5 H.P BRIGGS AND STRATTON ENG
S/N 130202 MODEL # 001501

Robbins & Myers HORIZONTAL
Moyno Fluids Handling Products

2L3. ROTOR = 13.125 — STANDARD
3L3. ROTOR = 18.250 HEAVY DUTY

OPERATION - ASSEMBLY INSTRUCTIONS AND PARTS LIST FOR

"L3" DRIVE END

ROBBINS & MYERS INC
2100 HUNTINGTON DRIVE
FAIRFIELD CA.
94533

(FRAME SIZES 1L3, 2L3, 3L3, 3M2, 6M2, 3P1, 6P1)

GENERAL

The Robbins & Myers Moyno Pump is one of the most versatile pumps available. It has been proven in thousands of applications over the past 40 years. It is backed by the experience gained over the years, both in application and manufacturing know-how.

The Moyno progressing cavity pump is a single-screw rotary pump. The pumping action is created by the single helical rotor rolling eccentrically in the double threaded helix of the stator. In its revolution, the rotor forms in conjunction with the stator a series of sealed cavities 180 degrees apart. As the rotor turns, the cavities progress from the suction to the discharge. As one cavity diminishes, the opposing cavity is increasing at exactly the same rate. Thus, the sum of the two discharges is a constant volume. The result is a pulsation-less positive displacement flow with no valves.

NAMEPLATE DATA

The Moyno Pump nameplate, located on the bearing housing, carries the serial number, frame size, and type designation. All are extremely important and must be used when ordering spare parts.

Record the nameplate data of your pump in the spaces provided in the heading of Page 122.

Moyno Pumps are identified by Frame and Type. Pump Frame is essentially an indication of size. It consists of a number, a letter, and a number (i.e. 2L3). The first number indicates the number of stages in the pumping elements. The letter indicates the model. The final number indicates the size of the rotor-stator pumping elements. A frame 2L3 pump, therefore, has two stages of size 3 pumping elements.

The "L" in the frame size indicates a standard relationship between the housing, bearings, and drive shaft and the size of the pumping elements. Many variations may be made by adapting smaller element sizes to a larger drive end size. This may be necessary due to the severity of a specific pumping application. In cases where the drive end (housing, bearings, and drive shaft) is one size larger than the element size normally used, the pump is referred to as an "M" frame pump (i.e. 3M2). If the drive end is two sizes larger than the element size, the pump is referred to as a "P" frame. Thus, a frame 3L3, 3M2, and 3P1 would all use a common drive end.

Type designation is a series of letters which identify the "Materials of Construction" in component groups of parts. The usual type designation will consist of three letters.

The first letter identifies the material of the suction housing casting or the body casting where the bearing housing is a part of the suction housing.

The second letter indicates the material used in the drive shaft, pins, connecting rod, rotor, and other minor metallic parts in contact with the material being pumped.

The third letter determines the material of the stator. It identifies only the stator material and not that of the tube in which the stator is placed.

A typical type designation such as CDQ would result in the following:

- C = Cast Iron Suction Housing
- D = Tool Steel Internals including drive shaft, pins, connecting rod, rotor, and other minor metallic parts in contact with the material being pumped
- Q = Buna N Synthetic Rubber Stator (70 durometer)

The following letters identify the actual materials that are used in standard construction:

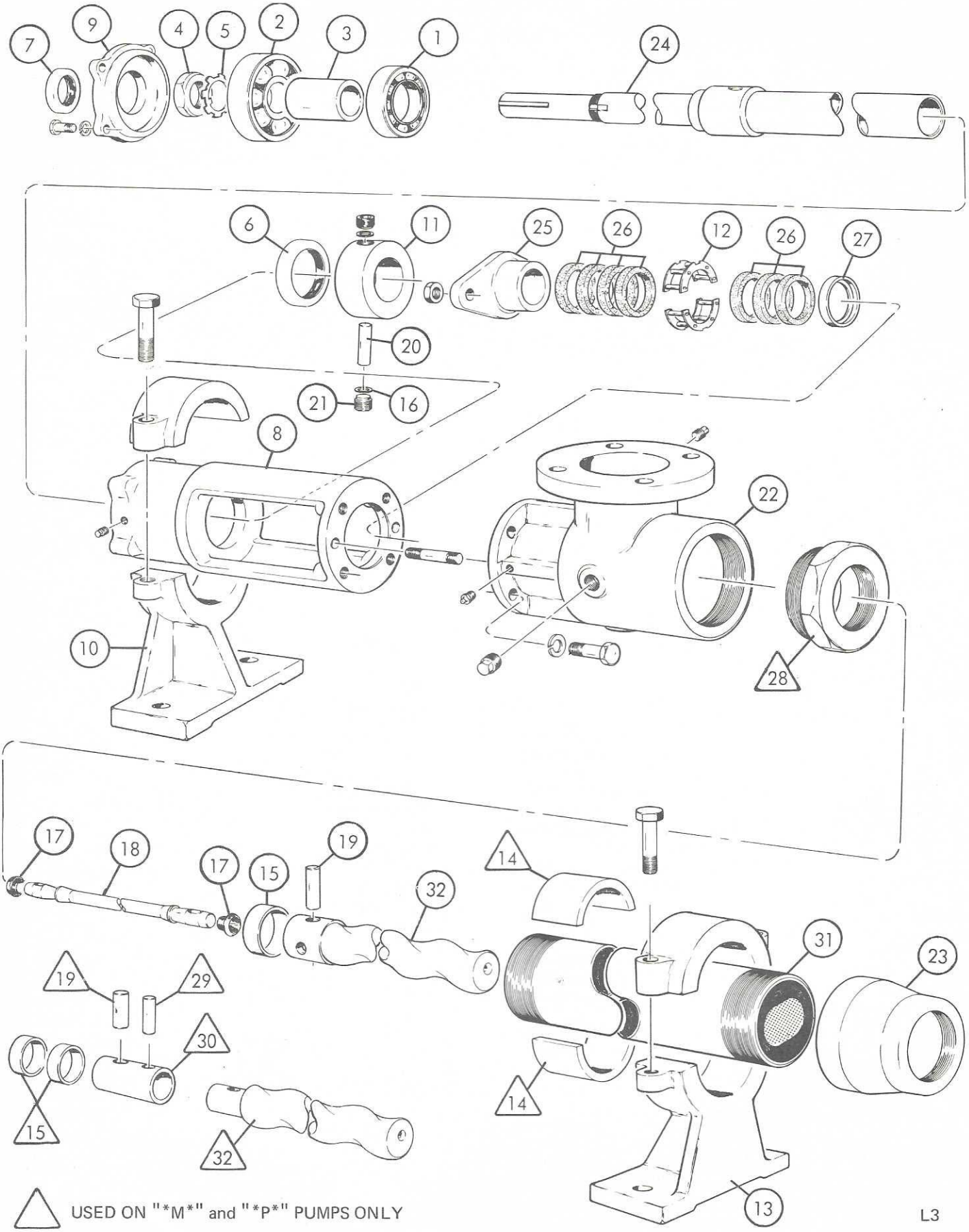
B - EPDM	Q - Buna N (70 durometer)
C - Cast Iron	R - Natural Rubber (55 durometer)
D - Tool Steel	S - Stainless Steel, type #316
F - Viton	T - Teflon (glass impregnated)
G - Stainless Steel, type #416	

A number of variations are possible which may affect the components of a standard pump. Any variation in a pump which indicates a non-standard condition will result in the letter "X" appearing either in the three letter type designation or as a suffix to it.

Example: Type designation CXQ - This could indicate an unusual component part in the internals group.

If the letter "X" appears in the type designation of your pump, contact your nearest Moyno representative or sales office for clarification. It is necessary that the serial number be referenced to properly identify the pump and its variation.

Do not order by Reference Number. Use Part Number on page 122.



△ USED ON "*M*" and "*P*" PUMPS ONLY

L3

NAMEPLATE DATA

Frame Size_____

Type Designation_____

Serial Number_____

"L3" DRIVE END PARTS TYPE DESIGNATIONS

Select type column corresponding to type designation at left.
Order by part number Refer to frame size to select proper rotor and stator.

REF. NO.	DESCRIPTION	CDQ CDR CDB CDF Part No.	CDD CDG CDT Part No.	CSQ CSR CSB CSF Part No.	CSG CSD CST Part No.	SSQ SSR SSB SSF Part No.	SSG SST Part No.
1.	Ball Bearing (Radial)	A03291	A03291	A03291	A03291	A03291	A03291
2.	Ball Bearing (Thrust)	A03301	A03301	A03301	A03301	A03301	A03301
3.	Bearing Spacer	A03331	A03331	A03331	A03331	A03331	A03331
4.	Bearing Lock Nut	A03581	A03581	A03581	A03581	A03581	A03581
5.	Bearing Lock Washer	A03591	A03591	A03591	A03591	A03591	A03591
6.	Grease Seal (Radial)	A03611	A03611	A03611	A03611	A03611	A03611
7.	Grease Seal (Thrust)	A03621	A03621	A03621	A03621	A03621	A03621
	Bearing Kit**	K03291	K03291	K03291	K03291	K03291	K03291
8.	Bearing Housing	A03051	A03051	A03051	A03051	A03051	A03051
9.	Bearing Cover Plate	A03341	A03341	A03341	A03341	A03341	A03341
10.	Pump Support	A03371	A03371	A03371	A03371	A03371	A03371
11.	Shaft Collar	A03491	A03491	A03491	A03491	A03491	A03491
12.	Lantern Ring	A03571	A03571	A03571	A03571	A03571	A03571
13.	Stator Support 1L3, 2L3, 3L3	A03381	A03382	A03381	A03382	A03381	A03382
	Stator Support 6M2, 3M2, 6P1, 3P1	A03381	A03381	A03381	A03381	A03381	A03381
14.	Support Bushing 6M2, 3M2, 6P1, 3P1 only	A03711	--	A03711	--	A03711	--
15.	Pin Retainer	A03501	A03501	A03501	A03501	A03501	A03501
16.	Retaining Screw Washer	A03731	A03731	A03731	A03731	A03731	A03731
17.	Connecting Rod Washer	A03531	--	A03531	--	A03531	--
18.	Connecting Rod	B0325D	B0325D	B0325S	B0325S	B0325S	B0325S
19.	Rotor Pin	B0345D	B0345D	B0345S	B0345S	B0345S	B0345S
20.	Shaft Pin	B0346D	B0346D	B0346S	B0346S	B0346S	B0346S
21.	Drive Pin Retaining Screw	B0354D	B0354D	B0354S	B0354S	B0354S	B0354S
	Connecting Rod Kit***	K0325D	K0325D	K0325S	K0325S	K0325S	K0325S
22.	Suction Housing 1L3, 2L3, 3L3, 6M3	B03021	B03022	B03021	B03022	B03026	B03027
	Suction Housing 3M2, 6P1, 3P1	B03022	B03022	B03022	B03022	B03027	B03027
23.	Reducer 1L3, 2L3, 3L3 only	B03091	B03092	B03091	B03092	B03096	B03097
24.	Drive Shaft +	B03261	B03261	B03266	B03266	B03266	B03266
25.	Packing Gland	B0341D	B0341D	B0341S	B0341S	B0341S	B0341S
26.	Packing +	B03421	B03421	B03425	B03425	B03425	B03425
27.	Packing Washer	B0365D	B0365D	B0365S	B0365S	B0365S	B0365S
28.	Adapter Bushing 3M2, 6P1, 3P1 only	B03511	B03512	B03511	B03512	B03516	B03517
29.	Rotor Head Pin 3M2, 6P1, 3P1 only	B0347D	B0347D	B0347S	B0347S	B0347S	B0347S
30.	Rotor Head 3M2, 6P1, 3P1	B0332D	B0332D	B0332S	B0332S	B0332S	B0332S
31.	Stator Frame 1L3	C4103*	C4103*	C4103*	C4103*	C5103*	C5103*
	Frame 2L3	C4203*	C4203*	C4203*	C4203*	C5203*	C5203*
	Frame 3L3	C4303*	C4303*	C4303*	C4303*	C5303*	C5303*
	Frame 3M2	C4302*	C4302*	C4302*	C4302*	C5302*	C5302*
	Frame 6M2	C4602*	C4602*	C4602*	C4602*	C5602*	C5602*
	Frame 3P1	C4301*	C4301*	C4301*	C4301*	C5301*	C5301*
	Frame 6P1	C4601*	C4601*	C4601*	C4601*	C5601*	C5601*
32.	Rotor Frame 1L3 +	C71031	C71031	C81031	C81031	C81031	C81031
	Frame 2L3 +	C72031	C72031	C82031	C82031	C82031	C82031
	Frame 3L3 +	C73031	C73031	C83031	C83031	C83031	C83031
	Frame 3M2 +	C73021	C73021	C83021	C83021	C83021	C83021
	Frame 6M2 +	C76021	C76021	C86021	C86021	C86021	C86021
	Frame 3P1 +	C73011	C73011	C83011	C83011	C83011	C83011
	Frame 6P1 +	C76011	C76011	C86011	C86011	C86011	C86011

*ADD THIRD LETTER OF TYPE DESIGNATION TO COMPLETE PART NUMBER.
EX: TYPE CDQ PUMP ADD Q TO BASIC NUMBER OF STATOR.

**Bearing Kit includes Items 1 thru 7. ***Connecting Rod Kit includes Items 16 thru 21.

+ See pgs. 124-125 for variations

INSTRUCTIONS FOR DISASSEMBLY AND ASSEMBLY
Frames 1L3, 2L3, 3L3, 3M2, 6M2, 3P1, 6P1

Disassembly Procedure

1. Disconnect the power source.
2. Close the suction and discharge valves to isolate the pump from the line.
3. Turn off flush water to packing or rotary seal if used.
4. Remove drain plug in suction housing to drain away any fluid remaining in pump.
5. Place a support block under suction housing in area of drain plug. Wooden blocks are sufficient. The purpose is to prevent undue stress on pump support when pump is disassembled.
6. Disconnect piping from stator end of pump.
7. **Stator Removal** - With pipe wrench or strap wrench remove discharge reducer (23). Remove cap of stator support and with strap wrench or pipe wrench, unscrew the stator (31) from the suction housing. Pull Stator off the rotor.
8. **Rotor Removal** - The rotor (32) is removed with the connecting rod (18) and rotor pin (19) as a unit. Removal of the unit is accomplished by removing the two drive pin retaining screws (21) located in the shaft collar (11). This step reveals the shaft drive pin (20) which is removed by driving the pin from the drive shaft (24) with a small punch or drift pin. Slide the shaft collar toward the packing gland (25) and remove the retaining screw washers (16) from each side of the drive shaft. The rotor and connecting rod can now be removed by pulling them from the pump.
   To disassemble, clamp the connecting rod (18) by its mid-section in a vise and, with a drift pin, drive the pin retainer (15) from the head of the rotor. The rotor pin (19) can now be removed from the rotor freeing the connecting rod. Remove the connecting rod washers (17) if present.
   On most "M" and "P" frame pumps a detachable rotor head (30) is present. On these pumps a second pin retainer (15) is present to retain the rotor head pin (29).
9. To remove packing (26), remove nuts holding packing gland (25). Slip packing gland from studs, remove packing rings, lantern ring (12), and remaining packing rings. Packing rings can be removed with a standard packing puller. Note: If step 10 is to be performed, it should precede step 9 as packing can then be removed by freeing packing gland and driving packing, lantern ring, and packing washer (27) from housing using a small rod. Rod should enter where stator screws into suction housing. Place rod on packing washer and tap. Entire set should easily exit from opposite end of stuffing box.
10. **Drive Shaft & Bearing Removal** - With rotor removed it is now possible to remove the drive shaft and bearings as a sub-assembly. Remove the four cap screws holding the bearing cover plate (9) and slip from shaft. Insert a bar or rod into the hollow end of drive shaft (24) where it enters the suction cavity. By tapping on the rod the entire assembly will be forced from the bearing housing.
    To disassemble, remove bearing lock nut (4) and bearing lock washer (5). Using an arbor press remove radial bearing (1), bearing spacer (3), and thrust bearing (2). Apply pressure to inner race only.
    When replacing drive shaft and/or bearings, it is recommended that both grease seals be replaced. Grease seals are pressed into the bearing housing and bearing cover plate.

Assembly Procedure

Moyno pumps are reassembled in the reverse order of disassembly with special notes as outlined below:

1. Always replace all old washers, and packing. We also recommend replacing grease seals when new bearings are installed.
2. **Bearing Shaft Assembly** - When installing new bearings, make sure that they are seated against the shoulder on the shaft. Replace bearing lock washer and bearing lock nut. Tighten bearing lock nut securely. Bend tab down onto lock nut to prevent loosening of nut.
   Make sure that the shaft collar, packing gland, and packing washer are installed on the drive shaft as the hollow end emerges in the bearing housing and approaches the stuffing box area.
   When replacing the bearing cover plate, tighten all cap screws evenly to prevent damage to the bearing cover plate and thrust grease seal.
   Do not over-lubricate bearings. (See Maintenance)
3. When installing the connecting rod, make sure that the hole in the rod is aligned with the holes in the drive shaft and shaft collar **before** inserting the pin. Always use retaining screw washers and make sure that the hollowed end of the retaining screw fits over the end of the shaft pin to ensure a tight fit. Retaining screws must seat on retaining screw washers and **not** on pin.
4. When replacing packing, insert three rings on the shaft, the lantern ring, and then four more rings. This will allow the lantern ring to line up with the grease fitting on the stuffing box. **Make sure you stagger the ends of the packing rings.**
   When installing the new packing, you may find that all but one ring will go on the drive shaft. When the pump has run for a short time and the new packing is compressed, this final ring can be installed.
5. When installing the stator on the rotor, it is best to lubricate the rotor with water (or a lubricant compatible with the rubber in the stator) to allow the stator to slip on easier. (Grease or oil is not compatible with type "R" or "B" stators.)
   When replacing the stator, always tighten it with the pipe wrench on the end of the stator nearest the suction housing. This will prevent it from binding and damaging the threads.
   If your stator has a stainless steel sleeve, use a teflon tape or similar material on the threads before replacing -- on all stators with a carbon steel sleeve, use pipe dope.

6. **Caution: Dry operation is harmful to the pump. Always fill the pump with fluid to be handled prior to start up. Check any valves in discharge line to determine that no restrictions exist.**

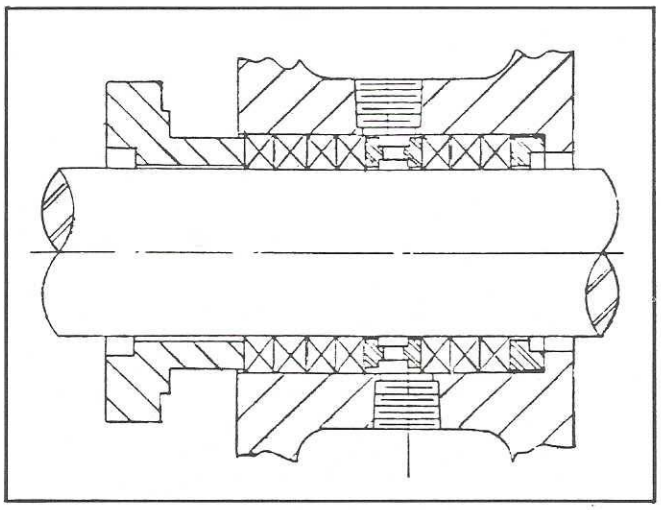
MAINTENANCE

The Moyno pump has been designed for a minimum of maintenance, the extent of which is routine lubrication and adjustment of packing and infrequent lubrication of the bearings. The pump is one of the easiest to work on in that the main elements are very accessible and require few tools to disassemble.

Packing

The Moyno pump is normally furnished with die formed packing. The packing may be either grease lubricated through a grease fitting in the stuffing box or have plumbing connected to the housing to allow a water flush. (See Water Flush of Packing)

Packing gland adjusting nuts should be evenly adjusted so they are little more than finger tight. Over-tightening of the packing gland may result in premature packing failure and possible damage to the shaft and gland. When the packing is new, frequent minor adjustments are recommended for the first few hours of operation in order to compress and seat the packing. Greasing the packing often but with limited quantities of grease is the best practice. This can be done through a grease fitting which leads to a lantern ring in the mid-section of the packing. Do not use a one-piece spiral wrap of packing.

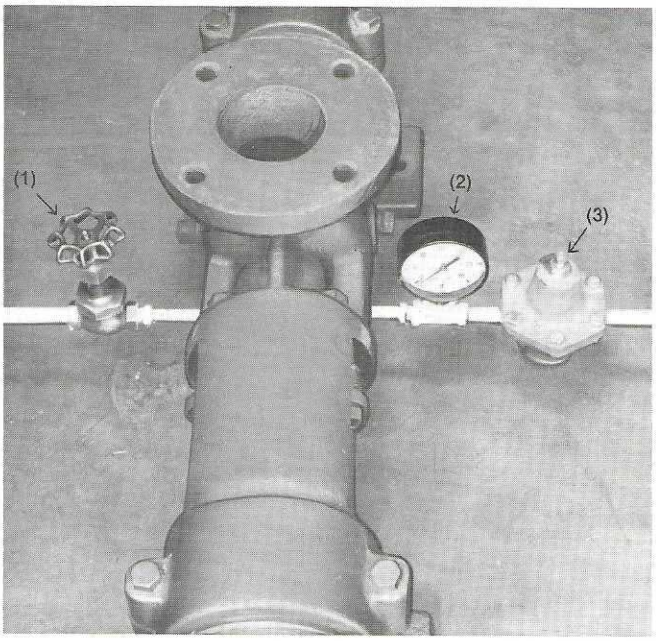


Cross section of stuffing box

Water Flush of Packing

When the material being pumped is abrasive in nature, it may be advantageous to flush the packing to prevent leakage under packing and excessive shaft wear.

Clean water can be injected through a 1/8" NPT tapped hole that normally houses the grease fitting for lubricating the packing. The water can be permitted to leak axially along the shaft in either direction or can be removed from the second tapped hole in the stuffing box. In both cases, the discharge from the stuffing box should be throttled slightly to maintain 10-15 PSI higher pressure in the stuffing box than is present in the suction housing.



Typical water Flush to packing

This is a basic arrangement, other variations can be used. (1) Throttling Valve (2) Pressure Guage (3) Pressure Regulating Valve

Bearings

The Moyno pump is equipped with ball bearings in the drive end size L2 through L10. The bearings are lubricated at the factory and do not need additional lubrication for at least 1500 hours of normal operation.

When relubricating the bearings, the bearing-shaft assembly should be removed (See Disassembly instructions) and cleaned of old grease. Add only enough grease to fill the area between the bearings 1/3 full. Add a few drops of oil to bearing seals before reassembling. It is normal for bearings to run warm to the touch for the first few hours of operation.

Any type of Ep Lithium soap base grease is satisfactory for bearing lubrication. The use of Sodium or Calcium base grease is not recommended.

The following is a partial listing of approved bearing lubricants:

Dow Corning	DC 33
Keystone Lubricating Co.	Keystone #89
Texaco	Regal AFB2
Shell Oil Co.	Cyprina #3
Humble Oil & Refining Co.	Beacon 325
American Oil Co.	Supermil Grease #A72832
Mobil	EP1
Shell Oil Co.	Alvania #2

VARIATIONS OF STANDARD PARTS

ROTORS identified on parts listing are standard size with hard-chrome plated surface. Other variations of rotor size and finish may be ordered by selecting the standard rotor part number and changing the last digit of the rotor number as follows:

2 = Standard size, non-plated
3 = Undersize, chrome-plated
4 = Undersize, non-plated
5 = Oversize, chrome-plated

Do not change rotor sizes without consulting your local Moyno Sales Office. These variations are used for certain specialized pumping conditions only.

PACKING VARIATIONS listed are common to most type designations. Others may be specified by changing the last digit to the following:

1 = Standard on all type CDQ pumps
3 = Standard on all type CDR & SSR pumps
5 = Standard on all type SSQ pumps
7 = Optional--Solid Braided Teflon
8 = Optional--Teflon impregnated white asbestos

DRIVE SHAFTS shown have hard-chrome plating on the packing wear area. If non-plated drive shafts are required, select the standard part number and change the last digit to next higher number. Example: B03261 to B03262.

L3 STANDARD HARDWARE

ITEM	SIZE	# REQ.
Bearing Cover Plate Screw	3/4L X 5/16 D-18	4
Lock Washer		4
Packing Gland Bolt	2 1/4L X 3/8D - 16	2
Nut		2
Stator & Pump Support Screws	1 3/4L X 3/8D-16	4
Suction Housing Drain Plug	1/4D	3
Pipe Plug	1/8D	2
Grease Fitting	1/8D	1
Hex Key	1/4	1

RECOMMENDED SPARE PARTS

The Moyno pump has been designed and built with all wearable parts replaceable. A recommended inventory of spare parts is dependent upon the application and importance of continued operation.

For the shortest possible downtime, we recommend the following parts be stocked:

1 - Rotor
1 - Stator
1 - Connecting Rod Kit

LIMITED WARRANTY

Robbins & Myers, Inc. will repair or replace, at its option, defects in material or workmanship developing within one year from factory shipment providing written notice of such defects is received and substantiated by the Company.

Correction of such defects by repair or replacement, FOB factory, shall constitute fulfillment of the guarantee. The return of all parts submitted under this guarantee must be authorized by the Company and transportation prepaid by the shipper. The Company has no liability for any repairs made outside the Company's factory, unless with prior written consent.

The guarantee will not be applicable unless the apparatus has been properly cared for and operated under normal conditions nor will the Company be responsible for damage resulting from improper storage or handling prior to placing the apparatus in service.

The guarantee of the Company on purchased items, assemblies or accessories which are installed as a separable unit shall not extend beyond the guarantee made by the manufacturer of the component.

Except for the express warranty above set forth, the Company makes no warranty, express or implied, and makes no warranty of fitness for a particular use.

Robbins & Myers
Moyno Fluids Handling Products

Springfield, Ohio 45501

2M/MP/8-77