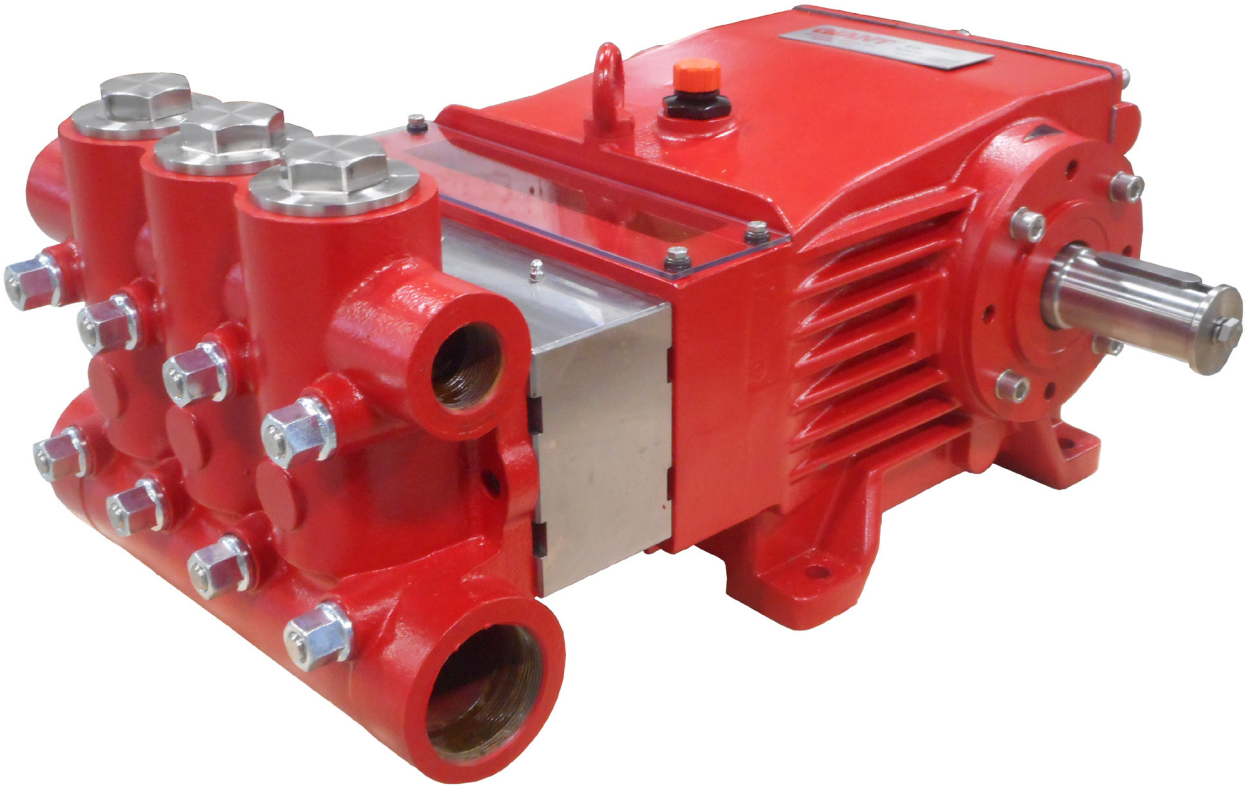
Triplex Ceramic
Plunger Pump
Operating Instructions/
Repair and Service Manual

Models BP7170/BP7171



GIANT
Performance Under Pressure

Updated 03/22

Contents:

INSTALLATION INSTRUCTIONS

Operation and Maintenance

Check oil level prior to starting and ensure trouble-free medium supply.

Oil: Use only 2.4 gallons (9.0 litres) of SAE 80W-90 gear oil (Giant's part number 01154) or ISO VG220 Industrial Gear oil.

Initial change after 50 operating hours and then after every 1000 operating hours.

Caution: When operating in damp places or with high temperature fluctuations. If condensate (frothy oil) occur in the gear box, oil must be changed immediately.

Maximum input pressure 145 PSI (10 bar). Maximum suction head -4.35 PSI (-0,3 bar). (These values might vary depending on the viscosity of the medium).

Important! To avoid any incrustation of the medium on the plungers (36B), screw cover plate (30) off after every operation and rinse the plunger area with clear non-pressurized water (at maximum water main pressure, never use high pressure).

Important! If recycled bentonite is being pumped, the pump must be rinsed for 3 - 5 minutes with clear water after usage to flush out dirt particles (sand) in the bentonite. The service life of the seals, ceramic plungers and valves depends largely on how fine the recycled bentonite is filtered.

Important! The service life of the seals is maximized if a minimal amount of leakage is present. A few drops of medium should drip from each plunger every minute. If leakage increases, the spiral rings can be tightened by turning the pressure sleeve (44) to the right. Leakage has to be examined every day. The plunger seals must be changed should leakage become excessive i.e., constant dripping.

Important! Only turn the sleeve past one or maximum two hole spaces. Otherwise friction will be too strong. Coat the seal by putting silicone grease in the grease nipples (47).

Safety Rules

A safety valve is to be installed in accordance with the guidelines for liquid spraying units so that the admissible operating pressure cannot be exceeded by more than 10%.

Pump operation without a safety valve as well as any excess in temperature or speed limits automatically voids the warranty.

Pressure in the discharge line and in the pump must be a zero before any maintenance to the pump takes place. Before work is performed on the pump, close off the suction line.

Take necessary precautions to ensure that the driving motor cannot get switched on accidentally (by disconnecting the fuses, for example).

In order to prevent air or an air/water mixture being absorbed and to prevent cavitation occurring, the pump positive suction head (NPSHR) and water temperature must be respected.

Cavitation and/or compression of gases lead to uncontrollable pressure kicks which can ruin the pump and unit parts and also be dangerous to the operator or anyone standing nearby.

The BP7170/BP7171 pumps are suitable for pumping clean water as well as water containing bentonite in a concentration of maximum 55 lbs (25 kg) of bentonite diluted in 264 gallons (1 m^3) of water.

Specifications - Model BP7170

	U.S.	Metric
Volume	84.5 GPM	320 L/min
Discharge Pressure	1015 PSI	70 bar
Power Consumption	59 BHP	44 kW
Speed		560 RPM
Inlet Pressure	-4.35 to 145 PSI	-0.3 to 10 bar
Plunger Diameter	2.76”	70mm
Plunger Stroke	2.05”	52mm
Crankshaft Diameter		48mm
Key Width		14mm
Crankshaft Mounting		Either side
Shaft Rotation		Top of pulley towards manifold
Temperature of Pumped Fluids	Up to 104 °F	(40 °C)
Inlet Ports		(2) 2-1/2” BSP
Discharge Ports		(2) 1-1/4” BSP
Weight	423 lbs.	(192 kg)
Crankcase Oil Capacity	2.4 Gal.	(9.0 Liters)
Fluid End Material		Cast Iron

Consult the factory for special requirements that must be met if the pump is to operate beyond one or more of the limits specified above.

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

$$\frac{\text{GPM x PSI}}{1450} = \text{hp}$$

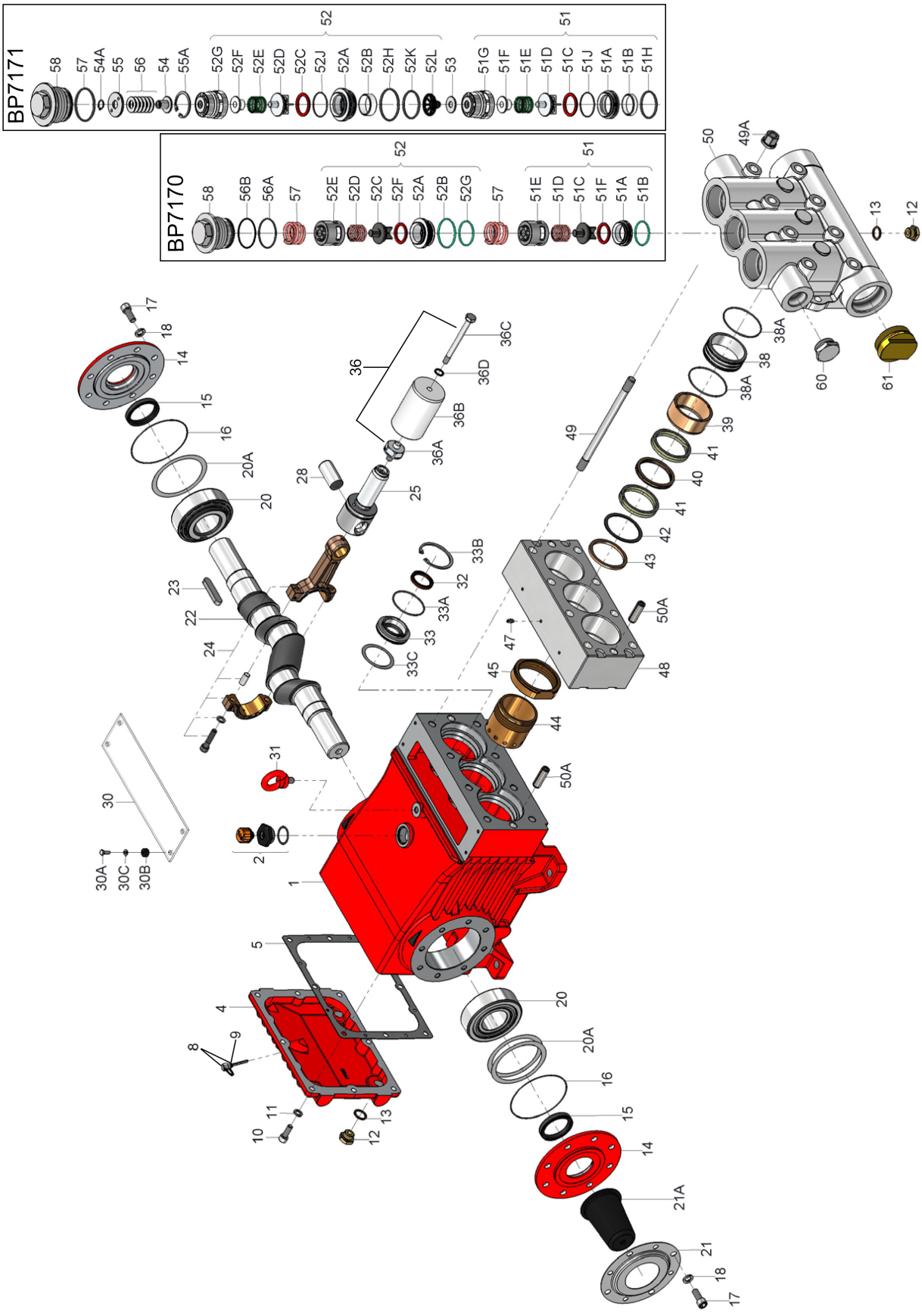
BP7170 Horesepower Requirements					
RPM	GPM	500 PSI	700 PSI	900 PSI	1015 PSI
300	45.3	15.6	21.9	28.1	31.7
400	60.4	20.8	29.2	37.5	42.3
500	75.4	26.0	36.4	46.8	52.8
560	84.5	29.1	40.8	54.5	59.2

SPECIAL NOTE:

The theoretical gallons per revolution (gal/rev) is 0.151. To find specific outputs at various RPM, use the formula:

GPM = 0.151 x RPM

Exploded View - BP7170/BP7171



Parts List - BP7170/BP7171

ITEM	PART	DESCRIPTION	QTY.
1	04674	Crankcase	1
2	06893	Oil Filler Plug Assembly	1
4	07601	Crankcase Cover	1
5	05798	Gasket, Crankcase Cover	1
8	03215	Oil Dip Stick Assembly	1
9	01009	O-Ring, Dip Stick	1
10	22706	Hexagon Screw	8
11	06725	Spring Washer	8
12	07109	Drain Plug	3
13	06272	Gasket, Drain Plug	2
14	04675	Bearing Cover	2
15	07608	Radial Shaft Seal	2
16	07184	O-Ring	2
17	05642	Inner Hexagon Screw	8
18	05039	Spring Washer	8
20	07610	Taper Roller Bearing	2
20A	07611	Fitting Disc (Shim)	1-5
21	05645	Shaft Guard Holder	1
21A	05646	Shaft Guard	1
22	13405	Crankshaft	1
23	07614	Key	1
24	13182	Connecting Rod Assembly	3
25	13183	Crosshead Assembly	3
28	13184	Crosshead Pin	3
30	06661	Cover Plate	1
30A	07225-0100	Hexagon Screw	4
30B	13136	Grommet	4
30C	05053	Washer	4
31	07623	Eye Bolt	1
32	07624	Radial Shaft Seal	3
33	06662	Seal Retainer	3
33A	13286	O-Ring	3
33B	05719	Circlip	3
33C	04676	Fitting Disc (Shim)	3
36	06664	Plunger Pipe Assembly (36 A-D)	3
36A	07667	Plunger Connection	3
36B	06665	Plunger Pipe	3
36C	07664	Tension Screw	3
36D	07665	Copper Ring	3
38	06666	Seal Case	3
38A	06667	O-Ring	6
39	04677	Spacer Sleeve	3
40	04678	Lubrication Ring	3
41	06670	Spiral Ring	6
42	06671	Support Ring	3
43	04679	Guide Ring	3
44	04680	Pressure Sleeve	3
45	04681	Adjusting Ring	3
47	04374	Grease Nipple	3
48	04682	Intermediate Casing	1
49	06675	Stud Bolt, BP7170	8
49	04683	Stud Bolt, BP7171	8
49A	13160	Hex Nut, BP7170	8
49A	13430	Hex Nut, BP7171	8
50	06676	Valve Casing, BP7170	1
50	04689	Valve Casing, BP7171	1
50A	13162	Cylinder Stud	4
51	06683	Inlet Valve Assembly (51A-F), BP7170	3
51	04684	Inlet Valve Assembly (51A-J), BP7171	3
51A	04704	Inlet Valve Seat, BP7170	3
51A	04685	Inlet Valve Seat, BP7171	3
51B	05408	O-Ring for 51, BP7170	3
51B	04686	Guide Ring, BP7171	3
51C	06678	Valve Plate, BP7170	3
51C	04687	Valve Seal Ring, BP7171	3
51D	07732-0100	Valve Spring, BP7170	3
51D	04688	Valve Plate, BP7171	3
51E	06679	Spacer Pipe, BP7170	3
51E	05450	Valve Spring, BP7171	3
51F	06680	Valve Seal Ring, BP7170	3
51F	04690	Guide Sleeve, BP7171	3
51G	04691	Spring Tension Cap, BP7171	3
51H	05167	O-Ring, BP7171	3
51J	07758	O-Ring, BP7171	3
52	06673	Discharge Valve Assembly (52A-G), BP7170	3
52	04692	Discharge Valve Assembly (52A-L), BP7171	3
52A	04705	Discharge Valve Seat, BP7170	3
52A	04693	Discharge Valve Seat, BP7171	3
52B	05818	O-Ring, BP7170	3
52B	03433	Guide Ring, BP7171	3
52C	06678	Valve Plate, BP7170	3
52C	04687	Valve Seal Ring, BP7171	3
52D	07732-0100	Valve Spring, BP7170	3
52D	04688	Vale Plate, BP7171	3
52E	06679	Spacer Pipe, BP7170	3
52E	05450	Valve Spring, BP7171	3
52F	06680	Valve Seal Ring, BP7170	3
52F	04690	Guide Sleeve, BP7171	3
52G	05408	O-Ring, BP7170	3
52G	04691	Spring Tension Cap, BP7171	3
52H	03434	O-Ring, BP7171	3
52J	07758	O-Ring, BP7171	3
52K	05599	O-Ring, BP7171	3
52L	13309	Spacer, BP7171	3
53	04694	Valve Holder, BP7171	3
54	04695	Plate Spring Adapter, BP7171	3
54A	04696	Clip Ring, BP7171	3
55	04187	Tension Disc, BP7171	3
55A	04697	Clip Ring, BP7171	3
56	04698	Plate Spring, BP7171	18
56A	07658	O-Ring, BP7170	3
56B	07635	Support Ring, BP7170	3
57	13173	Tension Spring, BP7170	6
57	04699	O-Ring, BP7171	3
58	06682	Plug M64 X 2, BP7170	3
58	04700	Valve Plug, BP7171	3
60	13151	Plug, 1-1/4” BSP, BP7170	1
60	13322	Plug, 1-1/2” BSP, BP7171	1
61	13171	Plug, 2-1/2” BSP	1
	04706	Gear End Assembly, BP7170 (1-33C, 49, 49A, 50A)	1
	04701	Gear End Assembly, BP7171 (1-33C, 49, 49A, 50A)	1
	04707	Manifold Assembly, BP7170 (1 x 12, 50-61 without 50A)	1
	04703	Manifold Assembly, BP7171 (50-61)	1
	04702	Plunger Replacement Kit, (36-45)	1

Specifications - Model BP7171

	U.S.	Metric
Volume	105.7 GPM	400 L/min
Discharge Pressure	1015 PSI	70 bar
Power Consumption	74 BHP	55 kW
Speed		700 RPM
Inlet Pressure	-4.35 to 145 PSI	-0.3 to 10 bar
Plunger Diameter	2.76”	70mm
Plunger Stroke	2.05”	52mm
Crankshaft Diameter		48mm
Key Width		14mm
Crankshaft Mounting		Either side
Shaft Rotation		Top of pulley towards manifold
Temperature of Pumped Fluids	Up to 104 °F	(40 °C)
Inlet Ports		(2) 2-1/2” BSP
Discharge Ports		(2) 1-1/2” BSP
Weight	423 lbs.	(192 kg)
Crankcase Oil Capacity	2.4 Gal.	(9.0 Liters)
Fluid End Material		Cast Iron

Consult the factory for special requirements that must be met if the pump is to operate beyond one or more of the limits specified above.

PULLEY INFORMATION

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

$$\frac{\text{GPM x PSI}}{1450} = \text{hp}$$

BP7171 Horesepower Requirements					
RPM	GPM	500 PSI	700 PSI	900 PSI	1015 PSI
300	45.3	15.6	21.9	28.1	31.7
400	60.4	20.8	29.2	37.5	42.3
500	75.4	26.0	36.4	46.8	52.8
560	84.5	29.1	40.8	54.5	59.2
700	105.7	36.5	51.0	65.6	74.0

SPECIAL NOTE:

The theoretical gallons per revolution (gal/rev) is 0.151.
To find specific outputs at various RPM, use the formula:

GPM = 0.151 x RPM

Repair Kits - BP7170/BP7171

Plunger Packing Kit
 # 09558

Item	Part #	Description	Qty.
38A	06667	O-Ring	6
41	06670	Spiral Ring	6
42	06671	Support Ring	3

Oil Seal Kit
 # 09557

Item	Part #	Description	Qty.
32	07624	Radial Shaft Seal	3
33A	13286	O-Ring	3

Valve Repair Kit - BP7170
 # 09559

Item	Part #	Description	Qty.
51A	04704	Valve Seat, Inlet	3
51B	05408	O-Ring	3
51C/52C	06678	Valve Plate	6
51D/52D	07732-0100	Valve Spring	6
51E/52E	06679	Spacer Pipe	6
51F/52F	06680	Ring for Valve	6
52A	04705	Valve Seat, Discharge	3
52B	05818	O-Ring	3
52G	05408	O-Ring	3
56A	07658	O-Ring	3
56B	07635	Support Ring	3

Valve Repair Kit - BP7171
 # 09836

Item	Part #	Description	Qty.
51A	04685	Valve Seat, Inlet	3
51B	04686	Guide Ring	3
51C/52C	04687	Valve Seal Ring	6
51D/52D	04688	Valve Plate	6
51E/52E	05480	Valve Spring	6
51F/52F	04690	Guide Sleeve	6
51G/52G	04691	Spring Tension Cap	6
51H	05167	O-Ring	3
51J/52J	07758	O-Ring	6
52A	04693	Valve Seat, Discharge	3
52B	03433	Guide Ring	3
52H	03434	O-Ring	3
52K	05599	O-Ring	3
52L	13309	Spacer	3
57	04699	O-Ring	3

Torque Specifications BP7170/BP7171

Item	Part #	Description	Torque	Tool Needed/ Lubrication
1	04674	Crankcase		Molycote Cu-Paste
10	22706	Hexagon Screw	33 ft.-lbs. (45 Nm)	
12	07109	Drain Plug	59 ft.-lbs. (80 Nm)	
24	13182	Connecting Rod Assembly	30 ft.-lbs. (40 Nm)	
30A	07225-0100	Hexagon Screw	89 in.-lbs. (10 Nm)	
33B	05719	Circlip		Loctite 403
36A	07667	Plunger Connection	33 ft.-lbs. (40 Nm)	
36C	07664	Tension Screw	30 ft.-lbs. (40 Nm)	Loctite 243
49	06675	Stud Bolt, BP7170		Loctite 243
49	04683	Stud Bolt, BP7171		Loctite 243
49A	13160	Hex Nut, BP7170	103 ft.-lbs. (140 Nm)	
49A	13430	Hex Nut, BP7171	59 ft.-lbs. (80 Nm)	
51A	04704	Inlet Valve Seat, BP7170		Hylomar
51A	04685	Inlet Valve Seat, BP7171		Hylomar
52A	04705	Discharge Valve Seat, BP7170		Hylomar
52A	04693	Discharge Valve Seat, BP7171		Hylomar
58	06682	Valve Plug	107 ft.-lbs. (145 Nm)	
58	04700	Valve Plug	107 ft.-lbs. (145 Nm)	

BP7170/BP7171 Repair Instructions

To Check Valves
Remove plugs (58). For BP7171, remove items 54-56. Using valve removal tool (07662), lift the complete discharge valve assembly (52) and suction valve assembly (51) from the valve casing (50).
Dismantling Valves (BP7170): the spring tension cap (51E, 52E) is screwed together with valve seat (51A, 52A). Remove spring tension cap, remove spring (51D, 52D) and valve plate (51C, 52C). The seal ring (51F, 52F) is snapped onto the valve plate. Examine sealing surfaces, o-rings (51B/52B/56A/56G) and support rings (56B). Replace worn parts. Glue in valve seats with Hylomar.

Dismantling Suction Valves (BP7171): the spring tension cap (51G) is screwed together with valve seat (51A). Remove spring tension cap and remove spring (51E) and valve plate (51D). The seal ring (51C) is snapped on to the valve plate. The guide sleeve (51F) is clipped into the spring tension cap. The guide ring (51B) is pushed into the valve seat from below.
Disassemble discharge valves (BP7171) (52) like the suction valves. Check sealing surfaces and o-rings (51H/52H/52J/52K/57). Replace worn parts. Glue in valve seats with Hylomar or Permatex.

Checking Seals and Plunger Pipes
Remove hexagon nut (49A) and take the pump head (50) off to the front. The intermediate casing (48) will either stay on the valve casing or on the crankcase (1).

Important! Pay attention to avoid any injury due to the heavy weight of the parts when removing these from the stud screws (49). If necessary, secure the valve casing by supporting it with wooden blocks or using a hoist. Pry intermediate casing (48) off the valve casing or crankcase with two screwdrivers (use the slots in the intermediate casing).

Examine seals and replace if necessary. The seal cases (38) normally remain in the valve casing (50) when this is separated from the intermediate casing. Remove spacer sleeves (39) and seal units (40/41/42/43) from the intermediate casing and examine them. Take adjusting rings (45) together with pressure sleeves (44) out of the crankcase. Unscrew these items and clean.

Important! Screw the pressure sleeve and adjusting ring into each other so that the adjusting ring is in alignment with the top of the pressure sleeve. Then put the parts back into the crankcase (1).

To Check Seals
Remove seal cases (38) from valve casing (50) and check o-rings (38A). Replace worn parts. Coat seals and o-rings with silicone grease before refitting.

Important! Mounting surfaces of the crankcase and intermediate casing must be clean and free of damage. The components must lie exactly and evenly on one another. The same exactness applies for all centring positions within the crankcase, intermediate and valve casing.

Important! Seal unit (40, 41, 42, 43) can only be fitted after intermediate casing (48) has been mounted on the drive. The seal unit is then mounted on to the plunger pipe and pushed into the intermediate casing using a sleeve or the spacer sleeve.

Important! The seal unit (40-43) is tensioned by spacer sleeve (39). To achieve long seal service live, the tension on the seal unit allows for a small amount of leakage which helps lubricate and cool the seals. If leakage increases, the spiral rings can be tightened by turning the pressure sleeve (44) in its seal sleeve (40) a little to the right. Grease the spiral rings (41) via the lubricating nipple (47). If necessary, replace the spiral rings (41) together with support ring (42). It is only necessary to change seals should leakage considerably increase, in turn causing the flow and pressure to fall.

To Check Plunger Pipes
Important! If the plunger pipe (36B) is worn, tap the tension screw (36C) lightly with a plastic hammer beforehand to loosen the glue on the threads of the tension screw. Then screw out tension screw (36C) and remove the plunger pipe from plunger connection (36A).

Using the tension screw, put the new plunger pipe together with a new copper ring (36D) on to the plunger connection. Cover the threads on the tension screw lightly with bonding agent and tighten at 30 ft.-lbs. (40 Nm).

Important! Glue must never come between the plunger pipe (36B) and the plunger connection (36A). Deformation of the plunger pipe due to excessive tightening of the tension screw or dirt or damage on the front surface can cause the plunger pipe to fracture.

Mounting the Valve Casing
Check mounting and sealing surfaces of the crankcase (1), intermediate casing (48) and valve casing (50), and clean where necessary. Put seal cases (38) in the centring holes of the valve casing, then push the valve casing carefully onto the centring studs (50A). Tighten hexagon nuts (49) at 59 ft.-lbs. 103 ft.-lbs. (140 Nm) for BP7170 and (80 Nm) for BP7171.

To Dismantle Gear
Take out plunger and seal sleeves as described above. Drain oil. After removing the circlip ring (33B), pry out seal retainer (33) with a screwdriver. Check seals (32, 32A, 33A) and crosshead surfaces. Screw off crankcase cover (4). Remove fitting screws on the connecting rods (24).

Important! Do not twist the connecting rod halves. The connecting rods are marked for identification and must be refitted onto the shaft journals in the exact original position.
Check surfaces of connecting rod and crankshaft (22). Push connecting rod halves together with the crosshead as far as possible into the crosshead guide. Remove one bearing cover and push the crankshaft out, taking care not to bend any connecting rods.

Important! Seal (32A) must always be fitted so that the seal-lip on the inside diameter faces the oil. Possible axial float of the seal adaptor (33) to be compensated with shims (33C).
Reassembly in reverse order. Adjust axial play on the crankshaft with shims (20A) of size min. 0.1mm max. 0.15mm. The shaft should turn easily with little clearance. Tighten fitting screws (24) to 30 ft.-lbs. (40 Nm).

Important! A little clearance must exist to enable slight sideward movement of the connecting rod on its journal.

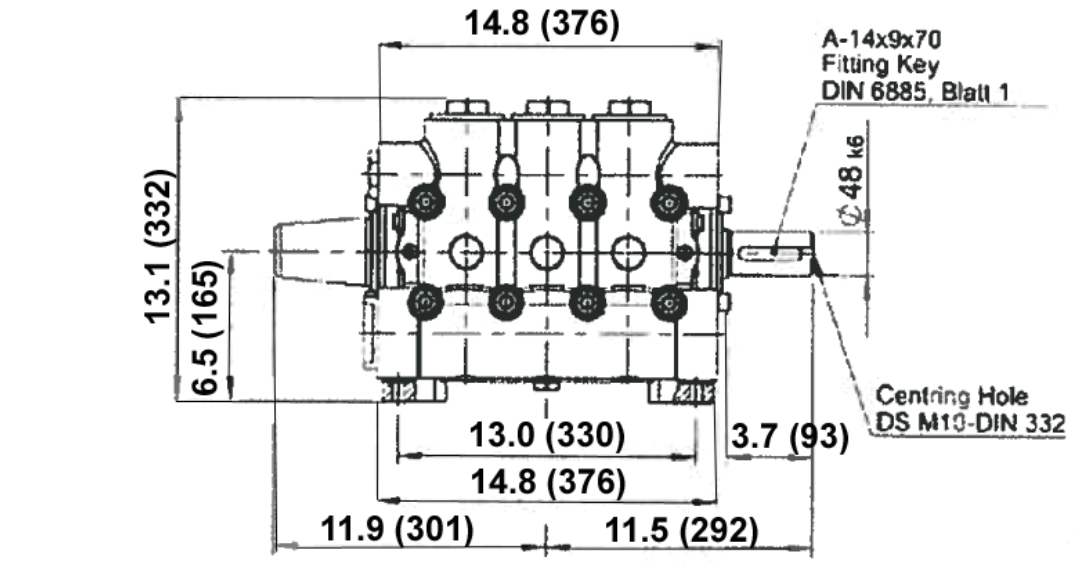
Preventative Maintenance Check-List & Recommended Spare Parts List

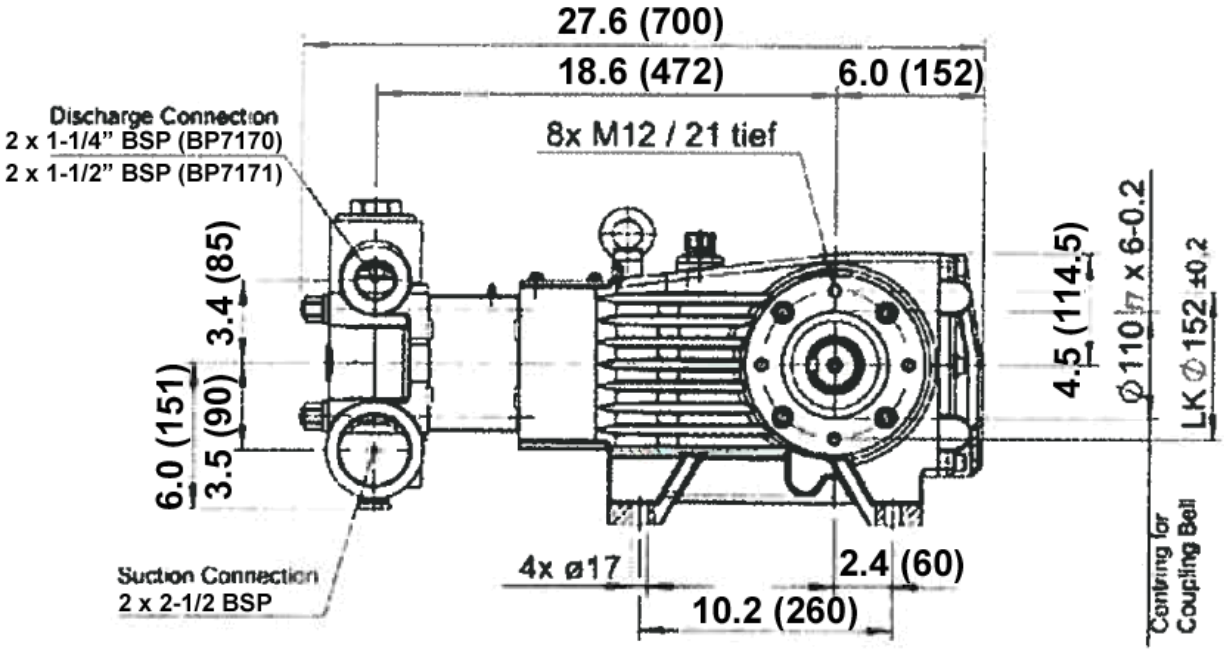
Oil Level/Quality	X					
Oil Leaks	X					
Water Leaks	X					
Belts, Pulley		X				
Plumbing		X				
Recommended Spare Parts						
Oil Change p/n 1154			X	X		
Seal Spare Parts (1 kit/pump) (Page 7 for kit list)					X	
Oil Seal Kit (1 kit/pump) (Page 7 for kit lit)					X	
Valve Kit (1 kit/pump) (Page 7 for kit list)						X

PUMP SYSTEM MALFUNCTION

MALFUNCTION	CAUSE	REMEDY
The Pressure and/ or the Delivery Drops	Worn packing seals	Replace packing seals
	Broken valve spring	Replace spring
	Belt slippage	Tighten or Replace belt
	Worn or Damaged nozzle	Replace nozzle
	Fouled discharge valve	Clean valve assembly
	Fouled inlet strainer	Clean strainer
	Worn or Damaged hose	Repair/Replace hose
	Worn or Plugged relief valve on pump	Clean, Reset, and Replace worn parts
	Cavitation	Check suction lines on inlet of pump for restrictions
	Unloader	Check for proper operation
Water in crankcase	High humidity	Reduce oil change interval
	Worn seals	Replace seals
Noisy Operation	Worn bearings	Replace bearings, Refill crankcase oil with recommended lubricant
	Cavitation	Check inlet lines for restrictions and/or proper sizing
Rough/Pulsating Operation with Pressure Drop	Worn packing	Replace packing
	Inlet restriction	Check system for stoppage, air leaks, correctly sized inlet plumbing to pump
	Accumulator pressure	Recharge/Replace accumulator
	Unloader	Check for proper operation
	Cavitation	Check inlet lines for restrictions and/or proper size
Pump Pressure as Rated, Pressure Drop at gun	Restricted discharge plumbing	Re-size discharge plumbing to flow rate of pump
Excessive Leakage	Worn plungers	Replace plungers
	Worn packing/seals	Adjust or Replace packing seals
	Excessive vacuum	Reduce suction vacuum
	Cracked plungers	Replace plungers
	Inlet pressure too high	Reduce inlet pressure
High Crankcase Temperature	Wrong Grade of oil	Giant oil is recommended
	Improper amount of oil in crankcase	Adjust oil level to proper amount

BP7170/BP7171 DIMENSIONS - INCHES (mm)





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. Five (5) years from the date of shipment for all pumps used in portable pressure washers with NON-SALINE, clean water applications.
2. Two (2) years from the date of shipment for Giant pumps used in car wash applications.
3. One (1) year from the date of shipment for all other Giant industrial and consumer pumps.
4. Six (6) months from the date of shipment for all rebuilt pumps
5. 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.

WARNING: This product might contain a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm.
For more information go to www.P65Warnings.ca.gov

Performance Under Pressure
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