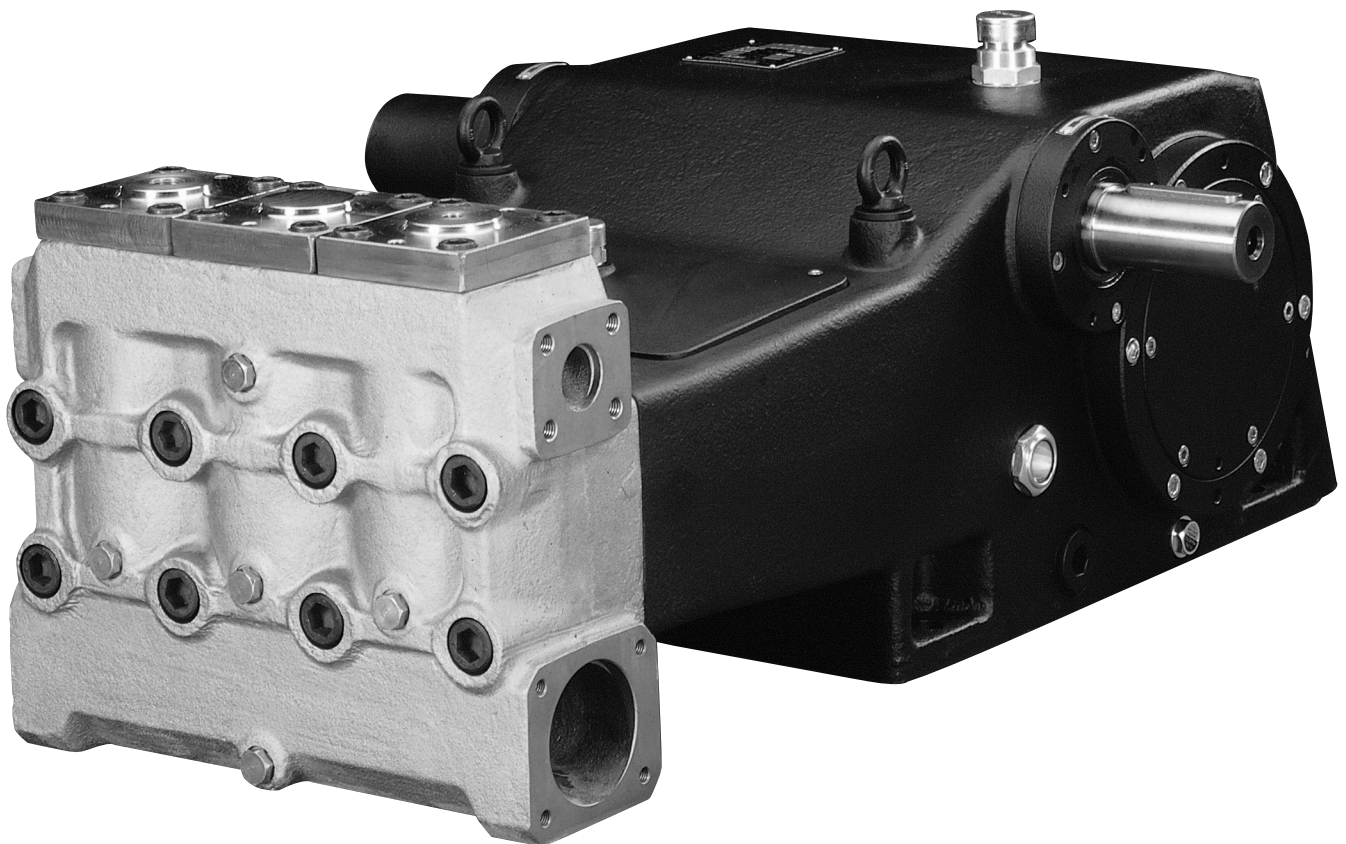




Owner's Manual

- *Installation*
- *Use*
- *Maintenance*



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1. INTRODUCTION

The General Pump LH series of high pressure plunger pumps have been designed for long life. They will provide a long period of trouble free operation, if they are correctly installed and maintained.

Read this manual carefully before using your pump. It contains necessary information for correct installation, use and maintenance, and practical trouble shooting suggestions.

2. GENERAL WARNINGS FOR SAFE OPERATION



WARNING: The misuse of a high pressure water unit and improper pump installation and maintenance increases the risk of personal injury and serious damage to the equipment.



WARNING: High pressure spray can cause serious injury. For professional use only. Observe all warnings.



WARNING: Read and understand all instruction manuals before operating equipment.

2a. Fluid injection hazard

General safety

This pump generates very high fluid pressure. Spray from a gun, leaks or ruptured components can inject fluid through your skin and into your body and cause extremely serious bodily injury including the need for amputation. Also, fluid injected or splashed into the eyes or on the skin can cause serious damage.

- **Never** point the spray gun or wand at anyone or at any part of the body. **Never** put hand or fingers over the spray tip.
- **Always** relieve system pressure before cleaning or servicing any part of the system.
- **Never** try to stop or deflect leaks with your hand or body.
- Be sure all equipment safety devices are operating properly before each use.
- **Always** install a pressure relief valve sized to discharge (bypass) 110% of the maximum pump flow rate.
- Protect all components from environmental damage and high pressure water spray.
- **Always** restrict access to the area to properly trained and required personnel.
- Keep the area clear of debris and loose items.
- **Always** use only genuine General Pump replacement parts when servicing the pump.

Medical treatment

If any fluid appears to penetrate your skin, **GET EMERGENCY MEDICAL TREATMENT AT ONCE. DO NOT TREAT AS A SIMPLE CUT.** Tell the doctor exactly what fluid was injected.

NOTE **NOTE TO PHYSICIAN:** *Injection in the skin is a traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream. Consultation with a plastic surgeon or reconstructive hand surgeon may be advisable.*

Pressure relief procedure

To reduce the risk of serious bodily injury, including fluid injection and splashing in the eyes or on the skin, always follow this procedure whenever you stop spraying for more than 10 minutes, when shutting down, and before checking or repairing any part of the system.

1. Engage the trigger safety latch.
2. Turn the system off.
3. Disconnect the power supply.
4. Shut off the water supply.
5. Disengage the trigger safety latch and trigger the gun to relieve pressure, and then engage the trigger safety latch again.
6. Before long-term (overnight) storage, disconnect the water supply and disconnect the power supply.

Spray gun safety devices

Be sure all gun safety devices are operating properly before each use. Do not remove or modify any part of the gun; this can cause a malfunction and result in serious bodily injury.

Safety latch: Whenever you stop spraying for a moment, always set the gun safety latch in the engaged or “safe” position, making the gun inoperative. Failure to properly set the safety latch can result in accidental triggering of the gun.

Spray tip safety: Use extreme caution when cleaning or changing spray tips. If a spray tip clogs while spraying, engage the gun safety latch immediately. **Always relieve system pressure before removing the spray tip to clean it.**

2b. Fuel and emission hazards: engine driven products

Never fill the fuel tank while the unit is running or hot. The fuel used in this unit is combustible and when spill on a hot surface can ignite and cause a fire. **Always** fill tank slowly to avoid spilling.

Never operate the unit in a closed building. The exhaust contains carbon monoxide, a poisonous, odorless, invisible gas which can cause serious injury or death if inhaled.

Never alter the maximum throttle setting, which is factory set. Tampering with this adjustment can damage the pressure washer and will void the warranty.

2c. Grounding instructions: motor driven products

This product must be grounded. If it should malfunction or break down, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. If the equipment is equipped with a cord having an equipment-grounding conductor and a grounding plug, the plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.



DANGER: Improper connection of the equipment-grounding conductor can result in the risk of electrocution. Check with a qualified electrician or service person if you are in doubt as to whether an outlet is properly grounded. Do not modify any plug provided with the product – if it will not fit the outlet, have a proper outlet installed by a qualified electrician.

2d. Extension cords: motor driven products

Use only 4-wire extension cords that have 4-prong grounding-type plugs and 4-pole cord connectors that accept the plug from the product. Use only extension cords that are intended for outdoor use. These extension cords are identified by a marking, "Acceptable for use with outdoor appliances; store indoors while not in use." Use only extension cords having an electrical rating not less than the rating of the product. Do not use damaged extension cords. Examine extension cord before using and replace if damaged. Do not abuse extension cord and do not yank or pull on any cord to disconnect. Keep cord away from heat and sharp edges. Always disconnect the extension cord from the receptacle before disconnecting the product from the extension cord.



WARNING: To reduce the risk of electrocution, keep all connections dry and off the ground. Do not touch plug with wet hands.

2e. Equipment misuse hazard

General safety

Any misuse of the pump or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in fluid injection, splashing in the eyes or on the skin, or other serious bodily injury, fire, explosion or property damage.

Never alter or modify any part of this equipment; doing so could cause it to malfunction.

Check all equipment regularly and repair or replace worn or damaged parts immediately.

Always wear protective eyewear, hearing protection and appropriate clothing. If using a chemical, read and follow the chemical manufacturer's literature for recommendations on additional protective equipment, such as a respirator.

System pressure

This pump can develop high operating pressure. Be sure that all equipment and accessories are rated to withstand the maximum working pressure of this system. **Do not** exceed the maximum working pressure of any component or accessory used in the system.

Chemical compatibility

Be sure that all chemicals used are compatible with the wetted parts as given in the Technical Data. Always read the chemical manufacturer's literature before using any chemical.

2f. Hose safety

High pressure fluid in the hoses can be very dangerous. If the hose develops a leak, split or rupture due to any kind of wear, damage or misuse, the high pressure spray emitted from it can cause a fluid injection injury or other serious bodily injury or property damage.

ALL FLUID HOSES MUST HAVE STRAIN RELIEFS ON BOTH ENDS. The strain reliefs help protect the hose from kinks or bends at or close to the coupling, which can result in hose rupture.

Tighten all fluid connections securely before each use. High pressure fluid can dislodge a loose coupling or allow high pressure spray to be emitted from the coupling.

Never use a damaged hose. Before each use, check entire hose for cuts, leaks, abrasion, bulging cover, or damage or movement of the hose couplings. If any of these conditions exist, replace the hose immediately.

Do not try to recouple high pressure hose or mend it with tape or any other device. A repaired hose cannot contain the high pressure fluid.

HANDLE AND ROUTE HOSES CAREFULLY. Do not pull on hoses. Do not use chemicals which are not compatible with the inner tube and cover of the hose. **Do not** expose hose to temperatures above 200° F (93° C) or below -40° F (-40° C).

2g. Moving parts hazard

Moving parts can pinch or amputate fingers or other body parts. **Keep clear** of moving parts when starting or operating the system.

Never operate the system without all guards and interlocks installed and functioning. **Always** relieve system pressure before cleaning or servicing any part of the system to prevent discharging high pressure fluid from the gun.

2h. Terms



WARNING or DANGER: Alerts user to avoid or correct conditions that could cause bodily injury.



CAUTION: Alerts user to avoid or correct conditions that could cause damage to the equipment.

NOTE **NOTE:** Identifies helpful procedures and information.

IMPORTANT: United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards – particularly the General Standards, Part 1910, and the Construction Standards, Part 1926 – should be consulted.

3. PUMP IDENTIFICATION

Each pump is fitted with a rating plate. The specifications stamped on it are as follows:

- pump model and version
- maximum rpm
- maximum pressure and volume
- crankcase oil capacity and specification
- serial number

The pump model, pump version and serial number data must be specified when ordering spare parts. If the pump is modified, any change should be mentioned on the rating plate for future reference.

4. TECHNICAL FEATURES

The pump features:

- three horizontal plungers and six different bore sizes
- vertically-arranged valves
- double V-shaped pressure packings lubricated by a water drip feed system
- splash lubricated crank mechanism
- pulley, flexible joint or PTO shaft drive capabilities
- available with 2.95:1, 3.12:1 or 3.39:1 gear reduction. Gear boxes can be fitted on the left or right side of the pump in different positions according to customer requirements

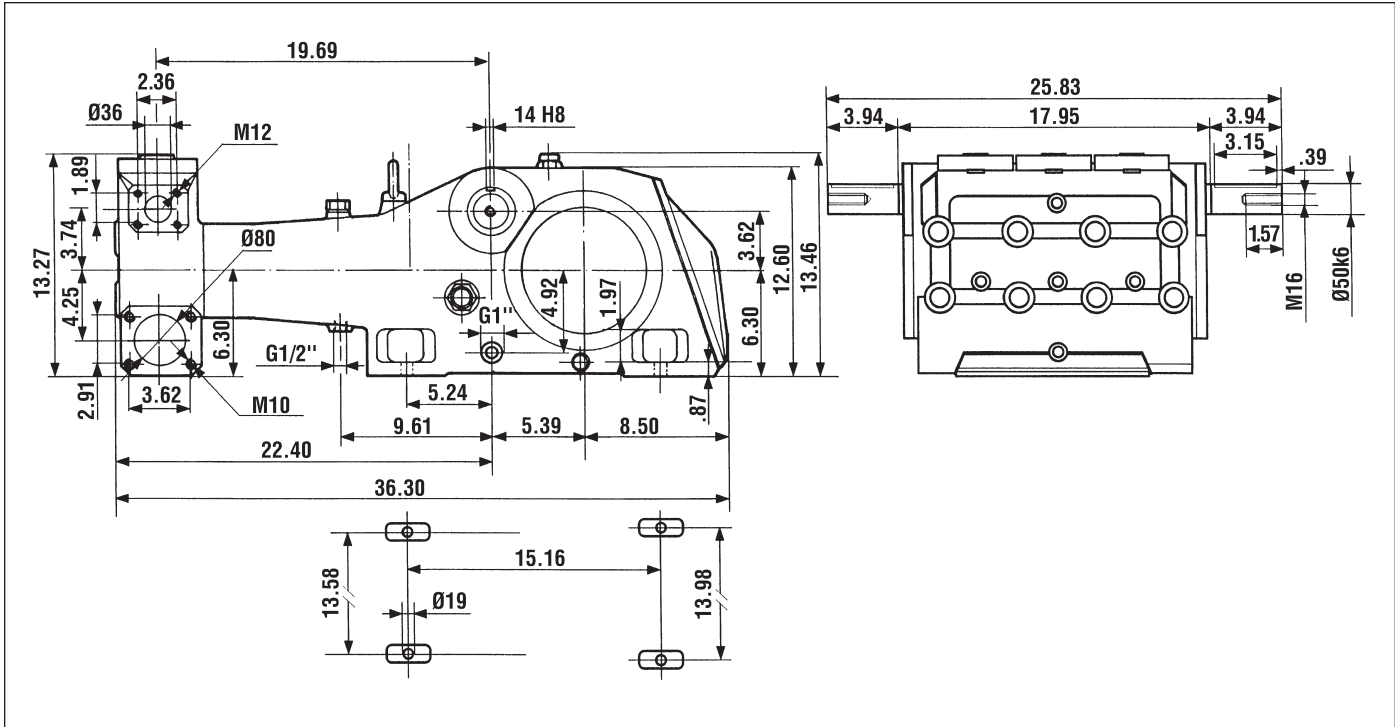
PUMP MODELS

MODEL	RPM*	Volume		Pressure		Power	
		L/Min	GPM	Bar	PSI	KW	HP
LH 40	1500	172	45.4	300	4350	95	135
	1750	188	49.7	300	4350	108	147
	1900	190	50	300	4350	109	148
LH 45	1500	218	57.6	240	3500	101	137
	1750	240	62.9	240	3500	109	149
	1900	240	63	240	3500	110	150
LH 50	1500	269	71.1	200	2900	104	141
	1750	293	77.4	200	2900	112	153
	1900	296	78	200	2900	113	154
LH 55	1500	326	86.1	160	2300	100	136
	1750	355	93.8	160	2300	109	148
	1900	358	94	160	2300	109	148
LH 60	1500	388	102	140	2050	105	142
	1750	423	112	140	2050	113	154
	1900	428	113	140	2050	114	155

Performances refer to theoretical delivery with 100% volumetric efficiency. Under normal operating conditions, pump volumetric efficiency is over 95%. Please contact our technical staff in case of continuous, heavy-duty or special applications.

FEATURES		
• Stroke	90 mm	3.54 in
• Min. Inlet Pressure	1 bar	15 psi
• Max. Inlet Pressure	3 bar	45 psi
• Max. Inlet Water Temperature	60° C	150° F
• Oil Capacity	14 liters	14.8 qts.
• Weight	360 kg	800 lbs.

<p>* 1500 RPM Crankshaft Speed <i>2.95 gear reduction</i> <i>Rated crankshaft speed 560 RPM</i></p> <p>1750 RPM Crankshaft Speed <i>3.158 gear reduction</i> <i>Rated crankshaft speed 554 RPM</i></p> <p>1900 RPM Crankshaft Speed <i>3.389 gear reduction</i> <i>Rated Crankshaft speed 560 RPM</i></p>
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5. CONSTRUCTION FEATURES

The main components of the pump consist of:

- A. crank mechanism
- B. plunger and packing system
- C. manifold

A. CRANK MECHANISM Includes the cast iron crankcase containing the drive system components:

- gas-nitrided, hardened and tempered alloy steel crankshaft mounted on self-adjusting double roller shaft bearings.
- forged split connecting rods with special anti-friction bearings.
- surface-treated steel piston guides.
- splash lubricated by the pump crankcase oil.

B. PLUNGER AND PACKING SYSTEM Primarily composed of ceramic-coated stainless steel plungers and pressure packings with packing supports and cylinders.

C. MANIFOLD Contains the inlet and discharge valves, made of stainless steel and bronze (LHZ and LHN versions are stainless steel). Valve components come out as a single unit.

6. GENERAL INFORMATION ON PUMP USE

The LH pump has been designed to pump, at room temperature, fresh, filtered water or other liquids of similar viscosity that are compatible with the wetted materials (for questionable liquids contact our Technical Department).

6a. Water temperature.

The maximum inlet water temperature is 150° F. Water temperature can be a significant factor in pump life. The higher the water temperature, the more likely it is to create cavitation, resulting in premature seal and valve failures.

For water above 100° F, follow these procedures:

- Feed the plunger pump with a centrifugal pump, supplying at least twice the plunger pump volume at 30 to 45 psi.
- Make the pump run more slowly, de-rating rpm by 30% at least (lowest allowable speed: 350 rpm)
- Make sure the crankshaft turns in the direction indicated by the arrows located near the drive shaft projection (see paragraph 8.b)

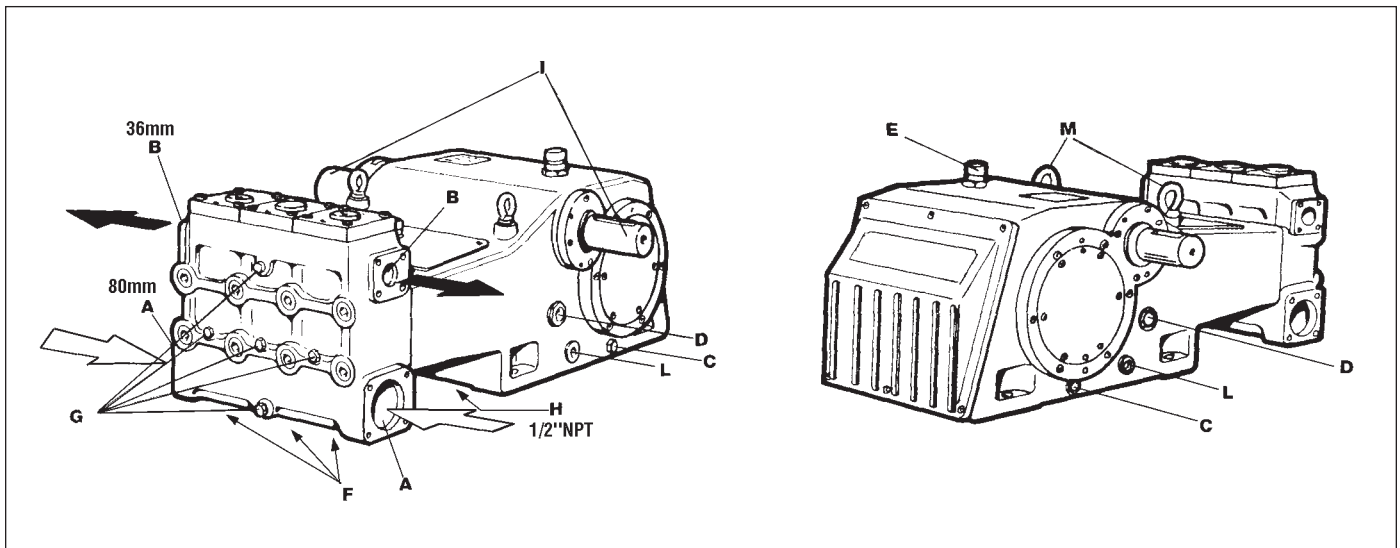
6b. Pump performance

Never exceed the maximum pump flow rate or pressure.

7. CONNECTIONS AND PLUGS

The LH series pumps have:

- 80 MM Dia Inlet Ports (2)** Water supply connection to either or both ports is acceptable. The port not being used must be sealed with the correct plugs.
- 36 MM Dia Outlet Ports (2)** Both ports can be connected to the delivery line, depending on the accessories to be installed and discharge line characteristics.
- Oil Drain Plug (2)** (position 18)* Used to empty the crankcase during oil changes. It includes a magnet to collect metal impurities inside the crankcase.
- Oil Level Indicators (2)** (position 16)
- Oil Fill Plug (1)** (position 23) Used to change or add oil.



- Plug (3)** (position 84) Used to remove the valve assembly from its seat if it is stuck due to excessive scaling. Remove plugs and insert a pin to dislodge the valve assembly and push it out.
- Plugs (5)** (position 81) Used to drain the fluid end.
- 1/2"-NPT Drain Hole** Used to drain water from the pressure packing chamber. Always leave this hole open.
- Shaft Projections (2)** 50 mm diameter, the one not being used should be protected by the cover (position 29).
- Plugs (2)** (position 15)
- Eyebolts (2)**

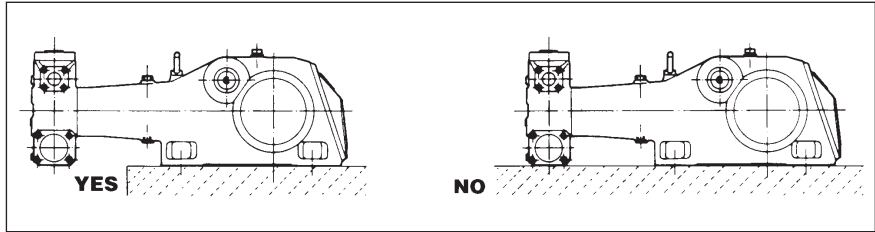
*All positions are referenced as shown on the parts breakdown on page 14.

8. PUMP INSTALLATION

8a. Positioning

The pump must be mounted to a rigid and flat base using the four threaded feet in the crankcase.

Be sure maximum pump inclination during operation does not exceed 5° from level in order to guarantee the correct splash lubrication.

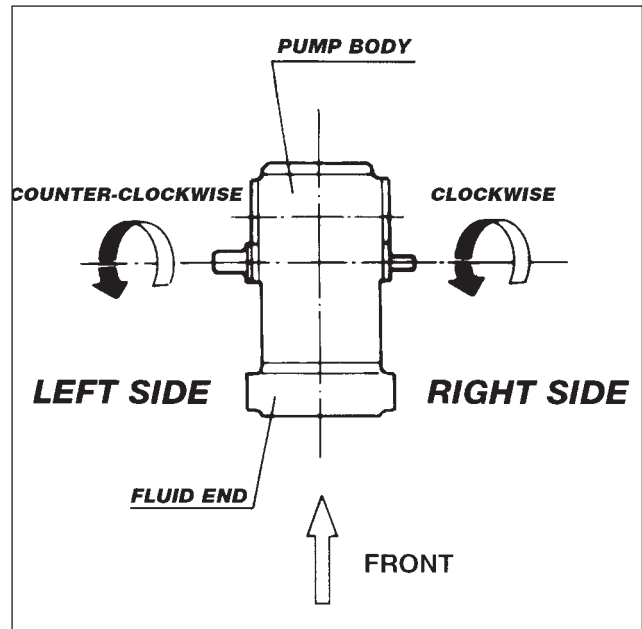


The base must not permit any misalignment or flexing of the pump/transmission coupling.

Never install the pump such that the fluid end rests on the base on which the pump is mounted. The fluid end must be left free and not subject to any force.

8b. Direction of rotation

The diagram at right shows the correct direction of rotation looking at the pump from the **fluid end side**:



8c. Water line connections

In order to isolate any pump vibration, use flexible hoses for both the inlet and discharge lines. The flexible hose must be rigid enough not to collapse during the suction stroke, when a partial vacuum may occur.

8d. Pump feeding

LH pumps require an inlet pressure at the inlet port between 15 psi and 45 psi.

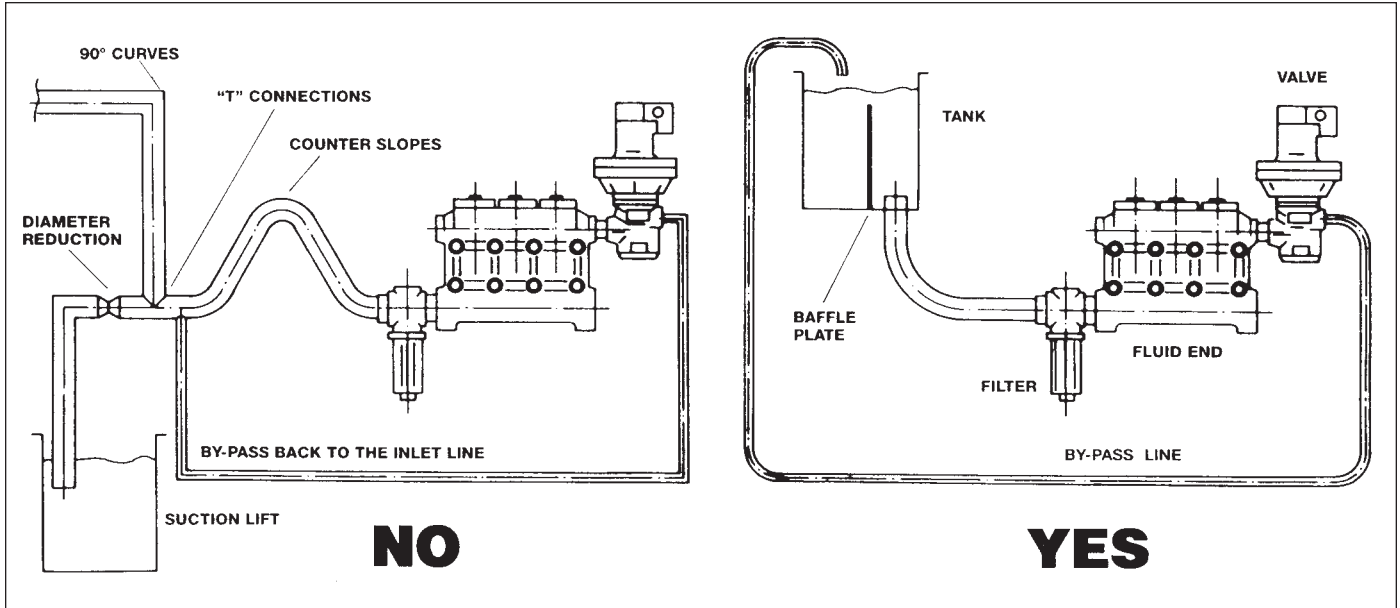
The feed pump (centrifugal type) must: (1) supply at least twice the plunger pump volume at the required pressure, (2) operate independently and (3) supply its full rated performance even if the plunger pump is run below its rated performances.

We recommend a pressure switch in the inlet line (after the filters) to prevent the LH pump from starting until the inlet pressure has reached 15 psi. This pressure switch will also stop the pump in case of filter clogging.

8e. Inlet line

THE INLET LINE **MUST** HAVE THE FOLLOWING CHARACTERISTICS:

- Minimum internal diameter of 40 mm (1.574 in.).
- No bends or changes in diameter within 12 inches of the suction port.
- Be airtight.
- Minimize all 90° elbows, diameter reductions, counter slopes and T-connections, and must not be connected with other pipelines within 10 diameters of inlet port.
- Be positioned so that it remains filled after the pump stops.



RECOMMENDATIONS:

- Do not connect the bypass line directly to the inlet line.
- Do not use high pressure flexible hose for the inlet line.
- Install the inlet pressure gauge after the filters and as close as possible to the pump inlet port.
- Be sure that the feed pump tank dimensions and the minimum water level do not create turbulence at the pump inlet port. Recommended minimum tank volume is five times discharge flow rate.
- Connect the by-pass directly to the feed tank and be sure that both the by-pass and feed tank flows do not create turbulence at the pump inlet port. Baffle plates should be inside the tank.
- Before connecting the suction line to the pump inlet port be sure the line is clean inside.
- Do not install a chemical injector on the inlet line.

8f. Filtration

LH pumps require 200 to 360 micron filtration.

The filters should be installed as close as possible to the pump, allow easy inspection and have the following characteristics:

- The capacity of each filter must be at least 3 times the rated pump volume.
- Filter port diameters should not be smaller than the pump inlet ports.

IMPORTANT NOTE: Clean the filters daily, more often in poor water conditions, to prevent premature pump wear and damage.

8g. Discharge line

To ensure the discharge line is correctly installed:

- Install a suitable safety valve on the discharge line.
- Use only high pressure hoses and fittings that exceed the working pressure of the system.
- Use glycerine filled pressure gauges.

9. START-UP AND RUNNING PROCEDURES

9a. Start-up checks

Before starting the pump, be sure that the following conditions have been met:

- Inlet line must be connected, and tight: **the pump must never run dry.**
- All ON-OFF valves in between the pump and water supply must be open. Be sure water flows into the pump.
- Be sure all connections are tight.
- Set the discharge line into the dump mode, to prime the pump.
- Be sure joint alignment, belt tension or U-joint angle are within Manufacturer's specification.
- Check oil level.

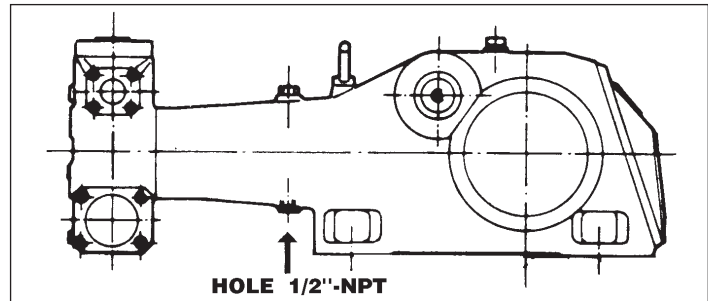
NOTE: If pump has not been operated for a long period of time, check the inlet and discharge lines for scaling.

9b. Start-up and operation

- Make sure the correct inlet pressure is provided.
- Do not start pump and motor (or engine) under load. Set the regulating valve to zero or set the discharge line into the dump mode.
- Check for proper direction of pump rotation.
- Be sure the rotating speed does not exceed the rated speed.
- Before putting the pump under pressure, let the pump run for some time until the oil flows freely.
- After stopping the pump, relieve the pressure from the system.

9c. Cooling system

During operation a small amount of water (a few drops a minute) is released from the pump fluid end. This leakage is designed to provide lubrication for the pressure packings. The leakage is drained out of the pump through a hole in the cover (position 12). **Always leave this hole open.**



10. MAINTENANCE INSTRUCTIONS

10a. Crank mechanism maintenance

Check the oil level (positions 16)* frequently. It should be checked on a weekly basis. Stop the pump and provide immediate service if water gets into the oil. Before filling the pump with new oil, wash the crankcase and crank mechanism with a solvent and allow to dry completely. Oil seals (position 56) should be replaced every three years.

Change oil after 50 working hours and every 500 working hours thereafter.

The oil must be changed at least once a year.

We recommend you use General Pump Industrial oil or its equivalent. (If working at normal room temperature – from 32° to 113° F – use General Pump Series 220 Oil (P/N 100217).)

Pump oil capacity is 14.8 quarts (14 liters).

During oil changes, the pump oil should be at working temperature; be sure to clean the magnetic plug (position 18) and check the cover (position 12) for grease sediment.


*All positions are referenced as shown on the parts breakdown on page 14.

10b. Fluid end maintenance

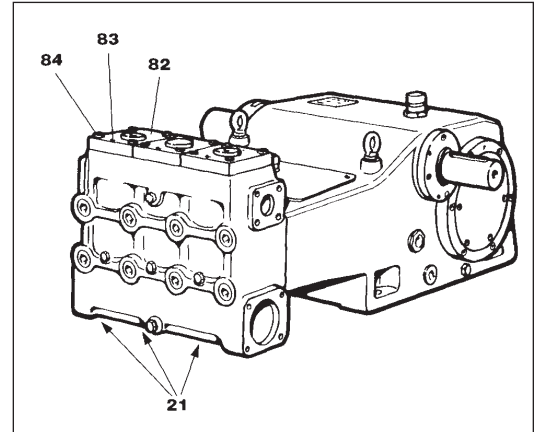
The fluid end **does not** require periodic maintenance.

Service operations are limited to valve inspection and/or replacement, when necessary:

- Step 1. Loosen the four valve cover screws (position 86)* and gradually tighten the set screws to lift the valve unit and allow extraction by hand.

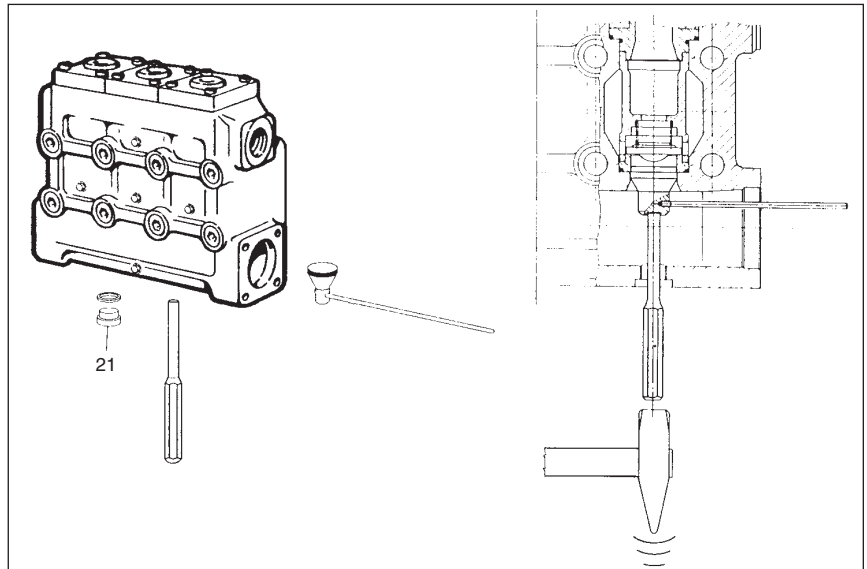


IMPORTANT NOTE: BEFORE REPOSITIONING THE VALVE UNITS, CLEAN AND DRY ALL VALVE HOUSINGS INSIDE THE MANIFOLD.



- Step 2. Replace each valve assembly. Before repositioning the valve assemblies in the fluid end, unscrew the set screws until they reach their initial position.
- Step 3. Replace all valve and valve cover O-rings at every inspection.
- Step 4. Replace valve cover screws (position 86) and tighten the screws to 90 ft.-lbs. in an alternating sequence.

If excessive scaling inside the fluid end prevents valve extraction, open one of the three inlet ports, loosen the three plugs (position 84), and push the valve unit out as shown.



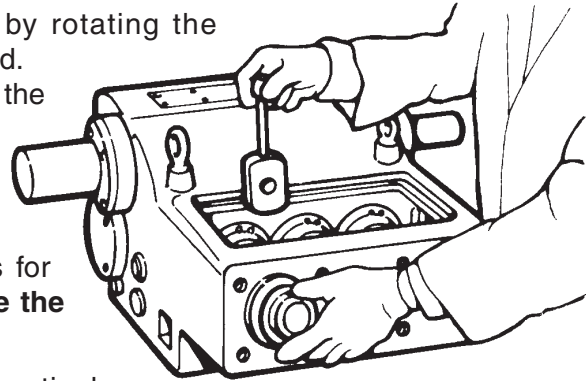
10c. Pressure packings and plungers maintenance

Periodically check the amount of water drained out by the pump through the hole provided in the cover. It clearly shows the pressure packing state of wear; replace packings if water dripping becomes continuous.

*All positions are referenced as shown on the parts breakdown on page 14.

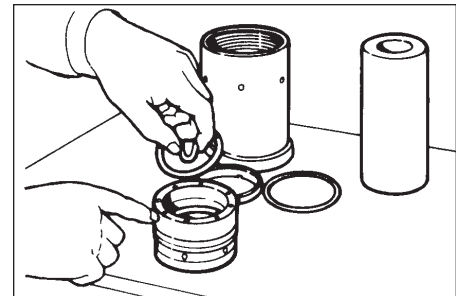
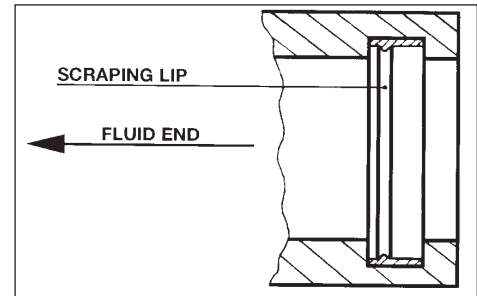
Inspection/replacement of the pumping unit components:

- Step 1. Remove the manifold (position 83) by loosening the eight mounting screws (position 82).
- Step 2. Remove the plunger bolt and washer (positions 63 and 62) and push the plunger forward.
- Step 3. Remove the cover (position 27).
- Step 4. Move guide piston (position 53) backwards by rotating the crankshaft until the bottom dead center is reached.
- Step 5. Insert a pin of adequate dimensions in between the guide piston and packing support (position 89).
- Step 6. Rotate the crankshaft to move the guide piston forward. The pin will move forward, ejecting the complete pumping unit.
- Step 7. Split the pumping unit, check the components for wear and replace as necessary. **Always replace the pressure packings.**



NOTE: The scraper (position 90) features a particular shape on its internal diameter which performs the correct scraping effect only if fitted in the correct position, as shown.

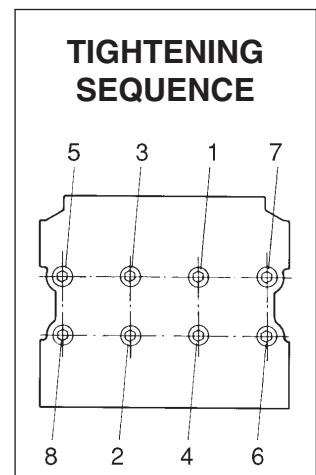
- Step 8. To fit the scraper in place, shape it with your fingers as shown. Once in place, seat the scraper with your fingers.
- Step 9. When replacing the pressure packings, apply a very small quantity of silicone grease on their lips to ease assembly.
- Step 10. Set up the complete pumping unit (plunger included) and fully tighten the cylinder (position 86) with the packing support (position 89).
- Step 11. Fit the complete pumping unit in the pump in one single block, paying attention to the correct position of the wiper (position 60).
- Step 12. Tighten the plunger screws (position 63) to 72 ft.-lbs. The washer (position 62) (or the O-ring for LHZ-LHN versions) **should always be replaced.**
- Step 11. Install the manifold and tighten the screws (position 82) to 260 ft.-lbs. in an alternating sequence as shown.



10d. Fastener torque values

Always use a torque wrench:

POSITION*	DESCRIPTION	Kgm	Nm	Ft-lbs
86	Valve cover screws	13	130	95.8
82	Manifold screws	36	353	260
63	Plunger screws	8	79	58
48	Connecting rod screws	10	100	72
5	Side & rear cover bolts	2	20	14.7
7	Flange bolt	7	70	51.5
11	Oil seal flange bolt (plunger rods)	1	10	7.3
31	Bearing flange bolt	2	20	14.7
10	Bearing flange bolt	4	40	29.4



(position 82)

*All positions are referenced as shown on the parts breakdown on page 14.

11. PUMP STOPPED FOR LONG PERIOD

Before starting the pump after a long period of inactivity: (1) check for correct oil level, (2) check the valves as indicated in section 10b and (3) use the starting procedures indicated in section 9.

When a long period of inactivity is scheduled, drain the entire suction and delivery line and run the pump for a few seconds to drain out all water.

12. FROST PRECAUTIONS

When there is risk of freezing:

- Drain all suction and delivery lines (filter included).
- Run the pump for a few seconds to drain the water collected inside the manifold. Flush the system with a 50-percent solution of anti-freeze until the anti-freeze works throughout the system.

WARNING: If a pump is frozen or appears frozen **DO NOT OPERATE THE PUMP** until the entire system has been thawed.

13. LHZ-LHN Models

Installation, use and maintenance instructions for these models are the same as the standard ones. For the LHN versions, rinse with pure water after use.

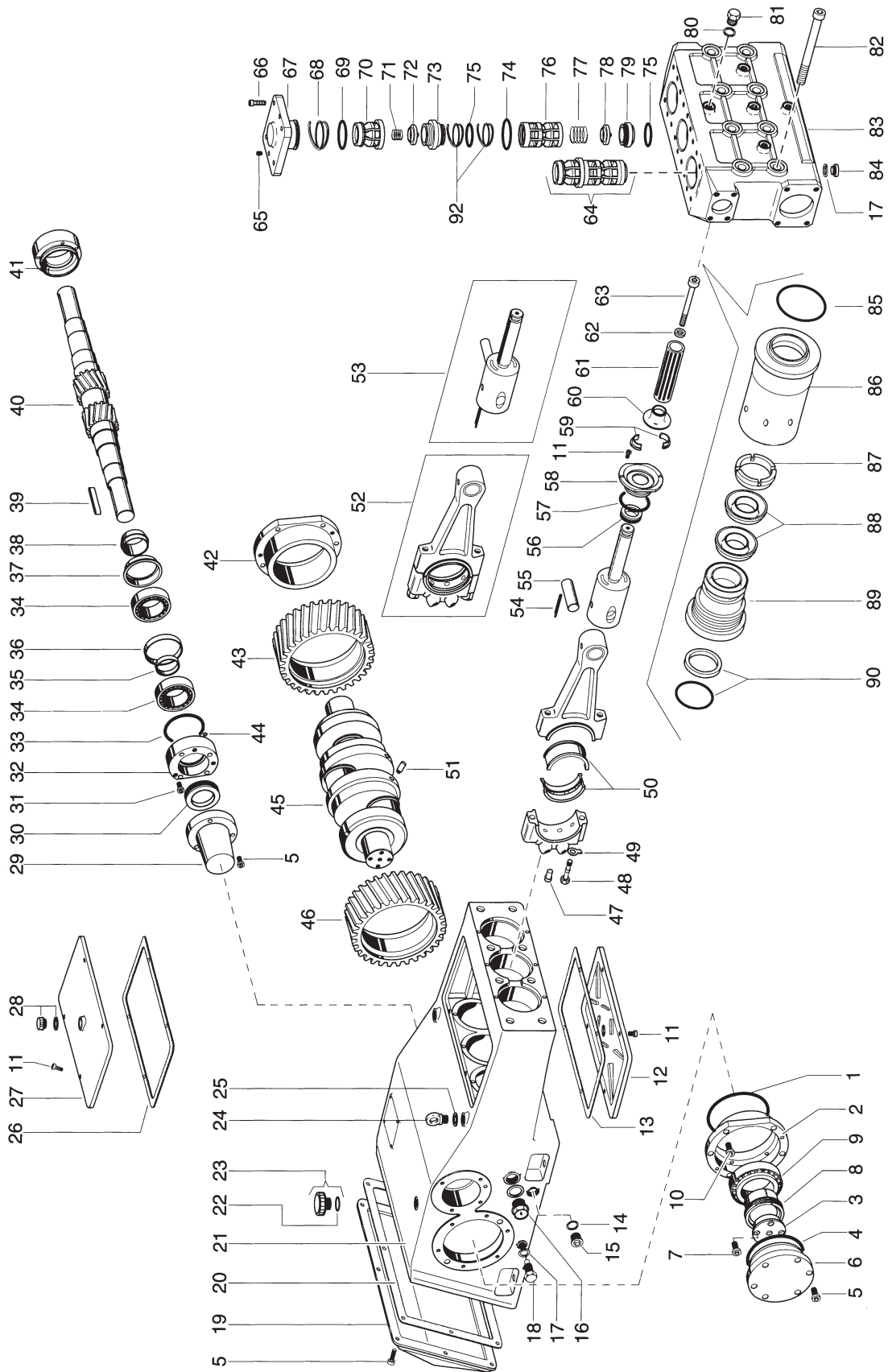
Torque values for LHZ-LHN models

Tighten screws using a torque wrench.

POSITION*	DESCRIPTION	Kgm	Nm	Ft-lbs
86	Valve cover screws	13	130	95.8
82	Manifold screws	36	353	260
63	Plunger screws	8	79	58
48	Connecting rod screws	10	100	72
5	Side & rear cover bolts	2	20	14.7
7	Flange bolt	7	70	51.5
11	Oil seal flange bolt (plunger rods)	1	10	7.3
31	Bearing flange bolt	2	20	14.7
10	Bearing flange bolt	4	40	29.4

*All positions are referenced as shown on the parts breakdown on page 14.

10e. Parts breakdown



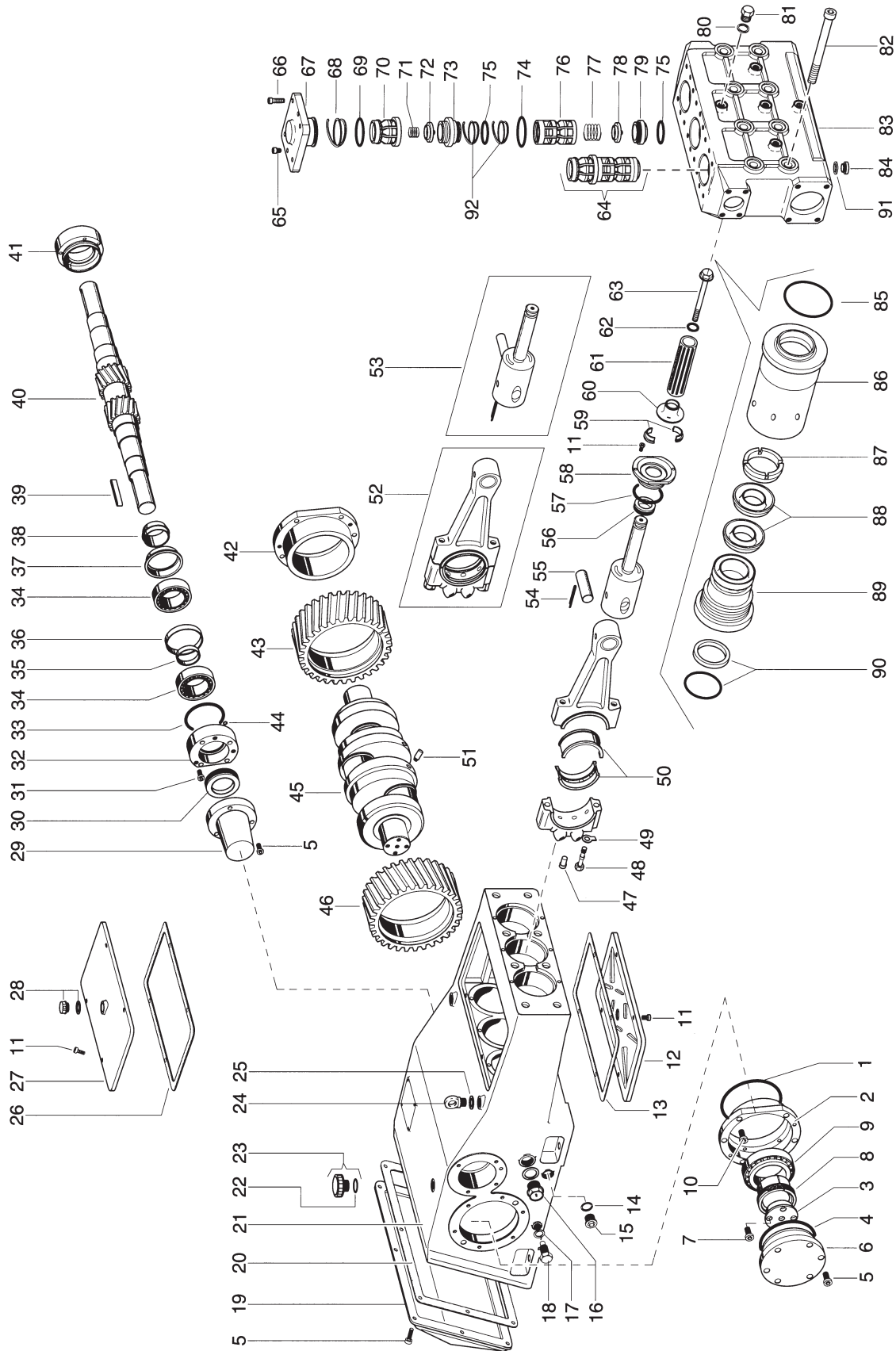
LH SERIES PARTS

Item	Part number	Description	Qty	Item	Part number	Description	Qty	Item	Part number	Description	Qty
1.	F881010133	OR Ø183.82x2.62	2	41.	F063400310	End cap	1	73.	F081200710	Valve seat	3
2.	F010100070	Side cover support bushing	1	42.	F010100080	Side cover	1	74.	F881011168	OR Ø 72x3 - Spec.	3
3.	F030000010	Crankshaft bearing retainer block	2	43.	F052000000	Ring gear 1500 rev/min. right (Z 59)	1	75.	F881011161	OR Ø 56x3 - Spec.	6
4.	F881010132	OR Ø152.07x2.62	2		F052000030	Ring gear 1750 rev/min. right (Z 60)	1	76.	F021200070	Valve guide, inlet	3
5.	F871121152	SHCS M 8x20	23		F052000140	Ring gear 1900 rev/min. right (Z 61)	1	77.	F090200040	Valve spring, inlet	3
6.	F063400280	Side cover support bushing	2	44.	F881010003	OR Ø 8.73x1.78	2	78.	F082200050	Valve poppet, inlet	3
7.	F871131102	SHCS M 12x25	8	45.	F050000060	Crankshaft	1	79.	F081200060	Valve seat, inlet	3
8.	F030000020	Retainer	2	46.	F052000040	Ring gear 1500 rev/min. left (Z 59)	1	80.	F872041300	Gasket washer Ø1/4"	5
9.	F811111017	Bearing	2		F052000040	Ring gear 1750 rev/min. left (Z 60)	1	81.	F821201051	Plug G 1/4"	5
10.	F871125154	SHCS M 10x30	12		F052000150	Ring gear 1900 rev/min. left (Z 61)	1	82.	F871151118	SHCS M 20x160	8
11.	F87115152	SHCS M 6x14	14	47.	F034000000	Connecting rod pin	3	83.	F064100200	Manifold	1
12.	F040400050	Lower cover	1	48.	F035000070	Connecting rod bolt	6	84.	F084000010	Plug G 1/2" NIK	3
13.	F080600030	Gasket, lower cover	1	49.	F872067006	Keeper Ø12	6	85.	F881011253	OR Ø 72x4 - Spec.	3
14.	F872043008	Washer, aluminum Ø1"	2	50.	F023300000	Bearing, connecting rod	2	86.	F062200090	Cylinder LH 40	3
15.	F821203006	Plug G 1"	2	51.	F020200000	Crankshaft pin	2		062200100	Cylinder LH 45	3
16.	F801053012	Oil level sight glass G 1"	2	52.	F250000030	Connecting rod, complete	3		F062200110	Cylinder LH 50	3
17.	F872043002	Washer, aluminum Ø1/2"	5	53.	F250001070	Piston complete	3		F062200120	Cylinder LH 55	3
18.	F801057002	Plug, magnetic G 1/2"	2	54.	F872142015	Roll pin Ø 5x36	3		F062200130	Cylinder LH 60	3
19.	F063400240	Rear cover	1	55.	F071000050	Wrist pin Ø 35	3	87.	F031200100	Head ring LH 40	3
20.	F080600010	Gasket, rear cover	1	56.	F881081001	Seal Ø 35x47x8.5 - Spec.	3		F031200110	Head ring LH 45	3
21.	F060100160	Crankcase	1	57.	F881010128	OR Ø 72.69x2.62	3		F031200210	Head ring LH 50	3
22.	F881010116	OR Ø 29.82x2.62	1	58.	F063400420	Rod seal retainer	3		F031200220	Head ring LH 55	3
23.	F801054027	Plug, vented G 1"	1	59.	F030000070	Split bushing	3		F031200230	Head ring LH 60	3
24.	F872026003	Eye bolt M 16	2	60.	F041200010	Retainer	3	88.	F881020011	Packings LH 40	6
25.	F030000030	Washer	2-4	61.	F024200250	Plunger LH 40	3		F881020012	Packings LH 45	6
26.	F080600020	Gasket, top cover	1		F024200260	Plunger LH 45	3		F881020014	Packings LH 50	6
27.	F040400030	Top cover	1		F024200270	Plunger LH 50	3		F881020015	Packings LH 55	6
28.	F801056002	Plug G 1/2"	1		F024200280	Plunger LH 55	3		F881020016	Packings LH 60	6
29.	F040400070	Cover, PTO	1		F024200290	Plunger LH 60	3	89.	F022300210	Packing support LH 40	3
30.	F881080026	Seal Ø 55x75x10	2	62.	F872040004	Washer Ø14 - Spec.	3		F022300220	Packing support LH 45	3
31.	F871121154	SHCS M 8x30	8	63.	F871135520	SHCS M 14x160 SS LH 40-45	3		F022300230	Packing support LH 50	3
32.	F063400300	Side cover, PTO	1		F871135514	SHCS M 14x100 SS LH 50-55-60	3		F022300240	Packing support LH 55	3
33.	F881010130	OR Ø 94.92x2.62	2	64.	F208005230	Assembly, Valve	3		F022300250	Packing support LH 60	3
34.	F811010109	Bearing, PTO	4	65.	F871245356	Set screw M 10x20	12	90.	F881061015	Scraper LH 40	3
35.	F031000020	Ring, internal	2	66.	F871135102	SHCS M 14x40	6		F881061017	Scraper LH 45	3
36.	F031000010	Ring, external	2	67.	F063200030	Valve cover	2		F881061018	Scraper LH 50	3
37.	F061000000	Bushing	2		F063200040	Valve cover w/G 1/4" port	1		F881061019	Scraper LH 55	3
38.	F031400000	Cone	2	68.	F881112003	Anti-extrusion ring	3		F881061021	Scraper LH 60	3
39.	F872097013	Key	1	69.	F881011252	OR Ø 70x4 - Spec.	3	92.	F881112011	Anti-extrusion ring	6
40.	F052000020	Prinion 1500 rev/min. (Z 20)	1	70.	F021200090	Valve cage	3				
	F052000050	Prinion 1750 rev/min. (Z 19)	1	71.	F090200050	Valve spring	3				
	F052000160	Prinion 1900 rev/min. (Z 18)	1	72.	F082200060	Valve poppet	3				

REPAIR KITS

ITEM	LH 40	LH 45	LH 50	LH 55	LH 60
62-85-88-90	KIT 1204	KIT 1205	KIT 1206	KIT 1207	KIT 1208
17-68-69-74-75-92			KIT 1195		
1-4-13-17-20-22-26-30-33-44	KIT 1209	KIT 1210	KIT 1211	KIT 1212	KIT 1213
49-54-56-57-62-68-69-74-75					
80-85-88-90-92					

10e. Parts breakdown



LHZ/LHN SERIES PARTS

Item	Part number	Description	Qty	Item	Part number	Description	Qty	Item	Part number	Description	Qty
1.	F881010133	OR Ø183.82x2.62	2	42.	F010100080	Side cover	1	74.	F881011168	OR Ø 72x3 - Spec.	3
2.	F010100070	Side cover support bushing	1	43.	F032000000	Ring gear 1500 rev/min. right (Z 59)	1	75.	F881011161	OR Ø 56x3 - Spec.	6
3.	F030000010	Crankshaft bearing retainer block	2		F0520000030	Ring gear 1750 rev/min. right (Z 60)	1	76.	F021200070	Valve guide, inlet	3
4.	F881010132	OR Ø152.07x2.62	2		F0520000140	Ring gear 1900 rev/min. right (Z 61)	1		F090200060	Valve spring, inlet LHZ	3
5.	F871121603	SHCS M 8x20 SS	23	44.	F881010003	OR Ø 8.73x1.78	2		F092200040	Valve spring, inlet LHN	3
6.	F063400390	Side cover	2	45.	F050000060	Crankshaft	1	78.	F082200070	Valve poppet, inlet LE	3
7.	F871131102	SHCS M 12x25	8	46.	F052000010	Ring gear 1500 rev/min. left (Z 59)	1		F082200050	Valve poppet, inlet LHN	3
8.	F030000020	Retainer	2		F052000040	Ring gear 1750 rev/min. left (Z 60)	1	79.	F081200080	Valve seat, inlet LHZ	3
9.	F881111017	Bearing	2		F052000150	Ring gear 1900 rev/min. left (Z 61)	1		F081200060	Valve seat, inlet LHN	3
10.	F871125606	SHCS M 10x30 SS	12	47.	F034000000	Connecting rod pin	3	80.	F881110126	Gasket washer Ø 3/8" SS	5
11.	F871115602	SHCS M 6x14 SS	14	48.	F035000070	Connecting rod bolt	6	81.	F084200470	Plug G 3/8"	5
12.	F040400050	Lower cover	1	49.	F872067006	Keeper Ø12	6	82.	F035000090	SHCS M 20x160 - Spec.	8
13.	F080600030	Gasket, lower cover	1	50.	F023300000	Bearing, connecting rod	3	83.	F064200180	Manifold	1
14.	F030300030	Washer, nickel Ø1"	2	51.	F020200000	Crankshaft pin	2	84.	F821203128	Plug G 1/2" SS	3
15.	F084000000	Plug G 1" Nickel	2	52.	F250000030	Connecting rod, complete	3	85.	F881011253	OR Ø 72x4 - Spec.	3
16.	F801053012	Oil level sight glass G 1"	2	53.	F250001070	Piston complete	3	86.	F062200140	Cylinder LHZ/N 40	3
17.	F030300010	Washer Ø1/2" Nickel	5	54.	F872142015	Roll pin Ø 5x36	3		F062200150	Cylinder LHZ/N 45	3
18.	F801057012	Plug, magnetic G 1/2"	2	55.	F071000050	Wrist pin Ø 35	3		F062200160	Cylinder LHZ/N 50	3
19.	F063400370	Rear cover	1	56.	F881081001	Seal Ø 35x47x8.5 - Spec.	3		F062200260	Cylinder LHZ/N 55	3
20.	F080600010	Gasket, rear cover	1	57.	F881010128	OR Ø 72.69x2.62	3		F062200270	Cylinder LHZ/N 60	3
21.	F060100160	Crankcase	1	58.	F0634000420	Rod seal retainer	3	87.	F031200150	Head ring LHZ/N 40	3
22.	F881010116	OR Ø 29.82x2.62	1	59.	F030000070	Split bushing	3		F031200160	Head ring LHZ/N 45	3
23.	F801054027	Plug, vented G 1"	1	60.	F041200010	Retainer	3		F031200240	Head ring LHZ/N 50	3
24.	F011000020	Eye bolt M 16 Nickel	2	61.	F124200510	Plunger LHZ/N 40	3		F031200300	Head ring LHZ/N 55	3
25.	F030000030	Washer	2-4		F124200520	Plunger LHZ/N 45	3		F031200310	Head ring LHZ/N 60	3
26.	F080600020	Gasket, top cover	1		F124200530	Plunger LHZ/N 50	3	88.	F881020011	Packings LHZ/N 40	6
27.	F040400030	Top cover	1		F124200390	Plunger LHZ/N 55	3		F881020012	Packings LHZ/N 45	6
28.	F801056002	Plug G 1/2"	1		F124200540	Plunger LHZ/N 60	3		F881020014	Packings LHZ/N 50	6
29.	F040400110	Cover, PTO	1	62.	F881011051	OR Ø 22x2 - Spec.	3		F881020015	Packings LHZ/N 55	6
30.	F881080026	Seal Ø 55x75x10	2	63.	F035200040	Plunger retainer bolt	3		F881020016	Packings LHZ/N 60	6
31.	F871121605	SHCS M 8x30 SS	8	64.	F208006210	Assembly, Valve LHZ	3	89.	F022300260	Packing support LHZ/N 40	3
32.	F063400400	Side cover, PTO	1		F208005230	Assembly, Valve LHN	3		F022300270	Packing support LHZ/N 45	3
33.	F881010130	OR Ø 94.92x2.62	2	65.	F871125601	SHCS M 10x16 SS	6		F022300280	Packing support LHZ/N 50	3
34.	F811101019	Bearing, PTO	4	66.	F035000080	SHCS M 14x40 - Spec.	12		F022300470	Packing support LHZ/N 55	3
35.	F031000020	Ring, internal	2	67.	F063200070	Valve cover	3		F022300480	Packing support LHZ/N 60	3
36.	F031000010	Ring, external	2	68.	F881112003	Anti-extrusion ring	3	90.	F881061015	Scraper LHZ/N 40	3
37.	F061000000	Bushing	2	69.	F881011252	OR Ø 70x4 - Spec.	3		F881061017	Scraper LHZ/N 45	3
38.	F031400000	Cone	2	70.	F021200090	Valve cage	3		F881061018	Scraper LHZ/N 50	3
39.	F872097013	Key	1	71.	F090200070	Valve pring LE	3		F881061019	Scraper LHZ/N 55	3
40.	F052000020	Pinion 1500 rev/min. (Z 20)	1		F090200050	Valve spring LHN	3		F881061021	Scraper LHZ/N 60	3
	F052000050	Pinion 1750 rev/min. (Z 19)	1	72.	F082200080	Valve poppet LHZ	3	91.	F881110127	Gasket washer Ø1/2" SS	3
	F052000160	Pinion 1900 rev/min. (Z 18)	1		F082200060	Valve poppet LHN	3		F881112011	Anti-extrusion ring	6
41.	F063400310	End cap	1	73.	F081200760	Valve seat LE	3				
					F081200710	Valve seat LHN	3				

REPAIR KITS

ITEM	LHZ/N 40	LHZ/N 45	LHZ/N 50	LHZ/N 55	LHZ/N 60
62-85-88-90	KIT 1216	KIT 1217	KIT 1218	KIT 1219	KIT 1220
17-68-69-74-75-92			KIT 1221		
1-4-13-17-20-22-26-30-33-44	KIT 1222	KIT 1223	KIT 1224	KIT 1225	KIT 1226
49-54-56-57-62-68-69-74-75					
80-85-88-90-92					

MAINTENANCE LOG

HOURS & DATE

Oil Change							
Grease							
Packing Replacement							
Plunger Replacement							
Valve Replacement							



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