

Series

GP8155(-1000)

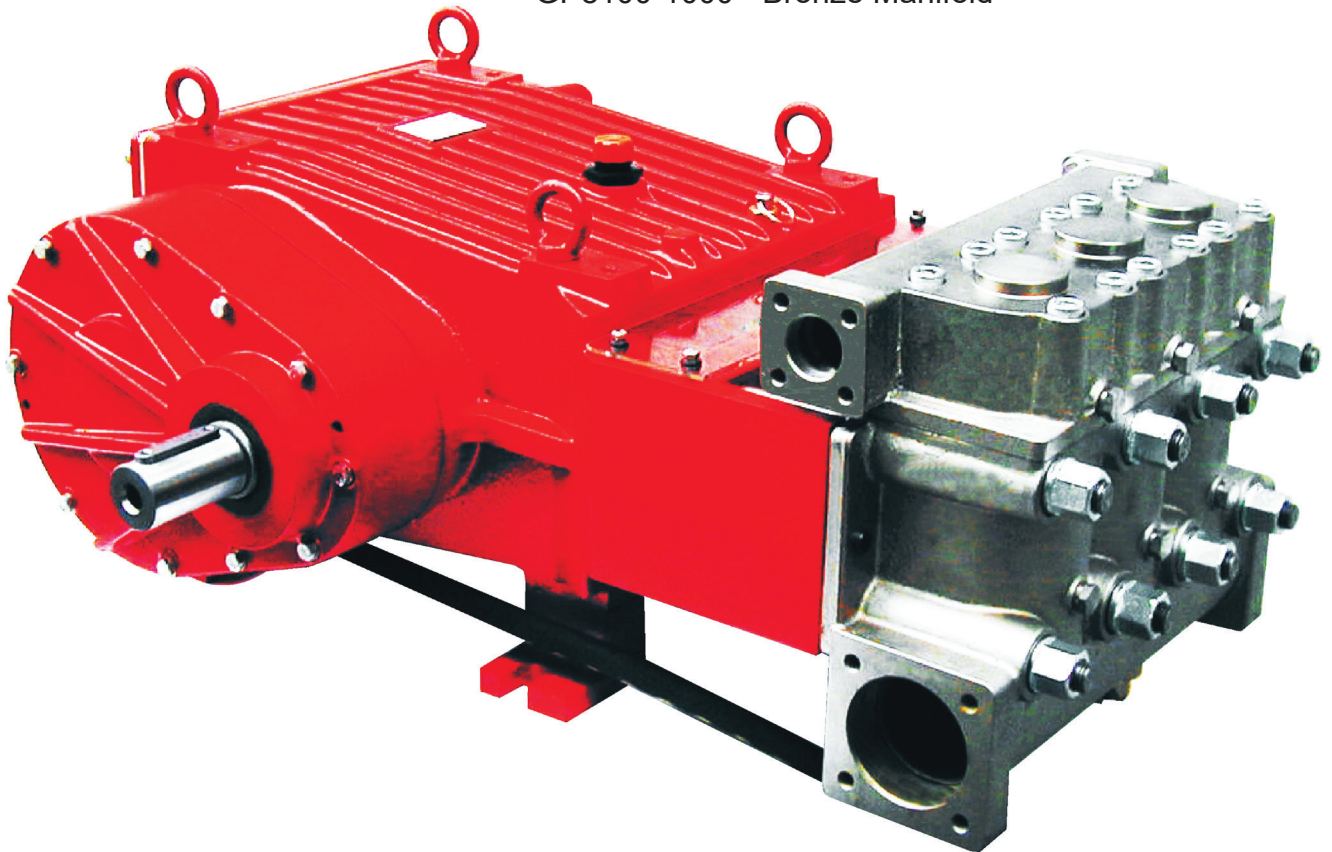
GP8160(-1000)

GP8165(-1000)

GEARBOX SERIES

Triplex Ceramic
Plunger Pump
Operating Instructions
Repair and Service Manual

GP8100 - Spheroidal Nickel-Plated Cast Iron Manifold
GP8100-1000 - Bronze Manifold



GIANT
Performance Under Pressure

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Updated 10/23

INSTALLATION INSTRUCTIONS

The stated figures are for maximum pressure and maximum speed (rpm) and apply for interval operation with cold water.

Required NPSH refers to water (specific weight 1kg/dm³, viscosity 1°E) at maximum permissible pump revolutions.

Fluid medium: Clean water filtered with 200µm. *higher temperatures possible with separate crankcase cooling system; the manufacturer is to be contacted in this case.

Operation and Maintenance

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

IMPORTANT! If there is a **danger of frost**, the water in the pump and in the pump fittings (particularly the unloader valve) must be emptied. The second discharge port can also be used and the pump run “dry” for 1-2 minutes for this purpose.

Oil amount: 4.2 gallons (16.0 litres). Only use **ISO VG 220 industrial gear oil** (e.g. Aral Degol BG220) or **automobile gear oil SAE 90 GL4**. Initial change after 50 operating hours and then every 1000 operating hours after one year latest.

IMPORTANT! When operating in damp places or with high temperature fluctuations. Oil must be changed immediately should condensate (frothy oil) occur in the gear box.

NPSH values must be observed.

Cooling the Gear Oil

IMPORTANT! The water input pressure must not exceed 29 PSI (2 bar) when using the integrated system for cooling the gear oil (standard version). If a **separate** cooling circuit (maximum 29 PSI [2 bar]) is installed, it is then possible to have an input pressure of up to maximum 145 PSI (10 bar) on the **suction side** of the pump.

Make sure that suction pulsation is sufficiently dampened – water column resonance must be avoided.

IMPORTANT! The pumps can be run without gear oil cooling in continuous operation **up to** a power rating of **93.9 HP (70 kW)** or with major intermittent operation at full performance. If operational power **exceeds 93.9 HP (70 kW)** or if continuous operation is the case, the pump must be run with the integrated oil cooling system. The max. temperature of the water being pumped and which is also fed through the cooling system must not exceed 86 °F (30 °C). The water amount which is fed into the cooling system depends on the pump speed and is approximately 1.9 GPM (7.0 L/min) at 580 pump rpm. The cooling water is sucked in by one of the pumping chambers and pumped away.

Definition of intermittent operation: operation at full performance for not more than altogether

20 minutes an hour, with the pump running without pressure or turned off in between. For example, this can be full load operation for 5 minutes four times an hour with 10 minute breaks in between or continuous full load operation for 20 minutes followed by a 40 minute break.

IMPORTANT! If higher medium temperatures or liquids other than water are involved or aggressive media such as seawater, demineralised water etc., the pump must be fitted with a separate cooling circuit. The separate cooler must have a cooling efficiency of 1700 watt. If there is a danger of frost, an appropriate amount of antifreeze must be mixed into the cooling circuit.

When starting up for work, the pump must run first at zero pressure for approximately 1 minute.

IMPORTANT! The GP8100 series has a black arrow on the reduction gear which shows the preferred direction of rotation. The pumps can be delivered either with the gear on the left side or right side which eases the planning of assembling units with regard to rotational direction.

Gear on right side from behind pump = optimal rotation: to the left
Gear on left side from behind pump = optimal rotation: to the right

The preferred/optimal direction of rotation ensures the motion of the connecting rods correctly shovels the oil on to the crosshead guides – which is a particular advantage where continuous operation is involved.

The pump can also be run against the recommended direction of rotation if operated periodically or at reduced pressure. If so, the pump has to be run in this direction to smoothen the bearing areas. This is done by a one-time operation at zero pressure for at least 30 minutes; thereafter the pressure must be slowly increased over the next hour to the desired maximum operating pressure; the pump is then run in. Check the oil temperature during this process.

IMPORTANT! The pump and cooling system must be emptied if there is a danger of frost. Travel wind can cause water in pumps fitted on open vehicles to freeze even if the outside temperature is above freezing point.

To empty the cooling circuit, remove the L-joints (K11) on the pump head (50). Blow out the circuit liquid at the joint connection (K11/K7) using compressed air.

The torque tension on the valve casing nuts (49A) is to be checked after approximately 200 operating hours. Please see the section ‘Maintenance’ concerning the torque values.

The pump must be at zero pressure when checking the torque tension.

IMPORTANT! The service life of the seals is maximized if a minimal amount of leakage is present. A few drops of water can drip from each plunger every minute. Leakage has to be examined every day; the plunger seals must be changed should leakage become excessive (=constant dripping).

OPERATING INSTRUCTIONS

Safety Rules

The operating instructions must be read and adhered to before performing any work on the pump or complete assembled unit. No responsibility will be carried by us for damage to materials or persons caused by improper handling of our pumps.

Access to the pump is not allowed for unauthorized personnel. 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.

When the pump is in operation, the driven shaft side and its coupling must be covered by a protective guard. The plunger area must also be covered by the protective plate (30).

Do not step onto the protective plate (30) nor put weight on it.

Pressure in the discharge line and pump must be at zero before carrying out any maintenance work to the pump or unit. Close off suction line. Disconnect fuses to ensure that the driving motor cannot get switched on accidentally. Make sure that the pump, the cooling system and all parts on the pressure side of the unit are vented and refilled, with pressure at zero, before starting the pump.

In order to prevent air or an air/water-mixture being absorbed and cavitation occurring, the pump-npshr, positive suction head 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.

Giant plunger pumps are suitable for pumping clean water and other non-aggressive or non-abrasive media with a specific weight similar to water.

Before pumping other liquids - especially inflammable, explosive and toxic media - the pump manufacturer must be consulted with regard to the resistance of the pump material. It is the responsibility of the equipment manufacturer and/or operator to ensure that all pertinent safety regulations are adhered to.

Specifications

U.S. Measurements

	Maximum Flow	Maximum Pressure	Maximum Speed	Power Required	Plunger Diameter	NPSHR
Model	GPM	PSI	RPM	HP	in	foot of head
GP8155	75.3	3000	580	145	2.17	23
GP8160	90	2500	580	147	2.36	23.6
GP8165	105.6/120*	2000	580/658	142/166	2.55	26.2

Metric Measurements

	Max. Flow	Maximum Pressure	Maximum Speed	Power Required	Plunger Diameter	NPSHR
Model	L/min	Bar	RPM	kW	mm	mWs
GP8155	285	200	580	108	55	7.0
GP8160	337	170	580	110	60	7.2
GP8165	400/455*	140	580/658	106/123	65	8.0

	U.S.	(Metric)
Maximum Inlet Pressure.....	Up to 29 PSI*	(2.0 bar)*
Plunger Stroke.....	2.83"	72mm
Maximum Temperature of Pumped Fluids.....	Up to 86 °F*	(30 °C)*
Pinion Shaft Diameter.....	1.77"	45 mm
Key Width.....		14 mm x 9 mm x 70 mm
Crankshaft Mounting.....		Either side
Shaft Rotation.....		See Page 2
Inlet Ports.....		(2) 3" BSP
Discharge Ports.....		(2) 1-1/4" BSP
Crankcase Oil Capacity.....	4.2 Gal.	(16.0 liters)
Weight.....	794 lbs.	(360 kg)
Fluid End Material (GP8155/GP8160/GP8165).....		Nickle plated Spheroidal Cast Iron
Fluid End Material (-1000 versions).....		Bronze

*The specifications above are based on maximum pressure and RPM for intermittent duty using cold water.

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.

<u>Model</u>	<u>Gear Ratio</u>	<u>Input Speed</u>
GP8100-2.6.....	2.6:1.....	1500 RPM
GP8100-3.1.....	3.1:1.....	1800 RPM
GP8100-3.8.....	3.8:1.....	2200 RPM
GP8100-4.5.....	4.5:1.....	2600 RPM

HORSEPOWER RATINGS: The rating shown are the power requirements for the pump. Gas engine power outputs must be approximately twice the pump power requirements shown above.

We recommend 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:

$$\frac{\text{GPM} \times \text{PSI}}{1450} = \text{HP}$$

Pump Repair Kits - GP8155/GP8160/GP8165

Plunger Packing Kits

GP8155 - # 09616

<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
38A	13286	O-Ring	6
38B	05281	Support Ring	6
39A	05066	O-Ring	3
40	07723	Seal Ring	3
42	05277	Sleeve	9

GP8160 - # 09617

<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
38A	06667	O-Ring	6
39A	05066	O-Ring	3
40	05067	Seal Ring	3
42	05069	Sleeve	9

GP8165 - # 09586

<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
38A	06667	O-Ring	6
39A	05066	O-Ring	3
40	06996	Seal Ring	3
42	06997	V-Sleeve	9

Valve Assembly Kits

Inlet Valve Kit - #09587

<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
51	04186	Inlet Valve Assembly	3
56A	06258	O-Ring	3

Discharge Valve Kit - #09588

<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
52	04188	Discharge Valve Assembly	3
56A	06258	O-Ring	3

Oil Seal Kits

#09584A (From 06/19)

<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
32	05058	Radial Shaft Seal	3
32A	03118	Scraper	3
33A	05056	O-Ring	3

#09584 (Prior to 06/19)

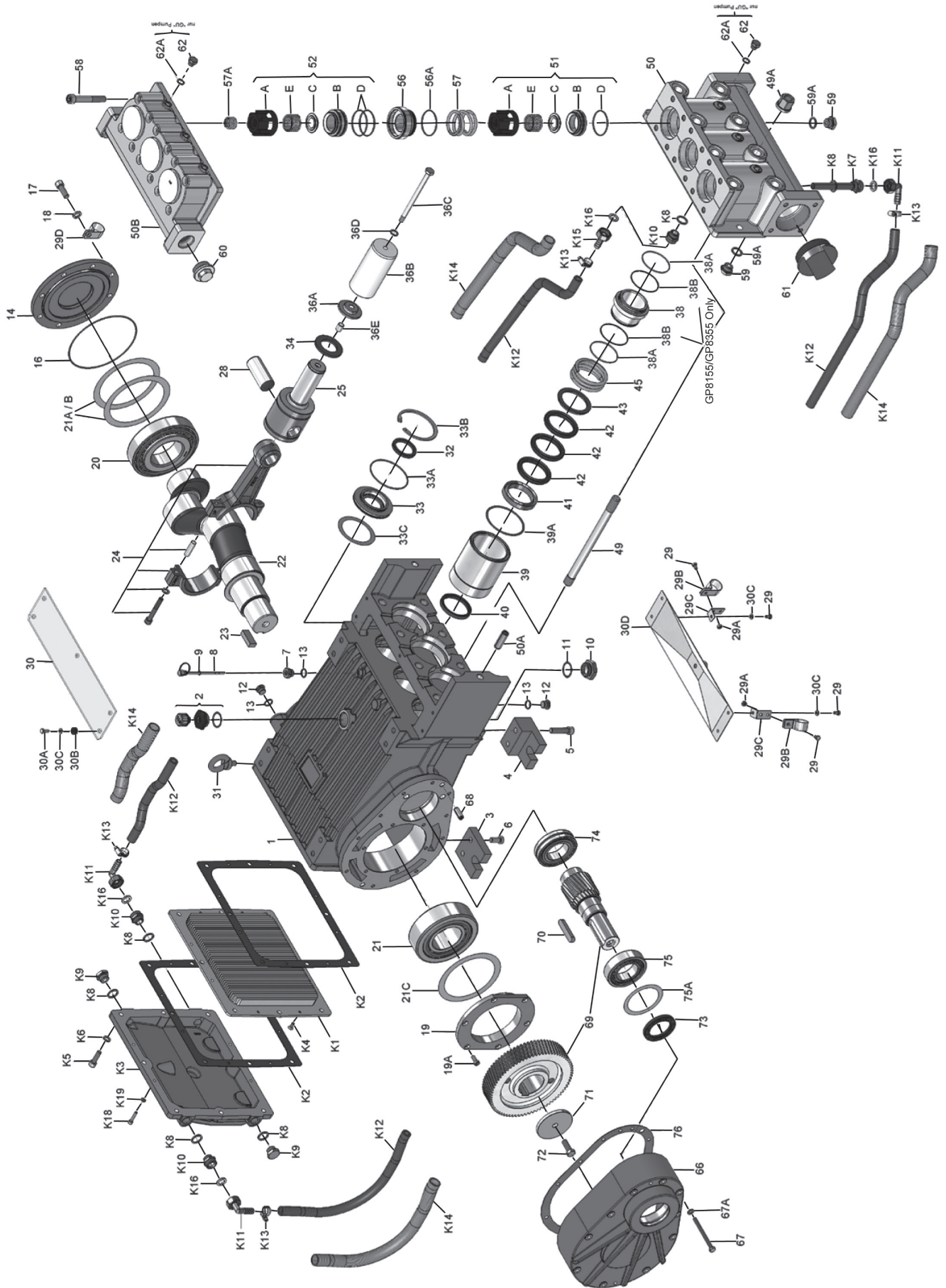
<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
32	05058	Radial Shaft Seal	3
33A	05056	O-Ring	3

#09584-R (Retrofit Oil Seal Kit -

To retrofit pumps made before 06/19)

<u>Item</u>	<u>Part #</u>	<u>Description</u>	<u>Qty.</u>
32	05058	Radial Shaft Seal	3
32A	03118	Scraper	3
33	03119	Seal Retainer	3
33A	05056	O-Ring	3

Exploded View - GP8155/GP8160/GP8165

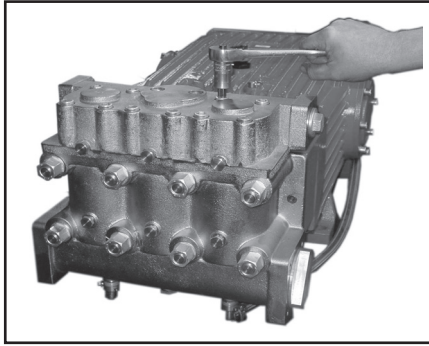


Parts List - GP8155/GP8160/GP8165

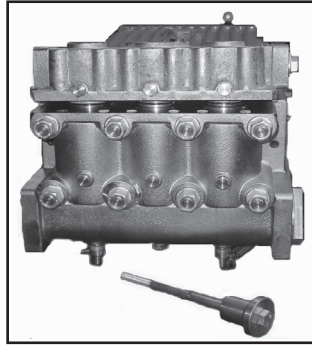
<u>Item</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>	<u>Item</u>	<u>Part</u>	<u>Description</u>	<u>Qty</u>
1	05651	Crankcase	1	45	05279	Seal Tension Spring, GP8155	3
2	06893	Oil Filler Plug Assy. with Vent	1	45	05071	Seal Tension Spring, GP8160	3
3	05652	Rear Foot for Crankcase	2	45	05119	Seal Tension Spring, GP8165	3
4	05653	Front Foot for Crankcase	2	49	05072	Stud Bolt	8
5	05654	Hexagon Socket Screw	4	49A	05073	Hexagon Nut	8
6	05655	Hexagon Socket Screw	4	50	05074	Valve Casing,	
7	05656	Plug, 3/8" for Oil Dipstick	1			GP8155/GP8160/GP8165	1
8	04185	Oil Dipstick Assembly	1	50	05074-3000	Valve Casing, -1000 Versions	1
9	01009	O-Ring	1	50A	13162	Centering Stud	2
10	05657	Plug M33 X 1.5	1	50B	05075	Discharge Casing,	
11	07102	O-Ring	1			GP8155/GP8160/GP8165	1
12	12256	Plug 3/8" BSP	3	50B	05075-3000	Discharge Valve Casing,	
13	22929	Copper Washer	4			-1000 Versions	1
14	05036	Bearing Cover Closed	1	51	04186	Suction Valve Assembly	3
16	05037	O-Ring	1	51A	04166	Spring Tension Cap	3
17	05038	Hexagon Socket Screw M12	8	51B	05078	Suction Valve Seat	3
18	05039	Spring Ring	8	51C	05079	Valve Plate	3
19	05765	Flange	1	51D	07658	O-Ring	3
19A	05766	Hexagon Socket Screw	6	51E	05080	Valve Spring	3
20	05658	Tapered Roller Bearing	1	52	04188	Discharge Valve Assembly	3
21	05659	Tapered Roller Bearing	1	52A	04166	Spring Tension Cap	3
21A	05042	Fitting Disc	3	52B	05084	Discharge Valve Seat	3
21B	05043	Fitting Disc	3	52C	05079	Valve Plate	3
21C	05113	Fitting Disc	3	52D	06258	O-Ring	6
22	05741	Crankshaft For Gear	1	52E	05080	Valve Spring	3
23	05661	Fitting Key	1	56	05085	Discharge Valve Adaptor	3
24	05047	Conn-rod Assembly	3	56A	06258	O-Ring	3
25	05048	Crosshead c/w Plunger	3	57	05086	Pressure Spring	3
28	05049	Crosshead Pin	3	57A	07210-0100	Pressure Spring	3
29	05051	Hexagon Screw	6	58	05087	Hexagon Socket Screw	12
29A	07408	Hexagon Nut	2	59	07109	Plug, 1/2" BSP	2 (3*)
29B	05383	Bracket 2 for Cooling Hose	2	59A	06272	Copper Seal	2 (3*)
29C	05662	Support Clamp	2	60	06909	Plug, 1-1/4" BSP,	
29D	05381	Bracket 1 for Cooling Hose	1			GP8155/GP8160/GP8165	1
30	05052	Cover Plate	1	60	13151	Plug, 1-1/4" BSP, -1000 Versions	1
30A	07225-0100	Hexagon Screw	5	61	05088	Plug, 3" BSP	1
30B	13136	Grommet	5	62	05302	Plug, 1/4" BSP	6
30C	08280	Washer	9	62A	06934	Copper Gasket	6
30D	05050	Splash Cover	1	66	03193	Gear Cover	1
31	07623	Eye Bolt	4	67	08484	Hexagon Screw	11
32	05058	Radial Shaft Seal	3	67A	08041	Washer	11
32A	03118	Scraper	3	68	04445	Cylinder Pin	2
33	03119	Seal Retainer	3	69	04171	Gear Wheel Set (1500 RPM=2.6)	1
33A	05056	O-Ring	3	69	04170	Gear Wheel Set (1800 RPM=3.1)	1
33B	05054	Clip Ring	3	69	05767	Gear Wheel Set (2200 RPM=3.8)	1
33C	05059	Fitting Disc	3	69	05666	Gear Wheel Set (2600 RPM=4.5)	1
34	05060	Oil Shield	3	70	07614	Fitting Key	1
36A	05063	Plunger Pipe Cover,		71	04571	Spacer Ring	1
		GP8160/GP8165	3	72	05667	Hexagon Screw	1
36B	05280	Plunger, GP8155	3	73	05608	Shaft Seal Ring for Gear	1
36B	05061	Plunger, GP8160	3	74	05668	Self-Aligning Roller Bearing	1
36B	05115	Plunger, GP8165	3	75	05669	Roller Bearing	1
36C	05062	Tension Screw	3	75A	05670	Fitting Disc	1
36D	07665	Copper Washer	3	76	03309	Gear Seal	1
36E	06900	Centering Sleeve	3	78	05025	Oil Cooler (Items K1 - K19)	1
38	05283	Seal Case, GP8155	3	79	07662	Valve Puller (Not Shown)	1
38	05064	Seal Case, GP8160/GP8165	3	K1	05026	Cooling Vane Plate	1
38A	13286	O-Ring, GP8155	6	K2	05027	Seal for Gear Cover	2
38A	06667	O-Ring, GP8160/GP8165	6	K3	05028	Gear Cover	1
38B	05281	Support Ring, GP8155 Only	6	K4	05029	Hexagon Hd Cntrsnsk Screw	4
39	05275	Seal Sleeve, GP8155	3	K5	07381	Hexagon Socket Screw	8
39	05065	Seal Sleeve, GP8160	3	K6	08041	Washer	8
39	05116	Seal Sleeve, GP8165	3	K7	05030	Connection for Oil Cooler	1
39A	05066	O-Ring	3	K8	06272	Copper Seal	6
40	07723	Seal Ring, GP8155	3	K9	07109	Plug, 1/2" BSP	2
40	05067	Seal Ring, GP8160	3	K10	05031	Connecting Branch	3
40	06996	Seal Ring, GP8165	3	K11	05032	U-Joint Connector c/w Nut	3
41	05276	Pressure Ring, GP8155	3	K12	05033	Tube for Cooler	2
41	05068	Pressure Ring, GP8160	3	K13	05402	Hose Clamp	4
41	05117	Pressure Ring, GP8165	3	K14	05403	Hose Guard	2
42	05277	Sleeve, GP8155	9	K15	05404	Hose Coupling Nut	1
42	05069	Sleeve, GP8160	9	K16	05405	Flat Gasket	4
42	06997	Sleeve, GP8165	9	K18	04158	Hexagon Socket Screw	4
43	05278	Sleeve Support Ring, GP8155	3	K19	05053	Washer	4
43	05070	Sleeve Support Ring, GP8160	3			*3 pieces for GP8155/GP8160/GP8165	
43	05118	Sleeve Support Ring, GP8165	3				

Pump Repair Instructions - GP8155/GP8160/GP8165

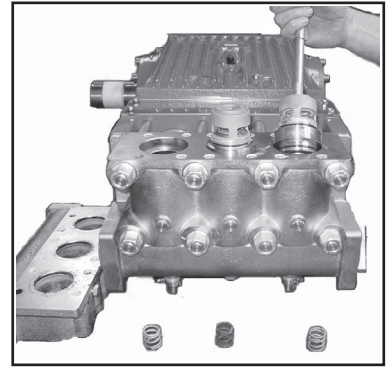
Valve Inspection and Repair



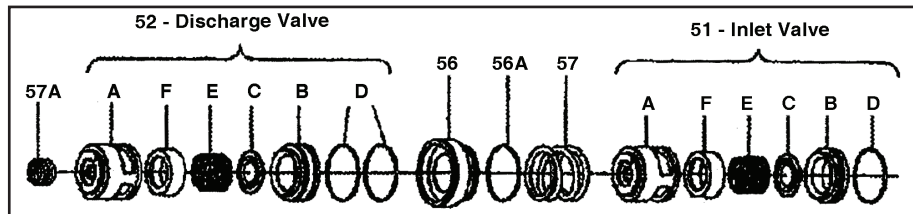
1) Remove socket head cap screws (58)



2) Lift discharge casing (50B) up and away.

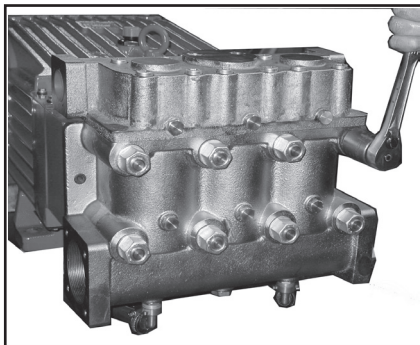


3) Take out pressure springs (57A). Pull out assembled valves (51 & 52) with valve puller.



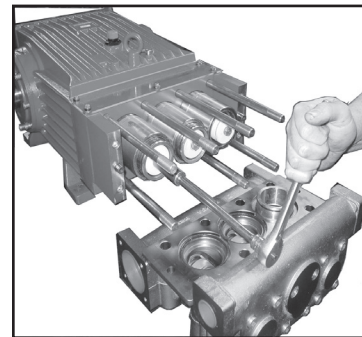
4) Remove valve assembly (52) from discharge valve adapter (56) by gently twisting apart. The spring tension cap (51A, 52A) is screwed together with the valve seat (51B or 52B). Remove spring tension cap. Takeout springs (51E, 52E) and valve plate (51C, 52C). Check sealing surfaces of valve plates (51C & 52C) and valve seats (51B & 52B) and O-rings (51D, 52D). Replace worn parts. Coat threads of valve seat with silicon grease or molycote anti-seize Cu-7439 when reassembling. Before refitting the valves, clean the sealing surfaces in the casing and check for any damage. Coat o-rings (51D, 52D & 56A) with silicone grease to help with re-assembly. Replace valve assembly (51) and pressure spring (57). Assemble valve assembly (52) to discharge valve adapter (56) by tapping together lightly with rubber mallet. While replacing the valve assemblies use a rubber mallet to tap the top of the valve puller lightly. This insures proper seating. Replace pressure spring (57A) and the discharge casing (50B). Tighten caps (58) at 132 Ft-lbs. (180 Nm); check torque tension after 8-10 operating hours.

To Check Seals and Plunger Pipe



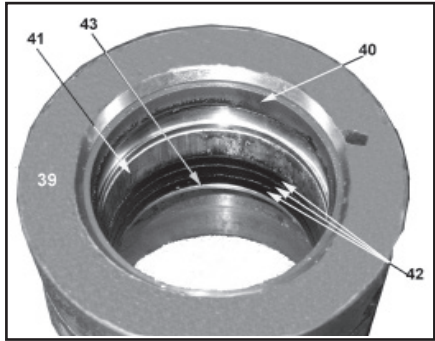
5) Remove hexagon nuts (49A) and valve casing together with seal case (38) from crankcase (1). If necessary, carefully tap the valve casing (50) past the centering stud (50A) using a rubber hammer.

IMPORTANT! If necessary, support the valve casing by resting it on wooden blocks or by using a pulley.

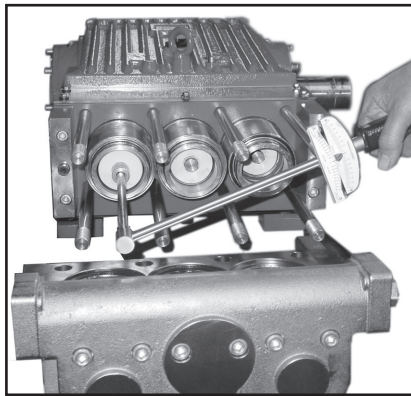


6) Remove tension screw (36C) and take seal sleeve (39) together with all mounted parts out of the drive. Pull plunger pipe (36B) out of the seal assembly and check for any damage. Carefully, remove seal rings (40) and sleeves (42) with a screwdriver.

Pump Repair Instructions - GP8155/GP8160/GP8165

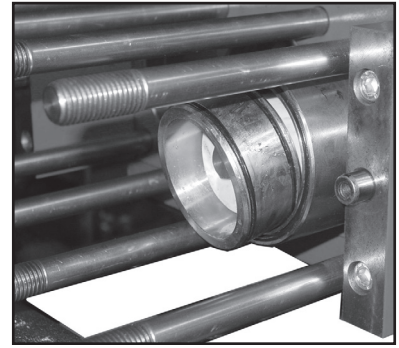


7) **Important!** Be careful not to damage the seal sleeve (39) and pressure ring (41). Check the inner diameter of the pressure ring for wear and if necessary replace together with seals (40) and (42). Clean all parts. New parts should be lightly coated with silicon grease before installation. Insert the seal unit (40, 41, 42 43) into the sleeve. Push the ceramic plunger carefully through the seals from the crankcase side. If necessary, the seals can be held tightly using a suitable pipe support held on the other side of the seal sleeve.



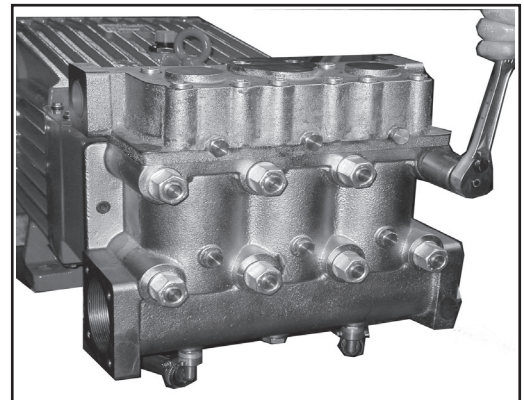
9) Coat the seal sleeve (39) lightly with anti-corrosive grease (e.g. molycote no. Cu-7439) in its fitted area towards the crankcase. Insert the seal sleeves in to their crankcase fittings. Coat the threads of the tension screw (36C) lightly with thread glue and insert it together with a new copper ring (36D) through the ceramic pipe. Turn the pump by hand until the plunger (25) rests against the plunger pipe. Tighten the tension screw at 30 Ft-lbs. (40 NM)

Important! Thread glue must never come between the plunger pipe (36B) and centering sleeve (36E). Overtensioning of the plunger pipe by excessive tightening of the tension screw and/or dirt or damage on the mounting surfaces can lead to plunger pipe breakage. Insert the seal tension spring (45) and o-ring (39A) in to the seal sleeve (39).



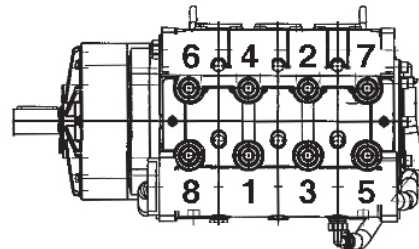
8) Take out the seal case (38) from the valve casing (50) and check o-rings (38A) (if necessary secure two screwdrivers in the front o-ring groove to extract seal casing from valve casing). Coat seals with silicon grease before installing.

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



Replacing Valve Casing:

10) Put seal cases (38) in the centering holes of the valve casing, then push valve casing carefully on to centering studs (50A). Tighten hexagon screws (49A) evenly and crosswise at 265 Ft.-lbs. (360 NM). Follow pattern below.



Important! The torque tension on the screws (49A) must be checked after 8-10 operating hours; the pump must be at zero pressure. Thereafter, the tension is to be checked every 200 operating hours.

Pump Repair Instructions - GP8155/GP8160/GP8165

To Dismantle Gear

Take out plungers and seal sleeves as described above.

Drain oil by taking off plug (12).

After removing the clip ring (33B), remove the seal retainer (33) with a screwdriver. Open hose adaptor (K11).

Remove gear cover (K3) and remove the cooling vane plate (K1) by unscrewing the screws (K4). Remove connecting rod screws (24).

IMPORTANT! Connecting rods are marked for identification. Do not twist connecting rod halves or interchange them. When reassembling, the connecting rods must be fitted in their exact original position on the crankshaft journals.

Push connecting rod halves together with the crosshead as far as possible into the crosshead guide.

Remove bearing cover (14), remove shims (21A/B).

To Dismantle Gearbox

Remove screws (67). Press off gear cover (66) by screwing two screws into both thread bores. Remove screw (72) and take off plate (71). Remove the gearwheel (69) from the shaft with a bearing removal tool.

Using a rubber hammer, tap out the crankshaft towards bearing cover (14).

Check surfaces on the connecting rods (24), crankshaft (22) and crossheads (25). Check the surfaces of the crosshead guides in the crankcase (1) for any unevenness.

Reassemble in reverse order. Thread the crankshaft in from the bearing cover side until the bearing rests cleanly in the outer ring on flange (19).

Press in the outer ring from bearing (20) and using shims (21A/B/C), adjust the bearing to be free of play. To achieve this, add shims, screw on cover (14) and turn the crankshaft until it can no longer be turned by hand.

Then remove a shim and establish whether the crankshaft can now be turned. A crankshaft that can be too easily turned may cause damage to the bearings (20/21) and connecting rods (24) due to the wobble movements in the conical bearing shells.

If bearings (20 & 21) have been replaced, the flange (19) must be taken off and a new bearing outer ring pressed in until the surfaces are even. Then mount the holding flange to push the bearing outer ring in deeper.

Mount connecting rod halves in their exact original position and tighten at 37 ft.-lbs. (50 Nm).

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

Mount cooler plate (K1) and gear cover (K3) with their respective seals (K2). When assembling the cooling circuit line, make sure that the oil cooler connection (K7) is always joined to the upper connection (K3) of the gear cover.

To Reassemble Gearbox

Heat ball bearings (74 & 75) first before pressing them onto the pinion. Press the cogwheel slightly onto the crankshaft (22) so that the pinion shaft (69) together with the bearing (74) can still be inserted.

Move the pinion shaft against the cogwheel and make them mate perfectly when mounting. Carefully tap the cogwheel and the pinion shaft simultaneously onto the crankshaft and into the bearing seat.

Fit fitting disc (69), and secure screw (72) with Loctite.

Fit the seal (76) onto the cylindrical pins (68).

Push the gear cover (66) carefully onto the bearing (75). Make sure that no damage to the radial shaft seal (73) occurs during the fitting onto the pinion shaft.

IMPORTANT! Before putting into operation again, turn the reduction gear shaft by hand at least four full turns to make sure the gear is correctly aligned.

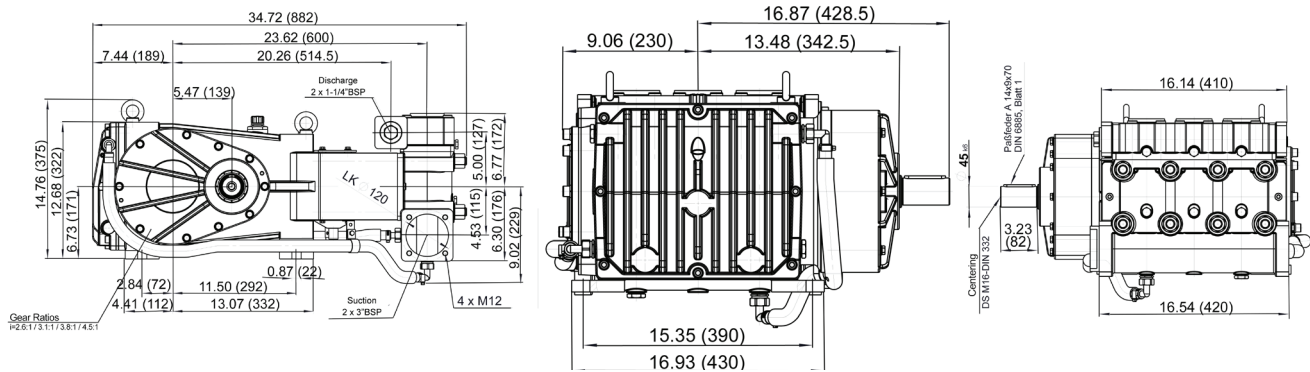
Troubleshooting GP8155/GP8355/GP8160/GP8360/GP8165/GP8365

TROUBLESHOOTING		
Problem	Cause	Solution
Pressure Drops, water leaks	V-sleeves leak	Replace V-sleeves, check surface of plunger
Pressure drops, pump gets loud	Discharge or suction valve leaks Steam formation (Cavitation)	Replace valve(s) Reduce suction height, reduce flow resistance in inlet line, clean inlet filter, lower water temperature.
Irregular pressure	Worn Valves	Examine valves
	O-ring on valves or inlet valve adapter leaks	Examine O-rings, check valve casing for unevenness on the sealing surfaces
Oil leaks at visible part of plunger	Gear sealing is leaking	Examine seals and running surface of plunger
Dirty, milk-colored or frothy oil	Water has mixed with oil	Replace oil immediately, find & fix the cause
Oil leakage on the crankshaft	Shaft seal ring leaks	Check seal and shaft
Noise increases without the loss	Worn bearing	Dismantle gear, examine all parts, replace worn parts, check oil level. If service life was too short, check for excess strain or whether lubrication intervals were too long. Only specified lubricants are to be used.

Torque Specifications - GP8155/GP8160/GP8165

TOOL LIST AND TORQUE SPECIFICATIONS				
Item	Part #	Description	Torque Ft-Lbs (NM)	Tool Needed
17	05038	Hexagon Socket Screw	64 (87)	10mm Allen Wrench
24	05047	Connecting Rod Hex. Hd. Socket Screw	37 (50)	8mm Allen Wrench
33B	05054	Clip Ring	N/A	Industrial Snap Ring Pliers
36C	05062	Tension Screw	30 (40)	16mm Socket
49A	05073	Hexagon Nut (Manifold)	265 (360)	30mm Socket
51 & 52	04188 & 04186	Valve Assemblies	N/A	Valve Puller (p/n 07662) included w/pump
58	05087	Hexagon Socket Screw	132 (180)	12mm Allen Wrench
K5	07381	Hexagon Socket Screw	N/A	8mm Allen Wrench

GP8155/GP8160/GP8165 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