as removed.
14. Remove the grease zerks from the bearing housings and re-install the plugs.

Motor Bearing Lubrication (where required)

For information regarding motor bearing lubrication, refer to the motor maintenance and operation manual.

Seal Fluid

The system is shipped from the factory without seal-water. Cool, clean water should be supplied. Standard performance is based on actual tests at a seal-water temperature of 60°F. Temperatures above 60°F result in capacity reduction. Water that is not clean or abrasive should be avoided whenever possible. Extremely hard water may result in the formation of scale deposits within the pump. If this occurs, please consult factory for methods of removal.

Guidelines for suitable water are:

- Minimum pH: 7
- Maximum Chlorides: 10 ppm
- Maximum total dissolved solids: 200 ppm
- Maximum hardness: 200 ppm

When charging the system with fresh water, make sure that the pump is filled with water to the shaft centerline level. Do not fill the pump above the shaft centerline. Starting the pump with fluid level above the shaft centerline may result in shaft or impeller damage or failure. You can add water by removing the suction or discharge flange and pouring water through pump suction or discharge port.

Seal Fluid Strainer

After the first 50 hours of operation, clean the strainer, if installed, in the seal fluid line. This is done to remove any debris carried over into the system from the process. Clean and inspect the strainer every 1000-3000 hours depending on application.

Stuffing Box Packing

Leakage through the packing glands is expected to keep the packing from overheating and damaging the shaft. Normal seal leakage is approximately 60 drops per minute. If leakage rates observed at the site exceed this value the packing gland screws should be tightened to reduce this leakage.

The pump must be operational for this adjustment to take place. This adjustment is made while there is minimal vacuum on the equipment. Each adjustment will require running the pump for 10 minutes before proceeding to the next step. Exercise all caution when making adjustments to the packing.

Figure 1 below shows a typical packing arrangement. A packing consists of multiple packing rings installed between the shaft and end plate of a vacuum pump. These rings are compressed to provide the adequate amount of sealing via the packing gland and packing gland adjusting screws. Over time the packing rings wear, thus the initial setting from the factory will need to be adjusted.

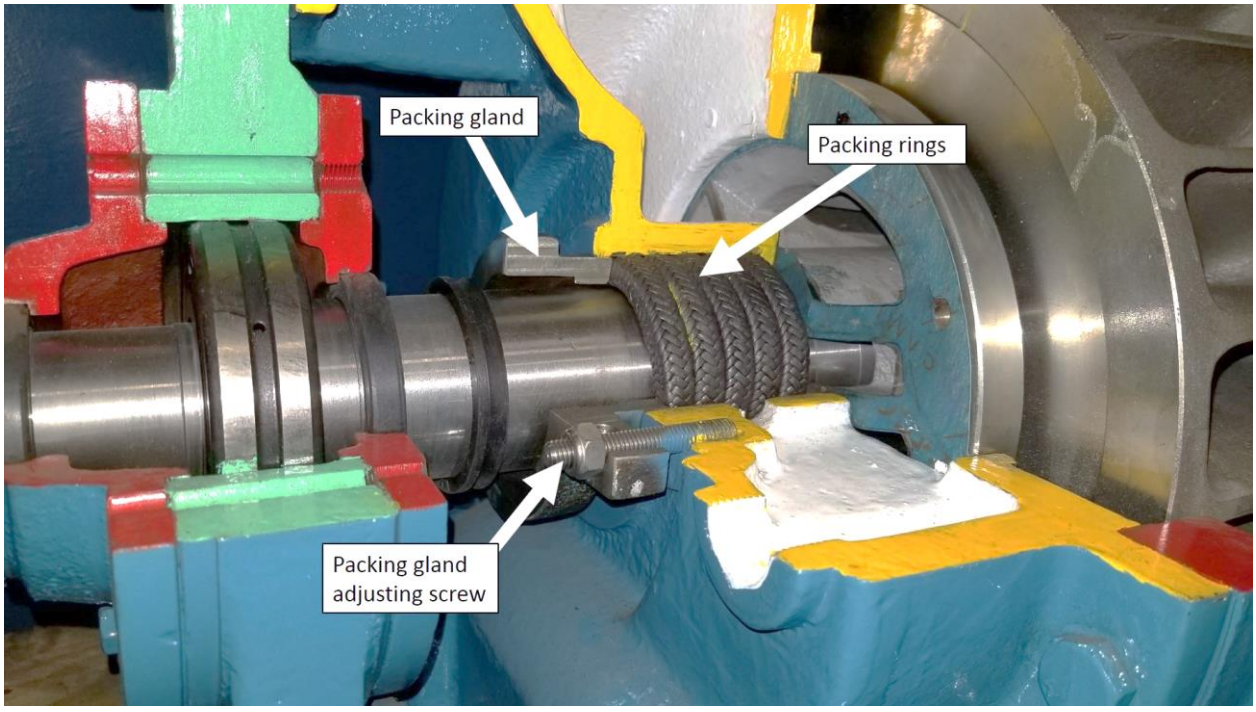


Figure 1

To adjust the tightness of the packing gland rotate the adjusting screws clockwise, ONE FLAT AT A TIME. Adjust all four adjusting screws equally and in a standard cross pattern starting with the upper right hand one (located at 2 o'clock position). Once the first adjustment is made wait for 10 minutes to determine the effect, if further adjustment is needed proceed as described above for the next adjustment. Closely monitor the temperature of the packing gland before proceeding to the next adjustment. If temperature of the packing gland exceeds 130°F no further adjustments shall be made.

Figure 2 below shows the packing gland adjusting screws provided with the pumps. There are total of 4 screws per pump end.

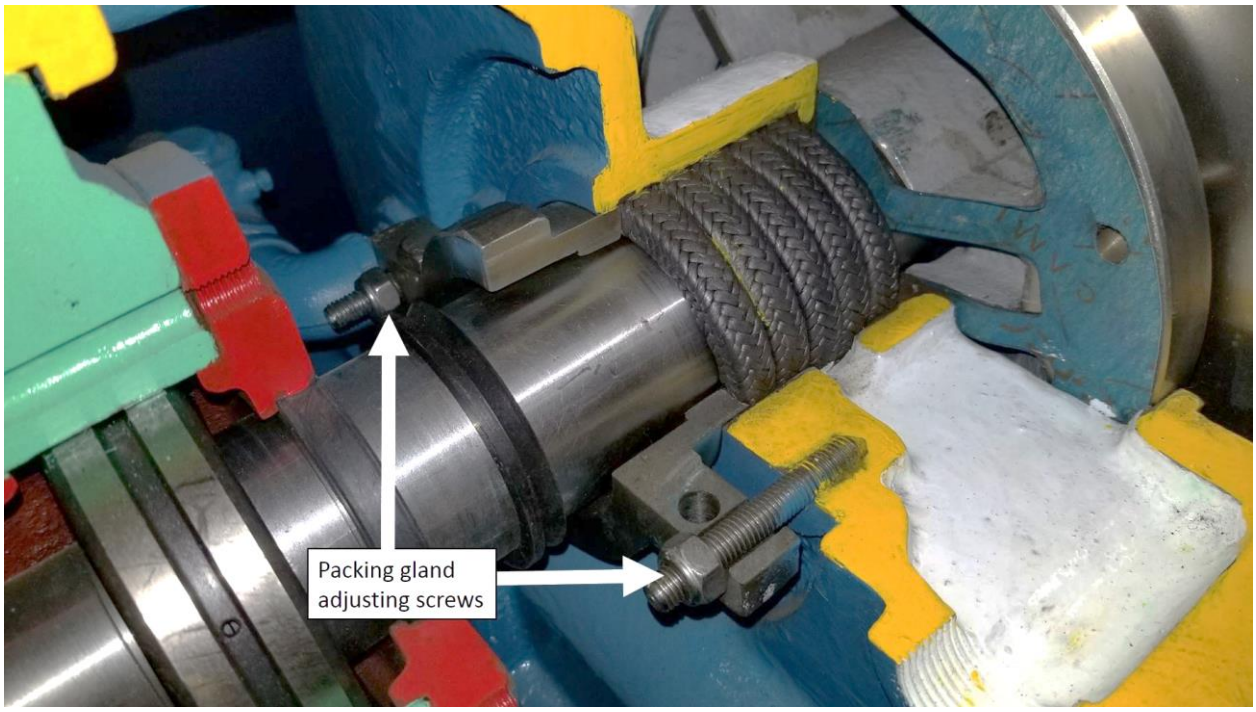


Figure 2

Shaft Seals

Mechanical seals (if installed) do not require maintenance unless there is more than a small amount of leakage. To define this we differentiate between the following:

Weepage: Mechanical seals work by having two flat surfaces pushed together by axial force from the closing mechanism and by product pressure in the seal chamber. When the seal is in operation, the seal fluid lubricates the two faces. This thin film of lubrication protects the faces of the seal from heat and excessive wear, but it can also allow for a small amount of leakage across the seal face. This small leakage is called a "weep". While a weep has rather arbitrary limits, it is commonly considered to be a leakage rate of less than one drop of liquid every minute. Seal weeps are not covered under warranty.

Leakage: A leakage rate of more than one drop per minute is considered to be a "leak". Seal leakage is normally a result of a build-up of abrasive particles carried over in the pump suction. These particles cause excessive wear on the seal faces. Leakage caused by wear and tear is not covered under warranty.

Seal replacement is addressed in the assembly and disassembly instruction for the specific pump model used. Consult factory for assistance.

MAINTENANCE SCHEDULE

To help ensure trouble free operation, a basic maintenance schedule consisting of the following system checks is recommended.

First 8 Hours of Operation

- Clean strainers and remove temporary inlet screen
- Check piping for signs of leakage and tighten if necessary
- Check belt tension, if applicable.

500 Hours of Operation

Under normal operating conditions repeat 8 hour check procedure as described above.

1,000 Hours of Operation

- Every 1000 hours, or every year, it is recommended that you replace the vacuum pump's packing in the stuffing boxes.
- Remove debris from pump housing, motor fan guard and heat exchanger.
- Applicable to pumps equipped with grease fittings located on each bearing housing. Grease bearings with a #2 quality lithium grease. Do not over-grease, 3 to 4 pumps with a grease gun is sufficient under normal conditions. For detailed information on bearing greasing, refer to page 16.

10,000 Hours of Operation

- Check coupling element for wear, if applicable. Replace if worn.
- Clean strainer in seal fluid line.
- Check belt tension, if applicable.

30,000 Hours of Operation

- Every 30,000 hours, or every 5 years, it is recommended that you replace the vacuum pump's shaft seals and bearings as preventative maintenance. This should be done by a DEKKER authorized distributor or properly trained service technician.

ACCESSORIES (IF INCLUDED)

Packed gland sealing is standard with optional mechanical seals available. Other features include removable bearing brackets, multiple inlet/discharge port configurations and an optional casing partition allowing for different operating pressures at each inlet port.

The following accessories are available:

- **Inlet or Discharge Flexible Connectors (optional):** These flex connectors are used in piping systems to eliminate vibration transmission from machinery throughout the piping network.
- **System Isolation Valve (optional):** This valve may be installed on the vacuum receiver tank or vacuum pump manifold. Usually the valve is used to isolate the vacuum system from the piping network.
- **Vacuum Relief Valve (optional):** This valve may be installed on the pump suction manifold or on the receiver. The vacuum relief valve is used to protect the vacuum pump from closed suction which can damage the pump.

TROUBLESHOOTING

The following is a basic troubleshooting guide and not all options may be included. Service should be done by a DEKKER authorized distributor or a properly trained service technician. Each unit is tested and checked at the factory. Always indicate model and serial number when calling. The model and serial number is viewable on the gold-colored information plate attached to the unit.

WARNING: Before attempting any maintenance such as changing the fluid, disconnect all power from the unit by switching off the main breaker, isolate all energy sources and allow unit to cool. All electrical work should be done by a qualified electrician in compliance with OSHA, National Electric Code and any other applicable local electrical code.

Start-Stop Problems

Unit operates, but does not achieve desired vacuum level

1. Stop unit and disconnect power.
2. Confirm vacuum gauge is working.
3. Ensure that pump has adequate sealing fluid.
4. Check that the pump is rotating in the correct direction.
5. Check isolation valve for proper operation.
6. Check seal fluid temperature.

Unit operates, but vacuum level is not stable

Stop unit and disconnect power.

1. Confirm pump is not operating deeper than suggested vacuum levels.
2. Check seal fluid flow rate to ensure it is not too low.
3. Confirm seal fluid piping is sized correctly.
4. Confirm inlet separator is draining properly.
5. Ensure there are no low areas in the inlet piping.
6. Verify there is not high flow, or widely varying flow, of process liquid through pump inlet.

Pump Locked Up

Pump will not rotate

1. Stop system and disconnect power.
2. Verify there is no build-up of rust, scale, or process solids on pump interior.
3. Check for foreign objects in pump.
4. Confirm packing rings are not too tight.
5. Verify pump clearances.

Overheating Problems

Unit overheats

1. Stop unit and disconnect power.
2. Check for proper water supply.
3. Check seal-fluid strainer.
4. Condensable vapor load entering the pump could be too high. Contact factory.
5. Check for scale build-up in pump.
6. On full-recovery systems, check for proper cooling water temperature and sufficient cooling water supply flow rate to heat-exchanger.

Abnormal Bearing Wear

Unit runs, but bearings are abnormally wearing

1. Stop unit and disconnect power.
2. Confirm bearing lubricant is not excessive and is clean.
3. Confirm there is not high discharge pressure.
4. Check the coupling/sheave for proper alignment.
5. Check belt tension on belt drive systems.
6. Ensure there is no strain on the pump from system piping.
7. Check that the mounting bolts of pump, coupling, fan and cooler are not loose. Tighten as required.