

Kurt J. Lesker[®] Company

KJLC-RV[™]



VACUUM PUMP OPERATION MANUAL

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QUALITY**DECLARATION OF CONFORMITY (MACHINERY)**

**Kurt J. Lesker Company
15-16 Burgess Road
Hastings, East Sussex TN35 4NR**

hereby declare that for the range of machinery identified as:

**KJLC-RV206 Vacuum Pumps
KJLC-RV212 Vacuum Pumps
KJLC-RV224 Vacuum Pumps**

Serial Numbers: 10140001 thru 12149999 and 01150001 thru 12159999

conforms with the requirements in accordance with the following European Directive:

Directive 2006/42/EC of May 2006 relating to Machinery

the following Type C Harmonised Standards, and normative references were complied with:

**EN1012-2:1996+A1:2009 Compressors and vacuum pumps
Safety requirements – Part 2: Vacuum pumps**

**EN 60204-1:2006/AC: 2010 Safety of machinery
Electrical equipment of machines – Part 1: General requirements**

Technical documentation is compiled in accordance with Annex VII (B) of the Directive.

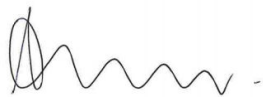
Technical File Number: MSTFPN1007-1

We undertake to transmit, in response to a reasoned request by the appropriate national authorities, relevant information on the completed machinery identified above. The method of transmission shall be electronic in the form of a PDF document or documents.

Machinery identified above is in conformance with the following additional, applicable directives:

Directive 2004/108/EC of December 2004 relating to Electromagnetic Compatibility

Signed by:



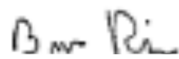
Date: **September 1, 2014**

Adam Bartlett

Managing Director

Kurt J. Lesker Company Ltd, 15-16 Burgess Road, Hastings East Sussex TN35 4NR, UK

Signed by:



Date: **September 1, 2014**

Brian Rist

Product Safety and Compliance

Kurt J. Lesker Company, 1925 Route 51, Jefferson Hills, PA 15025, USA

The technical documentation for the machinery is available from the above referenced address.

DECLARATION OF CONFORMITY (ELECTROMAGNETIC COMPATIBILITY)

**Kurt J. Lesker Company
15-16 Burgess Road
Hastings, East Sussex TN35 4NR**

hereby declare that for the machinery identified as:

**KJLC-RV206 Vacuum Pumps
KJLC-RV212 Vacuum Pumps
KJLC-RV224 Vacuum Pumps**

Serial Numbers: 10140001 thru 12149999 and 01150001 thru 12159999

conforms with the requirements in accordance with the following European Directive:

Directive 2004/108/EC of December 2004 relating to Electromagnetic Compatibility

Technical documentation is compiled in accordance with Article 7 & Annex II of the Directive. The Technical File provides evidence of the conformity of the apparatus with the essential requirements of the Directive

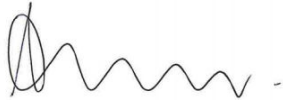
Technical File Number: EMCTFPN1007-1

We undertake to transmit, in response to a reasoned request by the appropriate national authorities, relevant information on the completed equipment identified above. The method of transmission shall be electronic in the form of a PDF document or documents.

Equipment identified above is in conformance with the following additional directives:

Directive 2006/42/EC of May 2006 relating to Machinery

Signed by:



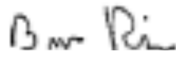
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Date: **September 1, 2014**

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Product Safety and Compliance

Kurt J. Lesker Company, 1925 Route 51, Jefferson Hills, PA 15025, USA

The technical documentation for the machinery is available from the above referenced address.

WARRANTY

EQUIPMENT WARRANTY AND REMEDY: COMPANY warrants that the Equipment fabricated and furnished by COMPANY hereunder shall be free from material defects in workmanship and materials. If any of the Equipment fabricated and furnished by COMPANY materially fails to conform to the warranty set forth in the preceding sentence, CUSTOMER's remedy shall be limited, at COMPANY's option, to either (i) repair or replacement of the non-conforming Equipment, F.O.B. point of repair or replacement, with shipping charges prepaid by CUSTOMER; or (ii) repayment of the portion of the contract price paid by CUSTOMER attributable to such non-conforming Equipment. Dismantling and reinstalling work is excluded from this Equipment Warranty and Remedy.

SERVICES WARRANTY AND REMEDY: COMPANY warrants that any services furnished under COMPANY's proposal or quotation will conform to standards of practice generally accepted in the profession and/or industry for services of a similar nature. If the services provided by COMPANY materially fail to conform to the warranty set forth in the preceding sentence, CUSTOMER's remedy shall be limited to revision, replacement or reperformance, at COMPANY's expense, of those services which COMPANY reasonably determines fails to so conform.

WARRANTY PERIOD: The warranties set forth in section above shall be effective for a period of twelve (12) months from the date of shipment of the Equipment from COMPANY's plant. The warranty set forth in section 2 above shall be effective for a period ending twelve (12) months from the date of performance of the services.

WARRANTY CONDITIONS AND LIMITATIONS: CUSTOMER's right to enforce the foregoing warranties is expressly conditioned upon CUSTOMER notifying COMPANY in writing during the Warranty Period of any alleged non-conformity or defect, stating specifically the nature of the alleged non-conformity or defect. COMPANY shall have the right, upon such notification, to review, inspect and/or examine the Equipment indicated by CUSTOMER, and CUSTOMER shall make the Equipment available to COMPANY for such purposes.

The foregoing warranties shall not apply if COMPANY's review, inspection or examination discloses that the Equipment (i) has not been installed, maintained or operated in accordance with COMPANY's instructions; (ii) has been used by CUSTOMER in a manner or for applications not recommended by COMPANY; (iii) has been repaired, altered or modified by CUSTOMER; (iv) has been subjected to other than normal use, storage, handling, installation, operation or maintenance; or (v) has been damaged by fire, act of God, any cause covered by CUSTOMER's insurance or any other event or occurrence not caused by COMPANY.

The foregoing warranties shall not apply to Equipment, or parts or components thereof, which are not manufactured or processed by COMPANY, or which are purchased by COMPANY from another party or parted. The manufacturer's warranty for such Equipment, parts or components, if any, shall be assigned to CUSTOMER without recourse to COMPANY.

The foregoing warranties shall not apply to designs, materials or specifications furnished or specified by CUSTOMER and incorporated into the Equipment.

THE EXPRESS WARRANTIES AND REMEDIES SET FORTH IN THIS SECTION ARE EXCLUSIVE AND ARE CONDITIONED UPON TIMELY NOTIFICATION BY CUSTOMER. THEY ARE GIVEN BY COMPANY AND ACCEPTED BY CUSTOMER IN LIEU OF ANY AND ALL OTHER REMEDIES, WARRANTIES, AND GUARANTEES, EXPLICIT OR IMPLIED, AND IN LIEU OF ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH ARE HEREBY SPECIFICALLY EXCLUDED AND DISCLAIMED.

COMPANY neither assumes, nor authorizes any representative or other person to assume for it, any obligation or liability other than such as is expressly set forth in this section. Any change, modification, extension or addition to the foregoing warranties, remedies or limitations shall not be binding upon COMPANY unless in writing and duly executed by an authorized officer of COMPANY.

DOCUMENT CONTROL

Version	Date Released	Change Notice	Remarks
1.0	8-7-2014	N/A	Draft first release
1.1	10-2-2014	Content and format	Final draft for review
2.0	10-20-2014	Final copy	Final copy for customer use

This manual contains drawings and technical instructions that are proprietary by the Kurt J. Lesker Company. These items are not to be reproduced, published or distributed to a third party without written consent from the Kurt J. Lesker Company.

The Kurt J. Lesker Company assumes no liability for damages to customer facilities or personnel resulting from misuse or misapplication of the unit.

All information, illustrations, and specifications in this manual are based on the latest product information available at the time of printing.

KJLC reserves the right to make changes at any time without notice.

Any duplication of this manual, in whole or in part, without express written approval from Kurt J. Lesker Company is strictly prohibited.

KJLC assumes no responsibility for equipment additions or modifications without KJLC's written consent. Component repair or replacement done by the user during the warranty period without direction or approval from KJLC Global Service can void the equipment manufacturer's warranty.

Original instructions are written in English.

INTRODUCTION

SAFETY

Please read all safety notes provided by KJLC with caution. The pump must only be operated and maintained by trained staff as described in this operation manual. Should you have any issues relating to safety, operation, or maintenance of the pump, please contact Kurt J. Lesker Company.

SAFETY SYMBOLS

The following safety notations will be used throughout this manual:



WARNING

Warnings are used when failure to observe the instruction could result in injury or death.

CAUTION

Cautions are used when failure to observe the instruction could result in damage to the equipment, associated equipment, and process.

NOTE: Notes are given to highlight any technical requirements, operations, procedures, or conditions that should be emphasized.

The following are American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) safety symbols that may be used within this manual or located on the pump:

 GENERAL WARNING	 EXPLOSIVE	 HOT SURFACE
 PINCH POINT	 ELECTRIC HAZARD	 LIFTING HAZARD
 FACE/ BREATHING HAZARD	 GLOVES REQUIRED	 TWO PERSON LIFT
 READ OPERATOR'S MANUAL		

DESCRIPTION

The KJLC-RV pumps are two stage oil sealed rotary vane pumps. The pumps are driven by a motor that is directly coupled through a flexible coupling to the pump shaft. The motor is cooled by a fan which guides air along the motor fins. The pumps are cooled by an additional fan attached to the motor coupling. The pump has KF25 inlet and outlet ports and a gas ballast valve for pumping of condensable gases. When the pump is turned off, an anti-suckback valve seals the inlet of the pump and prevents the back flow of air and oil into the vacuum system. The oil gauge and nameplate are positioned on the front of the oil casing. The oil gauge is used for monitoring the oil level and condition. Two oil intake plugs and an oil drain plug are located on the oil casing. The pump is mounted on a base plate to which four rubber feet can be installed as vibration isolators or it can be anchored to desired location.



FIGURE 1: KJLC-RV PUMP SERIES (KJLC-RV 206, 212, 224, AND 236)

OPERATING PRINCIPLE

Rotary vane pumps use an eccentrically mounted rotor inside the pump housing. Two vanes sliding in the rotor are forced against the housing by centrifugal force. As a vane passes in front of the inlet, an increasing volume is formed in which the gas from the chamber enters. When the second vane passes the inlet, this volume is then closed. The gas trapped in this volume between the two vanes is swept towards the exhaust as the rotor rotates. Gas is then compressed until expelled through the exhaust valve. Any liquid oil that may be in the gas is trapped by an internal oil filter. The gas exits the pump through the outlet port.

GAS BALLAST

The gas ballast is provided to help prevent the condensation of vapors in the pump. It is used to change the amount of air introduced into the low vacuum stage of the pump. The gas ballast valve has two positions to choose from:

1. Closed gas ballast (Position 'C'). Position used for:
 - Reaching best possible pressure
 - Pumping non-condensable gases
2. Open gas ballast (Position 'II'). Position used for:
 - Pumping of condensable vapors
 - Decontaminating the pump oil

When using an open gas ballast, the pump will operate with increased noise level, increased temperature level, and oil loss at outlet of the pump. For this position, we recommend the use of an exhaust oil mist eliminator (see Table 4 for recommended mist eliminator).



FIGURE 2: GAS BALLAST

PUMPING APPLICATIONS

KJLC-RV pumps are general vacuum pumps intended for use in many vacuum applications. Common applications are chamber roughing, turbo pump and diffusion pump backing, and cryo pump regeneration.

KJLC-RV pumps are NOT suited for:

- Dust removal
- Pumping liquids
- Gases which are corrosive or reactive
- Gases with oxygen concentration greater than what is in atmosphere (>21%)
- Explosive gases
- Hazardous gases
- Pyrophoric gases



WARNING

The KJLC-RV pumps are **NOT** ATEX compliant and not intended for use in positive pressure applications. Maximum inlet pressure is 1 ATM (760 Torr/1013 mbar). Never use the pump for unapproved applications.

GETTING STARTED

TRANSPORTATION

When you receive the pump, unpack it carefully. For best access to a boxed pump, remove the upper foam insert and cut the box around the pump to gain access to the lifting points. Lifting points are under the motor and under the pump oil casing.



WARNING

Improper handling of the pump could result in injury and/or equipment damage.

INSPECTION

Upon receipt of the pump, ensure:

1. The product is consistent with what you ordered.
2. No damage occurred during transport.

If product does not pass inspection, please contact KJLC.

SUPPLIED EQUIPMENT

The following equipment is supplied with the KJLC-RV pumps:

- Pump with motor
- 2 x quarts of KJLSS19 pump oil
- 1 x KF25 centering ring with mesh trap (Inlet)
- 1 x KF25 centering ring (Outlet)
- 2 x KF25 clamping rings
- 2 x KF25 blanking flanges



WARNING

The KF25 blanking flanges are supplied for shipment only. These flanges must be removed prior to operation.

INSTALLATION

Proper installation requires selection of a suitable location, filling the pump with oil, and making appropriate vacuum and electrical connections.

LOCATION

Select an appropriate location for the KJLC-RV pump.

1. Pumps should be installed on a level, flat, horizontal surface (maximum tilt angle is 10 degrees from horizontal). The pump is intended for indoor use only.
2. When installing the pump consider convenience for connection, operation, and wiring.
3. The chosen location should allow for sufficient air circulation to cool the pump. Keep front and rear of pump unobstructed.
4. Location should also consider the need to protect any electrical circuits from dripping water resulting from condensation on cold surfaces (examples of hazards could be water cooled devices, cryo pumps during regeneration, etc.).
5. Locate the pump so that the oil gauge is visible.
6. Locate the pump so the oil intake and drain plugs are easily accessible.
7. Use the rubber feet supplied with pump as vibration absorbers or use anchor holes on base plate for anchoring to selected location.
8. The pump operating ambient temperature is 50°F (10°C) to 104°F (40°C).

OIL

KJLSS19 oil is the recommended fluid for use with KJLC-RV pumps. Use of any other fluid in the pump may impact performance and void warranty.

CAUTION

The KJLC-RV pumps do not contain oil during shipping. KJLSS19 oil is supplied in separate bottles within the pump box. The pump must be filled with oil before usage.

OIL FILL PROCEDURE

1. Remove one of the oil intake plugs (see Figure 3 for location).
2. Pour oil into the pump until the oil level just reaches the MAX mark on the oil gauge sight glass (Figure 4). If the oil level goes above the MAX mark, remove the drain plug and drain the excess oil from the pump. Table 1 contains maximum oil capacity values for each pump model.
3. Replace the oil intake plug. Tighten the plug firmly, but do not over tighten.
4. After starting the pump for operation, recheck oil level in oil gauge sight glass to ensure adequate oil level.

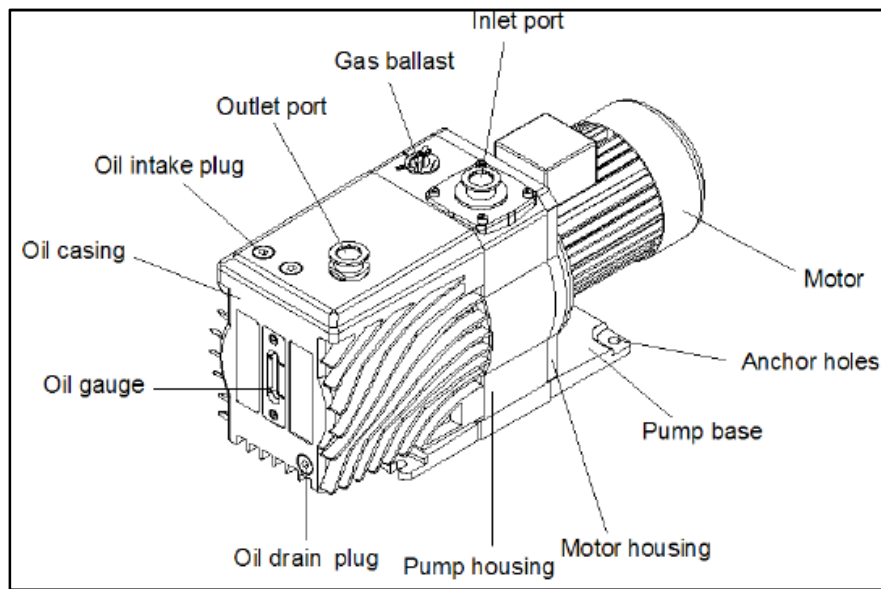


FIGURE 3: KJLC-RV PUMP

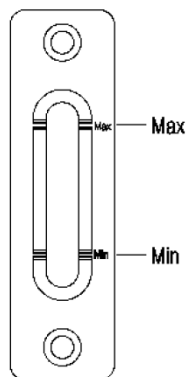


FIGURE 4: OIL GAUGE

PUMP MODEL	OIL CAPACITY (L / QT)
KJLC-RV206	1.3 / 1.4
KJLC-RV212	1.1 / 1.2
KJLC-RV224	1.4 / 1.5
KJLC-RV236	1.8 / 1.9

TABLE 1: MAXIMUM OIL CAPACITY

VACUUM SYSTEM CONNECTION

Prior to operation, the pump must have appropriate vacuum system connections.

**WARNING**

Remove the blanking flanges prior to vacuum system connection.

1. Connect the inlet and outlet lines with a centering ring and a clamping ring each. Use the centering ring with mesh trap for the inlet port.
2. Check cleanliness of pump flanges and hardware being used as it may impact the performance of the pump.
3. The inlet and outlet lines should be the same size as the connection ports on the pump.
4. If inlet line diameter is smaller than pump inlet, pumping speed will decrease.
5. If outlet line diameter is smaller than pump outlet, oil case may become over-pressurized which may result in shaft seal damage or external oil leaks.
6. Installed exhaust line should be arranged to prevent condensate from going back into the pump and contaminating the oil.
7. Ensure the exhaust port is not blocked or restricted in any way. If a mist eliminator or other exhaust control device is installed, it must not allow pressure buildup. See Table 4 for KJLC recommended mist eliminator.
8. Perform leak check on connecting hardware joints and flanges.

**WARNING**

Ensure exhaust connections comply with safe handling of oil mist and potentially hazardous gases.

ELECTRICAL INSTALLATION

Before electrical connections are made, ensure that the wired voltage of the motor corresponds with your electrical supply voltage. If it does not, contact KJLC for support. Applying the incorrect voltage to your KJLC-RV pump may damage the motor and void the warranty. Ensure proper grounding of the electrical circuit is provided.



WARNING

Ensure electrical installation of pump conforms to local and national safety requirements. Pump must be connected to a suitably fused and protected electrical supply. The electrical circuit must be suitably grounded.

OVERCURRENT PROTECTION

1. The user of the KJLC-RV vacuum pump is responsible for overcurrent protection of the circuit to which the pump will be connected.
2. Maximum fuse rating for each pump is located in Table 6.

MOTOR CONNECTION (SINGLE PHASE): KJLC-RV206/212

KJLC-RV206/212 vacuum pump motors are fitted with an IEC connector for ease of electrical connection. See Figure 5 for IEC connector location. Standard mains cables with suitable connectors for local standard electrical outlets are available, but not included with the pump. Ordering information for the mains cables can be found in Table 4.

After obtaining the appropriate standard mains cable, insert the connector end into the IEC connector. Make sure the on/off switch is in the off (O) position and then carefully plug into a standard electrical outlet.



FIGURE 5: IEC CONNECTOR AND ON/OFF SWITCH

MOTOR CONNECTION (SINGLE PHASE): KJLC-RV224/236

KJLC-RV224/236 vacuum pumps with single phase motors are hardwired with a mains power cord and plug end. See ordering table for available configurations.

OPERATION

PRIOR TO OPERATION

Inspect the following items:

1. Check both inlet and outlet ports to ensure they are not blocked or restricted.
2. Check oil level through oil gauge.
3. Check rotation direction of motor.



WARNING

- Before operating the KJLC-RV, make sure that the media which are to be pumped are compatible with each other so as to avoid hazardous situations.
- All relevant safety standards and regulations must be observed.
- In case of an emergency, immediately unplug the pump.

CAUTION

Always operate the KJLC-RV pump with a suitable exhaust line which is properly connected. It must slope down and away from the pump.

INITIAL WARMUP AND BEST PRESSURE PUMPING

1. Isolate the pump from your vacuum system.
2. Close the gas ballast (position "C").
3. Turn the power switch to the ON position (see Figure 5).
4. To achieve the KJLC-RV pump best pressure, pump for approximately 30 minutes to bring the pump up to normal operating temperature.

NOTE: If the pump is not achieving best pressure, refer to troubleshooting guide for possible causes and solutions.



WARNING

- Avoid exposing any part of the body to the vacuum.
- The surface temperature of the KJLC-RV pumps may rise to 104°F (40°C) during operation.
- If exhaust gases must be collected or contained, do not allow the exhaust line to become pressurized.

NON-CONDENSABLE GAS PUMPING

When the pump is used for pumping permanent (non-condensable) gases:

1. Close the gas ballast (position “C”).
2. Pump as desired.

CAUTION

It is advisable to run the pump with the gas ballast open (in the “II” position) when you do not know if the gas is condensable.

CONDENSABLE GAS PUMPING

When pumping condensable gases:

1. Run the pump for 30 minutes to warm up the pump and oil (see Caution below).
2. Open the gas ballast (position “II”).
3. Pump to the water vapor tolerance specified by the technical data (Table 5).
4. Prior to stopping the pump, operate with inlet port blanked off and gas ballast open for 30 minutes or until condensate is separated from oil.

CAUTION

It is crucial to operate with a hot pump. If pump operates at lower temperatures, condensate will dissolve in pump oil. This will decrease performance, require more frequent oil changes, and may cause internal corrosion.

MAINTENANCE



WARNING

- Avoid exposing any part of the body to the vacuum.
- Maintenance should be performed by trained staff only. Obey your local and national safety requirements.
- Staff must be familiar with the safety procedures which relate to the pump oil and the components handled by the KJLC-RV pumps.
- Before beginning any maintenance or service work, disconnect the pump from all power supplies.
- Allow the pump to cool to a safe temperature before starting maintenance work.

PREVENTATIVE MAINTENANCE

A preventative maintenance schedule is presented in the following table. The procedures for each task are provided below.

TASK	FREQUENCY
CHECK OIL CAPACITY	Daily
CHECK OIL QUALITY	Daily
OIL CHANGE	1. After the first 100 hours of operation 2. When the oil becomes contaminated 3. Yearly or as needed
OIL DECONTAMINATION	As needed
INSPECT INLET FILTER SCREEN	Daily
CLEAN INLET FILTER SCREEN	Every six months or as needed

TABLE 2: MAINTENANCE SCHEDULE

CHECK OIL CAPACITY PROCEDURE

1. Check that the oil level in the oil gauge is between the MAX and MIN level marks while running.
2. If the oil level is near to or below the MIN level mark, remove one of the intake plugs and pour more oil into the reservoir until the oil reaches the MAX level mark. **DO NOT OVERFILL THE PUMP.**

CAUTION

Do not attempt to add oil during high inlet pressure conditions as oil spillage will occur. Always unplug the pump before adding oil.

CHECK OIL QUALITY PROCEDURE

1. Visually inspect the oil. Normal pump oil should be clean and transparent.
2. Drain and refill the pump with clean oil when the oil:
 - Appears cloudy
 - Appears darker in color
 - Has a burnt smell

OIL CHANGE PROCEDURE

KJLC recommends only the use of KJLSS19 oil in the KJLC-RV pumps. Use of alternative fluids may negatively impact performance and void factory warranties.



WARNING

- Hazardous substances may escape from the pump oil. Take adequate safety precautions. Wear appropriate protective gear.
- Note the symbols on the pump pointing to the hazards. In the case of a hot pump, wear the required protective clothing.
- Avoid exposing any part of the body to the vacuum.
- The noise level of the KJLC-RV pump is less than 68 dBA. Use suitable hearing protection as required.

1. When changing oil, make sure pump is still warm. This lowers the viscosity of the oil and allows it to drain from pump easily.
2. Disconnect power supply to pump.
3. Remove one of the oil intake plugs.
4. Remove the oil drain plug and let oil flow into appropriate container.
5. If drained oil from the pump is contaminated, pour clean oil (KJLSS19) into the oil fill hole and allow it to drain out of the pump. Repeat this step until the oil reservoir in the pump has been thoroughly cleaned.
6. Reinstall oil drain plug.
7. Pour clean oil (KJLSS19) into the oil fill hole until the oil level reaches the MAX level on the oil gauge.
8. Reinstall the oil intake plug.
9. Disposal of waste oil should comply with all local and national safety and environmental requirements.

NOTE: The pump will require more frequent oil changes when operating at high inlet pressures, temperatures, and/or when pumping contaminated gases.

CAUTION

Only change the oil after the pump has been switched off and while the pump is still warm. If the oil becomes contaminated too quickly, installation of new intake filter is recommended.

OIL DECONTAMINATION PROCEDURE

The oil should be clear, but it can become cloudy or discolored. When this occurs, it is most likely contaminated with process vapors. To decontaminate the oil:

1. Isolate the pump from vacuum system.
2. Set the gas ballast valve to open (position "I").
3. Run the pump for 60 minutes until oil becomes clear again. If oil does not become clear from this procedure, then oil change is needed.

INSPECT INLET FILTER SCREEN PROCEDURE

1. Visually inspect the inlet filter screen. The inlet filter screen is designed to prevent particles from entering the pump. Normal inlet filter screen should be clean with no debris present.

CLEAN INLET FILTER SCREEN PROCEDURE

1. Remove the inlet filter screen from pump intake port.
2. If screen is damaged, replace with a new screen.
3. If screen is not damaged, clean screen with suitable cleaning agent.
4. Rinse in a suitable vessel with suitable solvent.
5. Dry with compressed air.
6. Reinstall the inlet filter screen.

NOTE: Inlet filter screen should be kept clean to prevent a decrease in pumping speed.

CAUTION

The cleaning interval depends on the application. If the pump is exposed to large amounts of abrasive materials, a dust filter should be fitted into the intake line. Contact KJLC Global Service for further assistance.

TROUBLESHOOTING

FAILURE	CAUSE	SOLUTION
Pump does not start	<ol style="list-style-type: none"> 1. High viscosity of oil 2. Problem with motor voltage 3. Error in wiring 4. Motor problem 5. Blown fuse/breaker 	<ol style="list-style-type: none"> 1. Keep ambient temperature >10°C or change oil 2. Change motor 3. Inspect and repair wiring 4. Replace motor, contact KJLC 5. Replace fuse/reset breaker
Pump fails to reach best pressure	<ol style="list-style-type: none"> 1. Gas ballast valve is open 2. External leak in the vacuum system 3. Issues with anti-suckback valve 4. Wrong oil being used 5. Oil contaminated or inadequate amount of oil 6. Oil-way blockage 7. Damage to one of seals 8. Improper installation of vanes 9. Damage to exhaust valve plate 10. Damage to vacuum gauge 	<ol style="list-style-type: none"> 1. Close gas ballast valve 2. Isolate and remove leak from the vacuum system 3. Repair anti-suckback valve 4. Drain and replace with KJLSS19 oil 5. Change or fill oil 6. Disassemble the pump for repair 7. Replace seals 8. Reinstallation of vanes 9. Replace exhaust valve plate 10. Repair or replace vacuum gauge
Decreased pumping speed	<ol style="list-style-type: none"> 1. Inlet line has too small diameter or too long 2. Oil contamination 3. Damage to anti-suckback valve 4. Inlet filter screen is blocked 5. Wrong oil being used 6. External leak in the vacuum system 	<ol style="list-style-type: none"> 1. Use adequate diameter and length intake line 2. Replace pump oil 3. Repair or replace the anti-suckback valve 4. Clean inlet filter screen 5. Drain and replace with KJLSS19 oil 6. Isolate and remove leak from the vacuum system
Oil darkens and is turbid	<ol style="list-style-type: none"> 1. Contamination / Condensation 2. Wrong oil being used 3. Inadequate amount of oil in operation of pump 4. External leak in the vacuum system 	<ol style="list-style-type: none"> 1. Drain and replace with clean KJLSS19 oil 2. Drain and replace with KJLSS19 oil 3. Provide adequate oil 4. Isolate and remove leak from the vacuum system
The vacuum system immediately rises to atmospheric pressure after pump stops	<ol style="list-style-type: none"> 1. External leak in the vacuum system 2. Damage to anti-suckback valve 	<ol style="list-style-type: none"> 1. Isolate and remove leak from the vacuum system 2. Repair or replace the anti-suckback valve
Pump runs abnormally loud	<ol style="list-style-type: none"> 1. Damage to the rubber coupling element 2. Oil level too low 3. Damage to vanes 4. Problem with motor 	<ol style="list-style-type: none"> 1. Replace rubber coupling element 2. Add KJLSS19 oil 3. Replace damaged vanes 4. Repair the motor
High consumption of oil	<ol style="list-style-type: none"> 1. Damage to drain plug o-ring 2. Improper installation of or damage to oil seal 3. Oil seal sleeve damaged or corroded 4. Air leak at pumps inlet and outlet 5. Oil leak from gasket between oil casing and pump housing 	<ol style="list-style-type: none"> 1. Replace the o-ring 2. Replace oil seal, while giving attention to direction of oil seal 3. Replace oil seal sleeve 4. Replace o-rings 5. Replace oil casing gasket
Vacuum system or intake line contaminated by oil	<ol style="list-style-type: none"> 1. Anti-suckback valve is blocked 2. Oil level is too high 	<ol style="list-style-type: none"> 1. Repair or clean the anti-suckback valve 2. Drain excess oil from the pump

FAILURE	CAUSE	SOLUTION
Pump is running hotter than normal	<ol style="list-style-type: none"> 1. Oil level too low 2. The air inlet duct improperly attached to the air outlet 3. Blockage of oil supply lines 4. Problem with oil pump 5. Ambient temperature above 40°C 6. Process gas is too hot 7. Oil is contaminated 8. Exhaust line is obstructed, creating backpressure 9. Operating continuously at a high pressure 	<ol style="list-style-type: none"> 1. Add oil 2. Connect the air inlet duct to the air inlet correctly 3. Disassemble pump, clean or repair, and replace with clean oil 4. Inspect, repair or change oil pump 5. Decrease ambient temperature 6. Change process procedure 7. Drain and replace with clean KJLSS19 oil 8. Check exhaust line 9. Check for leaks in the vacuum system
Smoke generated from outlet port of pump	<ol style="list-style-type: none"> 1. Too much oil in pump 2. Gas ballast valve is open 3. External leak in in vacuum system 4. Damage to exhaust valve plate 	<ol style="list-style-type: none"> 1. Reduce amount of oil in pump 2. Close gas ballast valve 3. Isolate and remove leak from the vacuum system 4. Replace damaged valve plate

SERVICE AND SPARE PARTS

SERVICE

When sending a pump in for repair, contact the Kurt J. Lesker Company at www.lesker.com or pumprepair@lesker.com for a quotation on a standard repair price. A Return Authorization Request form must be completed and returned prior to shipping in the pump for repair. This form can be found on our website at the following location:

http://www.lesker.com/newweb/documents/downloadableforms/downloadable_forms_main.cfm

The pump must be packed in a way that it will not be damaged during shipping and prevent contaminants from being released from the package. If you require assistance in shipping your pump to KJLC, contact us at pumprepair@lesker.com.

SPARE PARTS

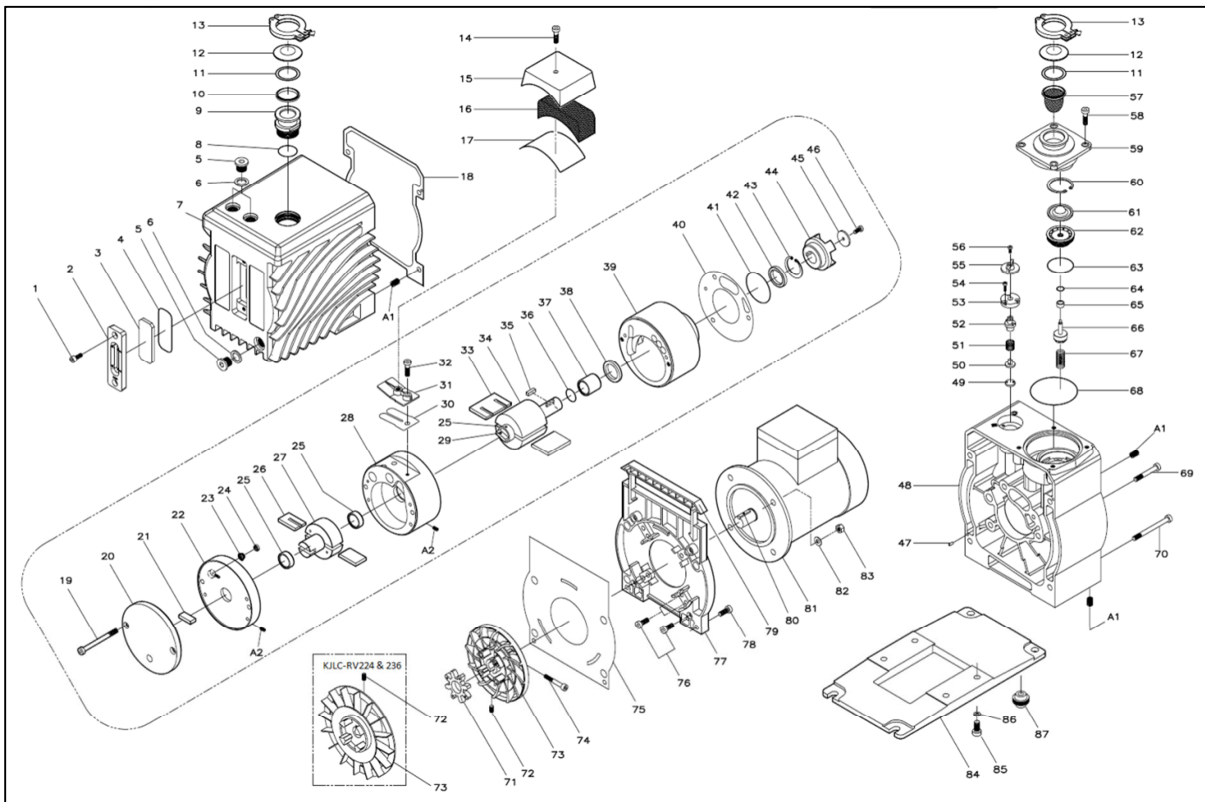


FIGURE 6: DIAGRAM OF PUMP PARTS

NOTE: All pump parts are labeled in this diagram for reference. The chart below details only the items included in the standard repair kit. For additional information, contact KJLC Global Service.

STANDARD REPAIR KITS

Standard repair kits are available for each model of the KJLC-RV pump. The repair kit contents are provided in the table below.

ITEM NUMBER	DIAGRAM NUMBER	DESCRIPTION	QUANTITY
1	6	O-Ring(Intake)	3
2	18	Gasket (For Casing)	1
3	25	Rotor Sleeve	3
4	26	2nd Vane	2
5	33	1st Vane	2
6	37	Oil Seal Sleeve	1
7	38	Oil Seal	1
8	40	Gasket (For Cylinder)	1
9	41	O-Ring	1
10	63	O-Ring	1
11	68	O-Ring(Intake Port)	1

TABLE 3: KJLC-RV STANDARD REPAIR KIT

ACCESSORIES

Recommended accessories and applications:

- Mains Cables – used for electrical connections of pump motors.
- Foreline Dust Filters – recommended for applications with high particulate generation to protect the pump against the dust particles.
- Foreline Traps – recommended to capture condensable vapors before entering the pump. Also aids with minimizing oil backstreaming from the pump to the vacuum system.
- Oil Mist Eliminators – minimizes the amount of atomized oil that exits the pump exhaust before entering the working environment.
- Repair Kits – standard repair kits for maintaining common wear components of the pump.

ACCESSORY	PART NUMBER
Mains Cable 110/115V US plug	KJLC-RVMCUS
Mains Cable 220V - UK plug	KJLC-RVMCUK
Mains Cable 220V EU plug	KJLC-RVMCEU
Foreline Dust Filter	PFI843KF25B
Foreline Trap	TSR4MR100QF (110V) TSR4MR100QF2 (220V)
Oil Mist Eliminator	PFEPG925QF25
Oil	KJLSS19Q1
KJLC-RV 206 Repair Kit	KJLC-RV206-RK
KJLC-RV 212 Repair Kit	KJLC-RV212-RK
KJLC-RV 224 Repair Kit	KJLC-RV224-RK
KJLC-RV 236 Repair Kit	KJLC-RV236-RK

TABLE 4: RECOMMENDED ACCESSORIES

CAUTION

Contact KJLC for installation instructions. Before contacting KJLC, have the series designation and serial number of the pump available. This information is located on the nameplate of the pump.

DATA

TECHNICAL DATA

FEATURES	UNITS	KJLC-RV206	KJLC-RV212	KJLC-RV224	KJLC-RV236
PUMPING SPEED (50hz)	m ³ /hr	5.4	10.8	21.6	32.4
PUMPING SPEED (60hz)	ft ³ /min	3.8	7.6	15.3	22.9
ULTIMATE PARTIAL PRESSURE (without gas ballast)	mbar	4 x 10 ⁻⁴	4 x 10 ⁻⁴	4 x 10 ⁻⁴	4 x 10 ⁻⁴
	torr	3 x 10 ⁻⁴	3 x 10 ⁻⁴	3 x 10 ⁻⁴	3 x 10 ⁻⁴
ULTIMATE PARTIAL PRESSURE (with gas ballast)	mbar	1.3 x 10 ⁻²	1.3 x 10 ⁻²	1.3 x 10 ⁻²	1.3 x 10 ⁻²
	torr	9.75 x 10 ⁻³	9.75 x 10 ⁻³	9.75 x 10 ⁻³	9.75 x 10 ⁻³
WATER VAPOR TOLERANCE	mbar	50	50	33	33
	torr	37.5	37.5	24.75	37.5
WATER VAPOR CAPACITY	kg/h	0.15	0.28	0.30	0.35
OIL CAPACITY	liters	1.3	1.1	1.4	1.8
	qt	1.4	1.2	1.5	1.9
INLET/EXHAUST PORTS	DN	KF25	KF25	KF25	KF25
MOTOR POWER (single phase)	kW	0.55	0.55	0.75	1.1
	hp	0.74	0.74	1	1.48
ROTATIONAL SPEED	rmp 50hz	1420	1420	1420	1420
	rpm 60hz	1710	1710	1710	1710
NOISE LEVEL	dBA	<68	<68	<68	<68
WEIGHT	kg	27	29	37	39
	lbs	60	64	81	86

TABLE 5: TECHNICAL DATA

NOTE: We can only guarantee that the pump will meet its specifications when using the type of lubricant which has been specified by KJLC.

ELECTRICAL DATA

PUMP	NOMINAL SUPPLY (V)	FREQUENCY (Hz)	POWER (kW)	FULL LOAD CURRENT (A)	MAXIMUM FUSE RATING (A)
KJLC-RV206	115	50/60	.55	7.2/6.8	16
	230	50/60	.55	3.6/3.2	5
KJLC-RV212	115	50/60	.55	7.2/6.8	16
	230	50/60	.55	3.6/3.2	5
KJLC-RV224	115	60	1.1	12.5	25
	230	50/60	.75	5.2/5.0	10
KJLC-RV236	230	50/60	1.1	6.9/6.6	10

TABLE 6: ELECTRICAL DATA

PUMP DIMENSIONS

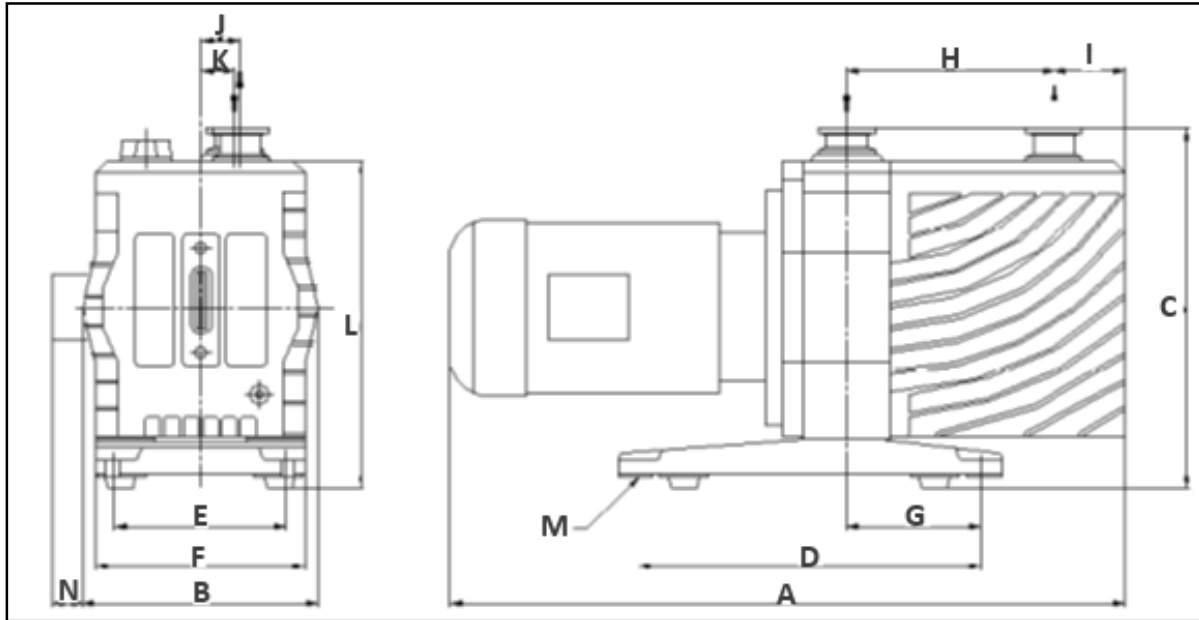


FIGURE 7: PUMP DIMENSIONS

PUMP	A	B	C	D	E	F	G	H	I	J	K	L	M	N
KJLC-RV206	470	165	252	240	120	146	94	120	50	24	28	229	∅9	53
KJLC-RV212	495	165	252	240	120	146	94	145	50	24	28	229	∅9	53
KJLC-RV224	535	205	288	310	140	180	147	156	75	40	34	262	∅12	48
KJLC-RV236	565	205	288	310	140	180	147	186	75	40	34	262	∅12	48

TABLE 7: EXTERIOR DIMENSIONS

SHUTDOWN/STORAGE/DISPOSAL

SHUTDOWN

Always shut down the pump when not in use.

NORMAL CONDITIONS

Under normal conditions the KJLC-RV pump can be turned off immediately by cutting power with no further actions required.

PUMPING CONDENSABLE VAPORS

When pumping condensable vapors let the pump continue to operate with the gas ballast valve open and the intake line closed for 30 minutes before switching off.

STORAGE

Pump should be stored in a climate controlled area with ambient temperatures between 50°F (10°C) to 104°F (40°C).

STORAGE PROCEDURE

If the KJLC-RV pump is going to be stored for a period of more than two months:

1. Fill the pump with clean oil.
2. Blank off the inlet flange.
3. Run the pump at best pressure for approximately 45 minutes to lubricate internal components.
4. Stop the pump.
5. Seal the inlet and exhaust ports of the pump.
6. Repeat this procedure every 6 months.

CAUTION

Deterioration of internal sealing components of the pump may occur if storing the pump for an extended period of time without following this procedure.

DISPOSAL

Disposal of the vacuum pump and/or any of the components of the pump must be in accordance with all local and national safety and environmental requirements.

COMPANY INFORMATION

QUALITY POLICY

Kurt J. Lesker Company® provides a quality vacuum product delivered on time and produced by a qualified team committed to becoming our customer's primary vacuum supplier choice.

We at Kurt J. Lesker Company (KJLC) strive to continually improve customer satisfaction by delivering a quality product, on time, without error, while providing superior service.

Kurt J. Lesker Company is ISO 9001 certified.

ABOUT US

As a leading global provider of high quality vacuum products and systems, along with an established tradition of service and attention to detail, the Kurt J. Lesker Company has built a reputation for "Enabling Technology for a Better World".

The common attribute across the entire company is the relentless and tireless pursuit of quality and customer satisfaction, both in the vacuum products and the services we provide worldwide. KJLC takes this responsibility seriously, working at all levels to ensure high quality performance in all our products.

Drawing from our comprehensive list of products and services, KJLC has long believed and behaved in ways that set industry standards and demonstrate responsibility and responsiveness to its customers. Every phone call is answered by an actual person. Every product issue gets immediate and complete attention until it is resolved. Experienced employees continually make themselves available to those seeking information and guidance. KJLC sees every customer interaction as an opportunity to deepen valued relationships.

Founded in 1954, KJLC has grown from a regional manufacturer and distributor of vacuum components into today's worldwide marketplace, offering a full range of vacuum parts, products, systems, design technologies, innovative thinking, and responsive customer service. Working with an attentive eye toward quality, environmental stewardship of resources, and customer satisfaction, KJLC serves the research and development market at both the academic and commercial levels, as well as providing vacuum products and services to industry on a global scale. Following our successful expansions into Europe and Asia, KJLC continues to reach out for a greater global presence with the newest location in Hong Kong.

FOUR FOCUSED DIVISIONS

As a manufacturer and distributor of all things vacuum, being focused is crucial. KJLC has developed the following divisions to better focus on the unique challenges each application provides.

MANUFACTURING™ DIVISION

Quality, backed by years of experience - that's what sets our manufacturing division apart. Providing not only standard and custom vacuum chambers to the industry for over three decades, but also ensuring the quality that comes with the KJLC brand is infused throughout the organization. World class manufacturing equals top quality products for all our business segments.

VACUUM MART™ DIVISION

Customers have access to the full range of approximately 14,000 basic vacuum components, such as flanges, fittings, pumps, fluids, valves, feedthroughs, and traps. Some would refer to these as the building blocks for every application in the marketplace; to that end we have the largest inventory of in-stock, ready to ship products in the industry. Dependable delivery and superior customer service keep the Vacuum Mart division the go-to source for customers all around the world.

PROCESS EQUIPMENT™ DIVISION

We provide customers with advanced single chamber and cluster chamber, computer controlled, and thin film deposition systems designed and built to meet the high demands of a growing and increasingly adventurous research and production client base. Utilizing our clean room assembly and test facilities in the U.S. and the U.K., KJLC is ready to help meet all your capital equipment needs.

MATERIALS™ DIVISION

Customers can select from an extensive list of pure elements, compounds, alloys, advanced metal oxide ceramic materials, and mixtures for thin film deposition, each stocked for rapid delivery. In addition to our expansive materials offering and technical expertise, this division also provides a vast array of crucibles, boats, filaments and wires available in all shapes and sizes, so you get the exact fit for your process. In-house bonding facilities and precious metal reclaim services highlight one of the most complete and quality driven material lines in the industry.