

Series

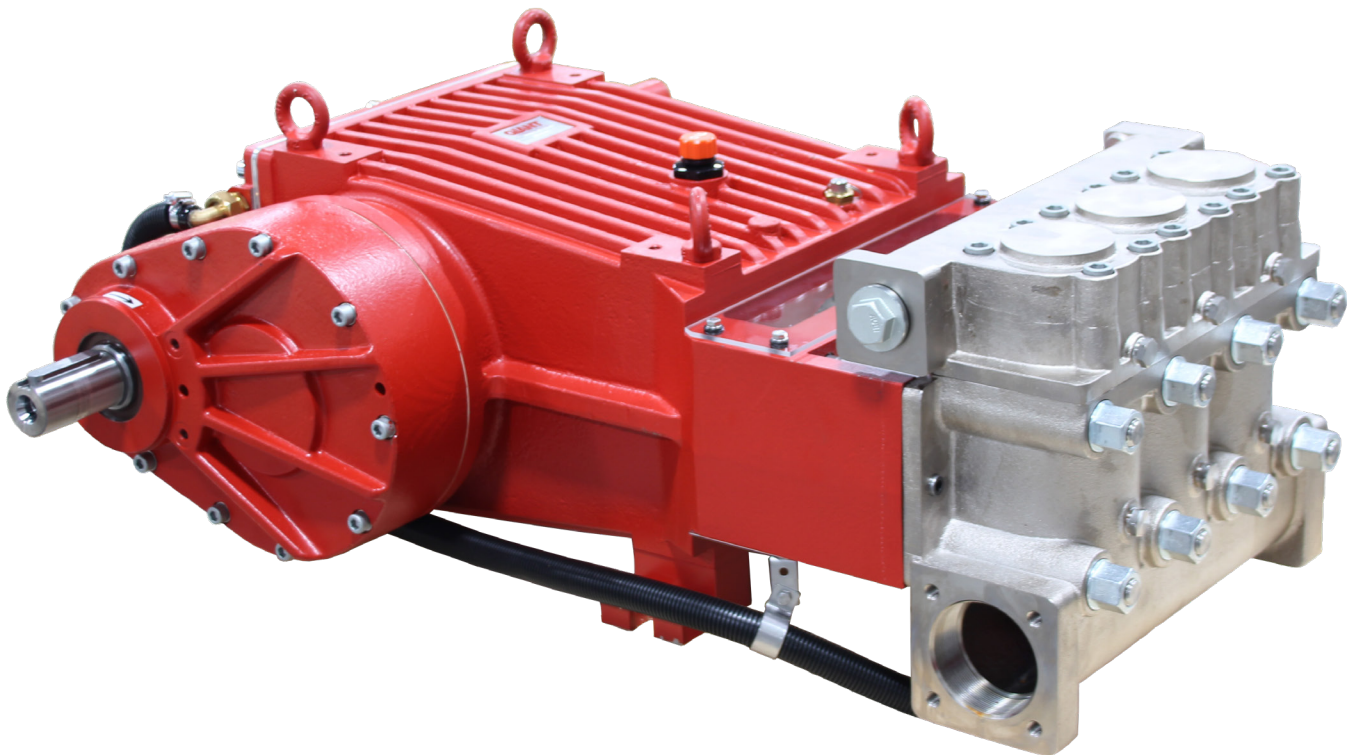
GP8155AGB-180

GP8160AGB-180

GP8165AGB-180

REVERSE GEARBOX SERIES

Triplex Ceramic
Plunger Pump
Operating Instructions
Repair and Service Manual



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Specifications

	Max. Flow*	Max. Flow*	Pressure*	Pressure*	Max. Speed	Max. Inlet Pressure	Max. Inlet Pressure	Plunger Diameter	Plunger Diameter	Power Req'd	Power Req'd
Model	GPM	l/min	PSI	bar	RPM	PSI	bar	in	mm	BHP	kW
GP8155A-180	75.3	285	3000	200	580	29	2.0	2.17	55	150	112
GP8160A-180	90.0	340	2500	170	580	29	2.0	2.36	60	155	116
GP8165A-180	105.7	400	2000	140	580	29	2.0	2.55	65	153	114

	<u>U.S.</u>	<u>Metric</u>
Stroke	2.83"	72 mm
Crankshaft Diameter	2.76"	70 mm
Key Width	0.55"	14 mm
Crankshaft Mounting	Either Side	
Shaft Rotation	See Page 2	
Temperature of Pumped Fluids	Up to 86 ° F	30 ° C
Inlet Port	(2) 3" BSP	
Discharge Port	(2) 1-1/4" BSP	
Weight (approximate)	775 lbs.	352 kg
Crankcase Oil Capacity	4.8 Gal.	18.0 L
Fluid End Material	Nickel Plated Spheroidal Cast Iron	

***Note:** The specifications above are based on maximum pressure and maximum RPM for intermittent duty using cold water. Fluid medium: Clean water filled with 200µm.
Higher temperatures possible with separate crankcase cooling system; the manufacturer is to be contacted in this case.

Model	Gear Ratio	Input Speed
GP8100-1.28-180	1.28:1	740 RPM
GP8100-2.6-180	2.6:1	1500 RPM
GP8155-3.1-180	3.1:1	1800 RPM
GP8100-3.8-180	3.8:1	2200 RPM
GP8100-4.5-180	4.5:1	2600 RPM

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.

SPECIAL NOTE:

The theoretical gallons per revolution (gal/rev) is 0.155.
To find specific outputs at various RPM, use the formula:

$$\text{GPM} = 0.155 \times \text{RPM}$$

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:

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

INSTALLATION INSTRUCTIONS

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

Oil: Use only 4.8 gallons (18 liters) of ISO VG 220 GL4 (e.g. Aral Dego BG220) or SAE 90 GL4 gear oil (Giant's p/n 01154). Initial change after 50 operating hours and then every 1000 operating, or after one year if used less.

IMPORTANT! Caution 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.

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 or 2 bar) is installed, it is then possible to have an input pressure of maximum 145 PSI (10 bar) on the **suction side**. Make sure that suction pulsation is sufficiently dampened - water column resonance must be avoided.

Before beginning work for the first time, the pump must run at zero pressure for approximately one minute.

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

Gear on right side (from behind pump) = optimal rotation : counterclockwise

Gear on left side (from behind pump) = optimal rotation: clockwise

The preferred/optimal direction of rotation ensures the motion of the connecting rods correctly distributes the oil onto 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 a 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 after which the pump is then run in. The oil temperature is to be checked during this procedure.

IMPORTANT! If operational power exceeds 80 HP (60 kW) or if continuous operation is the case, the pump must be run with the integrated oil cooling system. The maximum 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 1.8 GPM (7.0 l/min) at 580 pump rpm. The cooling water is sucked in by one of the pumping chambers and pumped away. The pumps can be run without gear oil cooling in continuous operation up to a power rating of 107 HP (80 kW) or with major intermittent operation at full performance. If this is your case, please request an extra spare parts list.

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! 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.

The torque tension on the valve casing nuts (49A) is to be checked after approximately 200 operating hours. Please see page 6 for values. When checking the torque tension, the pump must be at zero pressure.

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).



Safety Rules

The operating instructions must be read and adhered to before performing any work on the pump or complete assembled unit. Not 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.

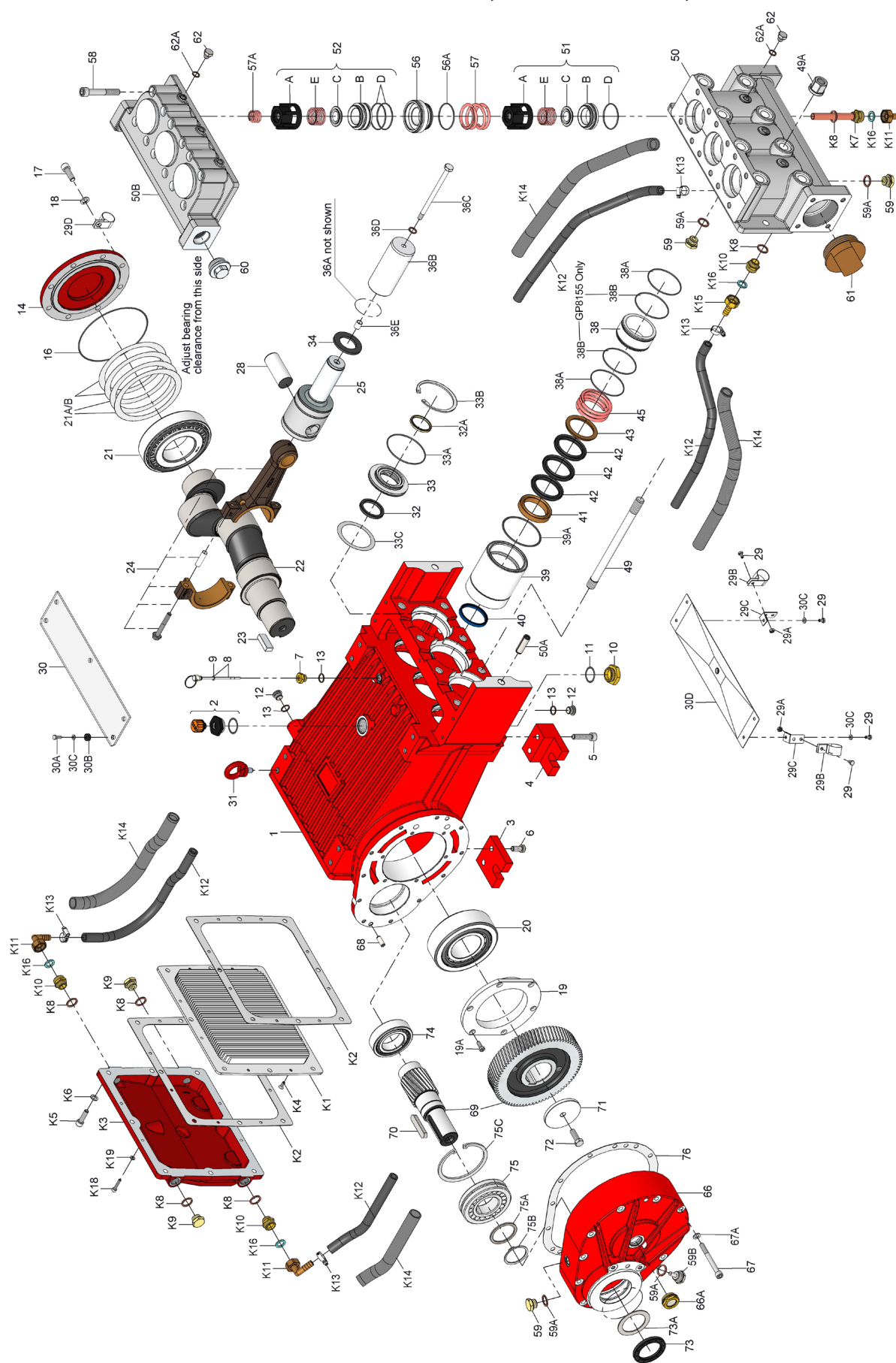
Close off the suction line. Disconnect fuses to ensure that the driving motor cannot get switched on accidentally. Make sure that the pump, the cooling system and all parts on the pressure side of the unit are vented and refilled with pressure at zero, before starting the pump. In order to prevent air on an air/water mixture being absorbed and cavitation occurring, the pump npsHr, (net positive suction head required) 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.

EXPLODED VIEW - GP8155A-180, GP8160A-180, GP8165A-180



Parts List - GP8155A-180, GP8160A-180 & GP8165A-180

Item	Part	Description	Qty	Item	Part	Description	Qty
1	05651-180	Crankcase for Reverse Gear	1	45	05119	Seal Tension Spring, GP8165	3
2	06893	Oil Filler Plug Assembly with Vent	1	49	05072	Stud Bolt	8
3	05652	Rear Foot for Crankcase	2	49A	05073	Hexagon Nut	8
4	05653	Front Foot for Crankcase	2	50	05074	Valve Casing	1
5	05654	Hexagon Socket Screw	4	50A	13162	Centering Stud	2
6	05655	Hexagon Socket Screw	4	50B	05075	Discharge Casing	1
7	05381	Plug, 3/8" for Oil Dipstick	1	51	04186	Suction Valve Assembly	3
8	04185	Oil Dipstick Assembly	1	51A	04166	Spring Tension Cap	3
9	01009	O-Ring	1	51B	05078	Suction Valve Seat	3
10	05657	Plug, M33 X 1.5	1	51C	05079	Valve Plate	3
11	07102	O-Ring	1	51D	07658	O-Ring	3
12	12256	Plug, 3/8" BSP	3	51E	05080	Valve Spring	3
13	22929	Copper Washer	4	52	04188	Discharge Valve Assembly	3
14	05036	Bearing Cover Closed	1	52A	04166	Spring Tension Cap	3
16	05037	O-Ring	1	52B	05084	Discharge Valve Seat	3
17	05038	Hexagon Socket Screw, M12	8	52C	05079	Valve Plate	3
18	05039	Spring Ring	8	52D	06258	O-Ring	6
19	05765	Flange	1	52E	05080	Valve Spring	3
19A	05766	Hexagon Socket Screw	6	56	05085	Discharge Valve Adaptor	3
20	05659	Tapered Roller Bearing	1	56A	06258	O-Ring	3
21	05658	Tapered Roller Bearing	1	57	05086	Pressure Spring	3
21A	05042	Shim, 0.1 mm	1-3	57A	07210-0100	Pressure Spring	3
21B	05043	Shim, 0.5 mm	1-3	58	05087	Hexagon Socket Screw	12
22	05741	Crankshaft For Turned Gear	1	59	07109	Plug, 1/2" BSP	3
23	05661	Fitting Key	1	59A	06272	Copper Seal	5
24	05047	Connecting Rod Assembly	3	59B	03696	Magnetic Plug, 1/2" BSP	1
25	05048	Crosshead c/w Plunger	3	60	06909	Plug, 1-1/4" BSP	1
28	05049	Crosshead Pin	3	61	05088	Plug, 3" BSP	1
29	05051	Hexagon Screw	6	62	05302	Plug, 1/4" BSP	6
29A	07408	Hexagon Nut	2	62A	06934	Copper Gasket	6
29B	05383	Bracket 2 for Cooling Hose	2	66	03697	Gear Cover	1
29C	05662	Support Clamp	2	66A	05943	Oil Sight Glass Assembly	1
29D	05381	Bracket 1 for Cooling Hose	1	67	08484	Hexagon Screw	11
30	05052	Cover Plate	1	67A	08041	Washer	11
30A	07225-0100	Hexagon Screw	5	68	03238	Cylinder Pin	2
30B	13136	Grommet	5	69	04171A	Gear Wheel Set (1500 RPM=2.6)	1
30C	08280	Washer	9	69	04170A	Gear Wheel Set (1800 RPM=3.1)	1
30D	05050	Splash Cover	1	69	05767A	Gear Wheel Set (2200 RPM=3.8)	1
31	07623	Eye Bolt	4	69	05666A	Gear Wheel Set (2600 RPM=4.5)	1
32	05058	Radial Shaft Seal	3	70	07614	Fitting Key	1
32A	03118	Oil Scraper	3	71	04571	Shim	1
33	03119	Seal Retainer	3	72	05667	Hexagon Screw	1
33A	05056	O-Ring	3	73	05428	Shaft Seal Ring for Gear	1
33B	05054	Clip Ring	3	73A	03698	Washer	1
33C	05059	Fitting Disc	3	74	05669	Self-Aligning Roller Bearing	1
34	05060	Oil Shield	3	75	03669	Roller Bearing	1
36A	05063	Plunger Pipe Cover GP8160/65	3	75A	03670	Fitting Disc	1
36B	05280	Plunger, GP8155	3	75B	03700	Clip Ring	1
36B	05061	Plunger, GP8160	3	75C	03701	Clip Ring	1
36B	05115	Plunger, GP8165	3	76	03309	Gear Seal	1
36C	05062	Tension Screw	3	79	07662	Valve Puller (Not Shown)	1
36D	07665	Copper Washer	3	78	05025	Oil Cooler (Items K1 - K19)	1
36E	06900	Centering Sleeve	3	K1	05026	Cooling Vane Plate	1
38	05283	Seal Case, GP8155	3	K2	05027	Seal for Gear Cover	2
38	05064	Seal Case, GP8160, GP8165	3	K3	05028	Gear Cover	1
38A	13286	O-Ring, GP8155	6	K4	05029	Hexagon Hd Cntrsnsk Screw	4
38A	06667	O-Ring, GP8160, GP8165	6	K5	07381	Hexagon Socket Screw	8
38B	05281	Support Ring, GP8155 Only	6	K6	08041	Washer	8
39	05275	Seal Sleeve, GP8155	3	K7	05030	Connection for Oil Cooler	1
39	05065	Seal Sleeve, GP8160	3	K8	06272	Copper Seal	6
39	05116	Seal Sleeve, GP8165	3	K9	07109	Plug, 1/2" BSP	2
39A	05066	O-Ring	3	K10	05031	Connecting Branch	3
40	07723	Seal Ring, GP8155	3	K11	05032	U-Joint Connector c/w Nut	3
40	05067	Seal Ring, GP8160	3	K12	05033	Tube for Cooler	2
40	06996	Seal Ring, GP8165	3	K13	05402	Hose Clamp	4
41	05276	Pressure Ring, GP8155	3	K14	05403	Hose Guard	2
41	05068	Pressure Ring, GP8160	3	K15	05404	Hose Coupling Nut	1
41	05117	Pressure Ring, GP8165	3	K16	05405	Flat Gasket	4
42	05277	Sleeve, GP8155	9	K18	04158	Hexagon Socket Screw	4
42	05069	Sleeve, GP8160	9	K19	05053	Washer	4
42	06997	Sleeve, GP8165	9		05760A	Gearend Assembly (2200 RPM) (1-34, 66-81)	
43	05278	Sleeve Support Ring, GP8155	3		05606	Manifold Assembly (50-62A w/o 52A)	
43	05070	Sleeve Support Ring, GP8160	3		05208	Plunger Replacement Kit, GP8155 (34A-45)	
43	05118	Sleeve Support Ring, GP8165	3		05207	Plunger Replacement Kit, GP8160 (34A-45)	
45	05279	Seal Tension Spring, GP8155	3		05209	Plunger Replacement Kit, GP8165 (34A-45)	
45	05071	Seal Tension Spring, GP8160	3				

Torque Specifications GP8155A-180, GP8160A-180, GP8165A-180			
Item	Description	Tool Needed/Lubrication	Torque - Ft.-lbs (Nm)
1	Crankcase	Molycote Cu-Paste	
17	Hexagon Socket Screw	10mm Allen Wrench	64 (87)
24	Connecting Rod Hex. Hd. Socket Screw	8mm Allen Wrench	37 (50)
32	Radial Shaft Seal	Loctite 403	
33B	Clip Ring	Industrial Snap Ring Pliers	
36C	Tension Screw	19mm Socket/Loctite 243	30 (40)
49	Stud Bolt	Loctite 243	
49A	Hexagon Nut (Manifold)	30mm Socket	265 (360)
51	Suction Valve Assembly	Valve Puller (p/n 07662)	
51B	Suction Valve Seat	Molycote Cu-Paste	
52	Discharge Valve Assembly	Valve Puller (p/n 07662)	
52B	Discharge Valve Seat	Molycote Cu-Paste	
58	Hexagon Socket Screw	12mm Allen Wrench/Loctite 243	132 (180)
67	Hexagon Screw		18.4 (25)
72	Hexagon Screw		30 (40)
K4	Hexagon Hd Cntrsnc Screw		11 (15)
K5	Hexagon Socket Screw	8mm Allen Wrench	33 (45)
K9	Plug, 1/2" SP		59 (80)

Pump Repair Kits - GP8155A-180, GP8160A-180, GP8165A-180

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 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 Kit

#09584A

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

MAINTENANCE INSTRUCTIONS

To Check Valves

Remove hexagon socket screws (58), lift discharge casing (50B) up and away. Take out pressure springs (57A). Pull out assembled valves (51 and 52) with fitting tool (07662).

Dismantling valves: the spring tension cap (51A, 52A) is screwed together with the valve seat (51B/52B). Remove spring tension cap, take out springs (51E/52E) and valve plate (51C/52C). Check sealing surfaces and O-rings (51D/52D).

Replace worn parts.

Coat threads of the 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.

Tighten screws (58) at 132 ft.-lbs. (180 Nm); check torque tension after 8-10 operating hours.

To Check Seals and Plunger Pipe

Remove hexagon nuts (49A). Remove the pump head (50/50B) together with seal case (38) from crankcase (1). If necessary, carefully tap the valve casing past the centring stud (50A) using a rubber hammer.

IMPORTANT! If necessary, support the pump head (50/50B) by resting it on wooden blocks or by using a pulley.

Remove tension screw (36C) and take seal sleeve (39) together with all mounted parts out of the drive.

Pull the plunger pipe (36B) out of the seal assembly (40-43) and check for any damage. Pry seal rings (40) and sleeves (42) out of the seal sleeve (39) with a screwdriver.

IMPORTANT! Be careful not to damage 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 fitting.

Insert the seal unit (40-43) into the sleeve. Push the ceramic plunger (36B) 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.

Take the seal case (38) out of the valve casing (50) and check O-rings (38A). If necessary secure two screwdrivers in the front O-ring groove to remove the seal casing from the valve casing. Coat seals with silicon grease before fitting.

IMPORTANT! Mounting surfaces of the crankcase (1) and valve casings (50-50B) 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 in the crankcase and valve casings.

Coat the seal sleeve lightly with anti-corrosive grease (e.g. molycote no. Cu-7439) in its fitted area towards the crankcase. Insert seal sleeves (39) into 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 (36B). Turn the pump by hand until the plunger (25) rests against the plunger pipe. Tighten tension screw at 30 ft.-lbs. (40 Nm).

IMPORTANT! Thread glue must never come between the plunger pipe (36B) and centring 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 the plunger pipe to fracture. Insert the seal tension spring (45) and O-ring (39A) into the seal sleeve (39).

Mounting the Valve Casing:

Put seal cases (38) in the centring holes of the valve casing (50), then carefully push the valve casing onto the centring studs (50A).

Tighten hexagon screws (49A) evenly and crosswise at 265 ft.-lbs. (360 Nm).

IMPORTANT! With no pressure in the pump, the torque tension on the screws (49A) must be checked after 8-10 operating hours. Thereafter the tension is to be checked every 200 operating hours.

To Dismantle the Reduction Gear

Remove screws (67). Press off gear cover (66) by screwing two screws into both thread bores. Remove screw (72) and take off plate (69). Remove the cogwheel from the shaft with a removal tool. Using a rubber hammer, tap out the crankshaft towards bearing cover (14).

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

Reassemble in reverse order. Thread the crankshaft (22) 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), 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 later to the bearings and connecting rods due to wobble movements in the conical bearing shells.

If bearings (20 and 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 Mount Reduction Gear

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

Move the pinion (69) against the cogwheel and make them mate perfectly when mounting. Then, carefully tap the cogwheel and the pinion simultaneously onto the crankshaft and into the bearing seat.

Fit fitting disc (75A), and secure screw (72) with Loctite.

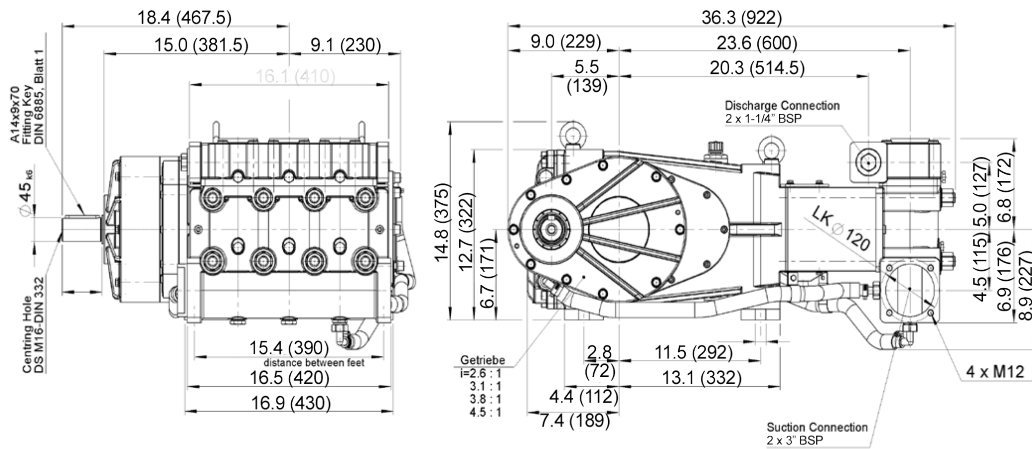
Fit the seal (76) onto the cylindrical pins (68).

Push the gear cover (66) carefully onto the bearing (75).

Make sure that the radial shaft seal (73) is not get damaged (during fitting onto the pinion).

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

GP8155A-180, GP8160A-180 and GP8165A-180 Dimensions - in (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

GIANT
Performance Under Pressure

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