



RA Series 1

Automatic Dry Priming Pumps

(Compressor Venturi Priming System)

Operation & Maintenance Manual

Rev 1.0 (May 2025)



Remko Pumps - Australia's go-to pump solutions provider.

Corporate Office: 4 McHarry Place, Shepparton VIC 3630

Remko

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INSPECTION

All equipment is inspected at the factory prior to shipment. However, you should inspect all equipment upon arrival for shipping damage and item shortages from the packing slip. Report any damage or shortages to the carrier and **Remko Pump**.

RECORDING MODEL & SERIAL NUMBERS

Please record the model and serial number for your **Remko Pump** in the spaces provided below. The factory will need this information when you require parts or service.

Pump Model : _____
Pump Serial Number : _____
Engine/Motor Serial # : _____
Engine/Motor Model : _____

WARRANTY INFORMATION

LIMITED WARRANTY: The Seller warrants for one year from the date of shipment Seller's manufactured products to the extent that Seller will replace those having defects in materials or workmanship when used for the purpose and in the manner which Seller recommends. If Seller's examination shall disclose to its satisfaction that the products are defective, and an adjustment is required, the amount of such adjustment shall not exceed the net sales price of the defective products, and no allowance will be made for labor or expense of repairing or replacing defective products or workmanship or damage resulting from the same. Seller warrants the products which it sells from other manufacturers to the extent of the warranties of their respective makers. Where engineering design or fabrication work is supplied, buyer's acceptance of Seller's design or of delivery of work shall relieve Seller of all further obligation, other than as expressed in Seller's product warranty. **THIS IS SELLER'S SOLE WARRANTY. NO OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE MADE OR AUTHORIZED. NO AFFIRMATION OF FACT, PROMISE, DESCRIPTION OF PRODUCT OF USE OR SAMPLE OR MODEL SHALL CREATE ANY WARRANTY FROM MANUFACTURER, UNLESS SIGNED BY THE DIRECTOR OF THE MANUFACTURER.** Seller neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of its engineering designs or products. This warranty shall not apply to any products or parts of products which (a) have been repaired or altered outside of Seller's factory, in any manner; or (b) have been subjected to misuse, negligence or accidents; or (c) have been used in a manner contrary to Seller's instruction or recommendations. Seller shall not be responsible for design errors due to inaccurate or incomplete information supplied by Buyer or its representative.

SAFETY AND PRECAUTIONS

DANGER



This marking warns of an imminent hazard to the life and health of people.

Failure to observe these instructions will lead to death or serious injury.

WARNING



This marking warns of a potentially hazardous situation to the life and health of people.

Failure to observe these instructions can lead to death or serious injury.

CAUTION



This marking warns of a hazardous situation to the health of people.

Failure to observe these instructions can lead to minor or moderate injury.

NOTICE



This marking indicates potential property damage.

Failure to observe these instructions may cause property damage.

IMPORTANT: Identifies information that controls correct assembly and operation of the product.

NOTE: Identifies helpful or clarifying information.



This symbol alerts the user to the presence of dangerous voltage inside the product that might cause harm or electrical shock.



This symbol alerts the user to the presence of hot surfaces that might cause fire or personal injury.



This symbol alerts the user to the presence of heavy equipment that might cause personal injury.

Before Getting Started

This equipment should be installed and serviced by technically qualified personnel who are familiar with the correct selection and use of appropriate tools, equipment, and procedures. Failure to comply with national and local electrical and plumbing codes and within Remko Pump recommendations may result in electrical shock or fire hazard, unsatisfactory performance, or equipment failure. Know the product's application, limitations, and potential hazards. Read and follow instructions carefully to avoid injury and property damage. Do not disassemble or repair unit unless described in this manual.

Failure to follow installation or operation procedures and all applicable codes may result in the following hazards:



DANGER



Risk of death, personal injury, or property damage due to explosion, fire, or electric shock.

- Do not use this product to pump flammable, combustible, or explosive fluids such as gasoline, fuel oil, kerosene, etc.
- If the liquid is hazardous, take all necessary precautions to avoid damage and injury before emptying the pump casing. If any external leaks are found while pumping hazardous products, immediately stop operations and repair.
- Do not use in explosive atmospheres or hazardous locations as classified by the NEC, ANSI/NFPA70.
- Never operate the pump for more than a short interval with the discharge valve closed as this can cause an explosion. The length of the interval depends on several factors including the type of fluid and its temperature. Contact Technical Support for additional support if required.
- When operating, the engine on this pump produces carbon monoxide, an odorless, colourless, poisonous gas that can cause asphyxiation and kill you in minutes. Breathing carbon monoxide can cause nausea, fainting, or death. Operate this pump ONLY outdoors in a well-ventilated area. Do not operate the pump inside any building, confined area such as a tunnel or trench, or enclosed area such as basement, garage, or similar locations, even if doors and windows are open.



WARNING



Risk of severe injury or death.

- To reduce risk of electrical shock, disconnect power before working on or around the system. More than one disconnect switch may be required to de-energize the equipment before servicing.
- If the pump is driven by an electric motor, check local electrical and building codes before installation. The installation must be in accordance with their regulations as well as the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
- Never start or operate a pump known or suspected to be damaged, defective or malfunctioning.
- When lifting or moving heavy components, use suitable lifting equipment, in good condition, rated for at least 5 times the weight of the materials being moved.
- Never stand under a load as it hangs in the sling or hoist.
- Do not attempt to start the engine with the spark plug removed. Unintentional sparking can result in fire or electric shock. Ensure that the spark plug, muffler, fuel cap, and air cleaner are in place.
- For diesel engines, if fuel is spilled, avoid starting engine or creating any source of ignition until the fuel evaporates or is cleaned up and any fuel vapours have dissipated.
- Excessive pump noise or vibration may indicate a dangerous operating condition. Shutdown the pump immediately.
- Handling must be carried out by specialized personnel to avoid damage to the pump and persons.

**CAUTION****Risk of bodily injury, electric shock, or equipment damage.**

- This equipment must not be used by children or persons with reduced physical, sensory or mental abilities, or lacking in experience and expertise, unless supervised or instructed. Children may not use the equipment, nor may they play with the unit or in the immediate vicinity.
- Operation of this equipment requires detailed installation and operation instructions provided in this manual for use with this product. Read the entire manual before starting installation and operation. End User should receive and retain manual for future use.
- Keep safety labels clean and in good condition.
- Never operate the pump without all safety devices correctly installed, including pump guards over the rotating parts.
- All components must be handled and transported securely by using suitable slings and/or lifting devices.
- Avoid hot exhaust gases and do not touch hot surfaces.
- Wear Personal Protective Equipment (PPE) while installing, operating or servicing this pump.

**NOTICE****Risk of damage to pump or other equipment.**

- Do not operate the pump and/or the system for an extended period of time below the recommended minimum flow.
- Do not attempt to start the engine before it has been filled properly with the recommended type and amount of oil. Failure to follow these instructions will void the warranty and cause damage to the engine. Refer to the engine manufacturer's instructions for oil type and proper procedure for adding oil. Check the engine oil level before every use and add as needed.
- If in an environment where the fluid in the system could freeze, never leave liquid in the pump. Drain the system completely.
- Incorrect rotation of the pump for even a short period of time can cause severe damage to the pumping assembly.
- If items are dropped, banged, or mistreated in any way, misalignment and malfunction can occur.

Product Specific Precautions

Remko pumps are designed for specific service and may not be suited for any other service without loss of performance or potential damage to equipment or personnel. This manual cannot possibly provide detailed instructions and precautions for each specific application. It is the owner's and installer's responsibility to ensure that applications not addressed in this manual are performed only after establishing that neither operator safety nor pump integrity are compromised. If there is any doubt about suitability for a specific purpose, contact Remko Pumps or your Remko Pump Distributor.

Rental companies and private owners: All persons to whom you rent or lend this pump must have access to and read the product's owner's manuals. Always keep the manuals with the pump and advise all operators to read them. You must also provide personal instruction on how to safely operate the pump, and you must be available to answer any questions the renter or borrower might have.

PRODUCT INFORMATION

Description

Remko Standard Centrifugal Pumps are designed to deliver outstanding performance in applications such as high-pressure transfer and dewatering.

These pumps use a compressor venturi priming system which is a versatile and minimal maintenance system. There are fewer moving parts compared to other automatic self-priming options.

The pump is basically a simple end suction pump which has a completely automatic priming system built into the design. This enables the pump to self-prime from a completely dry condition even with a long suction line. No liquid of any nature is required to prime the pump and therefore in temporary dry trench conditions the pump will 'snore' until such time as liquid is available.

These pumps are offered in a variety of mounting options, including trailer-mounted, skid-mounted, conventional channel base-mounted configurations or bare shaft pumps may be mounted by a third party. They are available with either electric or diesel motors. For detailed guidance on startup, installation, and maintenance, refer to the corresponding engine and motor manuals.



The pumps feature a robust run-dry system at the pump end, allowing continuous operation without prime—without causing damage to the mechanical seal. The mechanical seal is fitted externally to the pump in its own self-contained oil. This system consists of an oil reservoir and a specially engineered mechanical seal gland.

All standard models can be upgraded to Remko's venturi type, self-priming version for significantly higher flow rates, increased head capacity, and advanced priming capabilities.

Each unit is backed by a Limited Manufacturer's Warranty. Warranty durations vary depending on the product type. For complete details, please contact the Remko team.

Remko Venturi Priming System – How it Works

The Remko priming system produces a vacuum which is used to draw fluid up through the suction hose and into the pump, once the pump is fully flooded it is completely primed. The vacuum is created by accelerating compressed air through a venturi. When the compressed air flows through the narrowest portion of the venturi it reaches its highest speed. At this point it also has its lowest pressure. The air is evacuated from the pump casing and suction hose by drawing it through the suction chamber into the venturi's mainstream where it exhausted to the atmosphere.

The vacuum is created indirectly and so there is no risk that contaminants in the pumping fluid, which could potentially damage a vacuum pump or any other direct method, will be passed into the air compressor.

INSTALLATION



CAUTION

Risk of personal injury or damage to pump or other equipment.

- Make sure the pump is level.
- Use caution when positioning the skid-mounted unit to prevent damage to the fuel tank.
- For trailer mounted units, wheels should be properly chocked to prevent the trailer from rolling.
- For engine driven pumps, the reflective exhaust heat may damage the fuel tank, causing fire. Keep at least 1 meter of clearance on all sides of the pump for adequate cooling, maintenance, and servicing.

Package Leveling

Always make sure the package is level.

- For trailer-mounted units, use the tongue jack and blocking under the lower wheel.
NOTE: Properly chock wheels of the trailer to prevent rolling.
- For skid-mounted packages, use blocks under the skid if the ground is not sufficiently level.
- For electric units with a motor stool, install on a solid, level foundation for adequate bearing lubrication.

Foundation

1. Locate the foundation as close as possible to the liquid to be pumped, allowing adequate space for operation, maintenance, and inspection of the pump and equipment.
2. Allow the foundation to completely dry and cure.
3. Use anchor bolts to attach the pump base to the foundation.
4. Use a machinist's level on the mounting pads for adjustments as the anchor bolts are tightened.
5. Provide leveling nuts or wedges for mounting the baseplate to the foundation.

Mounting the Pump

1. Remove all shipping protection.
2. Ensure all foreign material has been removed from the pump and system piping.
3. Mount the pump level, making sure the pump and its driver are aligned.
IMPORTANT: Failure to align the pump driver and coupling will cause pump vibration and premature failure of the shaft, bearings, mechanical seal, and couplings.

Motor & Pump Alignment

Precise alignment is necessary to achieve correct performance of the system. Every time a component is moved, check the alignment.

IMPORTANT: When utilizing a diesel engine-driven pump system with a transmission/gearbox component, it is essential to verify the alignment each time the equipment is relocated.

Piping Installation

Suction Piping Installation

1. Select suction piping.
 - Consider NPSHA, site altitude, and temperature.

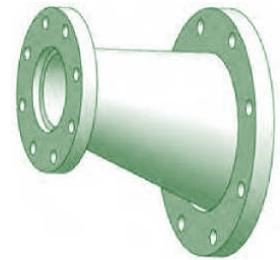
NOTE: Suction design must provide a margin of NPSH Available (NPSHA) over NPSH Required (NPSHR) of at least 0.5 mtr.

NPSHA is the measure of energy in a liquid above the vapor pressure. Consider losses from the foot valve and other entrance losses when calculating NPSHA. NPSHR is given in the pump data sheet and performance curve.

- Piping should be at least as large as the pump flange.
 - For diameters larger than the pump flange, install an eccentric reducer with the straight side up to avoid air pockets.
 - Use piping suitable for vacuum to avoid collapse during operation.
2. If long, level runs of piping cannot be avoided, slope up to the flange to prevent air pockets.
 3. Position the pump at the highest point of the suction piping.
 4. Slope the piping up to avoid air pockets.
 5. If required, install a foot valve at least 4 times the pipe diameter away from the pump inlet.
 6. Make sure the submergence of the suction pipe in the wet well, pond, etc. is at least 4 to 5 times the pipe diameter.

NOTE: If this is not possible, provide a baffle or other device suitable for preventing vortex formation, causing air to enter the pump's suction. For best performance, use a bell mouth fitting. Refer to the Hydraulic Institute Handbooks or other hydraulic data books for detailed sump design information.
 7. If a suction strainer is required, the open area should be at least 4 times the internal pipe diameter and rigid enough to prevent collapse if it becomes clogged.

Eccentric Reducer



Discharge Piping Installation

1. Use a concentric taper on the discharge side to increase from pump discharge flange size to a larger discharge pipe diameter or maintain discharge piping the same size as the discharge size of the pump.

Note: The decision of what size discharge pipe to use in an economic one, a balance between the higher cost of larger piping versus the higher energy requirements imposed by pipe friction. Otherwise, the only detrimental effects of discharge piping size choice is derived from the pump running too near shut off or too far out on its curve.
2. The discharge pipe size should be adequate to maintain reasonable velocities and reduce friction losses.
3. All valving and additional fittings should be the same size as the discharge line.

OPERATION



WARNING

Risk of severe injury or property damage.

- Fuel and its vapours are extremely flammable and explosive. Fire or explosions can cause severe burns or death. Do not add fuel indoors. Do not add fuel when the engine is running or hot. Do not light cigarettes or smoke when adding fuel. Keep fuel away from furnaces, stoves, water heaters, clothes dryers, or other appliances that have a pilot light or other ignition source (heat, flame, sparks, lit cigarette, etc.) because they can ignite fuel vapours.
- When adding fuel, ensure that the pump is outdoors on a flat, level surface. Do not add fuel to pump while indoors. Turn the pump OFF and let it cool at least 2 minutes before removing the fuel cap. Loosen the cap slowly to relieve pressure in tank. Refer to the engine manufacturer's instructions for recommended fuel type and proper procedure for adding fuel.
- If fuel is spilled, avoid starting engine or creating any source of ignition until the fuel evaporates or is cleaned up and any fuel vapours have dissipated.
- Never operate the pump without all safety devices correctly installed, including pump guards over the rotating parts.

Priming

Remko pumps come with a fully automatic vacuum priming system. If this priming device is not supplied on your pump model you will need either a flooded suction or a foot valve and some other means of evacuating air from the pump case and suction line. With a flooded suction use a bleed valve at the top of the volute to allow trapped air to escape. If you are using a foot valve, then fill the suction line and pump case with water and use a bleed valve for trapped gas as above. If a hand primer is to be used it will be necessary to have an airtight check valve or closeable control valve on the discharge line to prevent the entry of air from the discharge side. Rotating the pump shaft will release trapped gas in the impeller. Follow the below instructions regarding priming valve setup prior to starting the pumpset.

PRIMING TEE VALVE SET UP - ****ADJUST VALVES TO SUCTION CONDITIONS PRIOR TO START****



Valve #1

Valve #2

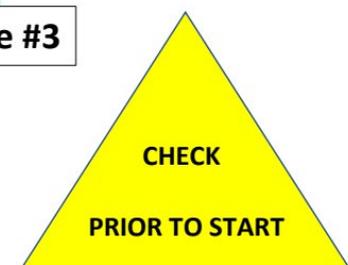
Valve #3

FLOODED SUCTION: (water level above suction port of pump)

1. Valve #1 should be **open**, Valve #2 and Valve #3 should be **closed**

SUCTION LIFT: (water level below suction port of pump)

2. Valve #1 should be **closed**, Valve #2 and Valve #3 should be **open**



Pre-Start Checklist

1. Verify that rotation is correct and that the shaft rotates freely.
2. Check all piping connections for tightness.
3. Inspect all accessories and make sure they are appropriate for your installation.
4. Verify that the driver and coupling are aligned correctly and that all guards are in place.
5. Ensure that all bearings and grease seals are lubricated.
6. Check if the venturi priming system valves are set to proper positions.
7. Check compressor drive belt for any slack.
8. Check the oil level in the mechanical seal oil reservoir. Oil levels should also be checked and maintained during pump operation.
9. Follow the instructions on all tags, labels and decals attached to the equipment

Starting the System



DANGER



Risk of death, personal injury, or property damage due to explosion, fire, or electric shock.

- Never operate pump with both the suction and discharge valves closed as this could cause an explosion.
- Failure to open the discharge valve upon starting the driver could cause a dangerous buildup of heat and possibly an explosion.
- If the pump is operated in an enclosed space and the pumpage may contain potentially hazardous fumes make certain that an exhaust hose is securely connected to the vacuum pump exhaust nozzle and routed outside the enclosed space. Failure to do so may result in injury or death.
- If liquid pump contains solids that may cause downstream clogs, take special care the pump is not operating against a blocked discharge for a prolonged period. Do not loosen flanges or open valves if the pump is suspected of operating against a downstream clog, as the release of stored heat can result in severe injury or death.



CAUTION

Risk of bodily injury or property damage. A pressurized system can cause a pump to deadhead.

- Rapidly closing the discharge valve can cause a damaging pressure surge. A dampening arrangement should be provided in the piping.
- Do not operate the pump without guards in place over the rotating parts. Exposed rotating parts can catch clothing, fingers or tools, causing severe injury to personnel.
- Never use the suction valve to throttle the flow.
- Do not attempt to run the pump without water; this could result in permanent damage to the pump.

IMPORTANT: Precise alignment is necessary for correct performance.

IMPORTANT: Some components and lubricants have shelf lives of less than 12 months. Inspect and replace as necessary.

1. **If starting after storing the pump for more than one month:**
 - Remove all rust preventive coating and drying agents, such as silica gel.
 - Clean the pump thoroughly to remove any foreign material that may have accumulated.
2. **Confirm the pump rotates clockwise when viewed from the drive input end. If incorrect:**
 - For a three-phase electric motor, interchange any two of the power leads.
 - For single-phase electric motors, refer to its wiring diagram.
 - For diesel engines, confirm engine rotation with the supplier.
3. **Check all piping and fittings for foreign materials (rocks, bolts, wire, etc.) that could disrupt pump flow.**

4. Depending on the type of suction applications (suction lift or flooded suction), open the relevant ball valves on the venturi priming system line as per the instruction provided in the pre-start checklist section.
5. Check the run-dry mechanical seal lubrication system:
 - Make sure the oil level is not above half the length of the sight tube and the oil is clean.
 - Check fittings and oil level sight tube for leaks.
 - Ensure the mechanical seal oil drain plug is tight and not leaking.
6. If the bearing housing is oil lubricated:
 - Hold the pump level.
 - Clean around the oil level plug on the side of the bearing housing and then unscrew it.
 - For oil level sight gauge windows, make sure the oil level is near the centre.
 - Make sure the oil is at the level of the plug opening and the housing is not overfilled.
7. Check the tension of the compressor drive belt.
 - The belt should be just tight enough to remove any slack. Do not over-tighten.
8. Make sure the Compressor Venturi Priming System is functioning properly, and the pump is primed before startup.
9. Check all accessible hardware, piping, and fittings are tight, secure, and supported.
10. Position hoses to avoid unnecessary stress. Sharp bends should be eliminated and protective measures taken where hoses are exposed to abrasive surfaces. Collapsible type hoses **MUST NOT** be used on the suction side of the pump.
11. Refer to the diesel engine or electric motor manuals for pre-start instructions.
12. Close the discharge valve.
13. Start the pump and slowly open the discharge valve to fully open.
 - Avoid any abrupt changes in the discharge flow rate to prevent pressure surges in the piping.
14. The pump will prime automatically once the suction hose intake is submerged.
15. Monitor the pumpset for a period of time. Observe and monitor:
 - Bearing temperatures
 - Mechanical seal coolant level
 - Mechanical seal coolant contamination
 - Pump discharge and suction pressure
 - Pump system leaks
 - Engine temperatures, pressure, emissions and gauges
16. If the design pressure is not achieved shut the pump down immediately.
 - Verify pump is adequately primed and restart.
 - Check all suction and discharge piping for leaks.

Failure to Prime Pump

Air Leaks

To test for air leaks, disconnect suction hose from pump and blank off suction entry. If the vacuum gauge registers a satisfactory reading, i.e. 9.14 metres, the leak will be in the suction hose. Re-couple hose to pump; remove intake and blank-off entry to hose. It should then be possible to locate leak.

If the air leak is in the pump:

- (1) Check that all drain plugs are screwed tightly in position
- (2) Remove NRV Inspection cover and make sure that the valve is seating correctly.

Run Dry System

The run dry system in the pump end allows it to run indefinitely when it is not primed without damaging the mechanical seal. The system can be either enclosed in the pump backplate or external to the pump wet end.

Whether enclosed or external, both configurations work the same:

1. As the pump starts, the mechanical seal is fed a constant supply of lubricating oil from the inside of the stationary seat.
2. Due to the centrifugal force generated by the rotating seat, a small amount of oil is fed between the two seal surfaces and forced out of the seal and into the pumped liquid.
3. The oil cools and lubricates the seal surfaces, prolonging its life.

Pump Dynamic Test

1. Before starting the engine, check that the shaft, pulleys and belt are free to rotate with the guards in position.
2. Start pump and run completely dry for a minimum period of 10 minutes (initial run up speed at 900rpm increasing during test to 1100rpm). During this period, generally check and observe for any unusual vibrations, overheating, fuel, oil or air leaks.
3. These faults must be rectified immediately to prevent a possible engine seizure.
4. After the dry running period, check that the pump unit will raise a minimum vacuum of 0.81bar (24 inches mercury).

Cavitation

If the Net Positive Head Available of the pump is less than the Net Positive Head Required, the pump end liquid will vaporize in the region of the impeller eye i.e. where the local pressure is less than the vapour pressure. In this region, the fluid will consist of a liquid plus vapour cavities. This can, in the extreme case, result in the formation of a vapour lock and the prevention of the fluid entering the impeller. This phenomenon is called 'cavitation'. The cavitation cycle comprises therefore of two-phase changes: one from liquid to vapour during the initiation and the other from vapour back to liquid during cavity collapse.

Cavitation may be caused by excessive suction lift, insufficient NPSHA or operation at too high a speed. The resulting effects include:

- (3) Pitting of material surfaces due to the continual hammering action of the collapsing vapour cavities.
- (4) Significant reduction of performance due to vapour formation.
- (5) The crackling noise (like gravel going through the pump) caused by vapour cavity collapse.

Severe cavitation usually results in excessive noise, vibration and damage to pump, whereas mild cavitation may produce nothing more than a small reduction in pump efficiency and moderate wear of pump components.

Venturi Ejector Assembly (for automatic priming)

The assembly consists of a diffuser and a mixer which are connected to the mixer unit as shown. The Venturi device creates a vacuum, which draws water into the pump and automatically primes it. The venturi device is connected to a compressed air supply via a compressor connected to the pump shaft.

Here's a more detailed explanation:

1. Vacuum Creation:

When the pump is turned on, a venturi device (often part of the priming system) is activated. This device uses a compressed air supply or a pump shaft to create a vacuum.

2. Liquid Suction:

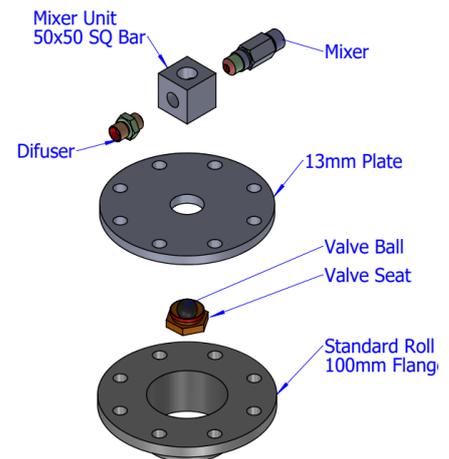
The vacuum created by the venturi device draws liquid from the source, such as a well or tank, into the pump's suction line.

3. Priming:

As the vacuum pulls liquid into the pump, it fills the pump casing, effectively priming it for operation.

4. Automatic Operation:

Once primed, the pump can automatically continue to draw liquid as needed, ensuring a consistent flow of water.



In essence, the venturi device acts as a pump within a pump, creating the necessary vacuum to prime the main pump, allowing it to operate even when the suction line is empty.

Venturi Test

1. Clean the diffuser and mixer with paraffin or similar cleaner. On no account should stiff wire be used as this will enlarge the bores.
2. Check the diffuser and mixer bores for any sharp edges, burrs or rough surfaces. If damaged and no replacement is readily available, smooth and polish as well as possible to original form.
3. Alignment of diffuser and mixer is important, but this is preset by machining tolerances.
4. Assemble venturi pack unit and check performance on test unit. Operation Air Pressure: 40 psi approximately. Minimum Pass Vacuum: 24" Mercury (27.24ft).
5. A satisfactory arrangement for carrying out the performance test on the ejector unit is a plate fitted with a vacuum gauge as illustrated.

Discharge Check Valve / NRV

Remko Automatic Self Priming Pump are supplied complete with discharge check valves as a part of the pump priming system. The primary function of the check valve is for sealing the discharge side of the pump during the automatic priming process. Whilst this check valve is rated for maximum pump performance it is not intended to be used as the discharge system non return valve. Remko recommends that a suitable system non return valve be installed as part of the discharge pipe work.

Operation:

1. When the pump begins to prime, the discharge check valve is closed to create a positive seal of the suction area.
 - The suction area includes the pump end, the suction manifold, and the priming Tee Chamber.
 - Without the seal, outside air would enter the priming system and disrupt the vacuum system.

2. When the pump is primed, the discharge flow opens the discharge check valve.
3. When the pump stops or loses prime, the weight of the flapper causes the valve to close.
 - This prevents reverse flow when the pump is stopped.

Shutting Down the Pump

For electric motor driven pumps, turn off the motor power supply. For engine driven pumps:

1. Slowly reduce the engine speed to idle.
2. Allow the engine to run at idle for four to five minutes.
3. Shut down the engine and turn it off at the control panel.

MAINTENANCE



WARNING



Risk of severe injury or property damage.

- To minimize risk of electrical shock, disconnect power before working on or around the system.
- When lifting or moving heavy components, use suitable lifting equipment, in good condition, rated for at least 5 times the weight of the materials being moved.
- Never stand under a load as it hangs in the sling or hoist.



CAUTION

Risk of bodily injury or property damage. A pressurized system can cause a pump to deadhead.

- Rapidly closing the discharge valve can cause a damaging pressure surge. A dampening arrangement should be provided in the piping.
- Never use the suction valve to throttle the flow.
- If items are dropped, banged, or mistreated in any way, misalignment and malfunction can occur.
- If the pump or components are hot, allow adequate cooling prior to servicing the unit.
- Store the pump in a well-ventilated area away from furnaces, stoves, water heaters, clothes dryers, or other appliances that have a pilot light or other ignition source (heat, flame, sparks, etc.) because they can ignite fuel vapours.
- Safety glasses, heat resistant welder's gloves, cut-resistant gloves, and safety boots should be worn. Use proper protective gloves and clothing when handling heated parts.

IMPORTANT: Precise alignment is necessary for correct performance.

Storage

If the pump is to be stored for more than one month:

1. If applicable, open the ball valve to drain the pump.
2. Drain the pump by removing the NPT plug on the volute drain.

IMPORTANT: Drain the pump completely to avoid water freezing and cracking its case and reduce corrosion.

3. Store the unit off the ground on blocks.
4. Protect the pump from blowing sand and dirt.
5. Do not stack other items on top of the pump and its equipment.
6. Shield the pump from entry of animals.
7. Protect the pump with drying agents, like silica gel.
8. Use a rust preventive coating on all bare metal parts.
9. Every 30 days:
 - Inspect the pump.
 - Reapply the drying agents (silica gel).
 - Rotate the pump shaft.
 - Lubricate bearing and seals.
10. Keep inspection records showing inspection dates and the condition of the stored pump.

Periodic Service

Frequency	Service
Daily	<ul style="list-style-type: none"> • Check all piping connections, pipe supports, and equipment fasteners for tightness. • Verify the driver (engine or electric motor) is aligned correctly and all guards are in place. • Check all oil quality and levels. If contaminated, replace immediately. • Follow the instructions on all tags, labels, and decals attached to the equipment.
Monthly or every 500 hours	<ul style="list-style-type: none"> • Apply grease to the bearing housing.
Every 6 months or 1000 hours	<ul style="list-style-type: none"> • Ask your Remko Pump Distributor to check the wear rings for excessive wear. • For belt-driven pumps, recheck drive belt tension with a belt tension indicator. <p>NOTE: The compressor belt should only be tight enough to eliminate slack. Adjustment is made by adding or removing shims (if provided) between the compressor base and support table.</p>
Yearly or every 2000 hours	<ul style="list-style-type: none"> • Change all lubricating oils in the bearing housing (if applicable) and mechanical seal oil reservoir.

Lubrication

Oil Lubrication



NOTICE

Risk of damage to pumps or other equipment.

- Over-filling of oil can result in premature failure of bearings.

To change the oil in the priming pump crankcase, bearing housing, and run dry reservoir:

1. Clean the area around the fill and drain plugs to reduce the possibility of contamination.
2. Remove the drain plugs.
3. Drain the oil.
4. Replace the drain plugs.
5. Remove the oil fill plug(s).
6. Fill the compartment with oil to the indicated correct levels on the oil level or sight gauge.
7. Replace the oil fill plug(s).

NOTE:

- Grease lubricated bearing housing does not require any oil service.

Grease Lubrication

Re-greasing recommendations:

- Use only one type of grease.
- Lithium or Lithium Complex greases are preferred.
- Do not mix Polyurea greases with Lithium types.

Recommended greases include:

- Texaco Starplex Moly 2
- Mobil Mobilux No. EP2
- Shell Alvana EP2
- Chevron SR1

To re-grease the bearings:

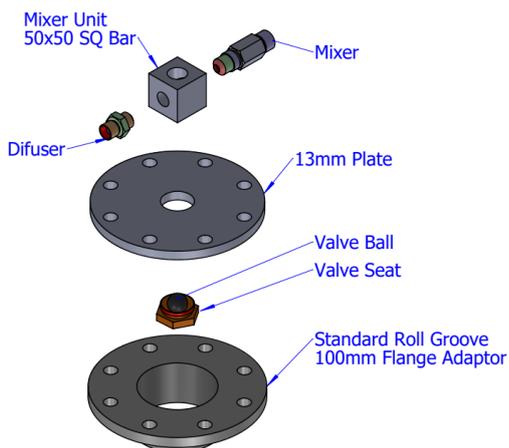
1. Clean the grease point.
2. Use a hand-operated grease gun with ball bearing grease.

NOTE: Grease guns dispense widely varying amounts of grease per stroke. Test before using on the pump.

NOTE: Lubrication intervals and quantities for the ball bearings depend on speed, load, ambient temperature, contamination, moisture, intermittent or continuous service and other factors. Contact your Remko distributor for details.

Venturi Ejector Package Maintenance

1. Check that all items are clean and free from burrs. The diffuser and mixer should only be cleaned with paraffin or similar cleaner. Wire should not be used as this will enlarge the bores.
2. Do not use excessive jointing compound when fitting these items and ensure that it does not enter the bores. This may cause a blockage in the venturi ejector.
3. Fit, in their grooves, O-ring onto diffuser and O-ring onto mixer.
4. Screw by hand, the diffuser and the mixer to the mixer unit. A spanner should only be used for the final quarter turn.
5. Screw the diffuser sleeve by hand into the separation tank cover. A spanner should only be used for the final quarter turn.
6. Place the ball in the valve seat, then secure it to the mixer unit plate.
7. Fit the mixer unit plate to the pump suction Tee piece with gasket filters and fasteners.
8. Connect the exhaust site valve and fittings back in place.
9. Connect the compressed air inlet side valves and fittings in place as shown below.



Centrifugal Pump (ISO or DIN standard)

The supplied centrifugal pump is a single stage, horizontal, end suction pump with overhung impeller and radially split casing. The range is designed for continuous service in clean water pumping applications.

1. Safety instructions for operation

- Do not touch any moving or rotating parts.
- Guards must be in place before operating the equipment.
- Failure to supply the stuffing box or mechanical seal with cooling of flush water may result in damage and premature failure of the pump.
- Do not touch surfaces, which during normal running will be sufficiently hot to cause injury. Allow sufficient time for cooling before maintenance. Be cautious and note that other parts of the pump may become hot if a fault is developing.
- In addition to local or site regulations for noise protection, we recommend the use of personal ear protection equipment in all enclosed pump rooms and particularly those containing diesel engines. Care must be taken to ensure that any audible alarm or warning signal can be heard with hearing protection worn.

2. Pre-Commissioning Procedure and Checklist

The following steps should be followed at initial startup and after the equipment has been overhauled:

1. Confirm correct pump is fitted into the designated functional location.
2. Prior to installing the pump, flush the suction side of the system to remove all deposit (slag, bolts etc). Remove all pre-commissioning screens and replace with operational units.
3. Ensure the pump and piping is clean. Before putting the pump into operation, the piping should be thoroughly back flushed to remove any foreign matter which may have accumulated during installation. Take all possible care not to contaminate your system.
4. Inspect all nozzle connections for
 - i. Missing bolts or loose bolts
 - ii. Missing gaskets
 - iii. Flange alignment / Misalignment
5. Check pipe work for
 - i. Correct sizing
 - ii. Any suction restrictions
 - iii. Make sure that all hold down bolts are in place and pulled down
6. Check drive coupling for
 - i. Correct Alignment
 - ii. The presence of preload caused by misalignment
 - iii. All fasteners are tight
 - iv. Coupling has been fitted correctly
 - v. Coupling guard is correctly fitted and firm.
 - vi. Check that keys are secured in the correct position and locked down
 - vii. Turn shaft by hand and check for running clearance
7. For oil lubricated Pumps, fill the bearing housing with the appropriate oil to the correct level. Bearings must receive a small amount of oil prior to starting to ensure adequate lubrication at start up. See section 3 for details.
8. For Grease lubricated pumps, fill about 15 gms for grease to ensure adequate lubrication at start up.
9. Install suction strainer if required.
10. Check that the Electrical connection is completed and signed off
 - i. Have the safety lock out device removed.
 - ii. Bump start pump to check for correct orientation. If rotation is not correct refer to motor manual for appropriate connections to change rotation. Take appropriate precaution before working on the motor.

11. If a Mechanical Seal is fitted, check
 - i. Quench or Flush is operational before startup
 - ii. Check that seal is located correctly
 - iii. Check that seal is locked to the shaft
 - iv. Remove setting Tabs

Running

On account of its simple construction, the centrifugal pump requires practically no attention while running. Lubrication of the bearings and manipulation of the glands are the only things that need attention from the operator.

Pumps fitted with wear rings

Casing and impeller wear rings are fitted in the casing and impeller to reduce the quantity of water leaking back from the high-pressure side to the suction side. When these wear rings are worn out, the clearance becomes greater, and more water passes back into the suction. They must be replaced from time to time to restore the pump efficiency to its normal value.

Pump Startup

- i. Close discharge valve if valve is not already closed. Crack open the valve to assure minimal flow.
- ii. Prepare the driver for startup in accordance with the driver manufacturer's instructions.
- iii. Ensure the relevant ball valves on the Auto-priming system is open (depending on negative or flooded suction)
- iv. Ensure suction valve is open.
- v. If pump re-circulating line is used, ensure it is open, clear and free of obstructions.
- vi. Turn on cooling liquid and assure correct flow exists (to cooler, insert gland etc.) as specified.
- vii. Double check pump rotation by starting unit momentarily. The direction of input shaft rotation is clockwise when facing pump shaft from coupling end. Ensure that the pump coasts down to a gradual stop.
- viii. Start the driver and bring it up to speed.
- ix. As soon as the pump is up to rated speed slowly open discharge valve.
- x. This will avoid abrupt changes in velocity and prevent surging in the suction line.
- xi. Perform the operating checks

Pumps fitted with Mechanical Seal

- i. Before pumping dirty liquids, it is advisable, if possible, to run in the pump mechanical seal using clean liquid to safeguard the seal face.
- ii. External flush or quench should be started before the pump is run and allowed to flow for a period after the pump has stopped.
- iii. Never run a mechanical seal dry, even for a short time (This is in case the mechanical seal is not oil cooled).

During Running the Pump

Check the following and regulate, if necessary

- The pump is running smooth.
- If packed gland is used, Leakage through stuffing box is normal. There should be leakage of 60-80 drops per minute.
- The bearings are not getting heated up excessively.
- Head and capacity developed by the pump is as specified.
- Power consumption is within the limit.
- Ensure that there is no mechanical friction in the pump.
- Check suction and discharge pressure gauges.
- Check for excessive leakage at seal areas.
- Check for unusual noises and vibrations.
- Stop the pump immediately, if any defects are noticed. Do not start the pump unless the defects are rectified. Report immediately to the supplier if it is not possible to rectify the defects.

Stopping and Shutting Down

- The centrifugal pumps can be shut down by switching off the power to the motor or the engine, with open or closed flow regulating valve. If there are no provisions against water hammer, it is recommended to close the flow regulating valve at pump discharge prior to stopping the pump but ensure that the pump runs in this condition for no more than a few seconds.
- Avoid the use of instantaneous shut-off valves, such as solenoid valves. These can cause severe pump damage.
- If a non-return valve is not fitted, or the isolating valve at the discharge side is not completely closed, it may happen that during the shut-down the pump shaft will rotate in the opposite direction than is normal: in such cases absolutely avoid restarting the pump until the pump shaft has stopped rotating.
- After the first start-stop and if necessary, check pump/motor alignment and make sure that no external forces or moment rest on pump or piping.

Safety Instructions while Maintenance and Servicing

- Before attempting any maintenance on a pump particularly if it has been handling any form of hazardous liquid, it should be ensured that the unit is safe to work on. The pump must be flushed thoroughly with suitable cleaner to purge away any of the product left in the pump components. To avoid any risk to health it is also advisable to wear protective clothing as recommended by the site safety officer especially when removing old packing which may be contaminated.
- Check and ensure that the pump operates at below the maximum working pressure specified in the manual or on the pump nameplate and before maintenance, ensure that the pump is drained down.
- Be aware of the hazards relating to the pumped fluid, especially the danger from inhalation of noxious and toxic gases, skin and eye contact or penetration. Obtain and understand the hazardous substance data sheets relating to the pumped fluid and note the recommended emergency and first aid procedures.
- Isolate the equipment before any maintenance work is done. Switch off the mains supply, remove fuses, apply lockouts where applicable and affix suitable isolation warning signs to prevent inadvertent reconnection. In order to avoid the possibility of maintenance personnel inhaling dangerous fumes or vapours, it is recommended that the maintenance work be carried out away from the pump locations by removal of bearing housing and shaft assembly to a suitable to a suitable maintenance area.

Maintenance Checklist

Daily Checks

- a. Pressure gauge reading.
- b. Bearing temperature.
- c. Leakage through stuffing box.
- d. Noise and vibration.
- e. Voltage and current.
- f. Constant flow of external sealing liquid if provided.
- g. Check all lubricant levels
- h. On grease lubricated pumps, check running hours since last recharge of grease or complete grease change.

Periodic Maintenance

- a. Replenish the grease.
- b. Change the stuffing box packing.
- c. Check the alignment of the pump set.
- d. Calibrate the measuring instruments.
- e. Check all paint or protective coatings.
- f. Check all power/instrument cable glands for tightness.
- g. Check the sealing connections for leakage etc.

Maintenance Schedule – ISO Pumps

The below schedule provides a suitable timetable to monitor pump and system performance and will provide a guide to pending maintenance requirements by comparing the current situation with previous recordings. Extreme or unusual operating environments should be taken into consideration, and shorter maintenance intervals are recommended.

ITEM	PERIOD	ACTION
Bearings	Monthly	Check bearing temperatures by thermometer. If bearing temperature is above 80 Deg. C, it may be because of too much, or insufficient lubrication. If necessary, check the condition of the bearings. Regreasable bearings should be supplied with fresh grease of the recommended grade. Check for lubricant leaks. Replace seals if leaking.
	3 Monthly	Oil lube bearings should be supplied with fresh oil of the recommended grade. Check old oil for metal particles or water. Check shaft for excessive free play.
Seal or Gland	3 Monthly	Check mechanical seal for leaks. Replace if leaking. Check packing for excessive leaks, and adjust or repack if necessary with the recommended grade and style of packing. When replacing packing, ensure that the lantern ring is aligned with the lubricant supply drillings. When repacking or replacing seals, check the condition of the shaft or sleeve. Replace if badly worn or corroded, and fit new bearings and seals. Check seal or gland flush piping for leaks, and repair or replace.
	Yearly	Check seal for wear, and replace if necessary. Check flush piping for scaling or blockages and clean and replace.
Flexible Coupling	6 Monthly	Check alignment of pump and motor. Re-align if necessary. Check for coupling wear and replace worn flexible element if necessary. Where frequent adjustment of alignment is necessary, check for cause (eg pipe loading, foundation failure, loose fasteners etc). If pipe loads are suspected, unbolt piping at suction and discharge flanges and check for mis-alignment. Check pipe supports and pack or adjust as required.
Pressure & Flow Recordings	3 Monthly	Check inlet and discharge pressure and rate of flow. Record these values and compare with previous recordings. A change in reading may indicate a fault in the system, wear or blockage in the pump. Investigate, and rectify as appropriate, as continued operation may result in untimely plant shutdown.
Valves & Fittings	6 Monthly	Check that ancillary fittings operate correctly. Improper function may cause premature pump failure.
Rotating Element	Yearly	Remove the rotating element and inspect for wear, scale buildup, or blockages. Clean unwanted deposits from components, as buildup will result in loss of performance. Check impeller running clearance. Replace defective components.

Dismantling Procedure

Tools Required:

A typical range of tools that will be required to maintain these pumps is listed below:

TOOL		WHERE USED
Open ended spanners (wrenches) to suit up to 2" (M50) screws/nuts		Undoing bearing cover
Tension wrench		Pretensioning impeller nut
Socket spanners (wrenches)		Undoing impeller nut
Socket sizes 28, 38, 48, 50 and 60 A/F		
Metric Allen keys (up to 10mm)		General disassembly
Screw driver set		Removing and assembling seals/gaskets
Soft mallet		Soft loosening assembled parts
Metal wedges		removing impeller off tapered pump shaft
Dial indicator		Checking impeller run-out
Shaft Locker		Holding shaft while undoing impeller nut

Dismantling Steps:

1. Remove the back plate to casing bolts. Jacking screw holes are provided in the back plate, to facilitate removal of the bearing housing shaft element.
2. Unscrew the impeller nut and remove the Nord-lock washer. Screw the impeller nut back on the shaft by hand and drive a pair of wooden wedges gently between the impeller and back plate, being careful not to distort the impeller. Remove the impeller nut and lift off impeller. Lift out impeller key.
3. Remove the bearing housing to back plate bolts and remove the back plate.

Note: Some pumps do not have separate bearing housing to back plate bolts, and these would have been removed in step (1)

4. Remove the bearing cover to bearing housing bolts. By tapping on the end of the shaft with a piece of wood, the shaft, bearing assembly and bearing cover can be removed.

A pump which has become worn in the body or impeller may be repaired by fitting bronze wear rings. These rings, with full instructions for machining the pump parts and fitting rings are obtainable from Remko Pumps.

Re-Assembly Procedure

Re-assemble the pump by following the procedure below, paying particular attention to the following:

1. Ensure gasket surfaces are clean.
2. Ensure shaft seal is fitted according to manufacturer's instructions.

Bearing Housing Assembly

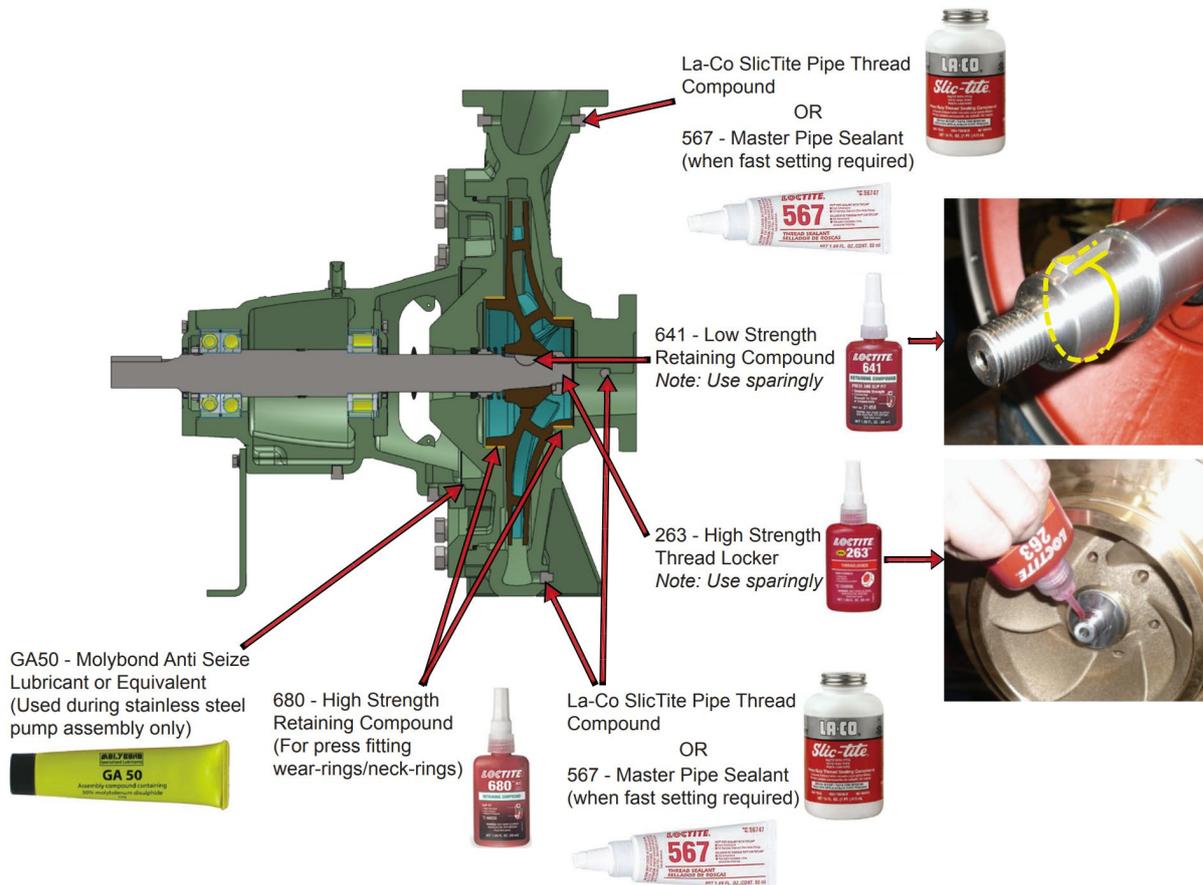
Step 1	Step 2	Step 3	Step 4
			
<p>Fit oil slinger and wet end bearing inner race to shaft then place in appropriate press setup (>30t). *Note bearing orientation. Flange end towards center of shaft*</p>	<p>Slide on a drive end bearing so that the large face of the inner race is towards the impeller end of shaft as shown. Press assembly together.</p>	<p>After pressing first bearing, fit and press second drive bearing. *Note: Second bearing faces opposite direction*</p>	<p>Securely mount bearing housing before assembly.</p>
Step 5	Step 6		Step 7
			
<p>Fit lock washer and nut. Tighten nut then lock.</p>	<p>Fit shaft from driven end</p>		<p>Fit outer race to previously pressed on inner race.</p>
Step 8	Step 9		
			
<p>Fit oil seal to bearing cap.</p>	<p>Fit bearing caps to bearing housing.</p>		

Remko RA Series 1 - Auto Prime Pump

Fitting the Impeller

Step 1	Step 2	Step 3	Step 4
			
Apply Loctite 641 on the shaft taper	Loctite 641 should be applied as shown in the above picture (Use Sparingly)	Apply Loctite 263 on the shaft thread (Use Sparingly) and place Mechanical Seal spring in place	Place the Impeller on the Shaft Taper
Step 5	Step 6	Step 7	Step 8
			
Clean Tapered stainless steel Custom designed Nuts and Nord-Lock Washers	Place the Lock-washer and Impeller nut on the shaft	Tighten nut to the specified torque.	Clean up excess loctite around the nut and shaft

General guide to using Adhesives, Sealants and Lubricants during Pump Assembly



La-Co SlicTite Pipe Thread Compound
 OR
 567 - Master Pipe Sealant (when fast setting required)

641 - Low Strength Retaining Compound
 Note: Use sparingly

263 - High Strength Thread Locker
 Note: Use sparingly

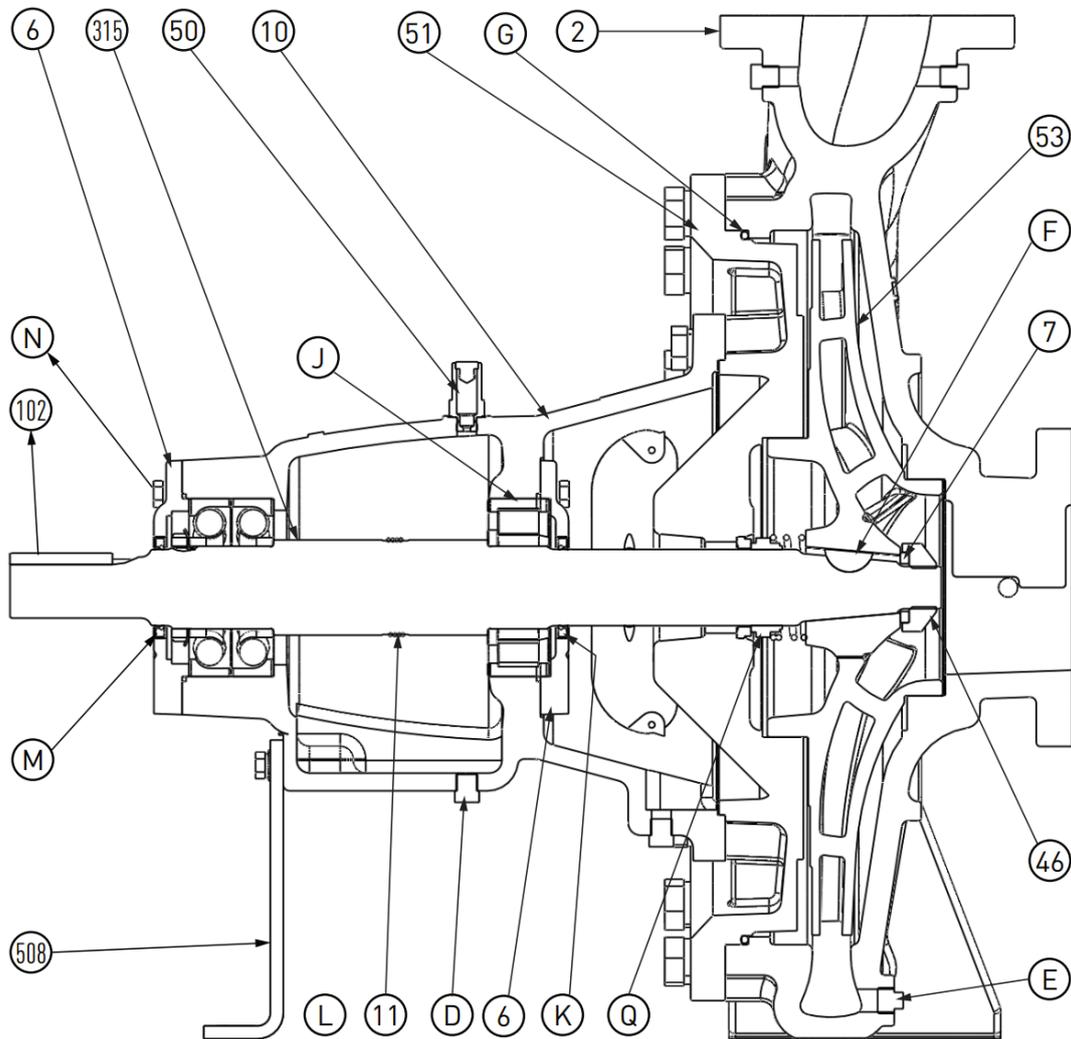
GA50 - Molybond Anti Seize Lubricant or Equivalent (Used during stainless steel pump assembly only)

680 - High Strength Retaining Compound (For press fitting wear-rings/neck-rings)

La-Co SlicTite Pipe Thread Compound
 OR
 567 - Master Pipe Sealant (when fast setting required)

Images showing application of Loctite 567, Loctite 641, and Loctite 263 to various parts of the pump assembly.

Cross Section and Parts List



ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION	ITEM NO.	DESCRIPTION
2	Volute Casing	102	Shaft Key	J	Bearing - Impeller End
6	Bearing Cover	301	Bearing Housing	K	Dust Seal - Impeller End
7	Impeller Lock Washer	315	Shaft	L	Oil Level Plug (NS)
11	Oil Thrower	508	Support Foot	M	Dust Seal - Pulley End
14	Water Slinger	D	Oil Drain Plug	N	Bearing - Pulley End
46	Impeller Nut	E	Casing Plug	P	Gland Flushing Plug (NS)
50	Oil Breather	F	Impeller Key	Q	Mechanical Seal
51	Backplate	G	Casing O-Ring	R	Packed Gland (NS)
53	Impeller			(NS)	Part Not Shown

Air Compressor (N75)

Preface

This manual provides the owner with the necessary instructions to maintain its compressor properly, so that the Customer gets the best service from it. Hence, the owner is requested to go through the contents of the manual & become well acquainted with the instructions herein. In case any question arises related to the equipment or the manual the customer is requested to contact Remko.

General Description

These compressor unit consists of N75 Pump which is a twin cylinder inline with pre-filled oil, air filters and pulley for optimal performance. they are positive displacement type, reciprocating and single acting. The cylinder barrels are air-cooled. The salient features of these compressors are robust overhung design crankshaft for reliability & easy maintenance, solid end connecting rods, highly thermal efficient interfolding, totally reliable lubrication for smooth vibration free operation.

Single Stage Compressor

The N75 features a full cast iron barrel and sump with an aluminium head to allow heat transfer out of the pump. The reed valves are made of high-quality stainless steel to ensure longevity. On the back of the pump, we have an oversized 12" flywheel which provides greater airflow over the pump, compared to others on the market, cooling the entire piston barrel. Being a twin cylinder inline pump when one piston reaches the top of the barrel the other will be at the bottom - this means it has an even stroke which greatly reduces vibration, noise, reduces amps and also less wear on your motor.

The compressor has cylinders of the same size. The principle of operation is as follows: On the suction stroke of the individual piston, air at atmospheric pressure enters the crankcase/cylinder through the inlet filter and the valve located in airhead. On the compression stroke of each piston, air is forced out through the valve and passes into a common discharge.

General Specifications

Model	N75
Pump Displacement (CFM)	14-20 CFM
Oil capacity	1 L
Suggested Speed	852 – 1061 RPM
Pump Head Tension	16 ft.lb / 22.4 Nm
Weight	28 Kg
Compressor Oil Grade	Caltex Rando HDZ-100 150 grade oil only



Operation

The following instructions should be used by the operator as a guide for the general operation of the compressor. As the operator gains experience with the compressor under actual conditions, a set routine should be established. After a general overhauling or installation of new parts, the operator should be guided by the instructions as though the compressor was new.

Initial Start:

IMPORTANT

It is very important that the intake piping be clean and properly installed. It is essential that this be done after installation or relocation of the compressor and after a long shutdown or new parts installation

Preparation

When the installation of the compressor has been completed in accordance with the instructions given, carry out the following procedure before starting the machine.

1. Clean up and remove oil, dirt and dust from the exterior of the compressor.
2. Remove the air head and clean out with safety solvent every portion of the interior and the crankcase oil sump to ensure a clean interior, free from dust and dirt, which may have entered during shipping and installation. Never use waste or a linty cloth to clean the interior of the machine.

The running and finished parts inside the crankcase are covered with a heavy anti-rust compound previous to shipment. It is not necessary to remove this coating before starting the compressor, as it is soluble in the pump lubricating oil.

3. Fill the crankcase to the proper oil level on the oil sight glass with the recommended grade of crankcase lubricating oil. Pour oil over all the bearings, which can be easily reached through the frame or openings. On lubricated units, fill the cylinder lubricator with the recommended grade of air cylinder lubricating oil.
4. Prime the frame lubricating oil pump.
5. On lubricated units each cylinder force feed lubricator line must be disconnected at the point where it is attached to the oil inlet side of the check valve. The lubricator feeds must then be operated manually until all the air is forced out of the lines and oil appears. The lines should now be reconnected and the lubricator given several additional turns to assure proper lubrication of the cylinder as soon as the compressor is started. Once the compressor is started, the oil lines will remain full of oil and require no further attention.
6. Drain the air intake pipe of any moisture, which may have accumulated. Be sure that the air intake filter is properly installed and protected.
7. Before starting a new compressor be sure you are familiar with the starting and stopping controls, and with the regulation and regulator controlling the load and no-load operation.
8. Check the compressor pump thoroughly to be sure there are no loose parts, and that the unit has not been tampered with.

Compressor Maintenance

Valve Maintenance

The valves are efficient, durable, reliable and easily serviced. They are readily accessible and may be removed without disturbing piping.

To clean the valves, remove the airhead bolts and take out the head and valve plate from the cylinder. Remove the valves from the valve plate and clean both the valve and valve plate by brushing with a stiff bristle brush (not wire). If necessary, use a non-flammable safety solvent to loosen dirt, oil or carbon deposits.

Handle the valves with care and be careful not to dent or scratch them. While replacing a valve, make sure it will lie flat against the seating surface surrounding the valve slots; otherwise, the valve will leak, resulting in carbonization and reduced compressor output.

General Maintenance

Before working on or around the compressor and components always observe the following precautions:

- 1) Stop the engine or electric motor before working on the compressor.
- 2) Keep hands away from actuator push rods and slack adjusters. They may apply as the system pressure drops.
- 3) Never connect or disconnect a hose or line containing air pressure. It may whip as air escapes.
- 4) Never remove a component or pipe plug unless you are certain all system pressure has been depleted.
- 5) Never exceed recommended air pressure.
- 6) Always wear safety glasses when working with air pressure. Never look into air jets or direct them at anyone.
- 7) Never attempt to dismantle a component until you have read and understand recommended procedures.
- 8) Some units contain powerful springs, and injury can result if not properly dismantled.
- 9) Use only the correct tools and observe all precautions pertaining to the use of these tools.

At pump services intervals check the compressor for any leakages of water, oil, or air. If the compressor is slow to build up pressure the cylinder head and valve plate may be removed. The condition of the valve assemblies and the cylinder bores may then be checked and any excessive build-up of carbon removed. Service kits with replaceable items are available on request.

Compressor Belt Replacement

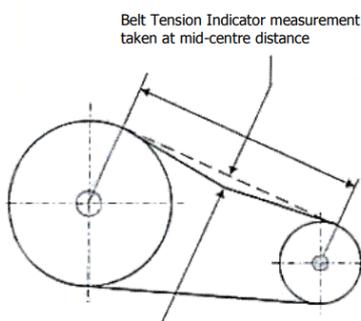
Timing Belt Procedure

1. Remove pulley guard set screws and pump support nuts and draw pump assembly away from engine flywheel housing.
2. Remove old belt and taper lock bush from pump pulley.
3. Ease replacement belt over pulleys, realign pulleys and refit taper lock bush.
4. Check belt tension and then refit pump unit onto engine.
5. The compressor tooth belt drive has fixed centres, so no adjustment is necessary.

Link Belt Procedure

- 1 Remove pulley guard and old belt.
- 2 Place belt around pulleys without creating any tension.
- 3 Count the number of links and remove 7% (1 in 14).
- 4 Place belting around pump shaft and link up.
- 5 Fit around drive pulley and over compressor pulley rotating the drive shaft slowly.

Compressor V-Belt Tension



Belt Section	Force required to deflect belt 16 mm per metre of span		
	Small Pulley Dia (mm)	Newton (N)	Kilogram-force (kgf)
A	80 to 140	10 to 15	1.0 to 1.5
B	125 to 200	20 to 30	2.0 to 3.1

Compressor Common Faults / Troubleshooting

Compressor Not Producing enough Air or Pressure to Prime Pump

1. Air leaks

Faulty Connection Fittings
Leaking Air Lines

2. Intake Filters Blocked

Remove Intake filters and check pump up performance.
Blocked intake filters can cause Head Gasket and Valve Failure.

3. Head Gasket or Valve Failure

Remove Filters and place hand or sheet of paper over intake port in head. If your hand or sheet of paper blows away from the port, this indicates a gasket or valve failure.

Oil Leaks

1. Oil Leaking from Sight Glass

Over a period of time, some hints of oil may leak from behind the oil sight glass. This is caused by an insecure sight glass seal. Carefully re-tighten or replace the seal.

2. Oil Expelling from Oil Breather

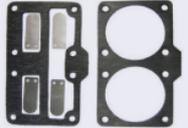
Oil blowing or misting from the oil breather is commonly caused by overfilling the oil volume, leaning the compressor over vertical, or blocked air lines or closed valves causing back pressure in the crankcase

3. Excessive Oil in The Air

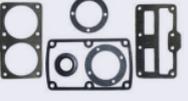
Line Commonly caused by blocked air lines or closed valves causing back pressure in the crankcase.

Compressor Spares

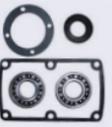
Top End

CODE	PARTS DESCRIPTION	IMAGE
00291-2	TOP END KIT GASKETS & VALVES 2 x Gaskets, 4 x Reed Valves (2 x Inlet, 2 x Exhaust)	
00291-11	TOP END KIT GASKETS ONLY 1 x Head Gasket, 1 x Valve Plate Gasket	

Complete Gasket & Seal Kit

CODE	PARTS DESCRIPTION	IMAGE
00291-3	GASKET & SEAL KIT 1 X Head Gasket, 1 X Valve Plate Gasket, 1 X Barrell Gasket, 1 X Front Bearing Cover Gasket, 1 X Rear Bearing Cover Gasket, 1 X Crankshaft Seal	

Internal Components

CODE	PARTS DESCRIPTION	IMAGE
00291-8	PISTON KIT PISTON, RINGS & GASKET 1 x Piston, 1 x set of Rings (3 Compression, 1 Oil), 1 x Barrel - Sump Gasket PER CYLINDER	
00291-7	PISTON RINGS & GASKET 1 x set of Rings (3 Compression, 1 Oil), 1 x Barrel - Sump Gasket PER CYLINDER	
00291-5	BOTTOM END KIT GASKETS & BEARINGS 1 x Barrel - Sump Gasket, 1 X Front Bearing Cover Gasket, 1 X Rear Bearing Cover Gasket, 1 X Front Bearing, 1 X Rear Bearing, 1 X Crankshaft Seal	
00291-6	CRANKSHAFT KIT CRANKSHAFT, BEARINGS & GASKET 2 X Crankshaft Bearings, 1 X Crankshaft Seal, 2 X Bearing Cover Gaskets, 1 X Cylinder - Crankcase Gasket, 1 X Crankshaft	
00291-10	CONROD & GASKET 1 X Cylinder - Crankcase Gasket	

External / Body Components of C5

CODE	PARTS DESCRIPTION	IMAGE	CODE	PARTS DESCRIPTION	IMAGE
00291-9	OIL SIGHT GLASS <i>Coarser thread than the C5</i>		00351	SMART START FILTER	
00288-4	OIL BREATHER WITH EXTENSION		00291-17	CAST IRON PISTON BARREL	
00291-12	CYLINDER HEAD		00291-33	90° BRASS EXHAUST ELBOW	
00291-25	FRONT BEARING COVER		00291-1	PULLEY / FLYWHEEL <i>320mm Diameter, 24 - 30mm Tapered Shaft Diameter, has a Keyway.</i>	

TROUBLESHOOTING

Problem	Probable Causes	Corrective Action
Pump will not prime	Blockages on suction pipe	Inspect strainers and other potential sources of blockage including kinking on suction piping. Open or, preferably, eliminate valves on suction piping.
	Venturi Priming valve(s) is closed	Open relevant ball valve depending on the suction type.
	System is leaking	Inspect suction piping, priming system, and discharge check valve for leaks. Tighten flanges as needed. Replace worn gaskets or piping as needed.
	Volute case drain ball valve open	Close the drain ball valve.
	Venturi priming system is not operating properly	Inspect the venturi priming system, including diffuser, mixer, pressure relief valve and compressor. Use vacuum plate with gauge to verify proper operation of vacuum pump.
	Insufficient NPSHa (Noise may not be present)	Recalculate NPSH available. It must be greater than the NPSH required by pump at desired flow.
Pump is carrying over	Flooded suction	Close the relevant ball valves on the venturi priming system.
	Pump is running off curve	Replace with different pump or model or adjust flow to within limits.
Inadequate flow	Insufficient NPSHa (Noise may not be present)	Recalculate NPSH available. It must be greater than the NPSH required by pump at desired flow.
	System is leaking	Inspect suction piping, priming system, and discharge check valve for leaks. Tighten flanges as needed. Replace worn gaskets or piping as needed.
	Worn pump internals, such as cutwater, wear ring, etc.	Inspect pump volute cutwater and wear ring. Replace as needed.
	Blockage in the system	Inspect impeller for ragging, fouling, or blockage. Clean as needed.
	Impeller trim is wearing out	Replace impeller.
	Closed discharge valves	Check and open all valves completely.
Inadequate pressure	System is leaking	Repair or tighten piping.
	Worn pump internals, such as cutwater, wear ring, etc.	Inspect pump volute cutwater and wear ring. Replace as needed.
	Insufficient NPSHa (Noise may not be present)	Recalculate NPSH available. It must be greater than the NPSH required by pump at desired flow.
	Impeller trim is wearing out	Replace impeller.
	Incorrect direction of rotation	Check if the pump is running in the correct direction.
Pump is making strange noises	Pump is running off curve	Replace with different pump.
	Suction is blocked	Make sure water level is deep enough and strainer and piping is clean.
	Impeller and/or wear ring is rubbing	Inspect components for rub marks.
	Insufficient NPSHa	Recalculate NPSH available. It must be greater than the NPSH required by pump at desired flow.
Mechanical seal is failing	Fluid temperature is too high	Make sure pumped fluid is less than 350 °F (177 °C) for standard centrifugal pumps. Make sure pumped fluid is less than 200 °F (93 °C) for pumps with Remko Priming System.
	Fluid is incompatible with pump	Refer to the pump owner's manual for fluid compatibility.
	Casing pressure is too high	Make sure casing pressure is no more than 250 PSI (17.23 BAR).
	Fluid is too abrasive	Check fluid composition and percent of solids. Refer to the pump's specifications.



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