# P200-3100 SERIES PUMPS 18mm Versions

Triplex Ceramic Plunger Pump Operating Instructions/ Repair and Service Manual

Nickle-Aluminum Bronze Models: P217-3100, P218-3100, P219-3100, P220-3100, P221-3100, P230-3100





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### INSTALLATION INSTRUCTIONS

Required NPSH refers to water: Specific weight 1kg/dm<sup>3</sup>, viscosity 1°E at maximum permissible revolutions .

#### **Ambient Conditions**

Ambient temperature: 5 °C < T Amb. < 30 °C

#### **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:** Use only 8.1 ounces (0.24 litres) of Giant Oil (p/n 01154) ISO VG 220 GL4 (e.g. Aral Degol BG220) or SAE 90 GL4 gear oil.

Initial change after 50 operating hours and then every 500 operating hours. In either case change the oil once per year.

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

#### Keep NPSH under control.

Maximum input pressure 145 PSI (10 bar), maximum suction head -4.35 PSI (-0.3 bar). Make sure that suction pulsation is sufficiently dampened water column resonance must be avoided.

#### Installation/Putting into Operation

To Turn Drive Shaft to the Other Side Remove the valve casing. Turn the seal adapters (20) by 180° also so that the leakage holes are underneath. Remount valve casing rotated 180°. Interchange plug (5) and oil dipstick (2) with each other.

Turn crankcase cover (3) by 180°.

#### **Direction of pump rotation**

When looking at crankshaft with valve casing mounted on left-hand side, counterclockwise direction of rotation.

When looking at crankshaft with valve casing mounted on right-hand side, clockwise direction of rotation.

### Suction line filter

Recommended mesh size 150 µm.

#### ▲ Safety Rules

Pump operation without safety valve as well as any excess in temperature or speed limits, automatically voids the warranty. The safety valve must be regulated in accordance with the guidelines for liquid spraying units so that the maximum admissible operating pressure can not be exceeded by more than 10 %.

When the pump is in operation, the drive shaft end and the coupling must be covered up by either a contact-protector or by a coupling bell.

Before any maintenance to the pump takes place the pressure in discharge line and in pump must be at zero. Close suction line. Disconnect fuses to ensure that the driving motor is not accidently switched on.

Make sure that all parts on the pressure side of the unit are vented before starting the pump. In order to prevent air, or an air-water-mixture being absorbed and to prevent cavitation occurring, the pump-NPSHR suction head and water temperature must be kept under control.

#### Cavitation and/or compression of gases lead to uncontrollable pressure-kicks which can ruin 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-agressive or abrasive media with a specific weight similar to water.

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

	Max. Flow	Max. Flow	Max. Press.	Max. Press.	Max. Speed	Power Req'd.	Power Req'd.	Stroke	Stroke	NPSH Required	NPSH Required
Model	GPM	l/min	PSI	Bar	RPM	BHP	kW	in.	mm	Fthead	mWs
P230-3100	1.1	4.2	2200	150	1750	1.5	1.1	0.13	3.4	n/a	n/a
P217-3100	1.85	7.0	2200	150	1750	2.8	2.1	0.22	5.5	n/a	n/a
P230-3100	2.1	7.9	2200	150	3450	2.9	2.2	0.13	3.4	n/a	n/a
P221-3100	2.34	8.9	2200	150	1750	3.32	2.5	0.28	7	n/a	n/a
P218-3100	3.4	12.8	2200	150	1750	4.7	3.5	0.39	10	21.0	6.4
P217-3100	3.3	12.5	2200	150	3450	5.0	3.7	0.22	5.5	n/a	n/a
P219-3100	4.2	15.9	2200	150	1750	5.8	4.3	0.49	12.4	21.0	6.4
P220-3100	4.7	17.6	2200	150	1750	6.5	4.9	0.56	14.1	21.6	6.6

P200-3100 - 18mm Versions - Pump Specifications

#### **Horsepower Ratings:**

We recommend a 1.15 service factor be specified when selecting an electric motor as the power source. To compute <u>electric motor</u> horsepower required, use the following formula: HP = (GPM X PSI) / 1450. The formula to determine the horsepower required for a gas engine is: HP = (GPM X PSI) / 1150. The formula to determine the horsepower required for a diesel engine is: HP = (GPM X PSI) / 1250. **For the Application of a Hydraulic Motor:** 

To Determine the Torque of a Hydraulic Motor -- (GPM x PSI x 36.77) / RPM = Torque (in-lbs) Calculating RPM / GPM of Pump:

A pump must be connected to an electric motor or gas or diesel engine with the correct ratio of pulleys and belts to attain the required speed and GPM. The use of a Variable Frequency Drive (VFD) may also be used to control the RPM of a properly sized electric motor when variable flows are required.

(Max. Pump RPM / Rated Pump GPM) x Required Pump GPM = Required Pump RPM

To calculate a pulley diameter one (1) pulley diameter and the required pump RPM must be known: (Pump RPM x Pump Pulley Diameter) / Motor RPM = Motor Pulley Diameter (Motor RPM x Motor Pulley Diameter) / Pump RPM = Pump Pulley Diameter

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Manifold	Nickle-Aluminum Bronze
Plungers	Solid Ceramic Oxide
Valves	316 Stainless Steel
Seals	Nitrile with Fabric Reinforcing
Gear End	Anodized Aluminum

Common Specifications:
Max. Inlet Pressure145 PSI (10 Bar)
Plunger Diameter0.71" (18mm)
Crankshaft Diameter0.94" (24mm)
Oil Capacity (short)7.5 fl. oz. (0.2 L)
Max. Temp160 °F (70 °C)
Max. Temp
(seawater applications)86°F (30°C)
Inlet Ports(2) 1/2" BSP
Discharge Ports(2) 3/8" BSP
Weight13.4 lbs (6.0 kg)
Shaft RotationTop of Pulley Towards Fluid End

### Exploded View - P200A-3100 Series



### P200A-3100 SERIES PARTS LIST

<b>ITEM</b>	PART NO.	DESCRIPTION	<u>QTY.</u>	<b>ITEM</b>	PART NO.	DESCRIPTION	<u>QTY.</u>
1	08300C	Crankcase	1	16B	08455	Plunger Pipe	3
2	08301	Dipstick	1	16C	08456-0100	Tension Screw, 316 S.S.	3
3	08302	Crankcase Cover	1	16D	07204-0100	Crush Washer, 316 S.S.	3
3A	07190-0100	Drain Plug & Gasket	1	16E	07203	Support Ring,	3
4	08005	O-Ring	1	16F	07023	O-Ring,	3
5	08185-0100	Oil Drain Plug with seal	1	17	08442	Wrist Pin	3
5A	08192	Gasket	1	19	08356	Oil Seal	3
6	07188-0100	Screw, 316 S.S.	4	20	08444A-0100	Seal Retainer, 316 S.S.	3
6A	07223-0100	Spring Washer, 316 S.S.	4	21	12260-0001	O-Ring	3
7	08303	Bearing Cover I	2	23	06704*	Grooved Seal	3
8	08491	Oil Sight Glass	1	23A	08087	Grooved Seal Ring, Brown	3
9	07193	O-Ring	1	23B	06163	Drip Shield	3
10	07225-0100	Screw	8	24	07904	Pressure Ring	3
10A	07223-0100	Spring Washer	8	25	08445-0100	Weep Return Ring, 316 S.S.	3
11	08331	Radial Shaft Seal	1	26	06582-3000	Valve Casing	1
12A	04917	Ball Bearing	1	26A	03469	Valve Assembly,(27-30)	6
12B	01086	Ball Bearing	1	27	07849-0100	Valve Seat	6
13	03026	Crankshaft (P217A-3100)	1	28	06809	Valve Plate	6
13	04920	Crankshaft (P218A-3100)	1	29	07906-0100	Valve Spring	6
13	04921	Crankshaft (P219A-3100)	1	30	07907	Valve Spring Retainer	6
13	04919	Crankshaft (P220A-3100)	1	31	7853-0001	O-Ring	6
13	04922	Crankshaft (P221A-3100)	1	32	07928-0300	Plug	6
13	04918	Crankshaft (P230A-3100)	1	33	07913-0001	O-Ring	6
14	06207	Fitting Key	1	34	08316-0100	Hex Head Cap Screw	8
15	08333	Connecting Rod	3	36	13338-0300	Plug, 3/8" BSP	1
16	08469-0100	Plunger Assembly	3	36A	07109-0300	Plug, 1/2" BSP	1
16A	08468-0100	Plunger Base, 316 S.S.	3	*p/n 0	8477 might als	o be used in this position	

### P200A-3100 SERIES REPAIR KITS

#### Plunger Packing Kit Part# 09602

<u>Item</u>	<u>Part #</u>	<b>Description</b>	<u>Qty.</u>		
23	08477*	Grooved Seal	3		
23A	08087	Grooved Seal Ring	3		
23B	06163	Drip Shield	3		
24	07904	Pressure Ring	3		
*p/n 06704 can also be used in this position					

### Valve Assembly Kits

	Part #	09714								
	<u>Item</u>	<u>Part #</u>	<b>Description</b>	<u>Qty.</u>						
	26A	03469	Valve Assembly	6						
	31	07853-0001	O-Ring	6						
	33	07913-0001	O-Ring	6						
	Oil Seal Kit									
Part# 09144										
	<u>Item</u>	<u>Part #</u>	<b>Description</b>	<u>Qty.</u>						
	19	08356	Oil Seal	3						

### P200A-3100 SERIES TORQUE SPECIFICATIONS

Position	Item #	Description	Lubrication Info	Torque Amount
3A 07190-0100		Drain Plug & Gasket		22 ftlbs. (30 Nm)
5	08185-0100	Oil Drain Plug w/seal		22 ftlbs. (30 Nm)
6	07188-0100	Screw, 316 SS		88 inlbs. (10 Nm)
10	07225-0100	Screw		88 inlbs. (10 Nm)
16C	08456-0100	Tension Screw, 316 SS	Loctite 243	200 inlbs. (22.5 Nm)
16D	07204-0100	Crush Washer	Loctite 577	
32	07928-0300	Plug	Loctite 243	55 ftlbs. (75 Nm)
34	08316-0100	Hex Head Cap Screw		106 inlbs. (12 Nm)

### **REPAIR INSTRUCTIONS - P200A-3100 SERIES**



 With a 22mm socket wrench, remove the (3) discharge valve plugs and (3) inlet valve plugs (32) Inspect the o-ring (33) for wear and replace if damaged.



 Using a needle nose pliers, remove the inlet and discharge valve assemblies (27-30), and o-ring (31). Inspect all parts for wear and replace as necessary.



 By inserting a small screw driver between the valve seat (27) and the valve spring retainer (30), the valve assembly can be separated.



 Apply one drop of Loctite 243 to the valve plugs (32) and tighten to 55 ft.-lbs. (75 Nm).



5. Next, use a 5mm allen wrench to remove the 8 socket head cap screws (34).



6. Carefully slide the valve casing (26) out over the plungers.



 Remove the weep return ring (25), pressure ring (24), and v-sleeve (23) from the valve casing (26). Remove the rear v-sleeve (23A) from the seal case (20). Inspect all parts, including o-ring (21) for wear and replace as necessary.



8.Check surfaces of plunger pipe (16B). A damaged surface will cause accelerated wear on the seals. Deposits of any kind must be carefully removed from the plunger surface. A damaged plunger must be replaced! When replacing the crush washer (item 16D), make sure the rolled side of the crush washer is placed on the ceramic. Prior to installation, carefully crush the seal ring on a hand press.



 If the crankcase oil seals (19) are to be replaced, they can be removed by prying loose with a flat screwdriver. Take care not to make contact with the plunger.

## REPAIR INSTRUCTIONS - P200A-3100 SERIES

### Disassembly sequence of the *back* end of the P200A-3100 series pump.

- 1) Before you begin, drain the oil from the crankcase.
- 2) Remove the crankcase cover (3) and o-ring (4) from the crankcase (1). To remove the crankshaft (13), remove the bearing cover (7) and sight glass (8). Using a rubber mallet, remove the crankshaft axially through the connecting rods by tapping on the end of the shaft. Be careful not to bend or damage the connecting rods during crankshaft removal.
- 3) If the bearings (12A and 12B) and radial shaft seal (11) are still in the crankcase, remove them. Inspect both bearings and seal for wear and replace if necessary.
- 4) Remove the connecting rod (15) and plunger assembly (16). Remove the wrist pin (17) if necessary. Check the plunger bore in the crankcase for wear. Inspect parts and replace as necessary.
- 5) Should you find it necessary to service the plunger assembly (16) you can do so by removing the tension screw (16C). Replace crush washer (16D). **NOTE: Carefully flatten crush washer before replacing it.** Inspect all parts and replace as necessary.

### Reassembly sequence of the P200A-3100 series pump

- 1) Reassemble plunger assembly (16) (apply a drop of Loctite to the tension screw (16C) threads) and the connecting rod (15) with wrist pin (17). Place assemblies in crankcase (1). Install crankshaft through connecting rods again being careful not to bend or otherwise damage the connecting rods.
- 2) Replace left and right side bearings (12A and 12B) if they were removed from the crankshaft. Be certain the bearings are pressed all the way onto the shaft and completely into the crankcase. Replace radial shaft seal (11), bearing cover (7), sight glass (8), and crankcase cover (3) with its o-ring (4).
- 3) If oil seals (19) were removed, replace with seal lip towards crankcase. Lubricate seal before replacing.
- 4) Replace seal case (20) with o-rings (21) over plungers. Generously lubricate o-rings and oil seal before reassembly. Replace drip shield (23B) and v-sleeve (23A) over plungers (16)..
- 5) Generously lubricate v-sleeve (23) and assemble into valve casing (26). Assemble weep return ring (25) and pressure ring (24) over plungers (16). Slide valve casing over plungers and seat firmly. Replace the eight socket head cap screws (34) and tighten to 106 inch-pounds (12 Nm) in a crossing pattern (see below).
- 6) Re-install the six o-rings (31) and the six valve assemblies (27-30). Now replace the six valve plugs with o-rings (32 and 33) and tighten securely with a 22mm socket wrench to 55 foot-pounds (75 Nm).
- 7) Fill crankcase with 7.5 ounces (0.2 L) of oil.



### Pump Mounting Selection Guide

<b>Bushings</b> <b>07174</b> - 24 mm Tapered H Bushing	
<b>Pulley &amp; Sheaves</b> 01061 - 7.75" Cast Iron - 1 gr AB Section 01062 - 7.75" Cast Iron - 2 gr AB Section	
Rails 01160 - Plated Steel Channel Rails (L=5.75"x W-1.0"XH=1.812") 01161 - Plated Steel Channel Rails (L=5.75"x W-1.0"XH=2.50")	

#### P200A-3100 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:

- 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



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