DEKKER

VACUUM TECHNOLOGIES, INC.

Installation Operation & Maintenance Manual

POWERGEN AquaSeal

Water-Sealed Liquid Ring Vacuum Pump Systems

Part No. 9983-0000-S03 Rev. A / January 2018

WATER-SEALED LIQUID RING VACUUM PUMP SYSTEMS

TABLE OF CONTENTS

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*

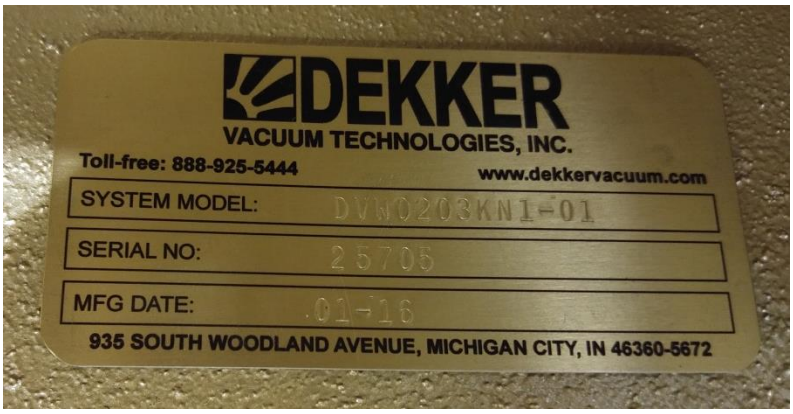
CUSTOMER SERVICE

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 AquaSeal-POWERGEN water-sealed liquid ring vacuum pump system for the Power Industry provides improved reliability and reduced maintenance costs. Compared with other vacuum pump systems the AquaSeal-POWERGEN water-sealed liquid ring vacuum pump system offers the advantages of no metal-to-metal contact between the impeller and casing. Grease lubricated bearings are mounted external to the pumping chamber. This means that the pump requires no internal lubrication.

DEKKER systems have been designed to provide safe and reliable service with low maintenance. 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 AquaSeal-POWERGEN water-sealed liquid ring vacuum pump system includes our high efficiency liquid ring vacuum pump. The liquid ring vacuum pump is known for its simplicity in design and low maintenance requirements, due to the absence of wearing parts such as pistons, sliding vanes and internal bearings. The impeller assembly is the only moving part, which rotates freely in the casing without metal-to-metal contact. This means that no internal lubrication is required. The function of the sealing liquid is to create a liquid piston action and to remove the heat of compression. The seal fluid in the system circulates in a closed loop (full recovery) configuration, which includes a water-cooled heat exchanger that removes the heat of compression and condensation. The discharge separator/reservoir holds the seal fluid and incorporates a separator arrangement to separate it from the air or gases discharged by the pump. See full recovery Piping and Instrument Diagram (page 10).

STORAGE

Keep the system in a cool, dry environment and close the seal fluid isolation valve. Plug all open ports to keep out dirt and foreign objects. Every 2 weeks add a small amount of rust inhibitor into the inlet of the liquid ring pump and rotate the shaft by hand 2 ¼ turns.

After a long idle period, empty the pump completely and remove any scale deposit by using the specially formulated DEKKER descaling compound Scale-Ex. When the descaling process is complete, add a small amount of rust inhibitor and rotate the impeller by rotating the shaft by hand. If you cannot rotate the shaft because the impeller is locked up, contact the factory.

NOTE: Do not use Scale-Ex in Maxima pumps. For Maxima Series Pumps please see pump manual for long-term storage procedures.

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. All piping connected to the system must be installed without imposing any strain on the system components. Improperly installed piping can result in misalignment, pump failure, and general operating problems. Use flexible connectors where necessary. Piping should be cleaned properly before installation.

Inlet Piping

Note: Some DEKKER systems are equipped with a temporary inlet screen. If that is not the case install a temporary screen at the pump inlet flange at first start-up to protect the unit against carry over of pipe debris and welding slag. The screen must be removed after the initial run-in period.

Inlet piping should be at least the size of the pump inlet. Install the system as close as possible to the process to minimize losses due to the length of the suction line. If the system has to be installed further away from the process, be sure that the inlet piping is oversized accordingly to minimize the overall line pressure drop. For more information consult your authorized dealer or call the factory. Pump systems operating in parallel on a common manifold must each have a manual or automatic shut-off valve or a suitable check valve installed in the suction line close to the pump suction flange. This allows each individual system to be isolated when it is not in operation. The line size of the manifold should be a minimum equal to the sum of the individual pipe system area.

AquaSeal-POWERGEN systems are NOT supplied with an inlet check valve as standard. They do typically have an actuated inlet valve which acts like an inlet check. Either the inlet check valve or the actuated inlet valve are required. This valve provides a minimum of resistance close to the pump suction flange to prevent back flow of process gas and seal fluid when the pump is stopped.

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.

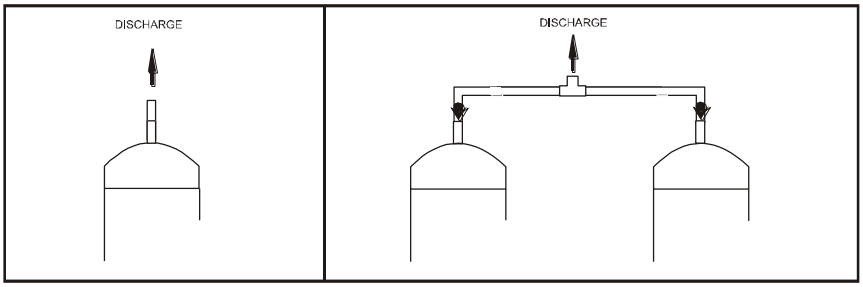
Never run a pump with a closed suction. This causes hydraulic knock / cavitation and can damage the pump.

Discharge Piping

Do not discharge the exhaust gases from the pump system into the room where the system is installed. Install an exhaust line of at least the same diameter as the discharge connection on top of the separator reservoir leading outside. See the "Discharge Piping Diagram" as shown below.

For pump systems operating in parallel on a common discharge, DEKKER recommends the installation of a suitable check valve close to the separator discharge flange of each unit. When discharging more than one pump in a common discharge line and/or over a long distance, oversize pipe accordingly.

Discharge Piping Diagram

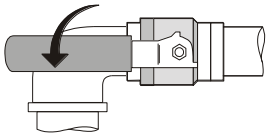
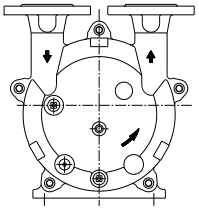
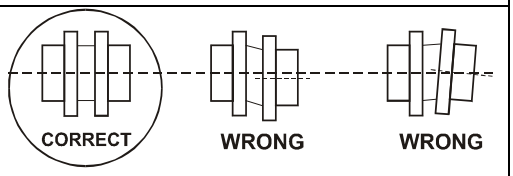


Cooling Water Piping

Full recovery AquaSeal-POWERGEN systems require an adequate supply of cooling water. Cooling water should be the same temperature as the Power Plant condenser water at a minimum supply pressure of 20 psig. If water is not provided at the same temperature, please call the factory.

Normal pump discharge operating temperature is between 45°-100°F. This is only an average value and may need to be readjusted based on particular application processes.

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	Connect cooling water supply to the heat exchanger. Ensure seal fluid isolation valve is open. Add a small amount of seal fluid into the pump inlet. Do not overfill the pump past the shaft centerline.	 Seal fluid Isolation Valve
3	Jog the motor briefly and check direction of rotation. The correct direction of rotation is marked by an arrow on the motor or 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. Mono-block units do not require any field adjustment (motors are C-face mounted).	

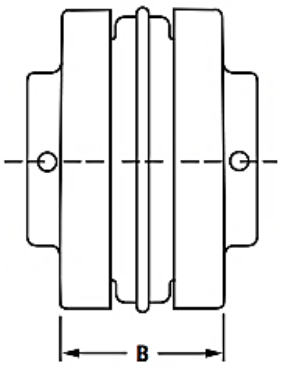


Figure 1
B Dimension

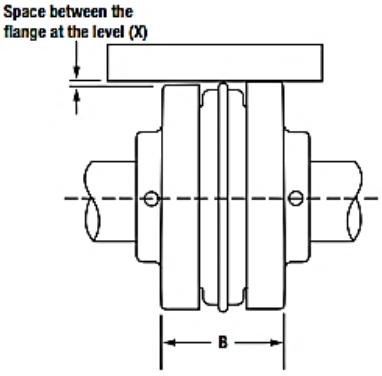


Figure 2
Parallel Measurement

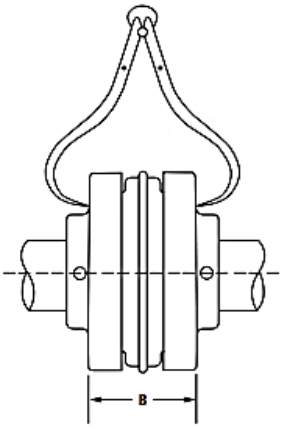


Figure 3
Angular Measurement

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***

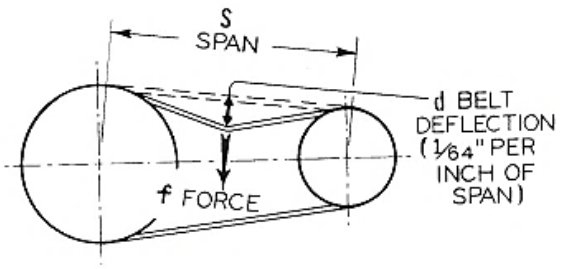
4B.1

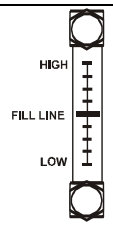
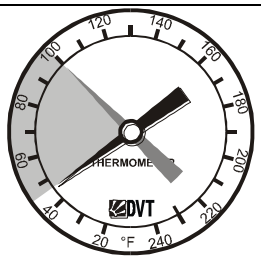
Tensioning Table

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	For full recovery systems, check fluid level in separator reservoir. The fluid level should be at the shaft center line.	
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 (page 16) 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!**
8	After 15-30 minutes of operation check pump discharge temperature, which should be in the 45°-100°F range. Please note specific applications can cause large variances in discharge temperature. Consult your authorized dealer or the factory for assistance.	
9	Remove temporary inlet screen.	

SHUT DOWN PROCEDURES

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

- Push the STOP button or turn switch to the OFF position. The pneumatically actuated inlet isolation valve will close and prevent fluid from the system from back flowing into the inlet manifold. The circulation pump will then stop re-circulating seal-water to the vacuum pump.
- **Note:** If inlet piping could be under vacuum for an extended period of time without the pump running, inlet piping should be vented to atmosphere unless the process requires otherwise.
- **Note:** Close the seal fluid isolation valve and the pump inlet isolation valve during extended periods of storage or when transporting. See Storage section (page 7) 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

Refer to pump series manual for details.

Motor Bearing Lubrication (where required)

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

Inlet Filter (If Installed)

Check after first 8 hours of operation. Clean or replace inlet filter element every 1000 to 3000 hours depending on application or if excessive pressure drop is noticed. In some applications it may be necessary to clean inlet filter more often. Clean filters by gently knocking off into a dust bin. Brush filter free of debris and clean with a wet/dry vacuum cleaner. **DO NOT USE COMPRESSED AIR TO CLEAN ANY FILTERS!**

CAUTION: Be careful not to allow foreign material to fall in the pump suction opening when removing the filter cartridge. Horizontal filter installation is recommended to prevent this. Filters must be disposed of properly as they might contain toxic substances carried over from the process.

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.

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 drips 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. 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.

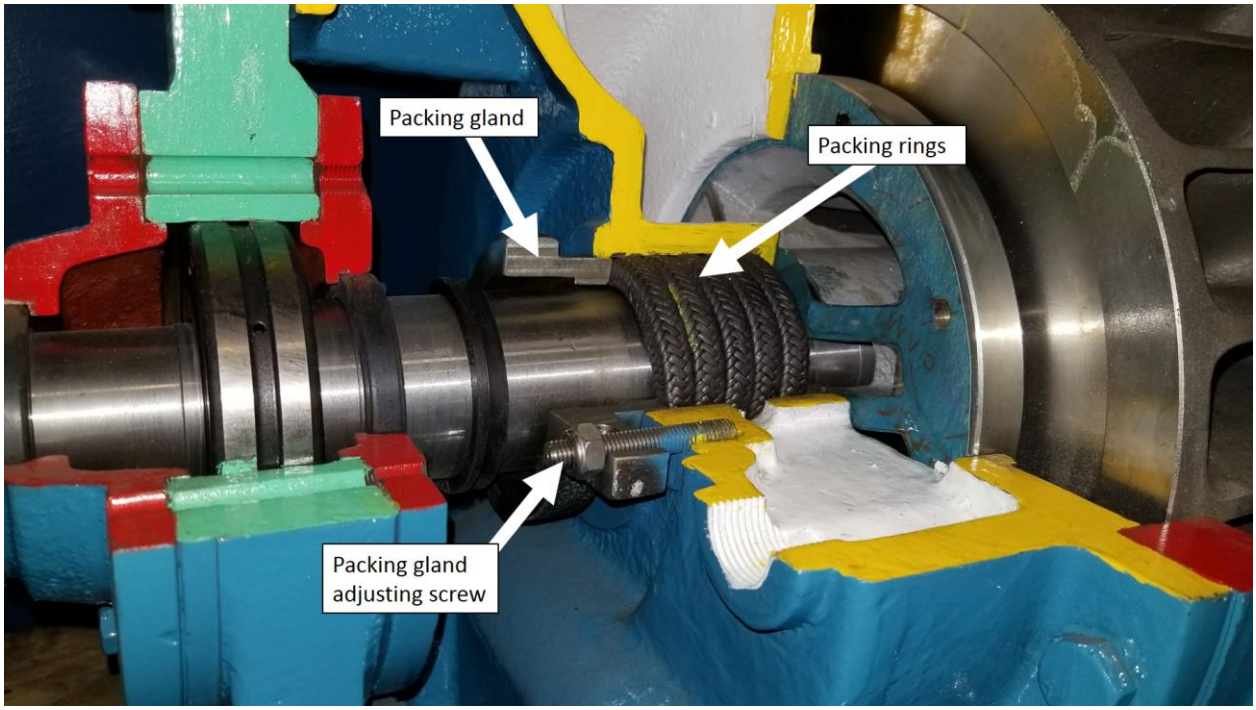


Figure 1

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.

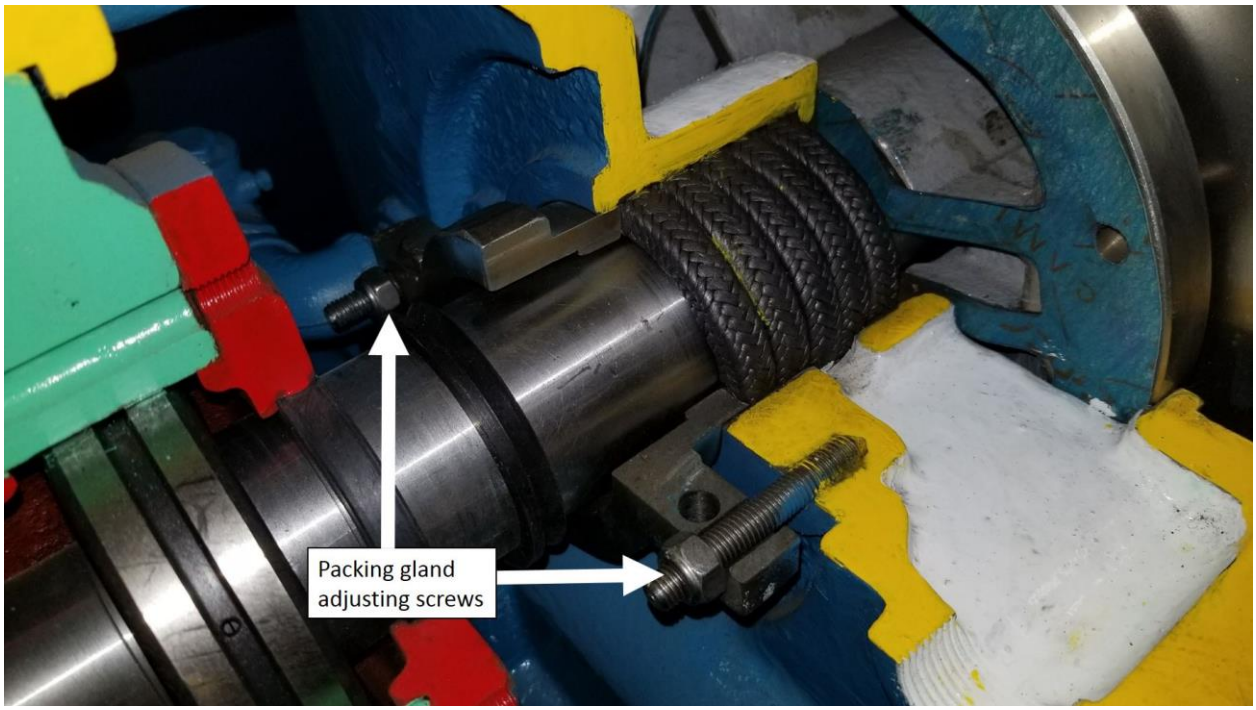


Figure 2

Seal fluid Strainer

After the first 50 hours of operation, clean the strainer in the seal fluid line. This is done to remove any debris carried over from the seal fluid supply line. Clean and inspect the strainer every 1000-3000 hours.

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 system 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 the **daily** steps above.

1000 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.

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 AND PROTECTIVE DEVICES (IF INCLUDED)

Accessories

The following accessories are available for AquaSeal-POWERGEN water-sealed liquid ring vacuum pump systems:

- **Inlet or Discharge Flexible Connectors (optional):** These flex connectors are used in piping systems to eliminate vibration transmission from machinery throughout the piping network. If ordered, DEKKER uses braided flexible connectors.
- **Vibration Isolators (optional):** Vibration isolators are used to eliminate vibrations, noise, and shock transmission from machinery to the floor. Floor-mount type vibration isolators are used for AquaSeal vacuum pump systems. The vibration isolators have a steel top plate, threaded insert and steel base, both totally imbedded in an oil-resistant neoprene. The isolators bolt onto a tank or base-frame with one bolt and have two mounting bolts to mount to the foundation or floor.
- **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.
- **Inlet Filter (optional):** An inlet filter may be installed on the AquaSeal water-sealed vacuum pump systems to prevent carry-over of particles into the pump.
- **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.

Protective Devices

The following protective devices are available to protect the unit from being damaged and to help with maintenance:

- **High Temperature Switch (optional):** The switch will signal when the temperature of the seal fluid is exceeding the shutdown level. The switch will shut the unit down. The unit will not restart until the alarm condition is acknowledged and is reset. The switch is a "snap disc" type of switch that is normally closed. When the temperature reaches the maximum set point, the switch will open. Once the switch has opened, there is a 10°-20°F differential that the temperature will need to drop to, in order for the switch to close.
- **No Seal-Water Flow Switch (optional):** This switch is installed in the seal-water piping of the liquid ring vacuum pump system. If the switch is triggered, the affected pump will shut down. The NO SEAL-WATER FLOW light on the control panel will be illuminated. The NO SEAL-WATER FLOW switch will be wired into the main alarm of the panel. The alarm will have to be reset to restart 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 will not start

1. No main AC power. Confirm that the main AC power disconnect is ON and supplying power to the control panel. This can be measured with an AC voltmeter at the power supply terminals in the control panel. Refer to the electrical control panel diagram supplied with the system. If main AC power is not present at the power supply, verify incoming AC voltage on the motor contactor.
2. Check if the disconnect or circuit breaker is switched on.
3. Check the overload setting on the starter and fuses.
4. Check alarm reset, light should be off.
5. Ensure that the proper voltage is supplied and that the wire size is correct.
6. Check electrical control panel. Make sure that all wires are tight. Wires may vibrate loose during shipment or operation.
7. Ensure seal fluid level is correct; pump is primed and filled with seal fluid to the shaft centerline only.
8. Check if the pump has seized by rotating the shaft or coupling by hand (disconnect power first), which should rotate freely. If a rubbing noise or binding is observed, contact authorized dealer.
9. Check for scale build-up in pump.

Unit shuts down while running

1. Check the overload setting on the starter and fuses.
2. Ensure that the proper voltage is supplied and that the wire size is correct.
3. Check for loose electrical connections.
4. Clean seal fluid strainer.
5. Check the vacuum switch setting.
6. Check seal fluid solenoid valve.
7. Check if the pump has seized by rotating the shaft or coupling by hand (disconnect power first), which should rotate freely. If a rubbing noise or binding is observed, contact authorized dealer.
8. Check for scale build-up in pump.

Vacuum Problems

Unit operates, but does not achieve desired vacuum level

1. Stop system and disconnect power.
2. Check if the inlet valve is open and inlet filter is clean.
3. Ensure that no inlet connections are open to the atmosphere, causing loss of vacuum.
4. Check for leaks in piping system using conventional leak detection methods.
5. Ensure seal fluid level is correct; pump is primed and filled with seal fluid to the shaft centerline only.
6. Check if the seal fluid isolation valve is open.
7. Check seal fluid temperature. This can affect vacuum level and capacity. Consult factory.
8. Check if the solenoid valve is working.
9. Check setting of vacuum relief valve and adjust as needed. The valve is typically preset at 27”HgV at sea level.
10. Check the vacuum switch setting.
11. Check if the motor rotation is correct. Rotation should be clockwise (facing pump from motor side) and marked by an arrow on the motor or pump housing. If incorrect, switch any two of the three main power leads on the contactor inside the control panel.

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.

Noise and Vibration Problems

Unit is making an abnormal noise or sound

1. Stop system and disconnect power.
2. Check the coupling and/or element for proper alignment. If worn or damaged, replace.
3. Check belt alignment on belt drive systems.
4. Check if the bearings are greased. Rotate the shaft or coupling by hand, which should rotate freely. If a rubbing noise or binding is observed, contact authorized dealer.
5. Ensure seal fluid level is correct; pump is primed and filled with seal fluid to the shaft centerline only.
6. Check setting of vacuum relief valve and adjust as needed. The valve is typically preset at 27”HgV at sea level.
7. Check if the inlet valve is closed. The pump may cavitate if inlet is closed.
8. Check for scale build-up in pump.
9. Check the seal fluid temperature, it could be too high.
10. Check the vacuum level, pump may cavitate as a result of a too deep of a vacuum level.