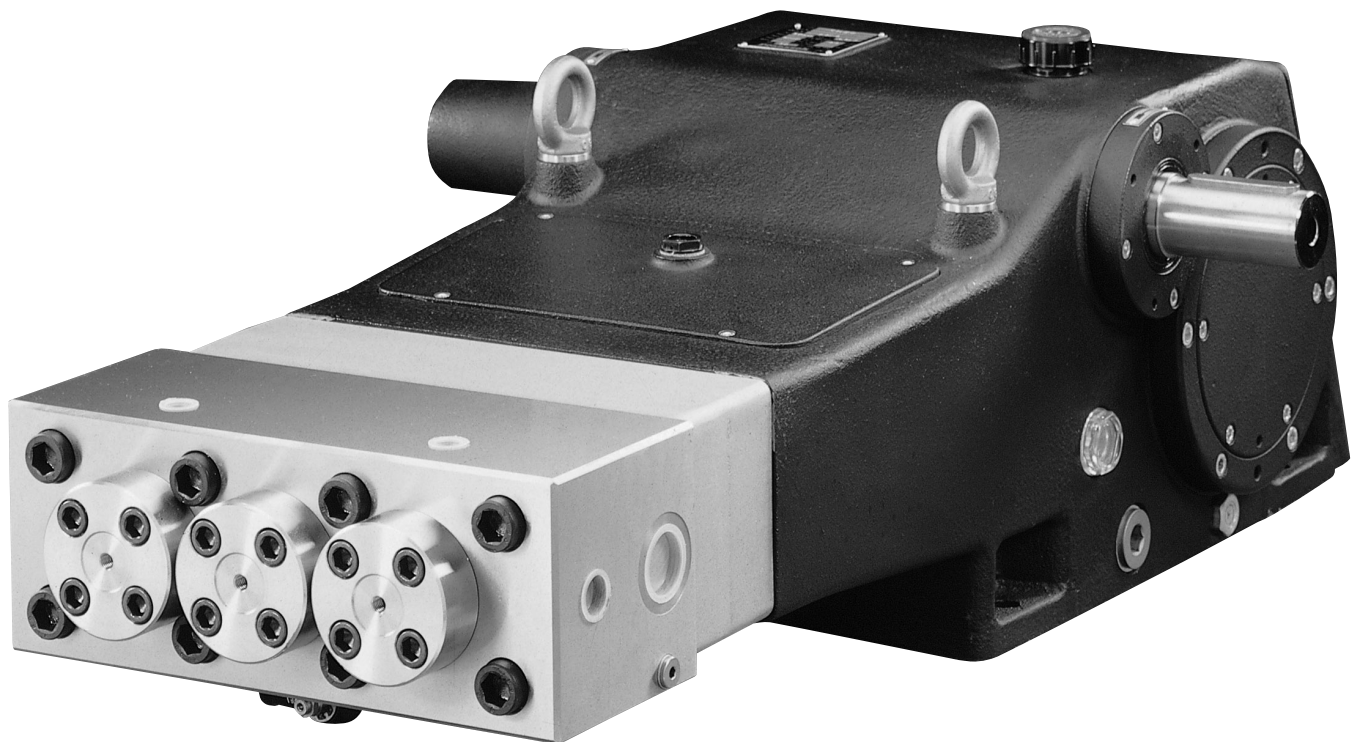




SH

Owner's Manual

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



INDEX

page

1. INTRODUCTION	1
2. GENERAL WARNINGS FOR SAFE OPERATION	1
a. Fluid injection hazard	1
b. Fuel and emission hazards: engine driven products	2
c. Grounding instructions: motor driven products	2
d. Extension cords: motor driven products	3
e. Equipment misuse hazard	3
f. Hose safety	4
g. Moving parts hazard	4
h. Terms	4
3. PUMP IDENTIFICATION	5
4. TECHNICAL FEATURES	5
5. CONSTRUCTION FEATURES	6
6. GENERAL INFORMATION ON PUMP USE	6–7
a. Water temperature	6
b. Pump performance	7
7. CONNECTIONS AND PLUGS	7
8. PUMP INSTALLATION	8–9
a. Positioning	8
b. Direction of rotation	8
c. Hydraulic connections	8
d. Pump feeding	8
e. Suction line	8
f. Filtration	9
g. Delivery line	9
9. START-UP AND RUNNING PROCEDURES	10
a. Start-up checks	10
b. Start-up and operation	10
c. Cooling system	10
10. MAINTENANCE INSTRUCTIONS	10–17
a. Crank mechanism maintenance	10
b. Fluid end maintenance	11
c. Pressure packings and plunger maintenance	11–12
d. Fastener torque values	13
e. Parts breakdown	14–17
11. PUMP STOPPED FOR LONG PERIOD	13
12. FROST PRECAUTIONS	13

1. INTRODUCTION

The General Pump SH 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 spilled 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 exceeding manufacturer's specifications.

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
- double shaft projection internal gear box available with 2.95:1 or 3.39:1 gear reduction.

PUMP MODELS

MODEL	Volume, GPM		Pressure PSI	HP	
	1750 RPM	1500 RPM		1750	1500
SH 20	11.6	11.3	20,300	137	134
SH 22	14.0	13.7	17,400	151	150
SH 24	16.6	16.3	13,750	155	153
SH 26	19.5	19.2	11,600	153	151
SH 28	22.7	22.3	10,150	156	154
SH 30	25.9	25.6	8,700	152	151

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	5 bar	75 psi
• Max. Inlet Pressure	7 bar	105 psi
• Max. Inlet Water Temperature	30° C	85° F
• Oil Capacity	14 liters	14.8 qts.
• Weight	380 kg	844 lbs.

1500 RPM Crankshaft Speed

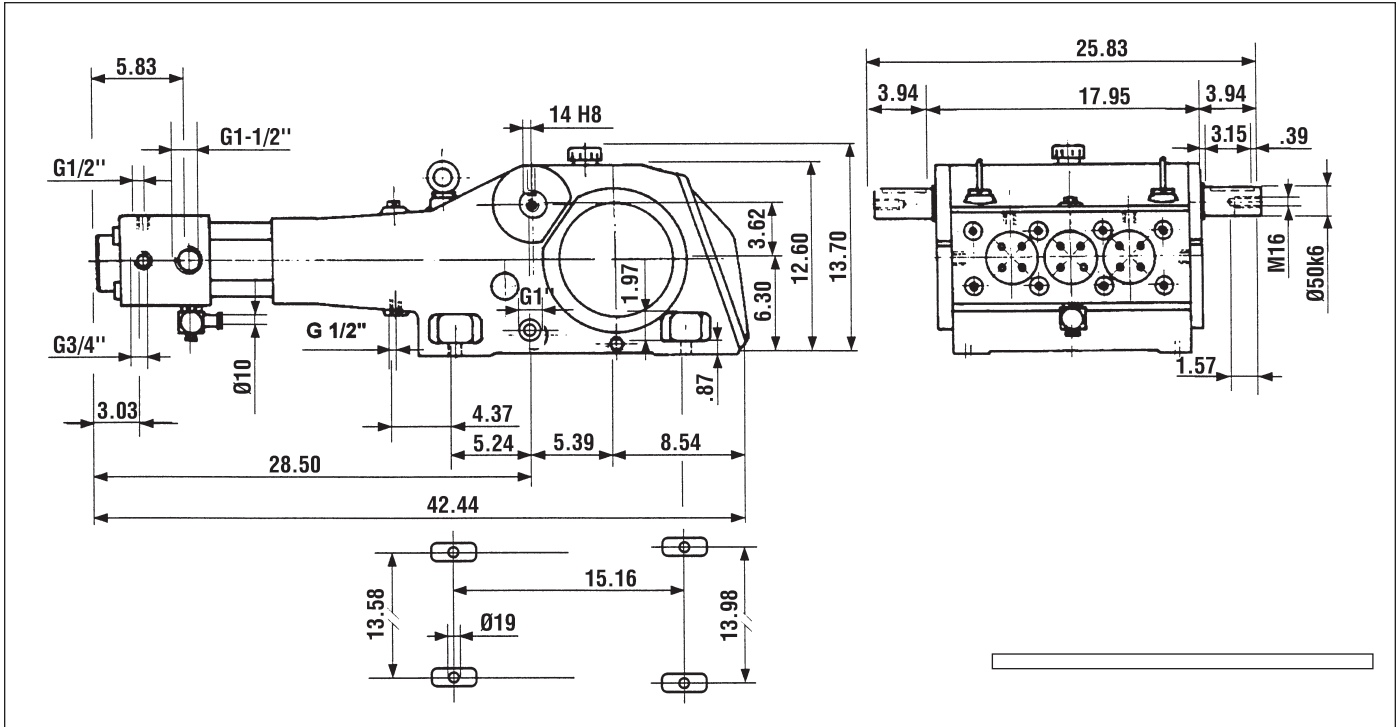
2.95 gear reduction

Rated crankshaft speed 560 RPM

1750 RPM Crankshaft Speed

3.39 gear reduction

Rated Crankshaft speed 560 RPM



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 cast iron piston guides.
- splash lubricated by the pump crankcase oil.

B. PLUNGER AND PACKING SYSTEM Primarily composed of solid ceramic plungers and pressure packings with packing supports and cylinders. A cooling system extends pressure packing and plunger life.

C. MANIFOLD Contains the inlet and discharge (in-line) valves, made of stainless steel.

6. GENERAL INFORMATION ON PUMP USE

The SH 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 85° F.

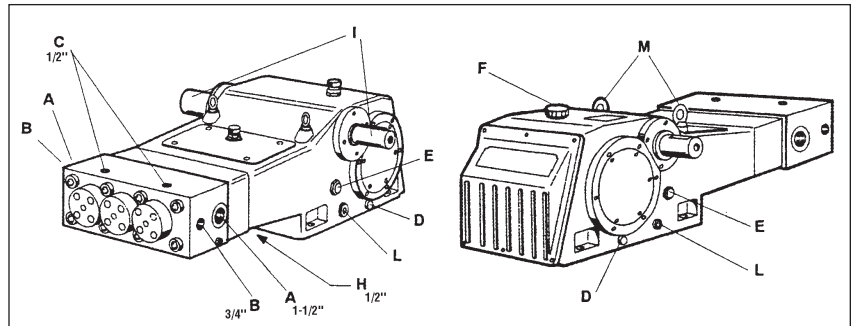
6b. Pump performance

Never exceed the maximum pump flow rate or pressure.

7. CONNECTIONS AND PLUGS

The SH series pumps have:

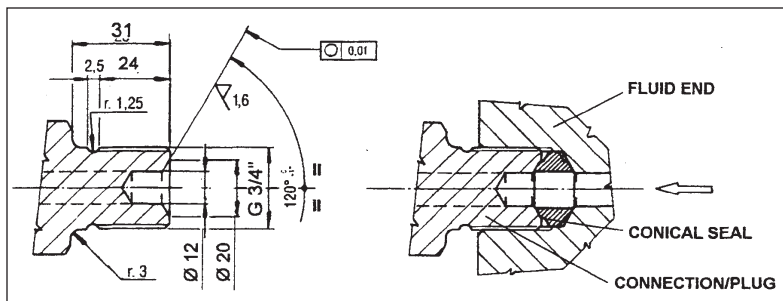
- A. **1-1/2"-BSPP Inlet Ports (2)** Water supply connection to either or both ports is acceptable. The port not being used must be sealed with the correct plugs.
- B. **3/4"-BSPP Outlet Ports (2)** Both ports can be connected to the delivery line, depending on the accessories to be installed and discharge line characteristics.
- C. **1/2"-BSPP Outlet Ports (2)** For pressure gauge and safety valve.
- D. **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.
- E. **Oil Level Indicator (1)** (position 16)
- F. **Oil Fill Plug (1)** (position 23) Used to change or add oil.
- G. **Throttler (1)** (position 91) Provided with quick coupling for 10 mm dia. rilsan hose, for draining water flow from the cooling system. This throttler is properly set before pump shipment and does not require any further adjustment during installation. It must be connected to the suction line **BEFORE** the feeding pump (see paragraph 8c).
- H. **1/2"-BSPP Drain Hole** Hole in the cover (position 12) is used to drain water from the pressure packing chamber. Always leave this hole open.
- I. **Shaft Projections (2)** 50 mm diameter, the one not being used should be protected by the cover (position 29).
- L. **1"-BSPP Plugs (2)**
- M. **Eyebolts (2)** For lifting the pump.



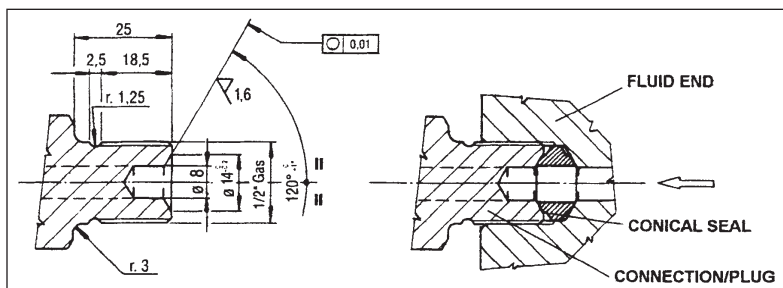
The pump is supplied with 4 conical seals made of stainless steel to be inserted in the outlet port seats of the pump; their task is to provide total sealing of the outlet connection. The outlet port is already provided to house this seal whereas the fitting of the outlet line must be machined according to the following diagrams:

NOTE: After any disassembling, the conical seal should be replaced.

**Outlet line
3/4"-NPT**



**Outlet line
1/2"-NPT**



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

8. PUMP INSTALLATION

8a. Positioning

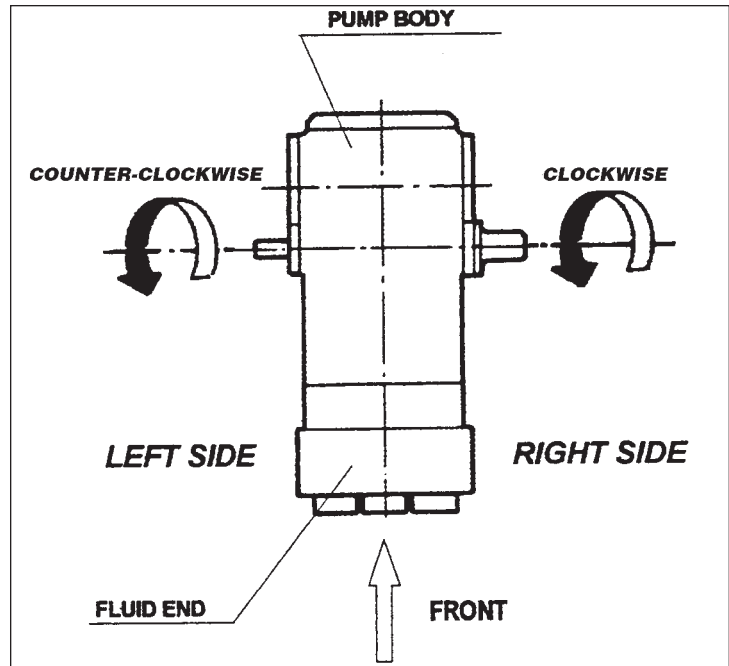
The pump must be mounted to a rigid and flat base using the four threaded feet in the crankcase.

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.

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.

8d. Pump feeding

SH pumps require an inlet pressure at the inlet port between 75 psi and 105 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 SH pump from starting until the inlet pressure has reached required pressure. This pressure switch will also stop the pump in case of filter clogging.

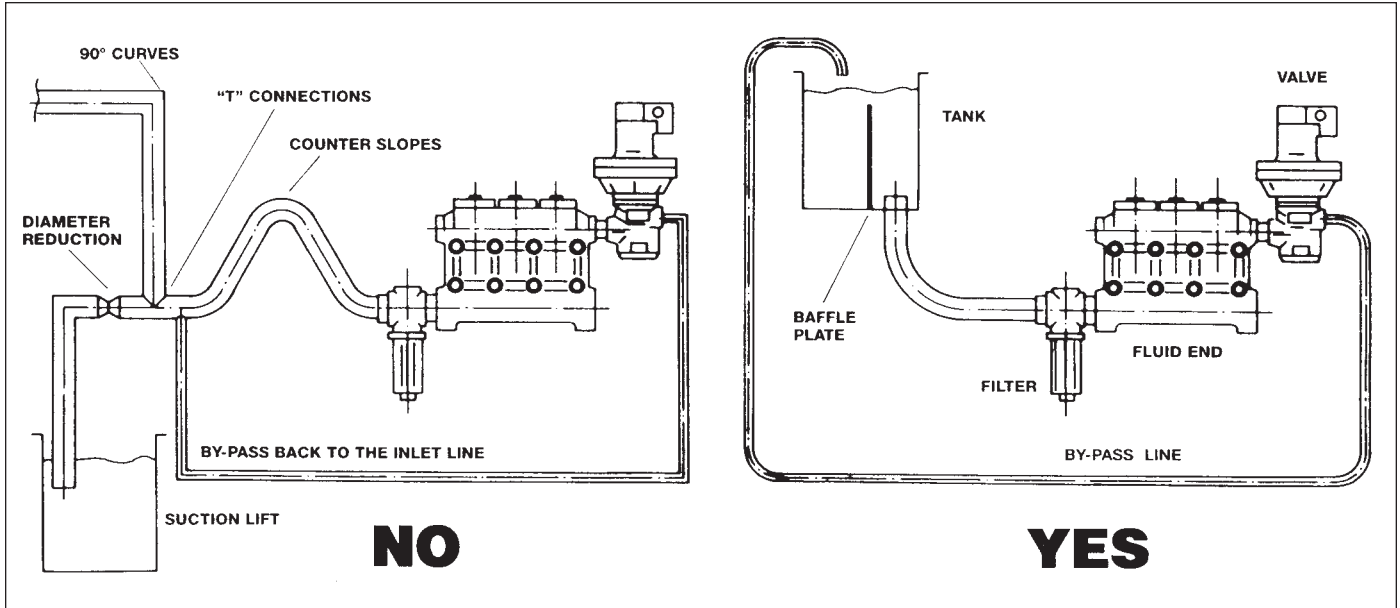
8e. Inlet line

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 12 inches of inlet port.
- Be positioned so that it remains filled after the pump stops.

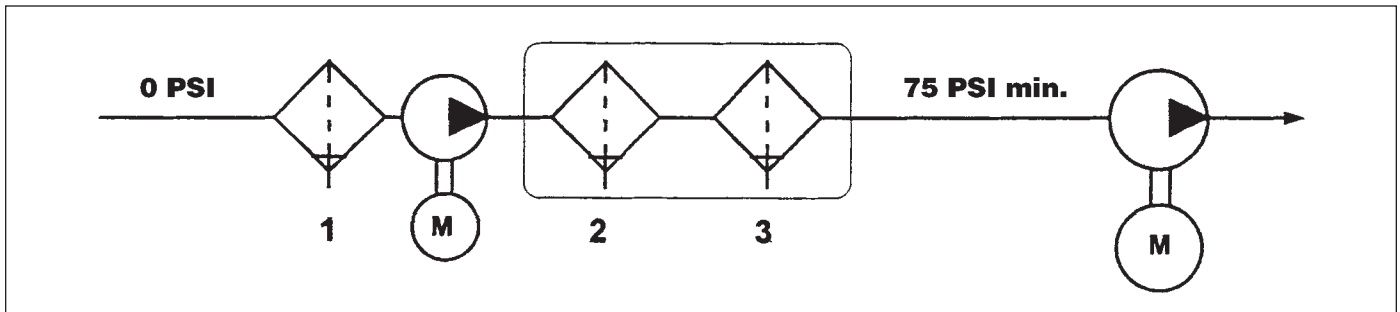
RECOMMENDATIONS:

- 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

SH pumps require 10 to 30 micron filtration. Three different filters should be provided and positioned as in the picture below:



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.
- Filters should be as follows:
 - Filter #1: 250 microns
 - Filter #2: from 100 to 70 microns
 - Filter #3: from 30 to 10 microns

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:

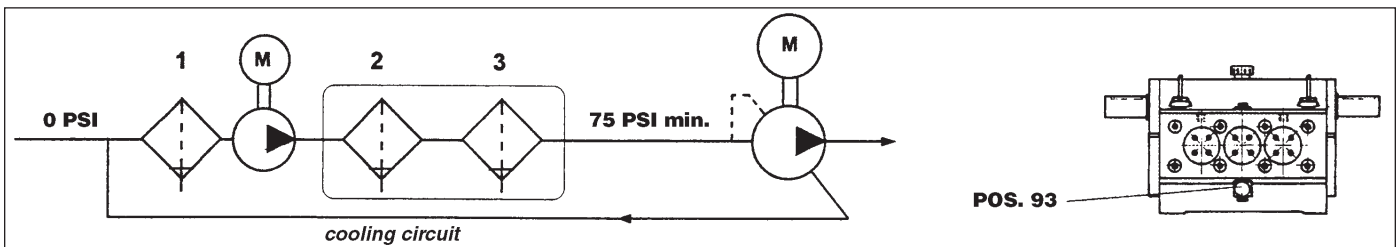
- Inlet line must be connected, and airtight: **the pump must never run dry.**
- All ON-OFF valves in between the pump and water supply must be open. Be sure water flows into the pump.
- Be sure all connections are tight.
- Set the discharge line into the dump mode, to prime the pump.
- Be sure joint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

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 flow is constant.
- After stopping the pump, relieve the pressure from the system by operating the dump device (where installed) or by releasing the regulating valve and reducing rpm to a minimum (diesel applications).

9c. Cooling system

During operation a small amount of water (a few drops a minute) is released from the pump fluid end through the throttler (position 91). This leakage is designed to provide lubrication for the pressure packings and plungers. It must flow back into the inlet line **BEFORE** the feeding pump (see picture below).



10. MAINTENANCE INSTRUCTIONS

10a. Crank mechanism maintenance

Check the oil level (position 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.

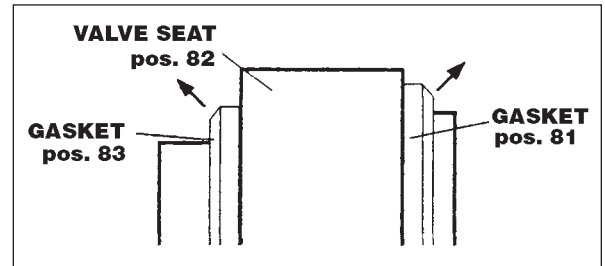
*All positions are referenced as shown on the parts breakdown on page 14.

10b. Fluid end maintenance

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

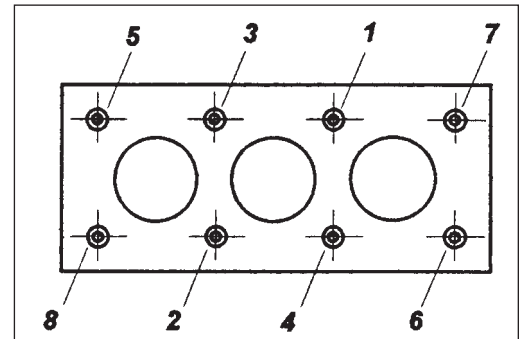
Service operations are limited to valve inspection and/or replacement, when necessary:

- Step 1. Loosen the four valve cover screws (position 96)* and remove the cover (position 95).
- Step 2. Remove the valve guide (position 86), the spring (position 85) and the disk (position 84).
- Step 3. Loosen the eight screws (position 94) and remove the fluid end (position 99) – be careful, it's very heavy. Watch for the valve seat (position 82) and valve disk (position 80) which may fall off the head during disassembly.
- Step 4. Remove the cover spacer (position 72).
- Step 5. Remove the valve seat (position 82) and the spring (position 79).
- Step 6. Check parts for wear and replace as necessary.
- Step 7. When changing the gaskets (positions 81 and 83) make sure they are positioned correctly – their bevels should be mounted facing outward (see arrows).



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

- Step 8. Install the spring (position 79), the valve disk (position 80) and the valve seat (position 82).
- Step 9. Install the cover spacer (position 72); make sure the O-rings (position 73) are correctly positioned.
- Step 10. Install the head and tighten the screws (position 94) using a torque wrench set for 400 ft.-lbs., in the pattern shown at right.
- Step 11. Install the valve disk (position 84), the spring (position 85) and the delivery valve guide (position 86).
- Step 12. Make sure the ring (position 97) and O-ring (position 98) are in good condition, and fit the valve cover (position 95) back in place.
- Step 13. Tighten the screws (position 96) in an alternating and uniform pattern with a torque wrench set to 145 ft.-lbs.



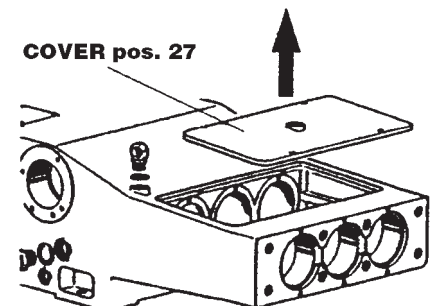
10c. Pressure packings and plungers maintenance

The pressure packings and plunger system is maintenance free. Should surging and vibrations on the pressure line occur, then check pressure packings and plungers for wear.

Inspection/replacement of the pressure packings:

- Step 1. Remove the fluid end as described in paragraph 9b.
- Step 2. Remove the upper cover (position 27), move the plunger backward by rotating the crankshaft to bottom dead center.
- Step 3. Using a suitable pad and hammer, push out the complete cylinder assembly from the inside.

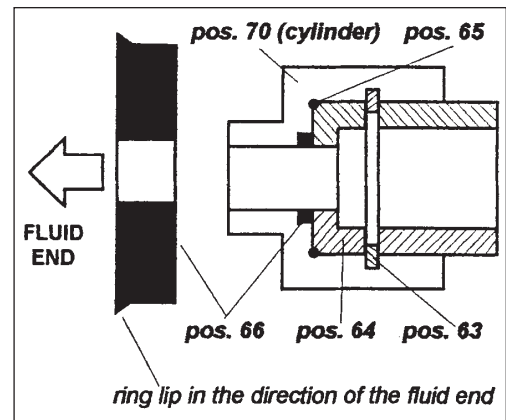
NOTE: *Once removed, do not attempt to separate the packing support (position 70) and the cylinder (position 78), as they are tightened and locked together with special glue.*



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

- Step 4. Unscrew the plungers and remove the wipers (position 60) together with the bushing (position 59) and spacer (position 61).
- Step 5. Take out the stop ring (position 63), the seal support (position 64), the O-ring (position 65) and the seal (position 66).

NOTE: When replacing the ring (position 65) make sure its lip is fitted in the direction of the fluid end, as shown at right.

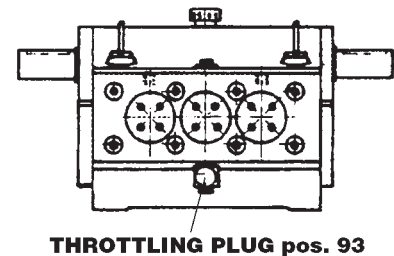


- Step 6. Insert a pin of adequate dimensions from the support (position 64) and push out the pressure packings (position 78) and the rings (position 76).
- Step 7. Make sure the pressure packing seats are clean and free from sediments or incrustations, if so, clean up using very fine sandpaper.
- Step 8. Check other parts for wear and replace as necessary.
- Step 9. Install the ring (position 66) — check the lip position; see diagram above — the O-ring (position 65), the support (position 64) and lock all parts with the stop ring (position 63).
- Step 10. **Insert the packing bushing (position 78) — which should be fitted with the bevel in the direction of the fluid end as is the ring (position 66) —** in the cylinder (position 70) by using the bushing (position 78) as a guide, then the anti-extrusion ring (position 75), the back packing (position 76), the pressure packing (position 77) and the packing bushing (position 78) with the larger diameter toward the pressure packings.
- Step 11. Fit the plunger back in place and tighten with a torque wrench set for 75 ft.-lbs.
- Step 12. Move the plunger to bottom dead center, check and grease the O-rings (positions 69 and 71) on the cylinders and mount them in the pump body.
- Step 13. Fit cover spacer (position 72) back in place, making sure O-rings (position 73) are positioned correctly.
- Step 14. Install the suction valve spring (position 79) and valve disk (position 80).
- Step 15. Check for correct installation of the rings (positions 81 and 83) (see diagram on page 11). Insert the valve seats (position 82) in the cylinders (position 70) and fit the fluid end as mentioned in paragraph 9b.

The pump comes with the throttling plug (position 93) already set for the correct pump operation and does not require any further adjustment.

Should it be necessary:

- Step 1. Remove the screw (position 88) on the head and install a pressure gauge scaled for 145 psi.
- Step 2. Keep the pump still and start the centrifugal feed pump.
- Step 3. Loosen the throttling plug lock nut and set the pressure at 30 psi.
- Step 4. Tighten the lock nut, remove the gauge and fit the screw (position 88) back in place.



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

10d. Fastener torque values

Always use a torque wrench:

POSITION*	DESCRIPTION	Kgm	Nm	Ft-lbs
94	Manifold screws	55	550	398
96	Valve cover screws	20	200	144
62	Plunger screws	10	100	72
48	Connecting rod screws	7.5	75	54
5	Side cover, shaft protector, rear cover	2	20	15
7	Bearing retainer flange	7	70	50
10	Bearing cover	4	40	30
11	Top & bottom cover	1	10	7
31	Bearing cover	2	20	15

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

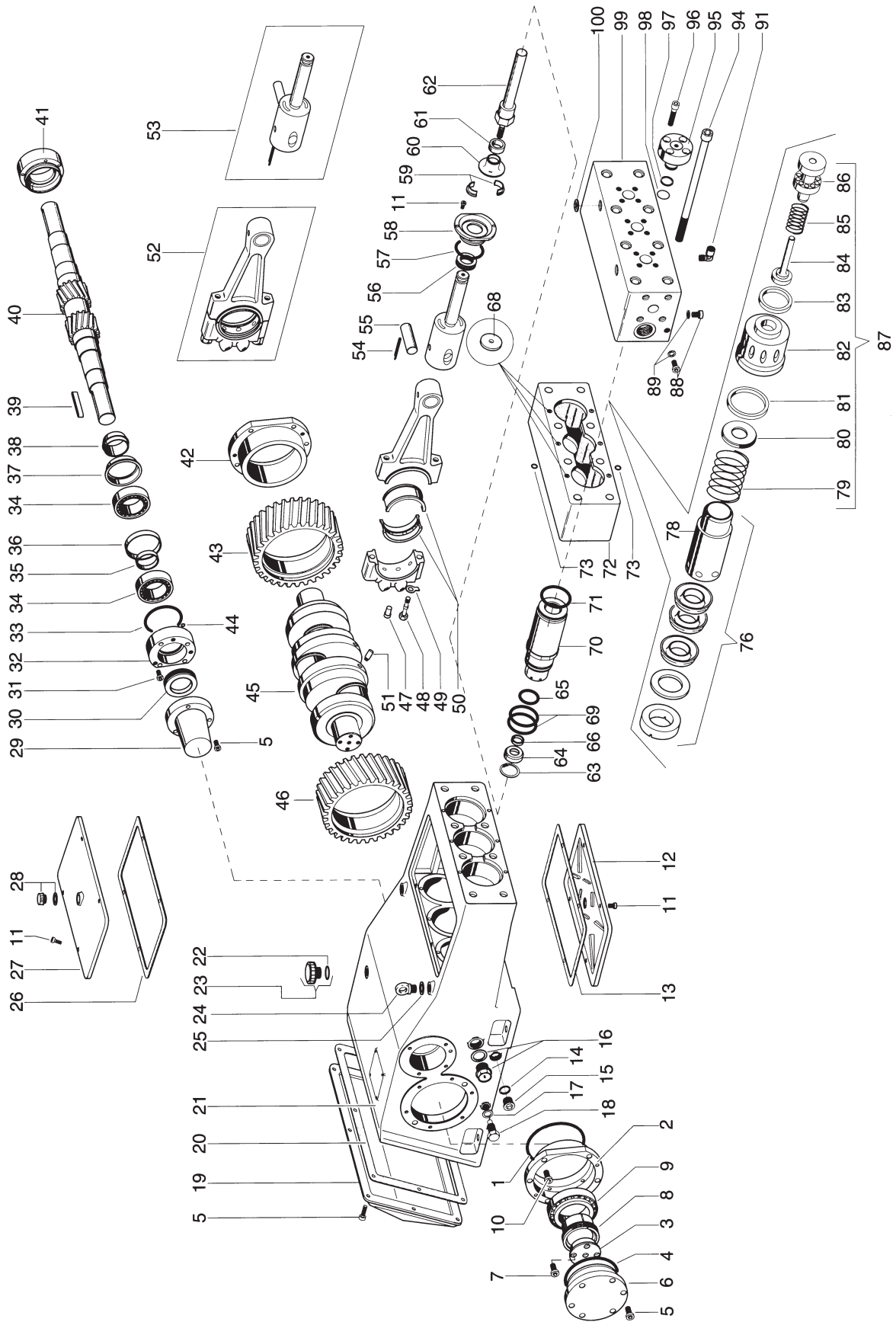
When there is risk of freezing:

- 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.

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

10e. Parts breakdown



SH SERIES PARTS

Item	Part number	Description	Qty	Item	Part number	Description	Qty	Item	Part number	Description	Qty
1.	F881010133	OR Ø183.82x2.62	2	46.	F052000010	Driven gear 1500 rpm. left. (Z 59)	1	71.	F881010143	OR Ø 82.22x2.62	3
2.	F010100070	Bearing housing, left	1	47.	F052000015	Driven gear 1750 rpm. left. (Z 61)	1	72.	F064400020	Collector	3
3.	F030000010	Bearing retainer block	2	48.	F034000000	Pin, conn rod	3	73.	F881010100	OR Ø 9.19x2.62	9
4.	F881010132	OR Ø152.07x2.62	2	49.	F035000070	Connecting rod bolt	6	76.	F205000050	Complete packing assembly SH 20	3
5.	F871121152	SHCS M 8x20	23	50.	F872067006	Keeper Ø12	6	77.	F205000060	Complete packing assembly SH 22	3
6.	F063400280	Side cover	2	51.	F023300000	Connecting rod bearing	3	78.	F205000070	Complete packing assembly SH 24	3
7.	F871131102	SHCS M12x25	8	52.	F020000000	Pin, crankshaft	2	79.	F205000080	Complete packing assembly SH 26	3
8.	F030000020	Bearing retainer	2	53.	F250000030	Complete connecting rod	3	80.	F205000090	Complete packing assembly SH 28	3
9.	F811111017	Bearing	2	54.	F250001070	Complete piston guide	3	81.	F205000100	Complete packing assembly SH 30	3
10.	F871125152	SHCS M 10x30	12	55.	F872142015	Roll pin Ø 5x36	3	82.	F031500190	Pressure seal bushing SH 20	3
11.	F871151152	SHCS M 6x14	14	56.	F071000050	Wrist pin Ø 35	3	83.	F031500200	Pressure seal bushing SH 22	3
12.	F040400050	Lower cover	1	57.	F881081001	Seal Ø 35x47x8.5	3	84.	F031500210	Pressure seal bushing SH 24	3
13.	F080600030	Gasket, lower cover	1	58.	F881010128	OR Ø 72.69x2.62	3	85.	F031500220	Pressure seal bushing SH 26	3
14.	F872043008	Aluminum washer Ø1"	2	59.	F063400420	Seal cover	3	86.	F031500230	Pressure seal bushing SH 28	3
15.	F821203056	Plug G 1"	2	60.	F030000070	Retainer bushings	3	87.	F031500240	Pressure seal bushing SH 30	3
16.	F801053012	Oil level sightglass G 1"	2	61.	F041200010	Flinger washer	3	88.	F080200180	Inlet valve spring SH 20 22 24	3
17.	F872043002	Aluminum washer Ø1 1/2"	2	62.	F031200040	Spacer	3	89.	F090200200	Inlet valve spring SH 26 28 30	3
18.	F801057002	Plug magnetic G 1/2"	2	63.	F124200220	Plunger SH 20	3	90.	F082200230	Inlet valve poppet SH 20 22 24	3
19.	F063400240	Rear cover	1	64.	F124200230	Plunger SH 22	3	91.	F082200270	Inlet valve poppet SH 26 2830	3
20.	F080600010	Gasket, rear cover	1	65.	F124200240	Plunger SH 24	3	92.	F080500170	Inlet valve seat seal SH 20 22 24	3
21.	F060100160	Crankcase	1	66.	F124200250	Plunger SH 26	3	93.	F080500200	Inlet valve seat seal SH 26 28 30	3
22.	F881010116	OR Ø 29.82x2.62	1	67.	F124200260	Plunger SH 28	3	94.	F081200570	Inlet/discharge seat SH 20 22 24	3
23.	F801054027	Plug, vented G 1"	1	68.	F124200270	Plunger SH 30	3	95.	F081200650	Inlet/discharge seat SH 26 28 30	3
24.	F872026003	Eyebolt M 16	1	69.	F872071530	C-clip Ø 52 SH 20 22 24	3	96.	F080500160	Discharge side seat seal	3
25.	F030000030	Eyebolt washer	2-4	70.	F872071533	C-clip Ø 58 SH 26 28 30	3	97.	F082200220	Discharge poppet SH 20 22 24	3
26.	F080600020	Gasket, top cover	1	71.	F031300170	Scraping ring retainer SH 20	3	98.	F082200260	Discharge poppet SH 26 28 30	3
27.	F040400030	Top cover	1	72.	F031300180	Scraping ring retainer SH 22	3	99.	F090200170	Discharge valve spring SH 20 22 24	3
28.	F801056002	Plug G 1/2"	1	73.	F031300220	Scraping ring retainer SH 24	3	100.	F021300390	Discharge valve guide	3
29.	F040400070	Shaft cover	1	74.	F031300210	Scraping ring retainer SH 26	3	101.	F208000670	Valve assembly SH 20 22 24	3
30.	F881080026	Seal Ø 55x75x10	2	75.	F031300190	Scraping ring retainer SH 30	3	102.	F208000670	Valve assembly SH 26 28 30	3
31.	F871121105	SHCS M 8x30	8	76.	F881010122	OR Ø 47.30x2.62 SH 20 22 24	3	103.	F821203100	Plug G 1/8"	4
32.	F063400300	Side cover, left	2	77.	F881010140	OR Ø 52.07x2.62 SH 26 28 30	3	104.	F801203033	Throttle valve G 3/8"	1
33.	F881010130	OR Ø 94.92x2.62	2	78.	F881030010	Scraping SH 20	3	105.	F871151330	SHCS M 20x300 - Spec.	8
34.	F811101019	Bearing	4	79.	F881030010	Scraping SH 22	3	106.	F063200150	Valve cover	3
35.	F031000020	Internal ring	2	80.	F881030041	Scraping SH 26	3	107.	F871135303	SHCS M 14x45 - Spec.	12
36.	F031000010	External ring	2	81.	F881030012	Scraping SH 28	3	108.	F010500050	Anti-extrusion ring	3
37.	F061000000	Lubrication bushing	2	82.	F881030013	Scraping SH 30	3	109.	F881010207	OR Ø 28.17x3.53	3
38.	F031400000	Lubrication cone	2	83.	F083500020	Orifice	3	110.	F064200320	Mainfold SH	1
39.	F872097013	Key 14x9x80	2	84.	F881010142	OR Ø 75.87x2.62	3	111.	F811101019	Gasket G 1/2"	2
40.	F052000020	Pinion 1500 rpm (Z 20)	1	85.	F162200050	Cylinder SH 20	6				
41.	F052000160	Pinion 1750 rpm (Z 18)	1	86.	F162200060	Cylinder SH 22	3				
42.	F010100080	Side cover, right	1	87.	F162200070	Cylinder SH 24	3				
43.	F052000000	Bearing housing, right	1	88.	F162200080	Cylinder SH 26	3				
44.	F052000010	Driven gear 1500 rpm right (Z 59)	1	89.	F162200090	Cylinder SH 28	3				
45.	F881010003	OR Ø 8.73x1.78	2	90.	F162200100	Cylinder SH 30	3				
	F050000060	Crankshaft	1								

REPAIR KITS

ITEM	SH 20	SH 22	SH 24	SH 26	SH 28	SH 30
65-66-68-69-71-73-76-97-98	KIT 1111	KIT 1112	KIT 1113	KIT 1114	KIT 1115	KIT 1116
81-83-97-98		KIT 1117			KIT 1118	
1-4-13-17-20-22-26-28-30-33	KIT 1119	KIT 1120	KIT 1121	KIT 1122	KIT 1123	KIT 1124
44-49-54-56-57-65-66-68-69						
71-73-76-81-83-89-97-98						

MAINTENANCE LOG

HOURS & DATE

Oil Change							
Grease							
Packing Replacement							
Plunger Replacement							
Valve Replacement							



GP Companies, Inc.

1174 Northland Drive
Mendota Heights, Minnesota 55120
(651) 454-6500 • Fax: (651) 454-4524