EM

INSTALATION AND OPERATING INSTRUCTIONS – EM OIL LUBRICATED VACUUM PUMPS

EM-R0…

H2O Innovation

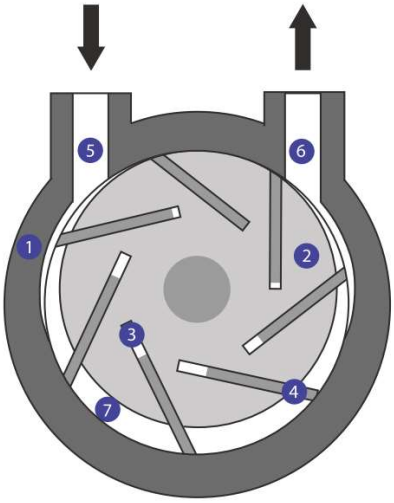
06/06/2023

I. WORKING PRINCIPLE

Rotary vane pumps consist of a cylindrical housing (1), eccentrically positioned rotor (2), and numerous free-moving vanes (4). The vanes are placed in the slots of the rotor (3) and, as the rotor turns, the centrifugal force throws the vanes against the cylindrical wall. The chamber volume changes as the rotor turns. From the inlet port (5), the chamber volume enlarges, and then decreases towards the outlet port (6). As air enters the inlet port (5) and the chamber enlarges (7), the vanes create a vacuum. As the air is pushed through the chamber and it becomes compressed, pressure is produced at the outlet port (6).

To avoid the suction of solids, the vacuum pump is equipped with a mesh screen in the suction connection. To avoid reverse rotation after switching off, the vacuum pump is equipped with a non-return valve.

NOTE: It is best practice to install an inlet check valve with the vacuum pump.



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II. SAFETY INSTRUCTIONS

To ensure safe operation, we have provided important safety guidelines in this manual for the EM-R pump.

Malpractice can result in severe injuries and material damage. The electrical connection may be performed by trained and authorized electricians only.

- Make sure the motor is electrically grounded, motor and blower covers are in place, the mounting bolts are properly secured.
- Before working on the pump always unplug power supply.
- Keep all tools, loose clothing, and hands away from rotating or moving parts while the unit is running. Rotating parts can cut or aspirate clothes and hair. Do not put hands into the pump inlet.
- Inspect the pump at regular intervals for damaged or worn parts. **Replace damaged parts immediately! Do not connect or turn on a damaged pump.**
- Tilting a vacuum pump that is already filled with oil can cause large quantities of oil to ingress into the cylinder. Starting the vacuum pump with excessive quantities of oil in the cylinder will immediately break the vanes and ruin the vacuum pump.

III. DESCRIPTION

EM-R Pumps have a nameplate containing the serial and model number located on the pump body. When placing a service call, please provide the serial number with our invoice number.
Inspect the pump at time of receipt to ensure that all components and accessories, as noted on the packing slip, were received and in good condition.

The vacuum pump is equipped with a gas ballast so water vapor within the gas flow is tolerated **within certain limits.** The gas ballast shall remain completely open when there is humidity in the room. The pump is thermally suitable for continuous operation.

Lubrification process

The oil mist is removed almost completely by the exhaust port. The exhaust filter can work for about 3000 hours under normal working conditions, but the lube quality and the pollution of the nearby environment will affect the life of the filter. If the environment is too polluted, consider adding a pre-filter. We recommend using our vacuum pump oil (ERAOIL-80-04), as other brands or reconditioned oil will reduce the performance of the vacuum pump.

NOTE: Replace the oil filter each year.

Cooling

Ambient air temperature and condition (not to exceed 104°F/40°C) should be considered when choosing placement of the vacuum pump, as the pump is very sensitive to the environmental temperature. If the environment is not optimal, the cooling fan will be covered with dust, which adversely affects the performance. Dust should be removed with low pressure compressed air. If it cannot be removed completely, a solvent should be used, and the heat dissipation surface of the oil coil should be kept dry.

The vacuum pump is cooled by:

- ambient air around the vacuum pump, including oil mist separator.
- air flow from the fan wheel.
- conveyed gas.
- air flow from the fan wheels on the shaft of the vacuum pump.

IV. TRANSPORT:

1. Attach lifting gear securely to the eyebolt on the cylinder.
2. Attach lifting gear to a crane hook with safety latch.
3. Lift the vacuum pump with a crane hook.

Packed on a pallet, the vacuum pump is to be transported with a forklift. Remove the stud bolts from the rubber feet.

NOTE: Tilting a vacuum pump that is already filled with oil can cause large quantities of oil to ingress into the cylinder. Starting the vacuum pump with excessive quantities of oil in the cylinder will immediately break the vanes and ruin the vacuum pump.

V. INSTALLATION

Mounting Position and Space Required for Installation

- Upon installation, please check for and remove any obstruction around pump suction inlet and install under cover to avoid motor damage or electric shock caused by contact with water.
- To avoid overheating, ensure airflow to the pump is undisturbed.
- A distance of at least 4 ft (1.2 meter) must be maintained between pump motor fan and wall to avoid overheating. Heat-resistant piping material is recommended within 4 ft (1.2 meter) of the pump.
- Do not use the vacuum pump in areas where it would be exposed to high temperatures, excessive dust, smoke, rain, caustic air, or combustible air. If temperature is below 5°C, install a temperature controller to have the pump to start automatically when oil temperature falls below acceptable temperature.
- Install the pump on a level, stable operating surface. The pump causes low vibration, but a special base is not required. If desired, the pump can be bolted down.
- Place the vacuum pump in such a way that the oil sight glass is easy to read. Make sure that the drain plug, oil filter and oil filler cap are accessible for oil changes and filter replacement.
- Make sure that the vacuum pump can neither inadvertently nor intentionally be stepped on and cannot be used as a support for heavy objects.
- Make sure that no temperature sensitive parts (plastics, wood, cardboard, paper, electronics) will touch the surface of the vacuum pump. Make sure that the vacuum pump cannot be accidentally touched when it is operating.

Plumbing and accessories

- Remove any foreign material (e.g. burrs, chips, welding drops, pipe cuttings, excess sealant, etc.) from plumbing.
- Remove safety rubber plugs from the inlet and outlet ports.
- Verify the motor is securely mounted and proper pump rotation before connecting to plumbing. The inlet and outlet port are not designed to support the plumbing without proper supporting elements.
- Connect the plumbing with properly sized fittings (2'' min). Recommended piping should be, at minimum, the same size as the inlet port on vacuum systems.
- Suction piping, flexible or not, must be vacuum-tight.
- Lorsque la conduite d'aspiration est vraiment longue, il est préférable d'utiliser du tube de plus grand diamètre afin de prévenir les pertes d'efficacité.
- Install an intake filter to prevent foreign material from entering the pump. In applications where there is high humidity or liquids being used in the process, install a moisture separator with a drain valve.
- Install two (2) gauges - one before and one after the filter - to monitor differential air flow through the filter element. As filters become clogged, performance efficiency will be reduced. Filters should be checked periodically and replaced when necessary.

DISCHARGE CONNECTION :

- The exhaust should have a minimum downward slope of 1/8'' per foot to prevent any return of water to the pump.
- Do not put the exhaust upwards. Do not obstruct the exhaust.
- Make sure that the discharge line either slopes away from the vacuum pump or provide a liquid separator or a drip leg with a drain cock, so that no liquids can back up into the vacuum pump.
- The exhaust air is very hot. Install a metal elbow, the rest of the piping can be plastic.


Above recommended installation.

Filling oil

Using the correct lubricant influences the end pressure (the 0.1 hPa ultimate pressure is obtained with the use of ERAOIL-80-04 oil type).

PUMP	OIL CAPACITY
EM-R0020	0.5
EM-R0040	1
EM-R0063	2
EM-R0100	2
EM-R0165	5
EM-R0302	6.5

1. Remove the oil fill plug.
2. Fil oil according to the values set in the table above. The table above is indicative, the oil sight glass acts as the reference.
3. Make sure that the oil level is between the MIN and the MAX-markings or the center line of the oil sight glass.
4. Make sure that the seal ring is inserted into the oil fill plug and undamaged. Replace if necessary.
5. Firmly reinsert the oil fill plug together with the seal ring.
6. Switch on the vacuum pump.
7. In case the suction line is equipped with a shut-off valve, close the shut-off valve. In case the suction line is not equipped with a shut-off valve, cover the suction connection with a rubber mat.
8. Let the vacuum pump run for a few minutes.
9. Make sure that the level is between the MIN and the MAX-markings or the center line of the oil sight glass.
10. In case the level has fallen below the MIN-marking of the oil sight glass, top off oil.

NOTE: Change the oil filter once a year.

VI. COMISSIONNING

Only start-up and operate under the following conditions:

- The pump must be completely assembled. Pay attention to the following components:
  - the pump cover.
  - the muffler on inlet and discharge connections; and
  - the fan guard.
- The pipes/hoses must be connected to inlet and discharge connections.
- Inlet and discharge connections and the connected pipes/hoses may not be closed, clogged, or soiled.
- Check the mounting elements, connections of the pipe/hose, lines, fittings and containers for strength, leaks, and firm seating at regular intervals.

Start-up

1. Ensure that all installation prerequisites are met and will remain.
2. Ambient temperature should be between 5 and 40°C.
3. Open shut-off device in intake/discharge pipe.
4. Switch on power supply for drive motor.
5. Operate pump for an hour, and then check:
    - Vacuum valves - adjust relief valve vacuum setting if needed.
    - Motor current - check that current supply matches recommended current rating on pump nameplate.
    - Electrical overload cutout - check that current matches rating on pump nameplate.

If motor fails to start or slows down significantly under load, shut off and disconnect from power supply. Check that the voltage is correct for the motor and that the motor is turning in the proper direction.

IMPORTANT: Before operation, the air inlet should be closed for 30 minutes until the internal temperature reaches 167ºF (75°C), which will allow any moisture to evaporate. After use, run the motor another 30 minutes so that any condensation in the pump oil evaporates.

Shut-Down

1. Switch off power supply for drive motor.
2. Close shut-off device in intake/discharge pipe, if applicable.

VII. MAINTENANCE SCHEDULE

The maintenance intervals depend very much on the individual operating conditions. The intervals given below shall be considered as starting values which should be shortened or extended as appropriate. Particularly heavy-duty operation, such as high dust loads in the environment or in the process gas, other contaminations, or ingress of process material, can make it necessary to shorten the maintenance intervals significantly.

NOTE: If the pump is having a variable frequency drive (VFD) it is important to start your pump at least once out of season to prevent VFD from being discharged.

Daily Maintenance:

- Clear the inlet air filter by using compressed air to blow from the inside to the outside.
- Check the pipeline.
- Check oil sight glass disassemble and wash if needed.
- Check oil level add more if needed.
- Clear dust from outside of the cooler and the inner pipeline.

Weekly Maintenance

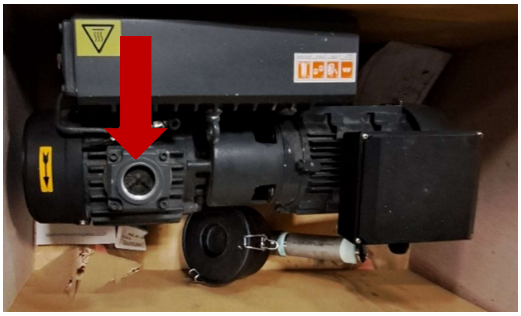
- Check the vacuum pump for oil leaks - in case of leaks have the vacuum pump repaired.
- Check the function of the exhaust filters.
- In case an inlet air filter is installed, check the inlet air filter, if necessary clean (with compressed air) or replace.
- In case of operation in a dusty environment, make sure that the housing is free from dust and dirt, clean if necessary.

Maintenance After One Season

- Make sure that the vacuum pump is shut down and locked against inadvertent start up.
- Make sure that the housing is free from dust and dirt, clean if necessary.
- Clean the fan cowlings, fan wheels, ventilation protection screen and cooling fins.
- In case an inlet filter is installed, clean (with compressed air) or replace the inlet air filter.
- Replace the exhaust filters (see “Maintenance, Exhaust Filter”).
- Change the oil, replace the oil filter(s) and clean the float valve. Prepare for a long-term stop.

Every 16000 Operating hours, at the latest after 4 Years have a major overhaul on the vacuum pump.

Below air inlet filter :



Oil:

Operation without oil will ruin the vacuum pump in short time. Prior to starting it must be made positively sure that oil is filled. A change from synthetic oil to mineral oil requires a special procedure. Keep the approximate amount of oil required by the pump. See the ‘‘filling oil’’ section for the approximative quantity.

Filling oil through the suction connection/gas inlet will result in breakage of the vanes and destruction of the vacuum pump. Oil may be filled only through the oil fill port. Do not mix oils.

Topping off Oil:
Under normal conditions there should be no need to top off oil during the recommended oil change intervals. A significant level drop indicates a malfunction (see “Troubleshooting”). During operation the exhaust filter gets saturated with oil. It is therefore normal that the oil level will drop slightly after replacement of the exhaust filter.

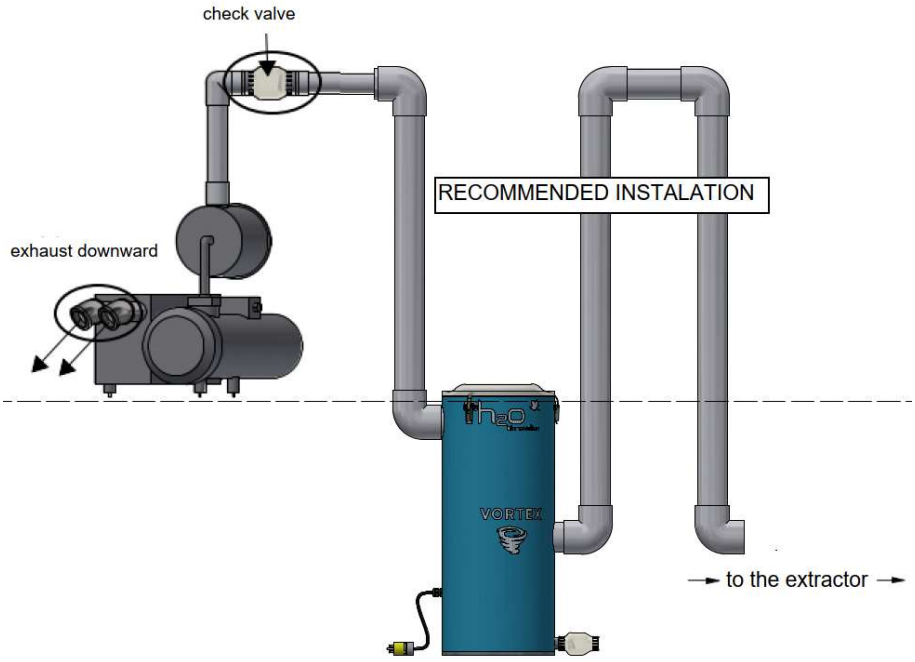
Read the level on the sight glass. In case the level has dropped underneath the MIN-marking, top off oil.
If the level is above the MAX marking change oil.

VIII. TYPICAL INSTALLATION SCHEME

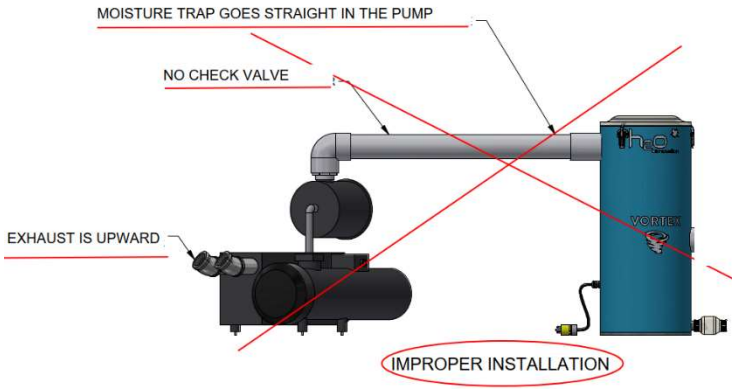
IMPORTANT :

- To prevent water from returning to the pump, it is important to position it above the baffles, moisture trap and extractor.
- It is highly recommended to install a check valve between the pump and the moisture trap.
- The exhaust should have a minimum downward slope of 1/8'' per foot to prevent any return of water to the pump.

Below, recommended installation.



To the right, diagram of improper installation: the pump exhaust is upward, the moisture trap goes straight in the pump. No check-valve.



IX. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
THE VACUUM PUMP IS BLOCKED	1. Solid foreign matter has entered the vacuum pump. 2. Vacuum system exerted under pressure onto the pump chamber. 3. Condensate ran into the pump chamber.	1. Repair the vacuum pump. Clean rotor and vanes or replace vanes. 2. Repair the vacuum pump. Make sure the vacuum system will not exert under pressure onto the shut-down vacuum pump, if necessary, provide an additional shut-off valve or non-return valve. 3. Check moisture trap, drain valve, float. Make sure no condensate will enter the vacuum pump, if necessary, provide a drip leg and a drain cock. Drain condensate regularly.
PUMP OPERATION FAILURE	1. Broken oil pipe connector. 2. One of the fuses has blown.	1. Replace oil pipe connector. 2. Check the fuses, replace fuses if necessary.
PUMP DOES NOT REACH USUAL PRESSURE CURRENT OVERLOAD EVACUATION OF THE SYSTEM TAKES TOO LONG	1. Blockage or leakage of inlet pipe or vacuum system. 2. Contaminated oil (most common cause). 3. No or not enough oil ion the reservoir. 4. Exhaust filter blocked. 5. Air inlet filter blocked. (Common cause) 6. Broken or blocked exhaust valve. 7. Stuck or broken vane. 8. A shaft seal is leaking. 9. The exhaust valve is not properly seated or stuck in partially open position.	1. Check pipe for blockage and remove blockages. 2. Drain and change oil. 3. Top off oil. 4. Replace exhaust filter. 5. Clean or replace air inlet filter. 6. Replace or clean exhaust valve. 7. Clean rotor and vanes or replace vanes. 8. Replace the shaft seal ring. 9. Disassemble and reassemble the exhaust valve(s).
ABNORMAL NOISE AND OVERLOAD	1. Lost phase of motor. 2. Vanes rotating in the wrong direction. 3. Infrequent oil changes (oil dark in color) or blocked exhaust filter. Contaminated oil. 4. Foreign body inside pump. 5. Broken vane or bearing/stuck vanes.	1. Inspect power supply and cord. 2. Adjust to correct rotation. 3. Clean vacuum pump and replace oil and exhaust filter. 4. Repair vacuum pump. 5. Only use ERAOIL-80-04 and change more frequently/change vanes. Use ‘’Loctite 515’’ between the vanes and the rotor.
OIL DARK IN COLOR OR LOW VISCOSITY	1. Infrequent oil changes, incorrect oil mixture.	1. Flush the vacuum pump. Replace the oil filter. Replace the exhaust filters. Fill in new oil

PROBLEM	POSSIBLE CAUSE	REMEDY
EXCESSIVELY HIGH TEMPERATURE OF VACUUM PUMP	1. Partially blocked exhaust filter. 2. Bad aeration. 3. Insufficient lubrication/unqualified lubrication/dark oil. 4. Blocked air inlet/outlet pipe or filters, insufficient air ventilation.	1. Replace filter. 2. Strengthen cooling aeration, clean vanes, cooler, and vane cover. 3. Replenish lubrication/Clean vacuum pump, change exhaust filter and lubrication/Use only recommended oil. 4. Clean air inlet/outlet pipe and change filters. Make sure that the cooling of the vacuum pump is not impeded by dust/dirt. Clean the fan cowlings, fan wheels, ventilation screens and cooling fins.
MOTOR FAILURE	1. Broken fuse. 2. Blocked vacuum pump or motor. 3. Broken motor.	1. Join fuse. 2. Remove the fan cover. Try to turn the fan by hand. If the unit vacuum pump/drive moto is still frozen: remove the drive motor, check the drive motor and the vacuum pump separately. If the vacuum pump is blocked: repair the vacuum pump/if the motor is broken replace or repair.
BROKEN VANE	1. Foreign body inside pump. 2. Incorrect rotation.	1. Repair vacuum pump. 2. Repair vacuum pump and correct rotation.
ABNORMAL OIL CONSUMPTION	1. Broken airtight ring or oil seal. 2. Exhaust filter blocked. 3. Blocked floater valve or oil leaking from exhaust nozzle. 4. Oil leak.	1. Replace airtight ring or oil seal. 2. Reset or replace exhaust filter. 3. Clean or replace floater valve. 4. Inspect and seal leak.
VACUUM PUMP FUMES AT THE EXHAUST SIDE OR EXPELS OIL DROPLETS/OIL LEVEL DROPS	1. Exhaust filters are not properly seated. 2. O-rings from the exhaust filters are missing or damaged. 3. The exhaust filters show cracks. 4. The oil return line is clogged or broken. 5. The oil return valve is clogged.	1. Check the proper position of the exhaust filters. 2. Add or replace the O-rings. 3. Replace the exhaust filters. 4. Repair the oil tubing. Replace a broken oil return line with an identically dimensioned line. Fill in new oil. 5. Clean the oil return valve.
DRIVE MOTOR IS RUNNING, BUT THE VACUUM PUMP STAND STILL	1. The coupling between the drive motor and the vacuum pump is defective.	1. Replace the coupling.

X. WARRANTY

Subject to the terms, conditions and exclusions provided for below, this warranty applies to any product, part or equipment for the maple industry sold to a customer (the « Customer ») by the Supplier, directly or through an authorized distributor (the « Equipment »).

1. Warranty

1.1 Equipment. Subject to the limitations and exclusions provided in this warranty, the Supplier warrants to the Customer that the Equipment is free from manufacturing defects for a period of two (2) years (the « Warranty Period ») from the Warranty Commencement Date as defined in paragraph 1.3 below, only when the Equipment is used and operated in a safe manner, according to the instructions and operating conditions specified by the Supplier and in the normal use for which the Equipment is intended.

1.2 Labor. Labor related to the installation and repair of the Equipment is guaranteed by the Supplier for a period of one (1) year from the Warranty Commencement Date.

1.3 Warranty Commencement date: The « Warranty Commencement Date » means the date of the invoice issued to the Buyer for the Equipment.

2.2 Conditions of application. For this warranty to be applicable, the Customer must provide the Supplier, with its Notice of Defect, with the proof of purchase of the Equipment clearly indicating the Date of Purchase by the Customer, the description of the Equipment as well as the delivery date. The Customer must also have paid the full price of the Equipment to the Supplier or have obtained a financing plan approved by the Supplier.