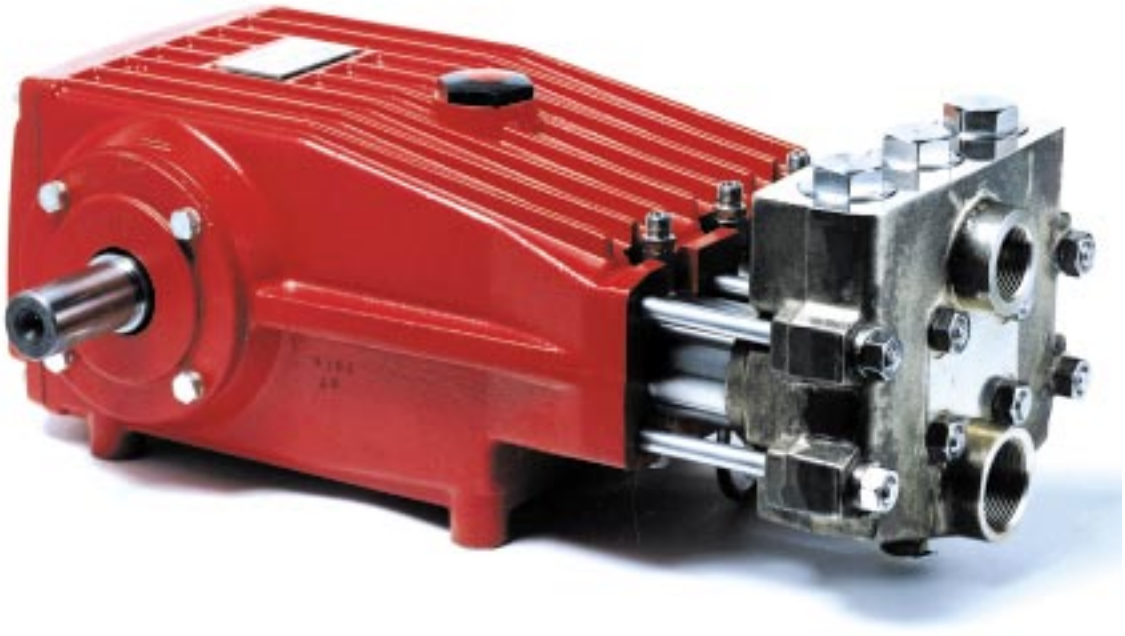
Triplex Ceramic
Plunger Pump
Operating Instructions/
Repair and Service
Manual

# Models
# LP350, LP400, LP450



GIANT

**Contents:**



**Updated 3/98**

# INSTALLATION INSTRUCTIONS

**Installation of the Giant Industries, Inc., pump is not a complicated procedure, but there are some basic steps common to all pumps. The following information is to be considered as a general outline for installation. If you have unique requirements, please contact Giant Industries, Inc. or your local distributor for assistance.**

1. The pump should be installed flat on a base to a maximum of a 15 degree angle of inclination to ensure optimum lubrication.

2. The inlet to the pump should be sized for the flow rate of the pump with no unnecessary restrictions that can cause cavitation. Teflon tape should be used to seal all joints. If pumps are to be operated at temperatures in excess of $140^0$ F, it is important to insure a positive head to the pump to prevent cavitation.

3. The discharge plumbing from the pump should be properly sized to the flow rate to prevent line pressure loss to the work area. It is essential to provide a safety bypass valve between the pump and the work area to protect the pump from pressure spikes in the event of a blockage or the use of a shut-off gun.

4. Use of a dampener is necessary to minimize pulsation at drive elements, plumbing, connections, and other system areas. The use of a dampener with Giant Industries, Inc. pumps is optional, although recommended by Giant Industries, Inc. to further reduce system pulsation. Dampeners can also reduce the severity of pressure spikes that occur in systems using a shut-off gun. A dampener must be positioned downstream from the unloader.

5. Crankshaft rotation on Giant Industries, Inc. pumps should be made in the direction designated by the arrows on the pump crankcase. Reverse rotation may be safely achieved by following a few guidelines available upon request from Giant Industries, Inc. Required horsepower for system operation can be obtained from the charts on pages 3-5.

6. Before beginning operation of your pumping system, remember: Check that the crankcase and seal areas have been properly lubricated per recommended schedules. Do not run the pump dry for extended periods of time. Cavitation will result in severe damage. Always remember to check that all plumbing valves are open and that pumped media can flow freely to the inlet of the pump.

Finally, remember that high pressure operation in a pump system has many advantages. But, if it is used carelessly and without regard to its potential hazard, it can cause serious injury.

## IMPORTANT OPERATING CONDITIONS

**Failure to comply with any of these conditions invalidates the warranty.**

1. Prior to initial operation, add oil to the crankcase so that oil level is between the two lines on the oil dipstick. DO NOT OVERFILL.

**Use SAE 90 Industrial gear oil.**

Crankcase oil should be changed after the first 50 hours of operation, then at regular intervals of 500 hours or less depending on operating conditions.

2. Pump operation must not exceed rated pressure, volume, or RPM. A pressure relief device must be installed in the discharge of the system.

3. Acids, alkalines, or abrasive fluids cannot be pumped unless approval in writing is obtained before operation from Giant Industries, Inc.

4. Run the pump dry approximately 10 seconds to drain the water before exposure to freezing temperatures.

# Specifications
# Model LP350

| | |
|---|---|
| Volume | Up to 22.6 GPM |
| Discharge Pressure | 2350 PSI |
| Inlet Pressure | Up to 90 PSI |
| Maximum Crankshaft Speed | Up to 1000 RPM |
| Plunger Diameter | 30mm |
| Stroke | 42mm |
| Crankcase Oil Capacity | 100 fl.oz. |
| Temperature of Pumped Fluids | 140 °F @1000 RPM |
| | 160 °F Up to 500 RPM |
| Inlet Port | 1-1/4" BSP |
| Discharge Port | 1" BSP |
| Shaft Mounting | Either side |
| Shaft Rotation | Top of pulley towards manifold |
| Weight | 105 lbs. |
| Crankshaft Diameter | 35mm |

## PULLEY INFORMATION

Pulley selection and pump speed are based on a 1725 RPM motor and "B" section belts. When selecting desired GPM, allow for a ±5% tolerance on pumps output due to variations in pulleys, belts and motors among manufacturers.

1. Select GPM required, then select appropriate motor and pump pulley from the same line.
2. The desired pressure is achieved by selecting the correct nozzle size that corresponds with the pump GPM.

## HORSEPOWER INFORMATION

Horsepower ratings shown are the power requirements for the pump. Gas engine power outputs must be approximately twice the pump power requirements shown above.

We recommend that a 1.1 service factor be specified when selecting an electric motor as the power source. To compute specific pump horsepower requirements, use the following formula:

HP = (GPM x PSI) / 1440

**LP350 PULLEY SELECTION AND HORSEPOWER REQUIREMENTS**

| PUMP PULLEY | MOTOR PULLEY | RPM | GPM | 500 PSI | 1000 PSI | 2000 PSI | 2300 PSI |
|---|---|---|---|---|---|---|---|
| 12.75" | 3.95" | 500 | 11.3 | 3.9 | 7.8 | 15.7 | 18.0 |
| 12.75" | 4.95" | 640 | 14.5 | 5.0 | 10.0 | 20.1 | 23.1 |
| 12.75" | 5.75" | 750 | 16.9 | 5.9 | 11.8 | 23.5 | 27.1 |
| 12.75" | 6.15" | 805 | 18.2 | 6.3 | 12.6 | 25.3 | 29.0 |
| 12.75" | 6.55" | 865 | 19.5 | 6.8 | 13.6 | 27.1 | 31.2 |
| 12.75" | 6.95" | 940 | 21.2 | 7.4 | 14.7 | 29.5 | 33.9 |
| 12.75" | 7.50" | 1000 | 22.6 | 7.8 | 15.7 | 31.4 | 36.1 |

# Specifications
# Model LP400

| | |
|---|---|
| Volume | Up to 15.1 GPM |
| Discharge Pressure | 3600 PSI |
| Inlet Pressure | Up to 90 PSI |
| Maximum Crankshaft Speed | Up to 1000 RPM |
| Plunger Diameter | 24mm |
| Stroke | 42mm |
| Crankcase Oil Capacity | 100 fl.oz. |
| Temperature of Pumped Fluids | 140 °F @1000 RPM |
| | 160 °F Up to 500 RPM |
| Inlet Port | 1-1/4" BSP |
| Discharge Port | 1" BSP |
| Shaft Mounting | Either side |
| Shaft Rotation | Top of pulley towards manifold |
| Weight | 105 lbs. |
| Crankshaft Diameter | 35mm |

### PULLEY INFORMATION

Pulley selection and pump speed are based on a 1725 RPM motor and "B" section belts. When selecting desired GPM, allow for a ±5% tolerance on pumps output due to variations in pulleys, belts and motors among manufacturers.

1. Select GPM required, then select appropriate motor and pump pulley from the same line.
2. The desired pressure is achieved by selecting the correct nozzle size that corresponds with the pump GPM.

### HORSEPOWER INFORMATION

Horsepower ratings shown are the power requirements for the pump. Gas engine power outputs must be approximately twice the pump power requirements shown above.

We recommend that a 1.1 service factor be specified when selecting an electric motor as the power source. To compute specific pump horsepower requirements, use the following formula:

HP = (GPM x PSI) / 1440

**LP400 PULLEY SELECTION AND HORSEPOWER REQUIREMENTS**

| PUMP PULLEY | MOTOR PULLEY | RPM | GPM | 2000 PSI | 2500 PSI | 3000 PSI | 3600 PSI |
|---|---|---|---|---|---|---|---|
| 12.75" | 3.95" | 500 | 7.5 | 10.5 | 13.1 | 15.7 | 18.8 |
| 12.75" | 4.95" | 640 | 9.6 | 13.4 | 16.7 | 20.1 | 24.1 |
| 12.75" | 5.75" | 750 | 11.3 | 15.7 | 19.6 | 23.5 | 28.2 |
| 12.75" | 6.15" | 805 | 12.1 | 16.8 | 21.0 | 25.3 | 30.3 |
| 12.75" | 6.55" | 865 | 13.0 | 18.1 | 22.6 | 27.1 | 32.6 |
| 12.75" | 6.95" | 940 | 14.2 | 19.7 | 24.6 | 29.5 | 35.4 |
| 12.75" | 7.50" | 1000 | 15.1 | 20.9 | 26.1 | 31.4 | 37.6 |

# Specifications
# Model LP450

| | |
|---|---|
| Volume | Up to 19.7 GPM |
| Discharge Pressure | 2600 PSI |
| Inlet Pressure | Up to 90 PSI |
| Maximum Crankshaft Speed | Up to 1000 RPM |
| Plunger Diameter | 28mm |
| Stroke | 42mm |
| Crankcase Oil Capacity | 100 fl.oz. |
| Temperature of Pumped Fluids | 140 °F @1000 RPM |
| | 160 °F Up to 500 RPM |
| Inlet Port | 1-1/4" BSP |
| Discharge Port | 1" BSP |
| Shaft Mounting | Either side |
| Shaft Rotation | Top of pulley towards manifold |
| Weight | 105 lbs. |
| Crankshaft Diameter | 35mm |

### PULLEY INFORMATION

Pulley selection and pump speed are based on a 1725 RPM motor and "B" section belts. When selecting desired GPM, allow for a ±5% tolerance on pumps output due to variations in pulleys, belts and motors among manufacturers.

1. Select GPM required, then select appropriate motor and pump pulley from the same line.
2. The desired pressure is achieved by selecting the correct nozzle size that corresponds with the pump GPM.

### HORSEPOWER INFORMATION

Horsepower ratings shown are the power requirements for the pump. Gas engine power outputs must be approximately twice the pump power requirements shown above.

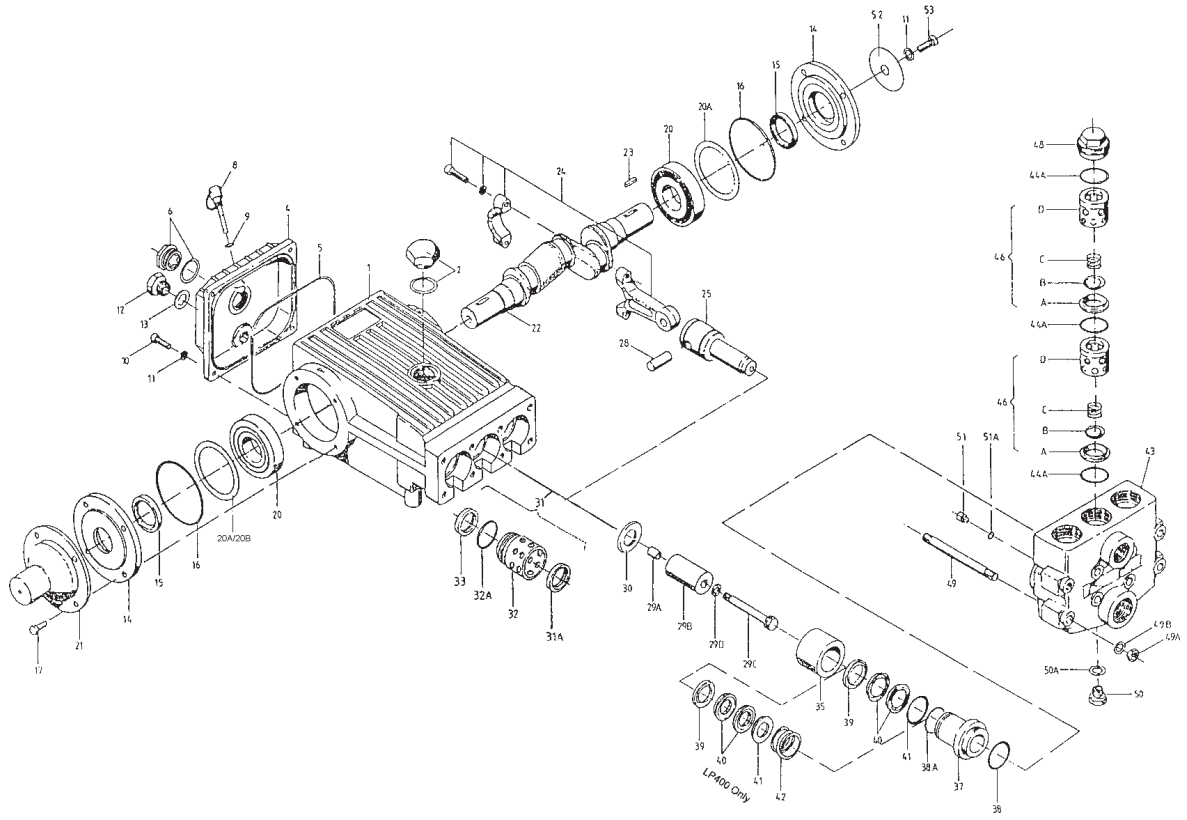
We recommend that a 1.1 service factor be specified when selecting an electric motor as the power source. To compute specific pump horsepower requirements, use the following formula:

HP = (GPM x PSI) / 1440

**LP450 PULLEY SELECTION AND HORSEPOWER REQUIREMENTS**

| PUMP PULLEY | MOTOR PULLEY | RPM | GPM | 1000 PSI | 1500 PSI | 2000 PSI | 2600 PSI |
|---|---|---|---|---|---|---|---|
| 12.75" | 3.95" | 500 | 9.8 | 6.8 | 10.3 | 13.7 | 17.8 |
| 12.75" | 4.95" | 640 | 12.6 | 8.7 | 13.1 | 17.5 | 22.7 |
| 12.75" | 5.75" | 750 | 14.8 | 10.3 | 15.4 | 20.5 | 26.7 |
| 12.75" | 6.15" | 805 | 15.8 | 11.0 | 16.5 | 22.0 | 28.6 |
| 12.75" | 6.55" | 865 | 17.0 | 11.8 | 17.7 | 23.6 | 30.7 |
| 12.75" | 6.95" | 940 | 18.5 | 12.8 | 19.3 | 25.7 | 33.4 |
| 12.75" | 7.50" | 1000 | 19.7 | 13.7 | 20.5 | 27.3 | 35.5 |

# LP350, LP400, LP450 - EXPLODED VIEW




# LP350, LP400 & LP 450 PARTS LIST

| ITEM # | PART # | DESCRIPTION | QTY | ITEM # | PART # | DESCRIPTION | QTY |
|---|---|---|---|---|---|---|---|
| 1 | 07759 | Crankcase | 1 | 33 | 06117 | Back Up Seal | 3 |
| 2 | 13000 | Oil filler plug assy. | 1 | 35 | 13010 | Seal Sleeve **(LP350)** | 3 |
| 4 | 06085 | Crankcase Cover | 1 | 35 | 13392 | Seal Sleeve **(LP400)** | 3 |
| 5 | 07104 | O-ring, Crankcase cover | 1 | 35 | 13009 | Seal Sleeve **(LP450)** | 3 |
| 6 | 07186 | Oil Sightglass with Gasket | 1 | 37 | 13011 | Seal Case **(LP350/LP450)** | 3 |
| 8 | 07105 | Oil Dipstick | 1 | 37 | 13393 | Seal Case **(LP400)** | 3 |
| 9 | 01009 | O-Ring, Dipstick | 1 | 38 | 07140 | O-Ring | 3 |
| 10 | 01010 | Cylinder Screw | 4 | 38A | 13012 | O-Ring | 3 |
| 11 | 01011 | Spring Ring | 5 | 39 | 07271 | Pressure Ring **(LP350)** | 3 |
| 12 | 07109 | Plug | 1 | 39 | 12055 | Pressure Ring **(LP400)** | 3 |
| 13 | 07110 | Gasket | 1 | 39 | 13013 | Pressure Ring **(LP450)** | 3 |
| 14 | 07111 | Bearing Cover | 2 | 40 | 13016 | V-Sleeve **(LP350)** | 6 |
| 15 | 07112 | Radial Shaft Seal | 2 | 40 | 06083 | V-Sleeve **(LP400)** | 6 |
| 16 | 07113 | O-Ring | 2 | 40 | 13015 | V-Sleeve **(LP450)** | 6 |
| 17 | 07114 | Hexagon Screw | 8 | 41 | 07150 | O-Ring **(LP350)** | 3 |
| 20 | 07116 | Taper Roller Bearing | 2 | 41 | 13394 | O-Ring **(LP400)** | 3 |
| 20A | 07117 | Fitting Disc | 1-3 | 41 | 07102 | O-Ring **(LP450)** | 3 |
| 20B | 13001 | Fitting Disc | 1-3 | 42 | 07338 | Pressure Spring **(LP400)** | 3 |
| 21 | 07118 | Shaft Protector | 1 | 43 | 13018 | Valve Casing | 1 |
| 22 | 13242 | Crankshaft | 1 | 44A | 07150 | O-Ring | 9 |
| 23 | 13243 | Woodruff Key | 1 | 46 | 07060 | Valve Assy. | 6 |
| 24 | 13340 | Connecting Rod Assy. | 3 | 46A | 07064 | Valve Seat | 6 |
| 25 | 13244 | Crosshead / Plunger Assy. | 3 | 46B | 07063 | Valve Plate | 6 |
| 28 | 13232 | Crosshead Pin | 3 | 46C | 07062 | Valve Spring | 6 |
| 29A | 07256 | Centering sleeve | 3 | 46D | 07066 | Spacer Pipe | 6 |
| 29B | 07261 | Plunger Pipe **(LP350)** | 3 | 48 | 07156 | Plug | 3 |
| 29B | 13046 | Plunger Pipe **(LP400)** | 3 | 49 | 07754 | Stud bolt | 8 |
| 29B | 13005 | Plunger Pipe **(LP450)** | 3 | 49A | 07158 | Hexagon Nut | 8 |
| 29C | 13007 | Tensioning Screw | 3 | 49B | 07159 | Disc | 8 |
| 29D | 07258 | Copper Ring | 3 | 50 | 07160-0100 | Plug | 1 |
| 30 | 07779 | O-Ring | 3 | 50A | 07161 | Copper Ring | 1 |
| 31 | 06120 | Oil Seal Retainer Complete | 3 | 51 | 13019 | Plug | 3 |
| 31A | 06118 | Oil Seal | 3 | 51A | 07676 | Copper Ring | 3 |
| 32 | 06116 | Oil Seal Retainer | 3 | 52 | 13020 | Disc for Crankshaft | 1 |
| 32A | 06119 | O-Ring | 3 | 53 | 13021 | Hexagon Screw | 1 |

# REPAIR INSTRUCTION - LP350, LP400, LP450

**VALVE REPLACEMENT**

1) With a 30mm wrench remove the three (3) tension plugs (#48) from top of valve casing (43).
2) Remove discharge and inlet valves (#46), pulling them upwards out of the valve casing. It maybe necessary to use a slide hammer tool.
3) With the valve assembly pointed down, place a dowel rod through the top of valve cage. Hold assembly in hand and tap end of dowel sharply with mallet until assembly pops free.
4) Inspect valve seats (#46A) and valve plates (#46B) for damage and replace if needed.
5) Check valve casing (#43) surfaces for damage.
6) Replace o-rings (#44A) and reinstall valve assemblies into valve casing. (Lubricate o-rings before installation.)
7) Replace tension plugs (#48) and tighten them securely.

**SEAL AND PLUNGER REPLACEMENT**

1) Remove the eight (8) manifold nuts and washers (#49A,B) using a 19mm wrench and pull off valve casing (#43). If needed, tap valve casing with a rubber mallet to remove it.
2) Pull seal sleeve (#35) out of crankcase guides.
3) Remove seal case (#37) from seal sleeve.
4) Check plunger surface for wear and pitting. If none is found, proceed to step eleven.
5) If plunger (#29B) is worn, remove tension screw (#29C) with a 17mm wrench. Clean tension screw with wire brush to remove any old locktite.
6) Discard copper gasket (#29D) and replace with new.
7) Clean the front surface of plunger/ crosshead assembly (#25).
8) Install new plunger (#29B) onto plunger/ crosshead assembly.
9) Put some locktite on both surfaces of copper gasket (#29D) and tension screw threads (#29C).
10) Secure plunger in place with tension screw (#29C) and gasket (#29D) and tighten to 33 ft. lbs.
11) Remove v-sleeves (#40) and o-ring (#41) for seal case and replace with new. Lubricate parts before reinstalling.
12) Replace seal case (#35) and seal sleeve (#37) into valve casing. Replace nuts and washers (#49A,B) and tighten to 59 ft. lbs.

**DISASSEMBLY OF CRANKCASE**

1) Remove valve casing (#43) and plunger pipe (#28B), drain oil.
2) Screw off gear cover (#4) and bearing cover (#14).
3) Remove connecting rod screws (#24) and push the front of connecting rod forward as far as possible. Remove back halves of connecting rods, note which position from which they came from.
4) Turning the crankshaft slightly, carefully hit on side of crankshaft (#22) with a rubber mallet until crankshaft is loose.
5) Check crankshaft and bearing for damage, replace if needed.

**REASSEMBLY**

6) Using a soft tool, press in the outer bearing ring until the outer edge lines up with the outer edge of crankcase (#1). Attach bearing cover (#14) with shaft seal and o-ring (#16) in place. Fit crankshaft through bearing hole on the opposite side. Press in bearing with bearing cover, keeping the shaft in a horizontal position and turning it slowly so that taper rollers touch the edge of outer bearing ring.
7) Adjust axial bearing clearance to at least .004" and maximum at .006 by placing fitting discs (#20A & 20B) under the bearing cover.
8) After assembly the shaft should turn easily with very little clearance.
9) Bolt connecting rod halves together making sure they are replaced in the same position from which they came from. Tighten connecting rod screws to 264 in.-lbs.

## LP350, LP400 & LP450 KITS

**Valve Kit #09196**

| Qty | Part # | Description |
|---|---|---|
| 1 | 7064 | Valve seat |
| 1 | 7063 | Valve plate |
| 1 | 7062 | Valve spring |

**Packing Kit, LP350 #09233**

| Qty | Part # | Description |
|---|---|---|
| 6 | 13016 | V-sleeve |
| 3 | 7150 | O-ring |
| 3 | 13012 | O-ring |
| 3 | 7140 | O-ring |

**Packing Kit, LP400 #09309**

| Qty | Part # | Description |
|---|---|---|
| 6 | 06083 | V-sleeve |
| 3 | 13349 | O-ring |
| 3 | 13012 | O-ring |
| 3 | 7140 | O-ring |

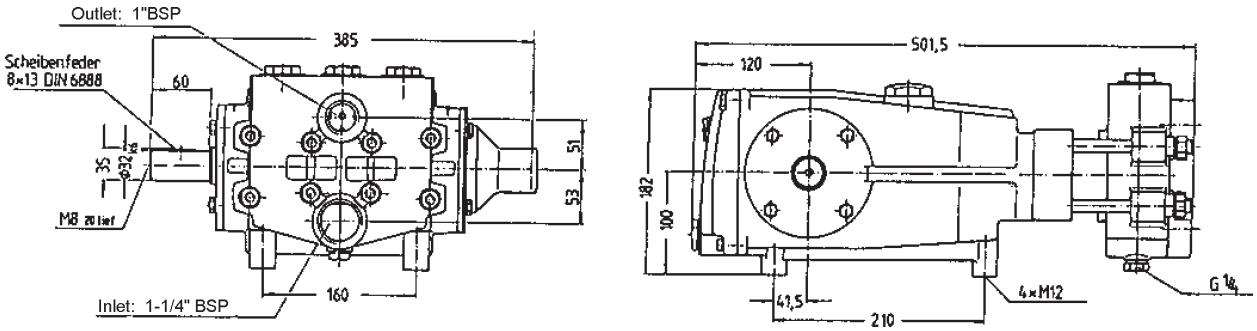
**Packing Kit LP450 #09234**

| Qty | Part # | Description |
|---|---|---|
| 6 | 13015 | V-Sleeve |
| 3 | 7102 | O-ring |
| 3 | 13012 | O-ring |
| 3 | 7140 | O-ring |

## TORQUE SPECIFICATIONS

| Position | Description | Torque Amount |
|---|---|---|
| 24 | Connecting Rod | 264 in.-lbs. |
| 29C | Tensioning Screw | 33 ft.-lbs. |
| 49A | Hexagon Nut | 59 ft.-lbs. |

## LP350, LP400 & LP 450 DIMENSIONS (metric)




# GIANT INDUSTRIES LIMITED WARRANTY

Giant Industries, Inc. pumps and accessories are warranted by the manufacturer to be free from defects in workmanship and material as follows:

1. For portable pressure washers and car wash applications, the discharge manifolds will never fail, period. If they ever fail, we will replace them free of charge. Our other pump parts, used in portable pressure washers and in car wash applications, are warranted for five years from the date of shipment for all pumps used in NON-SALINE, clean water applications.
2. One (1) year from the date of shipment for all other Giant industrial and consumer pumps.
3. Six (6) months from the date of shipment for all rebuilt pumps.
4. Ninety (90) days from the date of shipment for all Giant accessories.

This warranty is limited to repair or replacement of pumps and accessories of which the manufacturer's evaluation shows were defective at the time of shipment by the manufacturer. The following items are NOT covered or will void the warranty:

1. Defects caused by negligence or fault of the buyer or third party.
2. Normal wear and tear to standard wear parts.
3. Use of repair parts other than those manufactured or authorized by Giant.
4. Improper use of the product as a component part.
5. Changes or modifications made by the customer or third party.
6. The operation of pumps and or accessories exceeding the specifications set forth in the Operations Manuals provided by Giant Industries, Inc.

Liability under this warranty is on all non-wear parts and limited to the replacement or repair of those products returned freight prepaid to Giant Industries which are deemed to be defective due to workmanship or failure of material. A Returned Goods Authorization (R.G.A.) number and completed warranty evaluation form is required prior to the return to Giant Industries of all products under warranty consideration. Call (419)-531-4600 or fax (419)-531-6836 to obtain an R.G.A. number.

Repair or replacement of defective products as provided is the sole and exclusive remedy provided hereunder and the MANUFACTURER SHALL NOT BE LIABLE FOR FURTHER LOSS, DAMAGES, OR EXPENSES, INCLUDING INCIDENTAL AND CONSEQUENTIAL DAMAGES DIRECTLY OR INDIRECTLY ARISING FROM THE SALE OR USE OF THIS PRODUCT.

THE LIMITED WARRANTY SET FORTH HEREIN IS IN LIEU OF ALL OTHER WARRANTIES OR REPRESENTATION, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL SUCH WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY THE MANUFACTURER.

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