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, creating a chamber between the rotor and the cylinder (7). 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).

In order to avoid the suction of solids, the vacuum pump is equipped with a mesh screen in the suction connection. In order 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.
# Table of Content

WORKING PRINCIPLE ........................................................................................................................................... 1
SAFETY INSTRUCTIONS ..................................................................................................................................... 4
PUMP IDENTIFICATION ..................................................................................................................................... 5
PRODUCT DESCRIPTION .................................................................................................................................... 5
  Air Process: ................................................................................................................................................... 5
  Oil circulation: .............................................................................................................................................. 6
  Lubrification process: ................................................................................................................................... 6
  Cooling: ........................................................................................................................................................ 7
TRANSPORT....................................................................................................................................................... 8
INSTALLATION ................................................................................................................................................... 8
  Mounting Position and Space Required for Installation : ............................................................................. 8
  Plumbing and accessories: ............................................................................................................................. 10
  On/Off Switch ............................................................................................................................................. 11
  Electrical power supply: ............................................................................................................................... 11
  Connection to terminal box: .......................................................................................................................... 11
  Filling oil: .................................................................................................................................................... 13
COMISSIONNING: ........................................................................................................................................... 13
  Start up: ...................................................................................................................................................... 15
  Shut-Down: ................................................................................................................................................ 15
  Conveying Condensable Steams: .................................................................................................................. 15
EXTENDED SHUTDOWN AND STORAGE: ......................................................................................................... 16
  Beginning of season start-up, start-up after an extended shutdown: ....................................................... 16
MAINTENANCE: .............................................................................................................................................. 16
  Maintenance schedule: ............................................................................................................................... 17
  Oil: .............................................................................................................................................................. 17
  Exhaust Filter: ............................................................................................................................................. 20
  Inlet Flange and Filter: ............................................................................................................................... 20
TROUBLESHOOTING ........................................................................................................................................ 22
  EM 28 Exploded view ...................................................................................................................................... 24
  EM 63-100 Exploded view ............................................................................................................................ 25
  EM 140 Exploded view .................................................................................................................................. 26
  EM 202 Exploded view .................................................................................................................................. 27
SPARE PARTS ................................................................................................................................................... 28
SAFETY INSTRUCTIONS

To ensure safe operation, we have provided many important safety guidelines in this manual for the EM Oil Lubricated Rotary Vane Pumps.

- 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.
- Wear safety glasses and earplugs when working on the pump.
- 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.
- Intruding foreign objects or liquids can destroy the vacuum pump.
- Inspect the pump at regular intervals for damaged or worn parts. Replace damaged parts immediately! Do not connect or turn on a damaged pump.
- Use only H2O Innovation replacement parts, unless instructed and given clearance by H2O.
- Water, other liquids, aggressive or flammable gases and vapors may not be handled. Use only clean, dry air.
- Misuse of the pump could result in serious injury.
- High temperatures of up to approximately 167°F (75°C) can occur on the surface of the pump. Risk of burns. Do not touch during operation. The vacuum pump shall be protected against contact during operation or wear heat protection gloves. Make sure that no temperature sensitive parts (plastics, wood, cardboard, paper, electronics) will touch the surface of the vacuum pump.
- Do not walk, work or stand under suspended loads.
- Check the weight of the vacuum pump before lifting. Use adequate lifting gear as needed. The position of the eyebolt fits to the center of gravity of the vacuum pump, including the drive motor. If a vacuum pump without a drive motor is to be lifted, attach another belt/rope at a suitable point.
- 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.
- There is danger of an electrical shock when a defective pump is touched. Mount motor circuit breaker. Have electrical equipment checked regularly by an electrician.
- During operation the oil separator is filled with hot, pressurized oil mist. Risk of injury from hot oil mist with open oil fill port. Risk of injury if a loosely inserted oil fill plug is ejected. Remove the oil fill plug only if the vacuum pump is stopped. The vacuum pump must only be operated with the oil fill plug firmly inserted.
- Pump can overheat causing damage to the drive motor winding if intake or discharge connections are closed/soiled. Before start-up, make sure the inlet and discharge connections are not closed, clogged or soiled.
- Degraded oil can choke pipes and coolers. Risk of damage to the vacuum pump due to insufficient lubrication. Risk of explosion due to overheating.
PUMP IDENTIFICATION
EM 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.

Inspect the pump and motor assembly to ensure that the motor horsepower and voltage are correct.

PRODUCT DESCRIPTION
EM Series Oil Lubricated Vacuum Pumps are industrial grade pumps made for continuous duty. These pumps provide the vacuum to 29.9 HgV.

The vacuum pump is intended for the suction of air and other dry, non-aggressive, non-toxic and non-explosive gases. Conveying media with a higher density than air leads to an increased thermal and mechanical load on the vacuum pump and is permissible only after prior consultation with H2O Innovation. The vacuum pump is equipped with a gas ballast so water vapor within the gas flow is tolerated within certain limits. The vacuum pump is thermally suitable for continuous operation.

Air Process:
Exhaust must be connected outside. Exhausted air can be very hot and loaded with oil mist. Oil contained in process air is separated as best as possible, but not completely. The exhaust should have a minimum downward slope of 1/8” per foot to prevent any return of water to the pump.

Dust is removed by the inlet air filter, then the air goes into the pump body through the inlet port and mixes with the oil. The mixed air is compressed through the exhaust port, and then filtrated by the exhaust filter. The oil-free air is then exhausted into the atmosphere. The gas ballast should be open if there is moisture in the air.

The pump is equipped with a gas ballast valve, which can be partially or completely closed. A little air enters the pump body through the gas ballast valve and is compressed with the processed air. The inlet port cannot be used as a vacuum system check valve or the vane may rotate in the opposite direction after the machine is switched off.
Oil circulation:

Oil lubricates the vanes, seals the gaps, and removes compression heat. The oil reservoir is located on the pressure side of the pump (i.e. high pressure) and the bottom of the bottom chamber of the oil separator. The feed openings are located on the suction side of the vacuum pump (i.e. low pressure). Oil is drawn through the oil supply lines and injected on the suction side.

The injected oil mixes with the air/gas and is conveyed through the pump, then is ejected into the oil filter. Oil that separates before the exhaust filter accumulates at the bottom of the bottom chamber of the oil separator. Oil that is separated by the exhaust filter accumulates at the bottom of the upper chamber of the oil separator.

The flow resistance of the exhaust filters causes the inside of the exhaust filters (which is connected to be bottom chamber of the oil separator) to be on a higher-pressure level than the outside of the exhaust filters (i.e. the upper chamber of the oil separator). Because of the higher pressure in the bottom chamber it is not possible to let oil that drips off the exhaust filters simply flow down to the bottom chamber. Therefore, the oil that accumulates in the upper chamber is sucked through the oil return line right to the suction connection.

Lubrication process:

The lubrication process is separated into three parts:

1. The first part is cooled in the oil coil and is then injected into the vacuum body to cool the air.
2. The second part goes into both sides of the pump body to cool the bearing housing.
3. The spare lubrication moves into the vacuum body to cool the air. The oil injected into the vacuum body with the inlet air enters the oil separator through the exhaust port as oil mist. After the oil mist hits the oil separator, some oil returns to the bottom of the oil separator while some oil will be separated by the exhaust filter. After being separated by the filter, the oil gathers in the float valve and returns to the vacuum body through the float valve. Then the cycle repeats.

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.
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; and
- air flow from the fan wheels on the shaft of the vacuum pump.
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.

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.
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.

Recommended installation below:

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

The vacuum pump comes without on/off switch. The control of the vacuum pump is to be provided in the course of installation.

Electrical power supply:

Observe the rating plate. It is imperative that the operating conditions correspond to the data given on the rating plate. Deviations permissible without reduction in performance include:

- +/- 5% voltage deviation
- +/- 2% frequency deviation

Make sure that the drive of the vacuum pump will not be affected by electric or electromagnetic disturbance from the mains; if necessary, seek advice from your distributor.

Connection to terminal box:

2. Carry out the connection and arrangement of the jumpers in accordance with the wiring diagram.
3. The electrical connection must be permanently safe. There may be no protruding wire ends.
4. The terminal box must be free from foreign bodies, dirt, and humidity. Terminal box cover and cable entries must be tightly closed so as to make them dust-proof and waterproof. Check for tightness at regular intervals.
5. Install overload protection according to the voltage marked on rating plate or label and choose the appropriate overload device.
6. Watch the fan wheel of the drive motor and determine the direction of rotation just before the fan wheel stops. Operation in the wrong direction of rotation can destroy the vacuum pump in a short time. Prior to starting-up it must be made sure that the vacuum pump is operated in the proper directions.
7. If the rotation of the fan wheel must be changed, switch any two of the drive motor wires in the terminal box.

Make sure pump is filled with oil. Operation without oil will ruin the vacuum pump in short time. Prior to commissioning it must be made positively sure that oil is filled.
Filling oil:

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

<table>
<thead>
<tr>
<th>PUMP</th>
<th>OIL CAPACITY (LITERS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERAEM28B</td>
<td>1</td>
</tr>
<tr>
<td>ERAEM63B</td>
<td>2</td>
</tr>
<tr>
<td>ERAEM100B</td>
<td>3</td>
</tr>
<tr>
<td>ERAEM140B</td>
<td>3</td>
</tr>
<tr>
<td>ERAEM202B</td>
<td>5</td>
</tr>
</tbody>
</table>

1. Remove the oil fill plug
2. Fill 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: Starting the vacuum pump with cold oil is made easier when the suction line is neither closed nor covered with a rubber

COMMISSIONNING:

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.

Conveying Condensable Steams:

Residual condensates dilute the oil, deteriorate its lubricating properties, and can cause a jam of the rotor. Apply a suitable operating method to make sure that no condensates remain in the vacuum pump. In order to use the vacuum pump for the conveyance of condensable vapors, the vacuum pump must be equipped with shut-off valve in the suction line and with a gas ballast valve. Install a moisture trap and follow installation recommendations. Periodically inspect the pump components to avoid corrosion damage.

At process start:
   - Open the shut-off valve in the suction line.
At process end:
   - Close the shut-off valve in the suction line.
   - Operate the vacuum pump for another approximately 30 minutes.
EXTENDED SHUTDOWN AND STORAGE:

- Make sure the ball-cock of the gas ballast is closed.
- Wrap PTFE-tape around the thread of the suction and discharge connection, firmly insert plugs.
- Make sure that all ports are firmly closed; seal all ports that are not with PTFE-tape, gaskets or O-rings with adhesive tape.
- Wrap the vacuum pump in VCI film.
- Store in original packaging if possible.
- Must store pump in a place that meets the following conditions: dry, indoors, dust-free and low vibration (<2.8mm/s).
- The temperature during storage must be ambient temperature between 5°C and 40°C.

Beginning of season start-up, start-up after an extended shutdown:

1. Make sure that the vacuum pump is shut down and locked against inadvertent start up.
2. Make sure that the gasket, plug or adhesive tape are removed from the ports.
3. Remove the cover around the fan of the drive motor.
4. Slowly rotate the fan wheel by hand several revolutions in the intended direction of rotation.
5. Mount the cover around the fan wheel of the drive motor.
6. If deposits could have gathered in the vacuum pump, flush the vacuum pump (see “Maintenance”).
7. Observe the chapter “Installation and Commissioning”.

MAINTENANCE:

- Prior to action that requires touching of the vacuum pump, let the vacuum pump cool down or wear heat protection gloves.
- In case of oil draining, let the vacuum pump cool down for no more than 20 minutes.
- Prior to disconnecting connections make sure that the connected pipes/lines are vented to atmospheric pressure.
- Conveying air with high moisture may shorten the pump’s service life. Air with a high moisture content should be avoided. If unavoidable, inspect pump’s parts periodically to prevent pump damage or injury caused by corrosion.
- Bearings, vanes, and filters are consumable parts with limited life. Please inspect and replace periodically, especially in operations beyond normal ambient operating conditions.
- The inlet filter and the exhaust filter must be cleaned at regular intervals, depending on the amount of dust in the air being pumped. Blow out the filter cartridges with compressed air gun from the inside outwards.
- If the filter cartridge is too dirty to be cleaned, it must be replaced. The cartridges can be taken out after the removal of the filter cover. Each season replace the filter cartridge.
- Cooling fan, hood, and motor should be inspected regularly for dirt. Dirt prevents cool air intake and may lead to overheating of the vacuum pump.
- Bearings are pre-lubricated and require no maintenance.
Maintenance schedule:

NOTE: 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.

Daily Maintenance:
- Check oil color. If the oil is black or shows sediment, change the oil before use.
- 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.

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 (see “Maintenance, Oil, Topping off Oil”).

Draining used oil, Changing the oil:

NOTE: After switching off the vacuum pump at normal operating temperature wait no more than 20 minutes before the oil is drained.

1. To maintain optimal performance of your pump, oil should be replaced on a regular schedule.
2. Run the vacuum pump to heat up the oil, which will help the oil drain faster.
3. Cut off power to the pump.
4. Make sure that the vacuum pump is vented to atmospheric pressure.
5. Put a drain tray underneath the oil drain port. Remove the oil drain plug. Drain the oil.
6. When the oil stream dwindles, close the oil drain plug.
7. Switch the vacuum pump on for a few seconds. Remove the oil drain plug.
8. Make sure that the sealing seat on the oil drain plug is undamaged. If necessary replace the oil drain plug.
9. Vérifier qu’aucun joint ne coule ou n’est endommagé et remplacer au besoin.
10. Firmly reinsert the oil drain plug.
11. Dispose of the used oil in compliance with applicable regulations.

The oil life depends very much on the operating conditions. Under normal operating conditions, oil and the oil filter shall be changed at end of season. Under very unfavourable operating conditions the oil life can be less. Extremely short life times indicate malfunctions (see “Troubleshooting”) or unsuitable operating conditions.

Cleaning of the Float Valve:

1. Make sure that all of the used oil is drained.
2. Unscrew the fixing screws of exhaust cover plate, take off the washers and remove the cover.
3. Check the seal and replace if necessary.
4. Unscrew the fixing screws and remove the float.
5. Check the o-ring and replace if necessary.
6. Check float for cleanliness and good operation. Blast clean with compressed air if necessary.
7. For reassembly, refit float to its support while taking care to fit it the correct way.
Exhaust Filter:

Check During Operation

H2O Innovation recommends the use of a filter pressure gauge (available as accessory). Without filter pressure gauge the filter resistance shall be assessed on the basis of the drive motor current drawn. If the pressure differential is increasing, or the drive motor draws too much current and/or the pump flow rate has dropped, then the exhaust filters are clogged and must be replaced.

1. Make sure that the vacuum pump is running.
2. Check that the drive motor current drawn is in the usual range (see nameplate).
3. Check that the discharge air is free from oil.

NOTE: Exhaust filters cannot be cleaned successfully. Clogged exhaust filters must be replaced with new ones. If the discharge air contains oil, the exhaust filters can be clogged or broken through and, if applicable, must be replaced.

Removing the Exhaust Filters:

The market offers spares exhaust filters that are geometrically compatible with EM vacuum pumps but do not feature the high retention capacity of genuine H2O Innovation exhaust filters and deteriorate the service life and the efficiency of the vacuum pump due to their increased back pressure. In order to keep the emissions at the lowest possible level and to preserve efficiency and service life only H2O Innovation filters shall be used.

1. Make sure that the vacuum pump is shut down and locked against inadvertent start up.
2. Prior to disconnecting pipes/lines make sure that they are vented to atmospheric pressure.
3. Remove the discharge line, if necessary.
4. Remove the discharge cover from the oil separator.
5. Release the spring elements by unscrewing the screws and remove them.
6. Remove the exhaust filters and the O-rings.
7. Insert the new exhaust filters with the new O-rings into the oil separator. Be sure to fit the exhaust filters as indicated by the arrow at exhaust filters.
8. Mount spring elements apply a tension to the spring elements by means of the tension screw.
9. Check the cover seal and replace it if necessary.
10. Mount the discharge cover.

During operation the exhaust filters get saturated with oil. It is therefore normal that the oil level will drop slightly after replacement of the exhaust filters. Change exhaust filter whenever an oil change is made.

Inlet Flange and Filter:

Check the inlet flange daily. To clean the mesh screen at the inlet:

1. Remove the upper parts of the inlet flange.
2. Remove the flange.
3. Remove the mesh screen and clean it with compressed air.
4. Check the different seals and replace them if necessary.
5. Refit the mesh screen and the inlet flange.
## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THE VACUUM PUMP IS BLOCKED</strong></td>
<td>1. Solid foreign matter has entered the vacuum pump.</td>
<td>1. Repair the vacuum pump. Clean rotor and vanes or replace vanes.</td>
</tr>
<tr>
<td></td>
<td>2. Vacuum system exerted under pressure onto the pump chamber.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>3. Condensate ran into the pump chamber.</td>
<td>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.</td>
</tr>
<tr>
<td><strong>PUMP OPERATION FAILURE</strong></td>
<td>1. Broken oil pipe connector.</td>
<td>1. Replace oil pipe connector.</td>
</tr>
<tr>
<td></td>
<td>2. One of the fuses has blown.</td>
<td>2. Check the fuses, replace fuses if necessary.</td>
</tr>
<tr>
<td><strong>PUMP DOES NOT REACH USUAL PRESSURE</strong></td>
<td>1. Blockage or leakage of inlet pipe or vacuum system.</td>
<td>1. Check pipe for blockage and remove blockages.</td>
</tr>
<tr>
<td><strong>CURRENT OVERLOAD</strong></td>
<td>2. Contaminated oil (most common cause).</td>
<td>2. Drain and change oil.</td>
</tr>
<tr>
<td><strong>EVACUATION OF THE SYSTEM TAKES TOO LONG</strong></td>
<td>3. No or not enough oil ion the reservoir.</td>
<td>3. Top off oil.</td>
</tr>
<tr>
<td><strong>ABNORMAL NOISE AND OVERLOAD</strong></td>
<td>4. Exhaust filter blocked.</td>
<td>4. Replace exhaust filter.</td>
</tr>
<tr>
<td></td>
<td>5. Air inlet filter blocked.</td>
<td>5. Clean or replace air inlet filter.</td>
</tr>
<tr>
<td></td>
<td>6. Broken or blocked exhaust valve.</td>
<td>6. Replace or clean exhaust valve.</td>
</tr>
<tr>
<td></td>
<td>7. Stuck or broken vane.</td>
<td>7. Clean rotor and vanes or replaces vanes.</td>
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<tr>
<td></td>
<td>8. A shaft seal is leaking.</td>
<td>8. Replace the shaft seal ring.</td>
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<tr>
<td></td>
<td>9. The exhaust valve is not properly seated or stuck in partially open position.</td>
<td>9. Disassemble and reassemble the exhaust valve(s).</td>
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<tr>
<td><strong>ABNORMAL NOISE AND OVERLOAD</strong></td>
<td>1. Lost phase of motor.</td>
<td>1. Inspect power supply and cord.</td>
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<tr>
<td></td>
<td>2. Vanes rotating in the wrong direction.</td>
<td>2. Adjust to correct rotation.</td>
</tr>
<tr>
<td></td>
<td>3. Infrequent oil changes (oil dark in color) or blocked exhaust filter.</td>
<td>3. Clean vacuum pump and replace oil and exhaust filter.</td>
</tr>
<tr>
<td></td>
<td>4. Foreign body inside pump.</td>
<td>4. Repair vacuum pump.</td>
</tr>
<tr>
<td></td>
<td>5. Broken vane or bearing/stuck vanes.</td>
<td>5. Only use ERAOIL-80-04 and change more frequently/change vanes. Use “Loctite 515” between the vanes and the rotor.</td>
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<tr>
<td>PROBLEM</td>
<td>POSSIBLE CAUSE</td>
<td>REMEDY</td>
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<tr>
<td>OIL DARK IN COLOR OR LOW VISCOITY</td>
<td>1. Infrequent oil changes, incorrect oil mixture.</td>
<td>1. Flush the vacuum pump. Replace the oil filter. Replace the exhaust filters. Fill in new oil.</td>
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<tr>
<td>EXCESSIVELY HIGH TEMPERATURE OF VACUUM PUMP</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>MOTOR FAILURE</td>
<td>1. Broken fuse. 2. Blocked vacuum pump or motor. 3. Broken motor.</td>
<td>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 it.</td>
</tr>
<tr>
<td>BROKEN VANE</td>
<td>1. Foreign body inside pump. 2. Incorrect rotation.</td>
<td>1. Repair vacuum pump. 2. Repair vacuum pump and correct rotation.</td>
</tr>
<tr>
<td>ABNORMAL OIL CONSUMPTION</td>
<td>1. Broken air tight ring or oil seal. 2. Exhaust filter blocked. 3. Blocked float valve or oil leaking from exhaust nozzle. 4. Oil leak.</td>
<td>1. Replace air tight ring or oil seal. 2. Reset or replace exhaust filter. 3. Clean or replace float valve. 4. Inspect and seal leak.</td>
</tr>
<tr>
<td>VACUUM PUMP FUMES AT THE EXHAUST SIDE OR EXPELS OIL DROPLETS/OIL LEVEL DROPS</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>DRIVE MOTOR IS RUNNING, BUT THE VACUUM PUMP STAND STILL</td>
<td>1. The coupling between the drive motor and the vacuum pump is defective.</td>
<td>1. Replace the coupling.</td>
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</table>
EM 63-100 Exploded view
### SPARE PARTS

**NOTE:** GLASS FIBER VANES are sold by unit.

EM28, EM140 and EM202 INTERNAL EXHAUST FILTER are sold by unit.

EM63 and EM100 INTERNAL EXHAUST FILTER are sold by two (2).

<table>
<thead>
<tr>
<th>PUMP</th>
<th>VANE (Glass Fiber) / Sold by unit</th>
<th>position exploded view</th>
<th>INTERNAL EXHAUST FILTER (O-RING included)</th>
<th>position exploded view</th>
<th>GASKET &amp; O-RING KIT</th>
<th>position exploded view</th>
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<tr>
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<td>REM28-ROT20446</td>
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