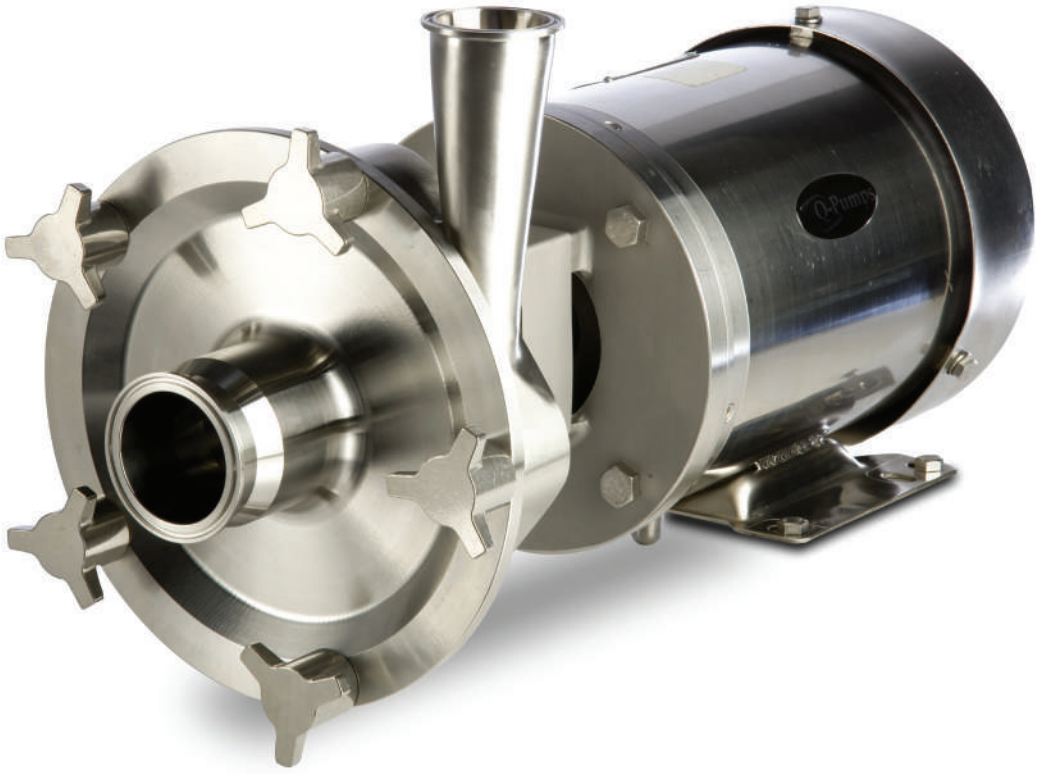
Q-Pumps S.A. de C.V.

Operations and maintenance manual

LC/LD Series

Sanitary centrifugal pumps



www.qpumps.com

Acceso “A” #103, Fraccionamiento Industrial Jurica, Querétaro, Qro., México, 76130
Teléfono: +52 (442) 218 4570 / 218 7400 Fax: +52 (442) 218 4577
sales@qpumps.com

INSTRUCTIONS

Your Q-Pumps centrifugal pump is a rugged unit designed to provide years of low cost pumping service. There is a small amount of necessary care required to ensure you of this expected long service. Every Q-Pumps pump receives a careful running test at the factory to ensure that the head-capacity rating is met in accordance with the Hydraulic Institute Standards and to ensure mechanical soundness. Special instructions and advice for unusual conditions, such as corrosive, abrasive, and other problems are too numerous to be included in this manual, but will be the subject of specific discussion on orders or inquires for special applications.

LOCATION

The immediate environment, in which the unit is located, while usually of prime importance tothe pump, may determine the enclosure needed for the motor. Q-Pumps can supplyCseveral different motor enclosures to meet specific requirements. The LC/LD-Series pumps are supplied with totally enclosed motors as standard. They may be installed where dirt, moisture and mild corrosion are present or in outdoor locations. Wash-down duty motors, with epoxy paint or paint free stainless steel, are designed for applications where the motor is frequently subject to wash-down to maintain a bacteria-free operating environment.

Specialty motors may be required for moist, corrosive, or explosive environments. Motor drain plugs (if not equipped with automatic drains) must be removed periodically to drain accumulated condensation. Pump units should be located where daily visual inspection is possible and no surrounding structure interferes with ventilating air over or through the motor. Submerged suction is the most economical and convenient method of priming a pump when installed in such a position that the top of the casing is below the surface of the liquid to be pumped. The liquid will flow by gravity into the pump and displace the air (through the discharge if possible or a vent when available).

INSTALATION

Begin with a suction line as direct and as simple as possible. The suction line is usually the most sensitive part of the entire pumping system being totally dependent on outside forces to provide liquid flow into the center of the impeller. Locate the pump as close to the supply of liquid as possible, with short and direct suction piping. Use wide radius elbows to help reduce friction loss. Air pockets due to high sections, concentric reducers, valve bonnets, etc. should be eliminated by installing a suction with continual rise or a straight horizontal run with an air eliminator near the pump suction entry. To prevent air pockets use eccentric pipe reducers that are mounted in a horizontal position across the top of the pipeline and valves that can be positioned in a plane rather than the normal upright position as an air pocket may exist in the upright valve bonnet. Above all, remember that until the liquid reaches the leading edges of the rotating impeller vane the pump cannot impart its energy to move the liquid. If possible, try not to connect an elbow directly to the inlet of the pump. This may cause excessive turbulence and hinder pump performance.

STARTING

The pump must be primed before starting, as the mechanical seal depends on the liquid being pumped for lubrication and cooling. Even a short run to determine direction of rotation without first priming may seriously damage the seal. The correct direction of rotation is counter -clockwise when viewed from the suction end of the pump. It is recommended to turn the pump by hand before starting the first time to ensure the unit is not binding.

MAINTENANCE

Since long-term breakdown cannot be tolerated in most services, maintenance procedures and a contingency plan must be established in advance to minimize any production loss caused by down time. During building and start-up it is common to use outside personnel. Operating personnel should acquaint themselves with the pump, particularly its running performance. This will aid in establishing a standard for future reference.

This manual and other information provided with the pump should be filed for future reference. All possible performance data should be recorded once the system is functioning properly and stable. Suction and discharge pressure readings, flow rate, seal leakage rate, bearing temperature, noise and vibration levels all provide input to a pump's performance in the system. It is unlikely that all of this data can be measured, but any information gathered can help alert the user of problems with the pump or system. Operating personnel should know that any changes in the system or the liquid being pumped might have an effect on the pump's performance. It is advisable to also record the fluid temperature, specific gravity, viscosity, liquid concentration, and percent of solid concentration, other additives, and properties. A proper maintenance procedure should begin with a file for each pump. All known data relative to the pump, fluid handled, and system should be included. Complete records of maintenance and repair costs along with a log of unit's operating hours should be kept. In addition, complete pump identification- size, type, operating speed, manufacturer, serial number, model number, and material of construction should be noted.

MAINTENANCE PROCEDURES

Daily Check-possibly the most important inspection will be the daily observation.
1. Seal leakage rate
2. Pressure reading and flow indication
3. Change in operating sound
4. Change in bearing temperature
5. Check to make sure flow is going through the double seal flush lines (for LD Series only)
Semi-Annual Inspection-typically made at 6-month intervals with results noted in pump's
maintenance file.
1. Check of mechanical seal assembly
2. Check of bearing lubrication
Annual Inspection-includes Semi-Annual inspection plus:
3. Removal of seal for inspection
4. Bearing Check
5. Check of axis/running clearance of impeller

CONTINGENCY PLAN

For inspection findings and breakdowns, a contingency plan should be developed. To begin
with, an adequate supply of probable replacement parts should be kept on hand.
The minimum recommended spare parts are as follows:
1. Mechanical seal kit (complete with o-ring set)
2. Volute casing o-ring
3. Impeller key
In addition Q-Pumps recommends
4. Impeller
5. Impeller nut
Where service cannot be interrupted, a complete stand-by pump unit fully assembled (and in a
by-pass line) is recommended.

DISMANTLE AND REPLACE PARTS AS FOLLOWS:

Before attempting any service on the pump or motor, disconnect or lock out electrical power to
the pump motor. If the pump and motor are to be removed as a unit, note the wiring
configuration. Use colored or numbered tape to mark the wire connections of the motor and
power source, for reconnection.
These instructions are limited to fluid ends only. See other drawings and literature applicable to
motors, pedestals, frames, shafts, bearings, etc., if additional repairs are required.
1. Disconnect pump from both suction and discharge piping. Remove the shaft cover guard at this time by taking off the cover guard bolt.
2. Remove the cover by taking off casing nuts. A rubber mallet may be necessary to loosen the nuts.
3. Remove the impeller nut using a 15/16" socket and holding the stub shaft with a 3/8" rod in the predrilled hole. Ease the impeller off the shaft. Pinch bars between the impeller and cover may be required. Be careful not to mar the pump's surface finish. Remove the impeller key by compressing the seal.
4. Remove the rotating parts of the mechanical seal by simply pulling them off the shaft. If the rotating seal does not come off the shaft, you may leave it on and it will come off with the volute. Be very careful not to drop it when you pull the volute off.
5. Loosen the adapter tightening bolt with two 3/4" wrenches. For pumps with frame sizes 280 or larger, use a 3/4" wrench to remove all bolts between the volute and the adapter.
6. Gently slide the pump volute off the pump shaft. The adapter can be widened if necessary by wedging a flat blade screwdriver in the widening slot.
7. Using a 7/16" wrench (or 5/32" Allen wrench for 250 frame motors), unbolt the retaining ring bolts to remove the retaining ring. It is best to have the volute laying on the casing studs, so that the retaining ring faces upwards.
8. Remove all pieces of the stationary seal from the volute housing. Be sure to check the pump for any gaskets still in the seal cavity.
9. Thoroughly clean the seal cavity and shaft and dry with a clean cloth.
10. (For LD Series only) Remove the external double seal components from the stub shaft. Use a 3/32" Allen wrench to remove the seal driver from the stub shaft.

The Mechanical seal is the only expendable pump part. It is suggested that the complete mechanical seal, both stationary and rotating members, be replaced whenever dripping or leakage occurs at the shaft, or whenever parts are removed to the point of separating the primary sealing surfaces.
The fluid end is now completely disassembled: Additional procedures are dictated by purpose for which unit was disassembled.

Mechanical Seal Replacement and Reassembly:
Please see the table on page 11 for proper identification of all pump components.
For LD Series pumps, begin by installing the rotating assembly for the double seal onto the stub shaft. Tighten the seal driver with a 3/32" Allen wrench and follow it with the spring, seal washer, o-ring, and rotating external seal.
1. Begin by setting the pump volute down on the casing studs. Place the seal flat gasket down into the seal seat. Place the stationary seal in the pump on top of the gasket. The smaller face on the seal should enter first.
2. Place the stationary o-ring onto the seal (do not lubricate). The retaining ring will follow this. Using a 7/16" wrench alternately tighten the retaining ring bolts to ensure an even fit.
3. Being careful not to bump the seal on the pump stub shaft, gently slide the volute over the stub shaft and

shoulder it against the adapter.
4. Using two 3/4" wrenches, tighten the adapter bolt to secure the volute, making sure the pump discharge is aligned properly for the system piping. For pumps with frame sizes 280 or larger, use a 3/4" wrench to alternately tighten all bolts between the volute and the adapter.
5. Lubricate the seal o-ring with a food grade lubricant (Use de-ionized water if oil is not permitted i.e. EPDM).
6. Place the seal o-ring and then the seal washer into the rotating seal. These will be followed by the spring, which fits into the slot in the rotating seal. For frame sizes 250 and up, the larger side of the spring goes into the rotating seal.
7. The other end of the spring will fit into the hole in the seal driver. Make sure that the inner driver o-ring is installed in the seal driver before this is done. It may or may not come preinstalled.
8. Slide the rotating seal assembly onto the shaft, with the keyway facing upwards. Compress the rotating seal so that the key can be placed into the shaft keyway.
9. Lubricate the outer driver o-ring and fit it into the groove in the seal driver.
10. Slide the impeller onto the pump shaft over the key. Next, lubricate the impeller nut gasket and install it on the impeller along with threading on the impeller nut. Be sure that the gasket fits into the groove in the impeller nut.
11. Tighten the impeller nut. This should be done with a 15/16" six point socket while using a 3/8" rod in the stub shaft hole to keep the pump shaft from rotating. Check the freedom of parts by hand rotating the impeller.
12. Install the cover onto the pump volute with a new cover gasket. It is best to have the gasket on the cover as it is placed against the volute. Put these on and tighten all cover nuts uniformly. Rotate the shaft by hand to check for rubbing.
13. Re-install the shaft cover guard.
13a. For LD (and LC with seal flush) Series pumps, install the flush lines through the back of the casing. Run flush water at about 1-2 gallons per hour. The maximum pressure for the seal is 5 PSI. Flush water should be throttled before the pump, and there should be about 2-5 feet of vertical tubing after the flush water exits the pump to maintain this. One way to damage a new seal is to run it dry. Be sure the pump is in place and primed before operating.
14. Place the pump back into service and inspect for proper rotation and leaks.

Motor / Pump Shaft Disassembly:
Before attempting any service on the pump or motor, disconnect or lock out electrical power to the pump motor. If the pump and motor are to be removed as a unit, note the wiring configuration. Use colored or numbered tape to mark the wire connections of the motor and power source, for reconnection.
1. Begin with pump disassembly as noted previously.
2. Loosen the shaft collar with an Allen wrench so that the stub shaft can be taken off the motor. A rubber mallet may be used to tap the stub shaft if it will not slide off. Be careful not to drop the shaft collar when the stub shaft comes off the motor.
2a. If the stub shaft does not come off, the volute, impeller, impeller nut gasket, and impeller nut may be assembled onto the shaft to help pull the stub shaft off (make sure that all seal pieces are out of the volute). A cloth between the volute casing and impeller is necessary in this step. Pull on the volute or gently tap it with a rubber mallet to create enough force to free the stub shaft from the motor.
At this time the motor can be replaced by unbolting the adapter from it and separating the two items.

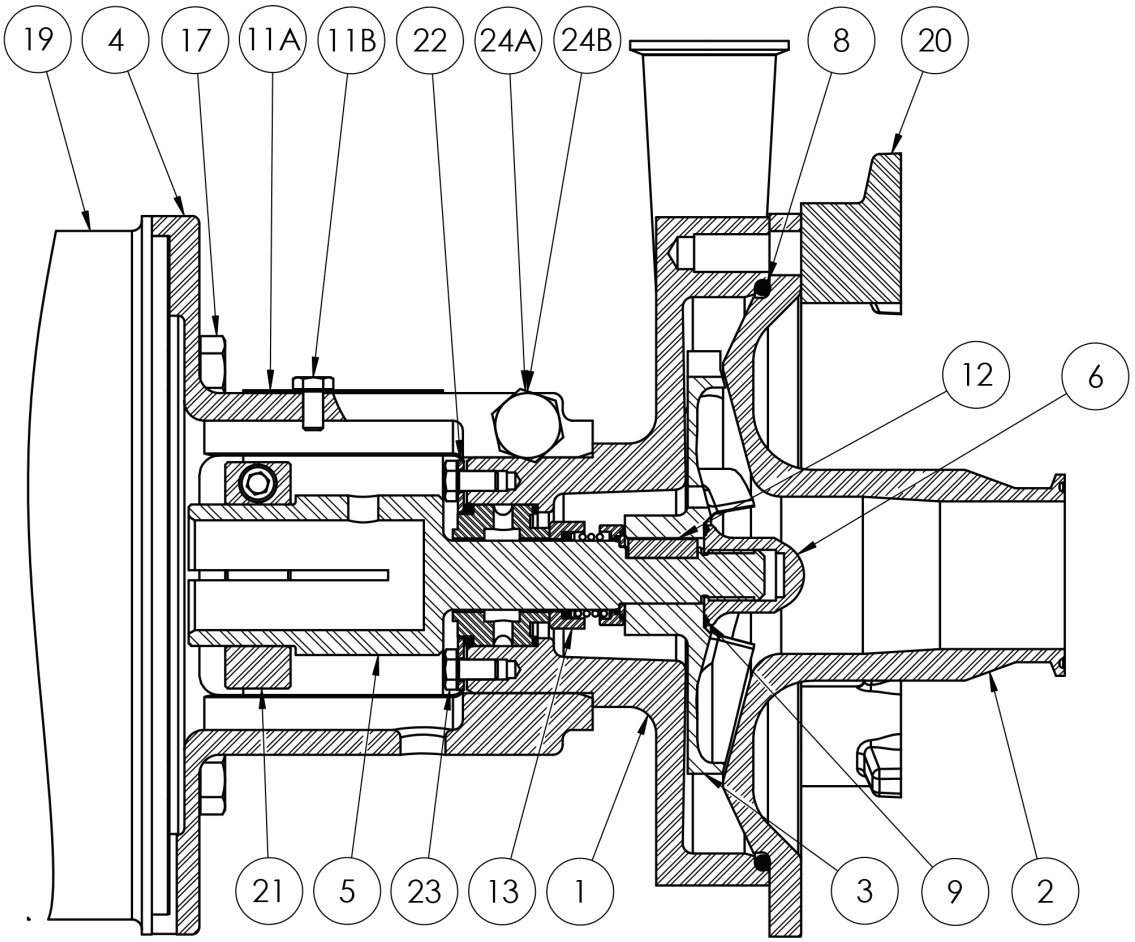
Motor / Pump Shaft Reassembly:
If the pump stub shaft is being replaced, it is recommended that a new shaft collar also be installed.
1. Begin by bolting the adapter onto the motor. Please note correct tightness of all fastening components in the table on page 12.
2. Slide the shaft collar onto the stub shaft and slide the two together onto the motor shaft, keeping the motor keyway in line with one of the slots in the stub shaft. If the collar has an identification groove in it, this will rest against the step in the stub shaft.
3. Line up the slot in the collar with the stub shaft slot and motor keyway gap. Do not tighten the shaft collar yet. Since the shaft was disassembled, the impeller clearance in the volute may have changed. The impeller must be repositioned to ensure the impeller will not rub and also for proper pump performance. The pump will be assembled without the seal kit in order to do this. The critical impeller gap is the gap between the volute and the nearest impeller blade to it.
This will be measured using a feeler gauge. The blades may not all be at the same distance due to manufacturing and balance procedures. Please see the table on page 12 for the correct impeller gaps.
4. Slide the volute over the pump shaft and shoulder it against the adapter.
5. Using two 3/4" wrenches, tighten the adapter bolt to secure the volute, making sure the pump discharge is aligned for the piping. For pumps with frame sizes 280 or larger, use a 3/4" wrench to tighten all bolts between the volute and the adapter.
6. Install the front seal driver onto the shaft, followed by the impeller key, impeller, and impeller nut gasket. Tighten the impeller nut to secure the assembly.
7. With a rubber mallet, gently tap the impeller nut to drive the stub shaft towards the motor while the feeler gauge is between the impeller and volute. This will create the critical impeller gap.
8. When the impeller gap is correct, align the shaft collar slot with the slot in the stub shaft and the motor shaft keyway, and tighten the shaft collar with an Allen wrench to secure the shaft position.
9. Remove the impeller nut, gasket, and impeller from the shaft. Now remove the pump volute and begin with the seal and pump assembly instructions.

LC SERIES PUMPS NEMA 250 AND UNDER
LIST OF PARTS

No.	QTY.	NAME
24B	1	ADAPTER TIGHTENING BOLT
24A	1	ADAPTER NUT
23	4**	CAP SCREW (RATAINING RING)
22	1	RETAINING RING
21	1	SHAFT COLLAR
20	X***	STAR NUT
19	1	MOTOR
17	4	CAP SCREW (MOTOR/ADAPTER)
16*	2	DRIVE SCREW
15*	1	NAME PLATE
13	1	MECHANICAL SEAL

No.	QTY.	NAME
12	1	IMPELLER KEY
11B	1	SHAFT GUARD BOLT
11A	1	SHADT GUARD
9	1	GASKET (IMPELLER SCREW)
8	1	O-RING (CASING/COVER)
6	1	IMPELLER SCREW
5	1	STUB SHAFT
4	1	ADAPTER
3	1	IMPELLER
2	1	COVER
1	1	CASING

* NOT SHOWN
** (6) SOCKET HEAD SET SCREWS FOR 250 FRAME
*** STAR NUT QUANTITY VARIES WITH PUMP MODEL
Nota: Please be sure to always include pump type, size, and serial number with any reference to above numbers and names

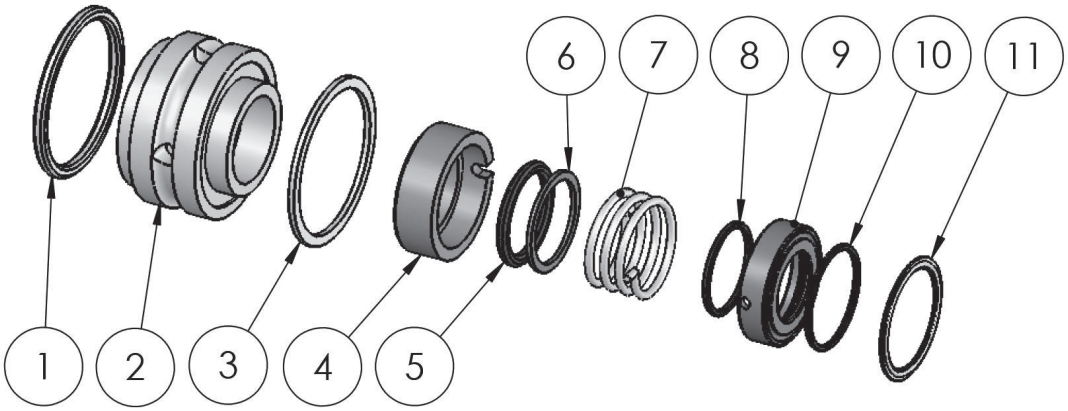


LC SERIES PUMPS SINGLE MECHANICAL SEAL

PART LISTS

No.	QTY	NAME
1	1	STATIONARY O-RING
2	1	STATIONARY SEAL
3	1	PLATE PACKING
4	1	ROTATING SEAL
5	1	ROTATING O-RING
6	1	FLAT WASHER

No.	QTY	NAME
7	1	SPRING
8	1	O-RING INTERNAL MOTORIZED SEAL (MAY BE PRE-INSTALLED)
9	1	MOTOR SEAL
10	1	EXTERNAL MOTOR SEAL
11	1	IMPULSOR NUT PACKING

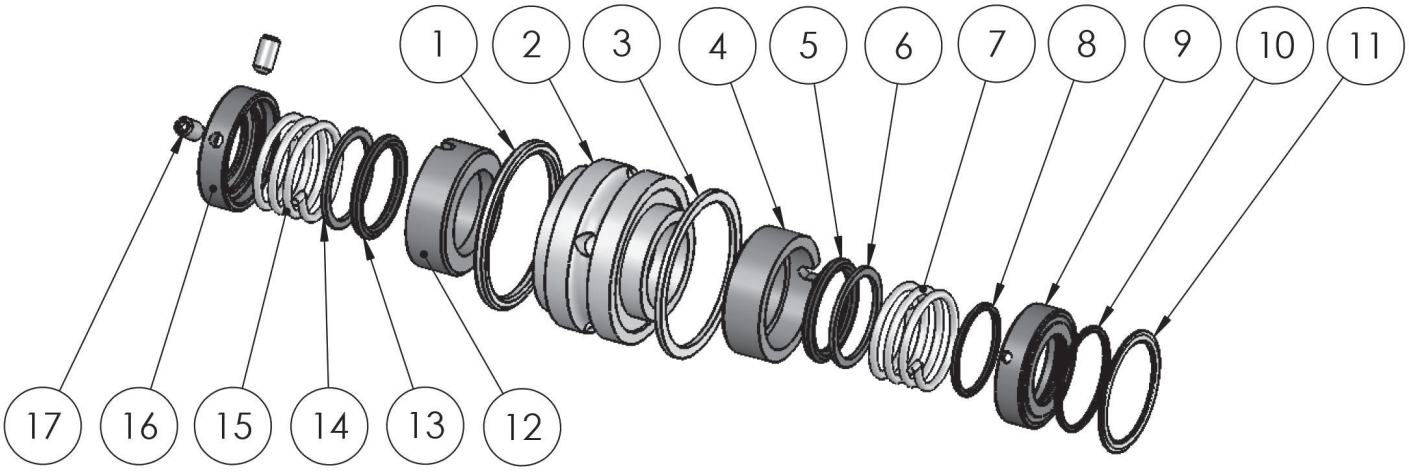


LC SERIES PUMPS DOUBLE MECHANICAL SEAL

PART LIST

No.	CANT.	NOMBRE DE LA PIEZA
1	1	STATIONARY O-RINH
2	1	STATIONARY SEAL
3	1	PLATE PACKING
4	1	ROTATING SEAL
5	1	ROTATING O-RING
6	1	FLAT WASHER
7	1	SPRING
8	1	O-RING INTERNAL MOTORIZED SEAL (MAY BE PRE-INSTALLED)

No.	CANT.	NOMBRE DE LA PIEZA
9	1	FRONT DRIVE SEAL
10	1	O-RING EXTERNAL MOTOR SEAL
11	1	IMPULSOR NUT PACKING
12	1	ROTATING SEAL
13	1	ROTATING O-RING
14	1	FLAT WASHER
15	1	SPRING
16	1	POSTERIOR MOTOR SEAL
17	2	MOTOR SEAL SCREWS



Proper Torque for Bolts on LC/LD Series Pumps

Item	TORQUE ft-lbs	Pump included
Motor bolts	20	NEMA 140
	55	NEMA 180 y 250
	70	NEMA 280
	110	NEMA 320
Ada`pter tightening bolts	55	NEMA 250
Volute casing nuts	50	NEMA 280+
Shaft Collar Bolt(s)	15	NEMA 180
	30	NEMA 210 y 250
	40	NEMA 280 y 320
Impeller nut	40	NEMA 320
	90	See note below
Retaining ring bolts	4.5	NEMA 250
	10	NEMA 280+

The torque of 90 ft-lb is only for models LC-X050, X150 and X160.

Proper impeller gaps for LC/LD Series Pumps

INCLUDED MODELS	GAP
All RXX models	0.020
Model V520	0.020
Model V530	0.040
Model V540	0.040
Model V550	0.060
Model X050	0.060

TROUBLESHOOTING

It is to the user's advantage to be familiar with a systematic procedure to determine reasons and causes for unsatisfactory pump operation. The following list of troubles and causes is intended to assist users in determining the cause of any pumping trouble. Faulty installations can then be corrected and a clear description given to the manufacturer if assistance is required. Human judgement should not be relied on to measure operating conditions. Use proper instruments to measure values of pressure, suction lift, speeds, temperature rise of motors, etc. When motor speeds are incorrect, check connections and measure voltage at the motor terminals.

1. No liquid delivered
a. Pump and suction line not completely primed
b. Speed too low
c. Required discharge too high
d. Suction lift too high
e. Impeller, piping, or fittings completely plugged up
f. Wrong direction of rotation
2. Not sufficient capacity
a. Air leaks in suction pipe or shaft seal
b. Speed to low
c. Required discharge head too high
d. Suction lift too high or insufficient NPSH available
e. Impeller, piping, or fittings partially plugged
f. Insufficient positive suction head for hot water or other volatile liquids
g. Liquid viscosity too high
h. Mechanical problems- wear rings worn, impeller damaged, shaft seal defective
i. Wrong direction of rotation
j. Suction pipe entrance too close to surface of liquid
k. Air pocket in pipe high points
3. Not sufficient pressure
a. Speed too low
b. Mechanical problems- wear rings worn, impeller damaged, shaft seal defective
c. Small impeller diameter
d. Air or gas in liquid
e. Wrong direction of rotation
f. Air pockets in pipe high points
4. Pump operates for a while, then quits
a. Leaky suction line
b. Air leaking in through shaft seal
c. Suction lift too high or insufficient NPSH available
d. Air or gas in liquid
e. Suction piping and fitting not completely freed of air during priming
f. Air pockets in pipe high points
5. Pump takes too much power
a. Speed too high
b. Pumping too much water because required head is lower than anticipated
c. Viscosity and/or specific gravity is higher than specified
d. Mechanical problems- binding at wear rings from distortion due to piping strains, shaft bent,
impeller rubbing casing, and/or stuffing box too tight
e. Wrong direction of rotation

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