



DEKKER
VACUUM TECHNOLOGIES, INC.

Installation
Operation
&
Maintenance
Manual

AquaSeal™ C

Water-Sealed Liquid Ring Compressors and
Compressor Systems

AquaSeal[™]C

WATER-SEALED LIQUID RING COMPRESSORS AND COMPRESSOR SYSTEMS TABLE OF CONTENTS

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**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



935 SOUTH WOODLAND AVENUE, MICHIGAN CITY, IN 46360-5672

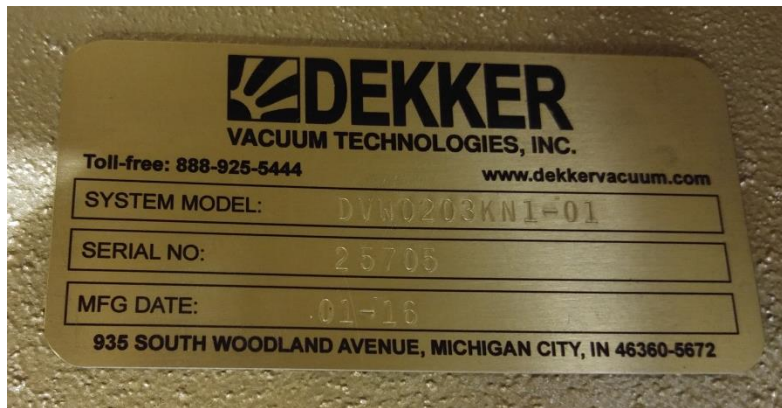
TEL.: 219-861-0661 – FAX: 219-861-0662 – TOLL-FREE: 888-925-5444

Bus. Hours: 7:30 a.m. – 4:30 p.m. CST

Website: www.DEKKERvacuum.com

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 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 DEKKER **AquaSeal-C** water-sealed liquid ring compressor has been designed with improved reliability and reduced maintenance costs. Compared with other compressors, the **AquaSeal-C** water-sealed liquid ring compressor offers the advantages of no metal-to-metal contact between the impeller and casing. Grease lubricated bearings are mounted external to the pumping chamber, isolated by mechanical shaft seals. This means that the unit requires no internal lubrication.

DEKKER units have been designed to provide safe and reliable service with low maintenance. Because a liquid ring compressor is a rotating piece of equipment, the operator 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 units - EXPLOSION HAZARDS!

THEORY OF OPERATION

The DEKKER **AquaSeal-C** water-sealed liquid ring compressor system includes our high efficiency liquid ring compressor. The liquid ring compressor 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 once-through (no recovery) configuration or a closed loop (full recovery) configuration, which includes an air- or water-cooled heat exchanger that removes the heat of compression. The discharge separator/reservoir holds the seal fluid and incorporates a separator arrangement to separate the seal fluid from the air or gases discharged by the unit.

amount of rust inhibitor and rotate the impeller by rotating the shaft by hand. If the shaft cannot be rotated it may be due to the impeller being 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 the factory.

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 unit? 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 can provide start up assistance in most instances for a fee. Contact DEKKER for hourly/daily service rates.

Unpacking

Upon receipt of unit, immediately inspect for signs of damage. Carefully remove packing or crating from around unit. 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 unit should be a minimum distance of 3 feet from surrounding walls to allow for checking fluid level, temperatures, pressures and general servicing.

Mounting

The unit 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 over 40hp 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 compressor/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/compressor 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.

WARNING: For NFPA 99 hospital and generator applications, please shut down the units prior to generator testing. The rapid stop and restart may cause damage to the pump/compressor and/or motor and cause damage to electrical panel and related components.

Pipe Connection and Sizing

Before installation, remove all protective inserts on the unit 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, unit failure, and general operating problems. Use flexible connectors where necessary. Piping should be cleaned properly before installation.

Inlet Piping

Note: Install a temporary screen at the compressor inlet flange at first start-up to protect the unit against carryover 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 compressor 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 the inlet piping is properly sized to minimize the overall line pressure drop. For more information call the factory.

Systems operating in parallel on a common manifold must each have a manual or automatic shut-off valve and a suitable check valve installed in the suction line close to the compressor 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 system pipe areas.

Systems are supplied with an inlet check valve as standard. This valve is installed close to the compressor suction flange to prevent back flow of process gas and seal fluid when the compressor is stopped.

If the possibility exists that the compressor 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 compressor inlet.

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

T-type Separator (No Recovery Systems Only)

The T-type separator has no moving parts and therefore requires no maintenance.

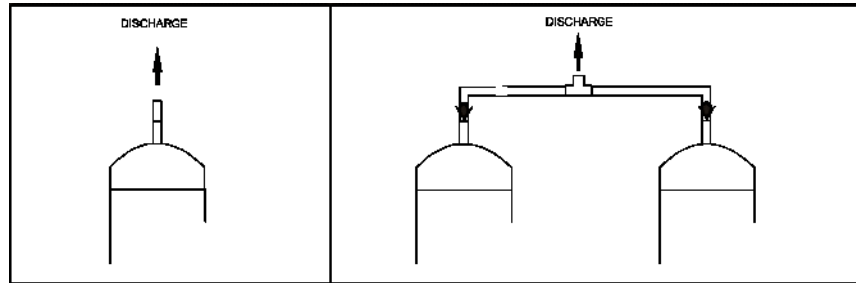
Discharge Piping

Do not discharge the exhaust gases from the system into the area where the system 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 on top of the separator reservoir leading outside. See the “Discharge Piping Diagram” as shown below.

For 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. Discharge check valves should be a low differential pressure type with positive shutoff. This will prevent discharge gasses from back flowing to other systems. When discharging more than one unit in a common discharge line and/or over a long distance, oversize pipe accordingly.

Discharge Piping Diagram



Drain Trap (No Recovery Systems only)

Drain traps should be checked at the same time valves and other line equipment are inspected. Experience will determine the required testing schedule. For troubleshooting see Troubleshooting section on page 12. In the event of unusual maintenance or operational difficulty contact the factory.

Cooling Water Piping (Full Recovery Systems only)


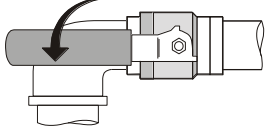
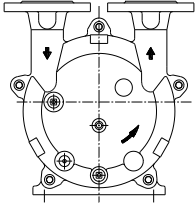
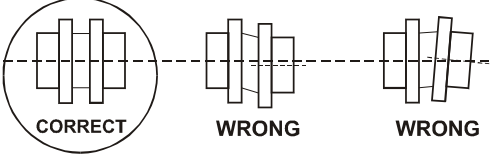
Full recovery **AquaSeal-C** compressor systems require an adequate supply of cooling water at a maximum of 75° F and a minimum supply pressure of 25 psig. If the cooling water temperature is higher or available pressure lower, call the factory.

Normal compressor discharge operating temperature is between 60-100°F. This is only an average value and may need to be readjusted based on particular application processes.

Seal Fluid Piping (No and Partial Recovery Systems only)

The seal fluid solenoid must be installed within 12” of the unit to minimize flooding to the unit on shutdown. Seal fluid solenoid activation should only occur on unit start up or with a maximum of a 5 second delay. Unit overflow plumbing is required as a safety to ensure maximum unit water levels are not exceeded prior to start up. Liquid ring seal fluid flow requirements will vary based on operating pressures. Positive pressure units must have a seal fluid pressure at required flow of at least ½ Bar over discharge pressure. Call the factory for specific flows for all applications.

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. This valve is located before the y-strainer. Add a small amount of seal fluid into the compressor inlet. Do not fill the unit above the shaft centerline.	 <p style="text-align: center;">Seal Fluid Isolation Valve</p>
3	Jog the motor briefly and check direction of rotation. An arrow on the motor or compressor housing marks the correct direction of rotation. If direction is incorrect, switch any two of the three leads at the power connection (three phase only).	
4A	Check drive coupling alignment. Angular and parallel alignment should be within the following chart allowances (<u>see next page, item 4A.1</u>). Consult the factory for specific system size alignment. Mono-block units do not require any field adjustment (motors are C-face mounted).	

4A.1

Alignment Chart

Sleeve Size	Maximum RPM	Parallel Misalignment	Angular Misalignment	"B"
3	9200	0.01	0.035	1.188
4	7600	0.01	0.043	1.5
5	7600	0.015	0.056	1.938
6	6000	0.015	0.07	2.375
7	5250	0.02	0.081	2.563
8	4500	0.02	0.094	2.938
9	3750	0.025	0.109	3.5
10	3600	0.025	0.128	4.063
11	3600	0.032	0.151	4.875
12	2800	0.032	0.175	5.688
13	2400	0.04	0.195	6.625
14	2200	0.045	0.242	7.75
16	1500	0.062	0.33	10.25

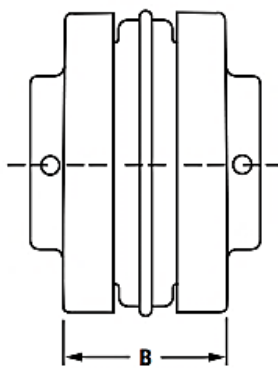


Figure 1
B Dimension

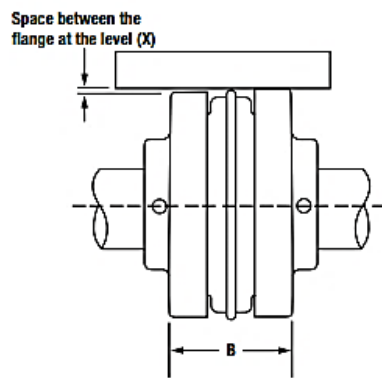


Figure 2
Parallel Measurement

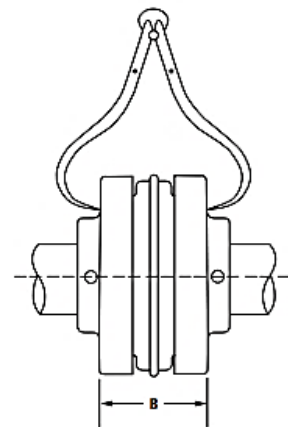


Figure 3
Angular Measurement

<p>4B</p>	<p>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.</p> <p>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.</p> <p>For more specific V-belt tensioning guidelines consult factory.</p> <p>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.</p> <p><u>Tensioning a Drive - General Rules of Tensioning</u></p> <ol style="list-style-type: none"> 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. 	<p><u>Simple Tensioning Procedure</u></p> <ol style="list-style-type: none"> 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 <u>Table 4B.1 on the next page</u>. 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. <p style="text-align: center;"><i>Tensioning rules and procedure courtesy of Dodge PT Manual MN-4002</i></p>
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4B.1

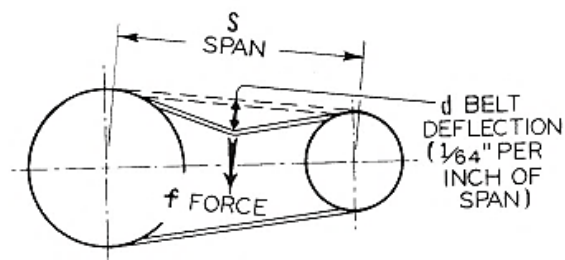
Tensioning Table

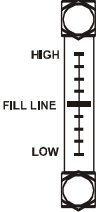
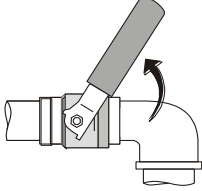

V-Belt Section	Small Sheave		Deflection Force			
	Speed Range	Diameter	1.0	1.5	2.0	4.0+
3VX	1200-3600	2.2	2.2	2.5	2.7	3
	1200-3600	2.5	2.6	2.9	3.1	3.6
	1200-3600	3	3.1	3.5	3.7	4.2
	1200-3600	4.1	3.9	4.3	4.5	5.1
	1200-3600	5.3	4.6	4.9	5.1	5.7
	1200-3600	6.9	5	5.4	5.6	6.2
5VX	1200-3600	4.4	6.5	7.5	8	9
	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 the unit contains an inlet valve in the vacuum line, set it to approximately ¾ closed, and start compressor. If valve is not supplied, one should be installed.	
7	<p>Check the voltage and motor current. They should be within the specifications for the motor. Amperage should be checked at the Overload.</p> <p>Note: This test should also be performed under normal system operating conditions.</p>	 <p>DANGER: HIGH VOLTAGE! Lethal shock hazard present. USE EXTREME CAUTION!</p>
8	After 15-30 minutes of operation check unit discharge temperature, which should be in the 55°-100°F range. Please note specific applications can cause large variances in discharge temperature. Contact the factory for assistance.	
9	Remove temporary inlet screen.	

SHUT DOWN PROCEDURES

To stop unit follow the procedure as outlined below.

- Push the STOP button, or turn switch to the OFF position. The inlet and discharge check valves will isolate the compressor from the process. In addition, in no recovery systems the solenoid valve will stop the flow of seal fluid back into the unit.
- **Note:** If inlet piping could be under pressure for an extended period of time without the unit running, inlet piping should be vented to atmosphere.
- **Note:** Close the seal fluid isolation valve and the compressor inlet isolation valve during extended periods of storage or when transporting. Open valves before starting system.

MAINTENANCE



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 system to cool.

Compressor Bearing Lubrication

The Titan-series single-stage liquid ring require lubricating every 3000 hours. Extreme operating conditions may require more frequent lubricating. Grease fittings are located on the top of each bearing housing.

Use a good quality high temperature lithium based grease of #2 consistency.

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 compressor 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 unit 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 unit. 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 unit with fresh water, make sure the unit it is filled with water to the shaft centerline level. **Do not fill the unit above the shaft centerline.** Starting the unit with fluid level above the shaft centerline

may result in shaft or impeller damage or failure. Water can be added by removing the suction or discharge flange and pouring water through compressor suction or discharge port.

Descaling

In areas with hard water, scale build-up may occur in the unit, which could cause the unit to seize.

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 service liquid line. Clean and inspect the strainer every 1000-3000 hours depending on application.

Shaft Seals

All DEKKER liquid ring compressors are fitted with mechanical shaft seals. Mechanical seals 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 compressor 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 compressor 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

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

Every 25 Hours

- Seal scavenger line, if installed, should be inspected every 25 hours for any type of contaminate (black dust, water, etc.). Consult factory if contaminants are found.

500 Hours of Operation

- Under normal operating conditions repeat the First 8 Hours of Operation steps above.

1000 Hours of Operation

- Clean or replace inlet filter element.
- Remove debris from compressor housing, motor fan guard and heat exchanger.
- Applicable to units equipped with grease fittings located on each bearing housing. Grease bearings with a #2 quality lithium grease. Do not over-grease, 3 to 4 units with a grease gun is sufficient under normal conditions.
- Clean and inspect the y-strainer screen every 1000-3000 hours depending on application.

10,000 Hours of Operation

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

30,000 Hours of Operation

- Every 30,000 hours, or every 5 years, it is recommended to replace the unit'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-C water-sealed liquid ring compressor 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-C compressor 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 the foundation or floor.
- **System Isolation Valve (optional):** 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-C water-sealed compressor systems to prevent carry-over of particles into the unit.
- **Vacuum Relief Valve (optional):** This valve may be installed on the suction manifold or on the receiver. The relief valve is used to protect the unit from closed suction, which can damage the unit and motor.

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 compressor system. If the switch is triggered, the affected unit 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 unit.

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. Check if the disconnect or circuit breaker is switched on.
2. Check the overload setting on the starter and fuses.
3. Check alarm reset, light should be off.
4. Ensure that the proper voltage is supplied and that the wire size is correct.
5. Check electrical control panel. Make sure that all wires are tight. Wires may vibrate loose during shipment or operation.
6. Ensure seal fluid level is correct; unit is primed and filled with seal fluid to the shaft centerline only.
7. Check if the unit 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 the factory.
8. Check for scale build-up in unit.

Unit shuts down while running

1. Check the pressure switch setting (if installed)
2. Check the fuses and the overload setting on the starter.
3. Ensure that the proper voltage is supplied and that the wire size is correct.
4. Check for loose electrical connections.
5. Check if the disconnect or circuit breaker (if installed) is switched on
6. Clean seal-fluid strainer.
7. Check flow switch in seal-fluid line (if installed).
8. Check and adjust relief valve, discharge pressure could be too high (relief valve is for safety blow off if pressure switch is not working.)
9. Check if the bearings are greased.
10. Check if the unit 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 the factory.
11. Check for scale build-up in unit.

Pressure Problems

Unit operates, but does not achieve desired pressure level

1. Stop unit and disconnect power.
2. Check if the inlet valve is open and inlet filter (if installed) is clean.
3. Ensure that no lines are open to the atmosphere, causing loss of vacuum.
4. Check for leaks in piping using conventional leak detection methods.
5. Check the pressure switch setting (if installed).
6. Check if the inlet valve is closed, should be open.
7. Ensure seal-fluid level is correct and that the unit is primed and filled to the shaft centerline only.
8. Check if the seal-fluid isolation valve is open.
9. Check if the solenoid valve (if installed) is working.
10. Check and adjust relief valve, discharge pressure could be too high.
11. Check if the unit 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 the factory.
12. Check the vacuum switch setting (if installed).

Overheating Problems

Unit overheats

1. Stop unit and disconnect power.
2. Check if the seal-fluid isolation valve is open.
3. Check if the solenoid valve is working.
4. On full-recovery systems, check for proper cooling water temperature and sufficient cooling water supply flow rate to heat exchanger.
5. Check and clean seal-fluid strainer.
6. Check for scale build-up in unit.

Noise and Vibration Problems

Unit is making an abnormal noise or sound

1. Stop unit 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.
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 the factory.
5. Ensure seal fluid level is correct; unit is primed and filled with seal fluid to the shaft centerline only.
6. Check if the inlet valve is closed. The unit may cavitate if inlet is closed.
7. Check for scale build-up in unit.
8. Check if baseplate is properly supported. Uneven floor will distort baseplate, which could cause vibration and abnormal sounds.

Unit is vibrating excessively

1. Stop unit and disconnect power.
2. Check if the seal-fluid isolation valve is open.
3. Check if the solenoid valve is working.
4. Check the coupling and/or element for proper alignment. If worn or damaged, replace.
5. 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 the factory.
6. Check that the compressor and motor mounting bolts are not loose. Tighten as required.
7. Check for scale build-up in unit.
8. Check if baseplate is properly supported. Uneven floor will distort baseplate, which could cause vibrating problems.

DRAIN TRAP PROBLEMS

Drain trap does not discharge

1. Insufficient liquid coming to drain trap to actuate float and permit discharge. Continue operation.
2. Drain trap filled with dirt or sludge. Remove cap and mechanism, clean thoroughly. Install strainer in inlet side of drain trap if necessary.
3. Differential pressure across drain trap too high. Check inlet and outlet pressure. If the difference exceeds the maximum operating pressure stamped on the drain trap, the valve will remain closed. Reduce differential pressure if possible, or install properly sized mechanism in drain trap.
4. Worn valve seat. As the seat becomes worn, the seating surface area enlarges, lowering the traps maximum operating pressure. Replace with new parts.
5. Drain trap inlet or outlet valves are closed, open valves.
6. Drain trap strainer (if installed) clogged. Clean strainer screen.
7. Drain trap float defective or collapsed. Replace float.

Drain trap discharges continuously

1. If drain trap discharges full stream of liquid continuously and vessel fills full of liquid, drain trap may be too small for the job. Replace with correct size drain trap.
2. Abnormal amounts of liquid may be coming into trap. Remedy cause or replace with drain trap that has larger capacity and can handle peak loads.
3. Check seal-liquid flow amount, may be too high.

Drain trap blows compressed air and water

1. Dirt or scale on valve seat. Remove cap, clean drain trap as well as valve and seat.
2. Worn valve or seat. Remove cap, replace mechanism.