



DEKKER

VACUUM TECHNOLOGIES, INC.

Installation
Operation
&
Maintenance
Manual

DuraVane

Lubricated and Lubricated for Saturated Air (Wet)
Service Rotary Vane Vacuum Pumps

DuraVane

LUBRICATED AND LUBRICATED FOR SATURATED AIR (WET)

SERVICE ROTARY VANE VACUUM PUMPS

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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

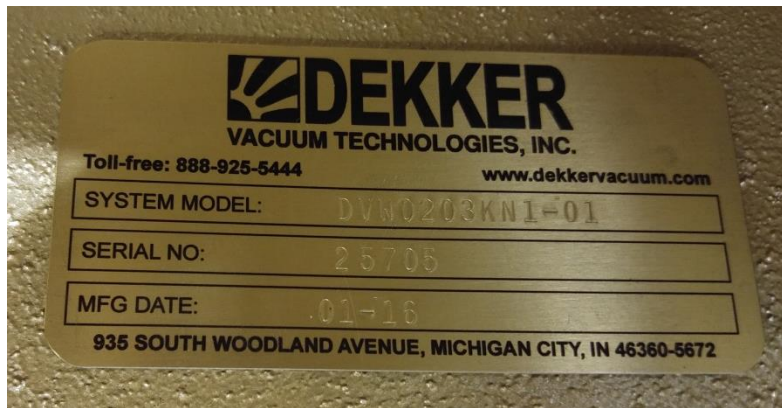
TEL.: 219-861-0661 – FAX: 219-861-0662 – TOLL-FREE: 888-925-5444

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 **DuraVane** rotary vane vacuum pumps and systems have been designed to give safe, reliable and trouble-free service, provided some of the basic maintenance guidelines as set out in this manual are followed. 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 **DuraVane** lubricated rotary vane pumps are single-stage pumps with an integrated closed loop oil circulation system. The vacuum pump works by using centrifugal force to turn vanes against the surface of a cylinder causing pockets of air to be pushed from the inlet to the discharge as air pressure increases. The pumps have an internally mounted inlet check valve. Pumps are direct driven with flange-mounted motor and can operate with closed suction without overheating.

STORAGE

Keep the pump in a cool, dry environment and plug all open ports to keep out dirt and foreign objects.

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 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 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 $\frac{3}{4}$ to 1- $\frac{1}{2}$ 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 $\frac{3}{4}$ 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 $\frac{1}{2}$ 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 155°-220°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 where necessary. Piping must be cleaned of debris before installation.

The piping system has to be designed to ensure that no liquids carried over from the process can reach the pump. If this possibility exists, a knock-out liquid separator should be installed. Consult the factory for recommendation.

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 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 the inlet piping is properly sized to minimize the overall line pressure drop. For more information contact the factory.

Pump 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 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 system pipe areas.


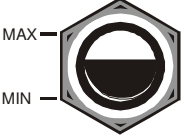

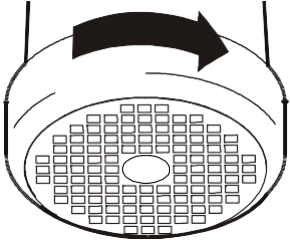

Systems are supplied with an inlet check valve as standard. This valve is installed close to the pump suction flange to prevent back flow of process gas and seal fluid when the pump is stopped.

If the inlet gas pumped contains dust or foreign particles, a suitable 5 micron (or finer) inlet filter should be installed at the inlet port. For more information contact factory.

Following are the inlet and discharge connection sizes for the different pump models:

PUMP MODEL	INLET	DISCHARGE
RVL002H	3/8" HOSE	3/8" HOSE
RVL003H	3/8" HOSE	
RVL003W	1/4" G	
RVL006H	3/8" G	3/8" G
RVL010H	1/2" G	1/2" G
RVL013H	1/2" G	1/2" G
RVL014H	1/2" G	1/2" G
RVL020H	1/2" G	1/2" G
RVL020W	1/2" G	1/2" G
RVL030H	1" G	1 1/4" G
RVL030W	1" G	1 1/4" G
RVL031H	1 1/2" G	1 1/4" G
RVL031W	1 1/2" G	1 1/4" G
RVL050H	1 1/2" G	1 1/4" G
RVL050W	1 1/2" G	1 1/4" G
RVL051H	1 1/2" G	1 1/4" G
RVL051W	1 1/2" G	1 1/4" G
RVL070H	1 1/2" G	1 1/4" G
RVL070W	1 1/2" G	1 1/4" G
RVL075H	1 1/2" G	1 1/4" G
RVL075W	1 1/2" G	1 1/4" G
RVL076H	1 1/2" G	1 1/4" G
RVL076W	1 1/2" G	1 1/4" G
RVL110H	1 1/2" G	1 1/4" G
RVL111H	1 1/2" G	1 1/4" G
RVL125H	2" G	2" G
RVL145H	2" G	2" G
RVL145HH	2" NPT	2" NPT
RVL200H	2" G	2" G
RVL212HH	2" NPT	2" NPT
RVL215H	2" G	2" G
RVL300LH/HH	3" NPT	3" NPT
RVL301LH/HH	3" NPT	3" NPT
RVL400LH/HH	3" NPT	3" NPT
RVL401LH/HH	3" NPT	3" NPT
RVL475LH/HH	3" NPT	3" NPT
RVL550LH/HH	4" NPT	3" NPT
RVL700LH/HH	4" NPT	4" NPT

START-UP PROCEDURES

1	<p>Ensure all shipping plugs and/or paper covers are removed from unit and tagging information is followed for successful startup.</p>	
2	<p>The units are ship dry from the factory (they do not contain oil). Remove the oil filler plug and pour oil in the tank up to mid-range of the oil sight glass. Close the filler plug.</p>	
3	<p>Jog the motor briefly and check direction of rotation. An arrow on the motor or pump 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).</p> <p style="text-align: center;"></p> <p style="text-align: center;">WARNING: OPERATING PUMP BACKWARD CAN CAUSE VANE FAILURE.</p>	
4	<p>Start and run the unit for approximately five (5) minutes, then stop.</p>	<p style="text-align: center;"></p> <p style="text-align: center;">DANGER: HIGH VOLTAGE! Lethal shock hazard present. USE EXTREME CAUTION!</p>
5	<p>With the unit shut off, check the oil level. The oil level should be visible in the middle of the bulls-eye gauge. Add oil if necessary.</p> <p style="text-align: center;">WARNING: NEVER REMOVE THE OIL FILL PLUG WHILE THE VACUUM PUMP SYSTEM IS RUNNING.</p>	
6	<p>Start the unit and adjust the inlet suction valve to the desired vacuum setting. Check that the discharge pressure does not exceed 2 psig when operating deeper than 15" HgV. A pressure higher than 2 psig at start-up is a sign of high backpressure in the discharge pipe system. As the running time of the pump(s) increases the backpressure will increase.</p>	
7	<p>Voltage and motor current should be checked by a qualified electrician and should be within the motor specifications.</p> <p style="text-align: center;">Note: This test should also be performed under normal system operating conditions.</p>	

SHUT DOWN PROCEDURES

To stop the unit, follow the procedure as outlined below.

Push the STOP button or turn switch to the OFF position. The inlet check valve will prevent fluid from the unit from back flowing into the inlet manifold. In no recovery and partial recovery systems, the solenoid valve will stop the flow of seal fluid to the 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.

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.

Pump Oil Level (Check Daily)

Under normal circumstances it should not be necessary to add oil between recommended oil changes. A significant drop in oil level means there is an oil leak, a broken exhaust filter or a leaking anti-suck-back or inlet check valve.

It is normal for the oil to be slightly foamy and lightly colored. If the oil is milky or dark colored, it is burned or contaminated and must be changed.

Check the oil level only when the pump is shut off. The best time to check is before start-up. Replenish oil if the level drops below the MIN. line next to the sight glass. Oil must be added through the fill port only.

CAUTION: Do not add oil while pump is running, since hot oil can escape from the fill opening. Be careful when draining hot oil, personal injury could result.

Oil Filter (If Installed)

Use the factory recommended oil and change the oil filter every 6 months, or 1000 hours of operation, whichever comes first.

CAUTION: Do not clean or re-use these filters. Filters must be disposed of properly as they might contain toxic substances carried over from the process.

Pump Bearing Lubrication

Internal pump components do not require preventative maintenance. Bearings are self-lubricating type.

Motor Bearing Lubrication (where required)

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

Inlet Filter

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.

Exhaust Filter

The exhaust filter on these unit is internal. Replace after every 2,000 hours of operation or every 6 months. All pumps fitted with a backpressure indicator should use this as a guide for changing the filter whenever the pressure has reached the red mark of 8-10 psig.

CAUTION: Over filling pump with oil may result in misting and if filter is oil-soaked, it must be replaced.

CAUTION: Do not clean or re-use these filters. Filters must be disposed of properly as they might contain toxic substances carried over from the process. Always replace o-rings on filter when changing.

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

- Check inlet filter element, if installed
- Remove temporary inlet screen
- Check piping for signs of leakage and tighten if necessary

Daily

- Check oil level daily, sight glass should be half-full when pump is stopped.
- Inspect inlet filter and replace if necessary.

500 Hours of Operation

- Under normal operating conditions, repeat Daily check procedure as described above.
- Replace oil filter (if equipped).
- Standard Duratex oil should be changed every 6 months (or 500 hours of operation) or when oil darkens. Drain oil when warm, using caution, and properly dispose of oil.

1000 Hours of Operation

- Clean or replace inlet filter element.
- Remove debris from pump housing, motor fan guard and heat exchanger.
- Replace oil filter (if equipped).
- Synthetic Duratex oil should be changed every 6 months (or 1000 hours of operation) or when oil darkens. Drain oil when warm, using caution, and properly dispose of oil.

2000 Hours of Operation

- Replace internal exhaust filter every 6 months (or 2000 hours of operation).

50,000 Hours of Operation

- Replace pump vanes.

ACCESSORIES (IF INCLUDED)

The following accessories are available for **DuraVane** rotary vane vacuum pump systems:

- **Flexible Connectors (optional):** are used in piping systems to eliminate vibration transmission from machinery throughout the piping network.
- **Vibration Isolators (optional):** are used to eliminate vibrations, noise and shock transmission from machinery to the floor. Floor-mount type vibration isolators are used for rotary vane 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):** may be installed on the vacuum receiver tank or vacuum pump manifold. The valve is typically used to isolate the vacuum system from the piping network.
- **Inlet Filter (optional):** For pumps only, an inlet filter is optional but recommended and needs to be installed in the inlet piping.
- **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 maintain a certain vacuum level.

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 reset button on control panel. Overloads may have been triggered.
3. Check HOA switch and vacuum switches.
4. Check power. Ensure that supply voltage matches motor voltage and that wire size is correct.
5. To check electrical control panel disconnect power. Make sure that all wires are tight. Wires may vibrate loose during shipment or operation.
6. Check motor overload in control panel. Overload settings may be too low. Set overload setting in motor starter in accordance with the motor nameplate data (include Service Factor).
7. Check fuses in control panel.
8. Check motor wires. Motor may be wired incorrectly. Look at motor wiring diagram on conduit box of motor for correct wiring configurations. Make sure connections are secure.
9. Check wire size and length. Incorrectly sized wires can cause a voltage drop at the motor.
10. Pump or motor may be seized. Contact the factory.

Unit starts, but has difficulty doing so, and draws a high current

1. Stop unit and disconnect power.
2. Check motor wires. Motor may be wired incorrectly. Look at motor wiring diagram on conduit box of motor for correct wiring configurations. Make sure connections are secure.
3. Check if motor rotation is correct by comparing it to the 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 (3-phase only).
4. Check power supply. Excessively high or low voltage or phase imbalance will damage motor.
5. Foreign particles may have carried over into pump causing damage to the vanes or other internal parts. Contact the factory.
6. Unit may have seized due to high temperature operation. Contact the factory.

Vacuum Problems

Unit is not drawing vacuum

1. Stop unit and disconnect power.
2. Check if the motor rotation is correct. Rotation is 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.
3. Check vacuum gauge. Gauge may be faulty. Replace.
4. Check if the inlet valve is open and inlet filter is clean.
5. Ensure that no lines are open to the atmosphere, causing loss of vacuum.
6. Check for leaks in piping systems, using conventional leak detection methods.
7. Check pump for high discharge backpressure. Replace discharge element if necessary.
8. Check to see if inlet check valve assembly is stuck in closed position due to contamination. Disassemble and clean inlet check valve and screen as required.
9. Internal parts may be worn or damaged. Contact the factory.
10. One or more of the vanes in the rotor may be stuck. Contact the factory.

Unit is not reaching ultimate vacuum level

1. Stop unit and disconnect power.
2. Check vacuum gauge. Gauge may be faulty. Replace.
3. Check to see if system is holding vacuum. This can be done by shutting the unit down and observing for about 30 minutes if the gauge on the receiver or pipe system is holding. If vacuum is not holding, check all pipe connections for leaks using conventional leak detection methods.
4. Check pump for high discharge backpressure. Replace discharge element if necessary.
5. Check to see if inlet check valve assembly is stuck in closed position due to contamination. Disassemble and clean inlet check valve and screen as required.
6. Internal parts may be worn or damaged. Contact the factory.
7. Check pump model and specifications. Pump may not be suitable for application. Contact the factory.

Overheating Problems

Unit overheats

1. Stop unit and disconnect power.
2. Make sure that pump is being cooled correctly. Check that pump is located in a well-ventilated area. Maximum ambient temperature for the rotary vane vacuum pumps is 104°F.
3. Inspect fan for damage.
4. Clean motor and pump air grills if needed.
5. Check pump for high discharge backpressure. Replace discharge element if necessary.

Noise and Vibration Problems

Unit is making an abnormal noise or sound

1. Foreign particles may have carried over into the pump, causing damage to the vanes or other internal parts.
2. Check bearings. If bearings are noisy, contact the factory for replacement instructions.
3. One or more of the vanes in the rotor may be stuck. Contact the factory.