

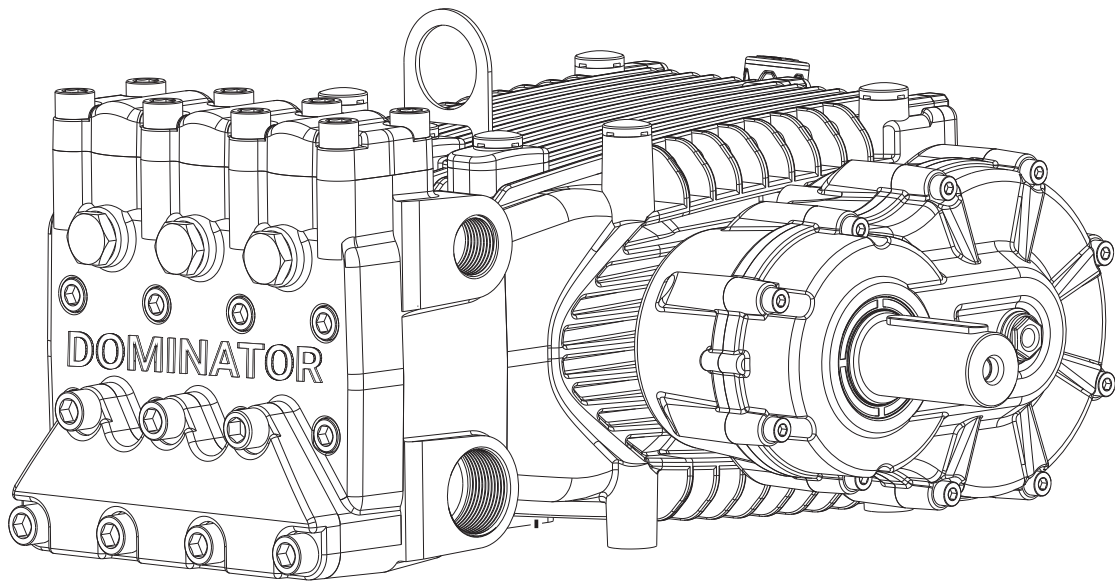
DOMINATOR

TRIPLEX WATER PUMP

USER MANUAL

Installation, use, and maintenance

Model DP2040GR



This manual contains:
IMPORTANT WARNINGS and **INSTRUCTIONS**. READ AND RETAIN FOR REFERENCE.

WARNING: To reduce the risk of injury, the user must read and understand the operators manual before using this product.

SAVE THIS MANUAL FOR FUTURE REFERENCE

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1. Introduction

This User Manual for the Industrial Reciprocating Plunger Pump DBH series contains the necessary information for installation, use, maintenance and trouble shooting. Please ensure that you have read and understand the information before attempting to use the pump, this pump should be used by trained and fully-competent individuals, in a safe working environment. Following the instructions with correct use and adequate maintenance will give long trouble-free operation, any damage and malfunction that is caused by misuse or the non-observance of the instructions will void the warranty. Upon receipt of your pump, inspect for overall condition, any damage should be reported to the dealer before installing and starting the pump.

Please note that the contents of this manual are based on the latest product information available at the time of publication and that the manufacturer reserves the right to make changes at any time without notice.

2. Safety Symbols



WARNING
Potential Danger



DANGER
Wear eye protection



READ MANUAL
Read and full understand before installation and/or operation



DANGER
Wear protective boots



DANGER
High Voltage



DANGER
Wear protective overall



DANGER
Wear face protection



DANGER
Wear protective gloves

3. Safety Guidelines

3.1 General Safety Warnings



Misuse and non-observance of installation and maintenance guidelines of pumps and high-pressure units can result in serious damage or injury to people or property.

This pump is to be assembled by trained and fully-competent individuals, who should have the required knowledge of all components.

Users must adopt all necessary safety precautions.

3. Safety Guidelines (continued)

3.2 High Pressure Unit Safety Requirements

1. The high pressure water delivery line must always be equipped with a safety valve. Failure to fit such relief devices could result in personal injury or damage to the pump or to system components and will void warranty.
2. The high pressure units have to be well protected against rain, frost and heat when they are working outdoors.
3. The Electric components, connections and wiring have to be well protected from water spray, in particular when the unit are working outdoors on in wet environment.
4. The high pressure hoses and any other accessories under high pressure should be sized in accordance with the unit's max working pressure and must always work within the safety margins indicated by the hose/accessories manufacturer.
5. The ends of the high pressure hose ends should be fastened to a steady structure in order to prevent them from dangerous sweeping, if not they will burst or come off of their end fittings.
6. Proper safety guards must be provided to cover the transmission joints, pulleys, belts or auxiliary drives.



DO NOT GET ELECTRIC COMPONENT WET



DO NOT OPERATE WITH COVER REMOVED



MOVING PARTS CAN CRUSH DO NOT TOUCH



WATER JETTING CAN CUTS DO NOT TOUCH

3.3 Safety of Operation

The working area for the high pressure system must be clearly cordoned off and proper warning notices displayed in prominent positions. The access into the area when a high pressure unit is working should be strictly prohibited to unauthorized personnel. Personnel authorized to enter that area have been previously trained to do so and informed of the risks arising from failures, misuse and any foreseeable circumstance which may occur during operation.

Before starting the unit, the Operator must check:

1. The inlet water supply pipe should be of an adequate diameter to allow unrestricted water flow into the pump.
2. The inlet water filter to be properly cleaned, and in good condition.
3. Electrical components and wiring, with special emphasis on connections, junction boxes, switches and supply cables should be free from external damage (i.e. exposed and broken wires) and adequately protected against water.



3. Safety Guidelines (continued)

4. High pressure hose should not show apparent external wear and the fittings at both ends should be free from signs of erosion or corrosion.
5. Make sure that all fluids (lubricating oil for pump and engine, cooling water, hydraulic fluids) are at proper levels and in good condition.
6. Make sure the safety guards are in good condition.

The work should stop immediately and the pressure must be released in the event that leakage becomes apparent or if any person becomes aware of any change in condition or any hazard existing or being introduced. Any failure must be promptly reported and then checked.

3.4 General procedures for high pressure gun/lance operation

1. The Operator should take reasonable care for the safety of himself and of other persons who may be affected by his acts or omission at work. His actions should always be governed by his good sense and responsibility.
2. The Operator must always wear a helmet with waterproof clothing, and suitable boots. The helmet provided with full face shield, the clothing set should include adequate hand protection, the boots able to ensure proper grip on wet surface, waterproof garment providing full cover to the Operator, including his arms. And as most water jets produce noise levels in excess of 90 dB(A) suitable ear protection is advised.

NOTICE: If the operator has the main sewer hose with any type of hand-controlled wand or attachment, then all protective equipment listed is necessary. Water pressure is limited to 4,000 PSI when using the sewer hose water system. The handgun system has a separate pressure relief valve that limits the water pressure to 800 PSI or less.



WEAR PROTECTIVE OVERALL



WEAR HELMET WITH FACE PROTECTION



WEAR PROTECTIVE GLOVES



WEAR EAR PROTECTION



WEAR PROTECTIVE BOOTS



WARNING: The appropriate clothing provides adequate protection against spray and flying particles, it does not provide adequate protection against the direct impact of the water jet. Additional protections in the form of suitable metal shields or barriers may be necessary for certain jetting operation.

3. It is necessary to employ a team of operators consisting of two members at least for the high pressure water jetting operations.

One operating the gun, and the other attending the pump unit, and watching the surrounding area for intrusion by other persons or unsafe situations, and keeping close watch on the gun operator for signs of difficulty or fatigue, he will shut off the pressure unit until it is safe to continue.

3. Safety Guidelines (continued)

4. The working area should be clear of loose items and debris to prevent being unintentionally hit by the high pressure water jet, causing damage or dangerous situations.
5. The water jet should be only and always directed towards the operational objectives even during preliminary operating tests prior to starting work.
6. Where applicable, proper side shields should be placed to safeguard personnel and equipment against contact with grit or particles removed by the water jet.
7. For no reason must the operator be distracted during operation until the jet has been stopped. Personnel having reason to enter the water jetting area should wait until the jet is stopped and his presence known.
8. Each team member must always be aware of the actions and intentions of other team members in order to prevent any dangerous misunderstanding from occurring during jetting operation.
9. The high pressure pump unit should not be started and brought up to pressure unless each team member is in his designated position, the nozzle directed to the operational objectives and the lance or gun securely held.

3.5 Safety of maintenance

1. The high pressure water unit should be maintained in accordance with the Manufacturer's instructions.
2. The unit should be maintained only by competent personnel.
3. Service and maintenance should be carried out with proper tools in order to prevent any damage on high pressure connections and fittings.
4. Use of other than original spare parts is strictly forbidden.



ALWAYS POINT WATER
JETTING TO A SAFE DIRECTION



SLIPPERY WET SURFACE
ALWAYS WEAR NONSKID BOOTS



DO NOT TOUCH ELECTRIC
COMPONENTS WITH WET HANDS

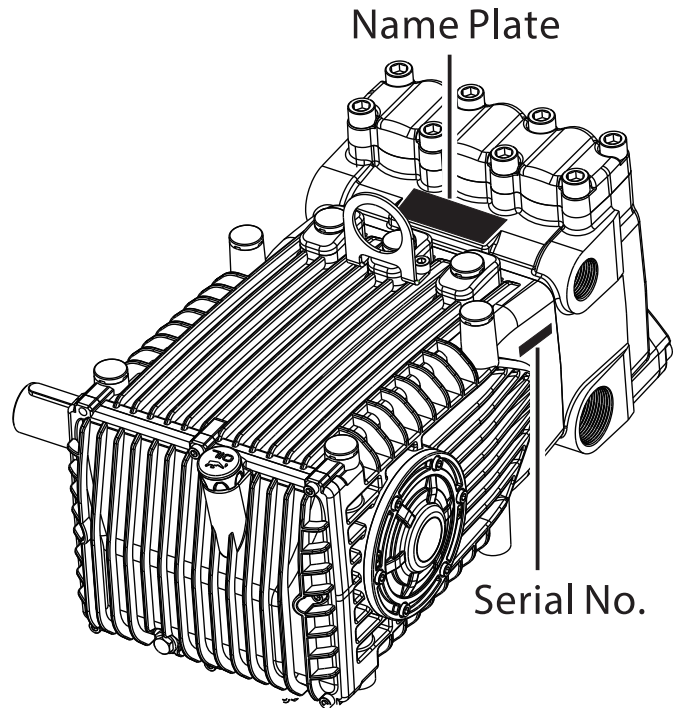
4. Pump Identification

4.1 Name Plate

1. Pump model and version
2. Bore and stroke
3. Max pressure (bar/psi)
4. Pump and Gearbox RPM
5. Power KW/HP

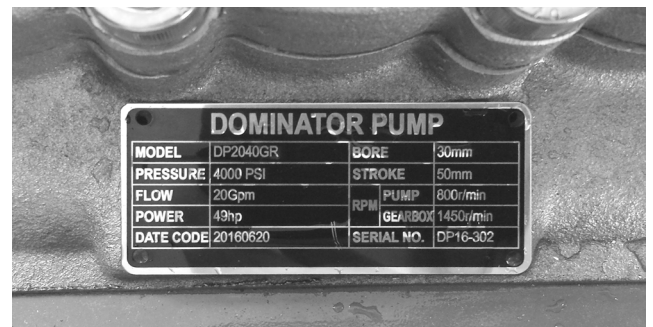
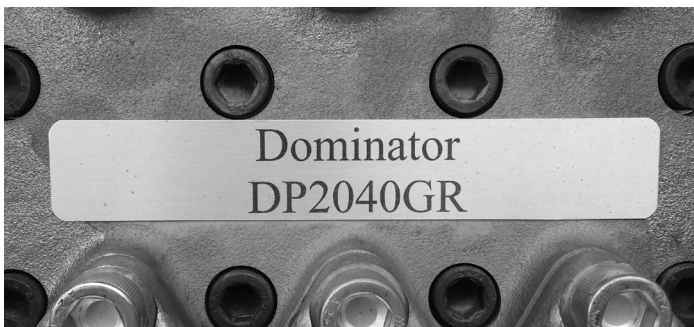
4.2 Serial Number

The serial number is unique; it contains the year, month, and day of production, and can track the batch of materials, assembler and tester. Please provide the serial no. along with the pump model and version when ordering spare parts, and reporting any issues of concern.



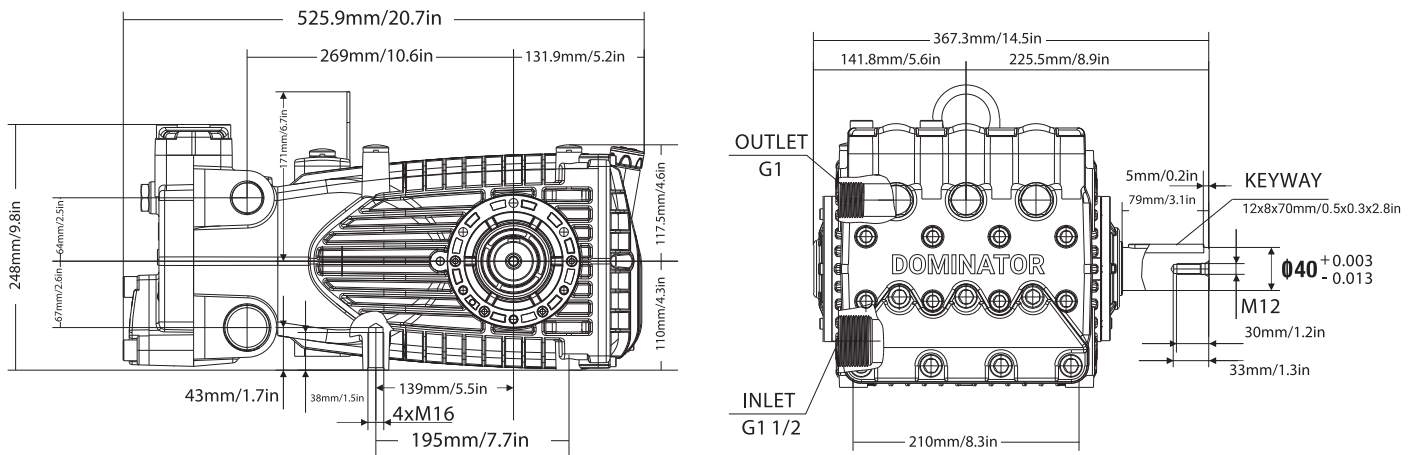
5. Pump Technical Data

PUMP MODEL	MAX FLOW		MAX PRESSURE		INPUT RPM	POWER REQUIRED		SHIPPING WEIGHT		SHIPPING SIZE
	GPM	LPM	PSI	BAR	RPM	HP	KW	KGS	LBS	CM
DP2040GR	20	75.71	4000	275.79	800	49	36.539	68	150	52.5x36.5x25.5

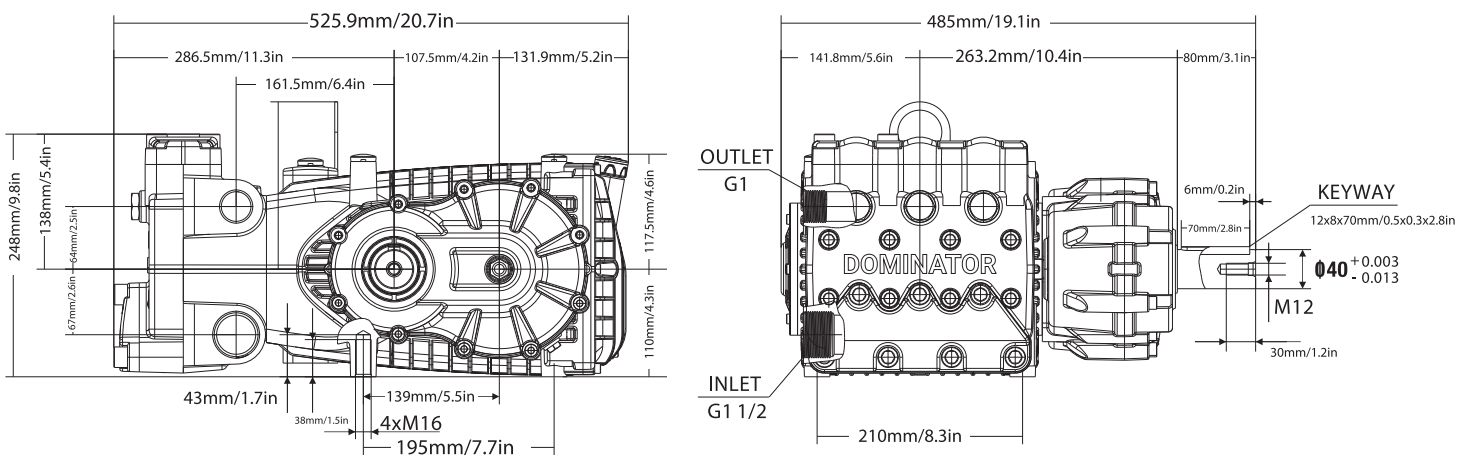


6. Dimensions

6.1 Standard pump.



6.2 Pump with gearbox fitted.



NOTE: Gearbox reduction ratio: 1.82:1 2.24:1 2.94:1

7. Connections

7.1 2 Inlet Port Size G1 1/2 inch / 1.5 inch NPT

Suction line connection to any of the two inlet ports is acceptable, if the port is not to be in use should be sealed with correct plug.

7.2 2 Outlet Port Size G1 inch / 1 inch NPT

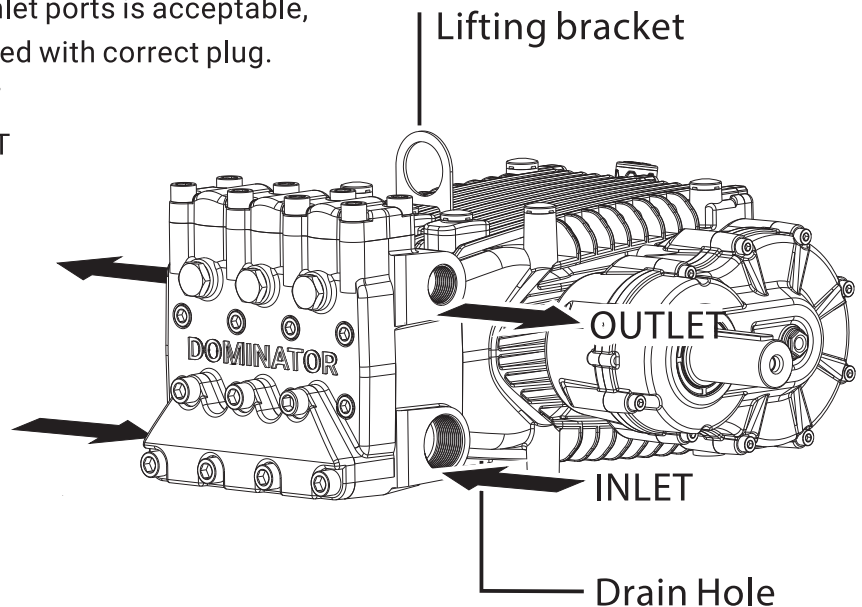
7.3 3 Gauge Port M22x1.5 / 3/4 inch NPT

7.4 Draining Hole

The DRAIN provided is underneath the crankcase and designed to drain out the water leakage of the pressure packings. The hole must always be left open.

7.5 Lifting Bracket

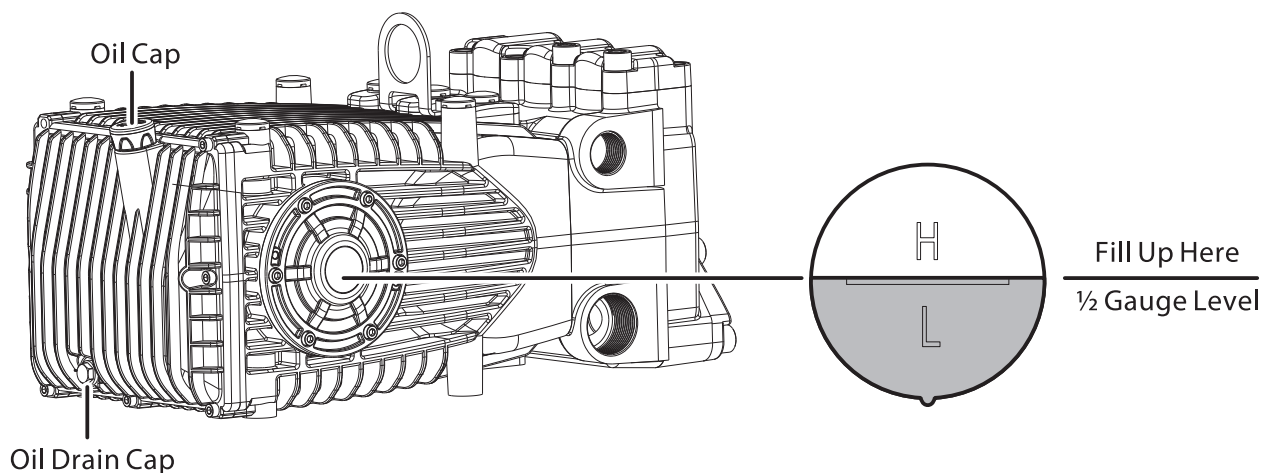
The pump is installed with a lifting bracket for easy moving and installation



8. Pump Lubrication

Pump Lubrication Oil

1. Pump lubricates via oil splash, so operating the pump with no oil or low oil level causes damage and voids warranty.
2. Type of lubrication oil: SAE 85-90 gear lubricants or ISO 220 type oil.
3. Oil amount for pump 3500ML / 3.7 quarts
4. Oil amount for gearbox 750ML / 0.8 quarts
5. The correct oil level is marked halfway on the sight view window.



9. General Information About Using

9.1 Pump Selection

The Dominator pump is designed for pumping fresh filtered water at room temperature, and offers superior corrosion resistance. It is essential to always use the right pump for the job, please provide us with as much information as possible about the liquid to be pumped, its temperature, the application, duty cycle, running conditions, and the location & environment; especially if the pump will be used in a hazardous zone-classified area.

9.2 Water Temperature

The max water temperature allowed for the pump is 40°C/104°F, the higher it is, the more likely it is to create cavitation, resulting in premature seal and valve failures. It is possible to use the pump at 60°C/140°F for short periods of time, if used for long periods of time, feed the plunger pump with a centrifugal pump supplying at least twice the pump flow at 30 to 45 PSI and reduce pump rated RPM by 30% to 50%. For water temperatures exceeding 60°C/140°F, the standard pump is not suitable, please contact the dealer for Technical Assistance Service.

9.3 Max Flow and Pressure Ratings

The performance data indicated refer to the maximum performance of the pump. The use of the pump below the rated performances does not allow the drop in power absorbed to be balanced by altering the pressure or volume of the pump above its maximum value.

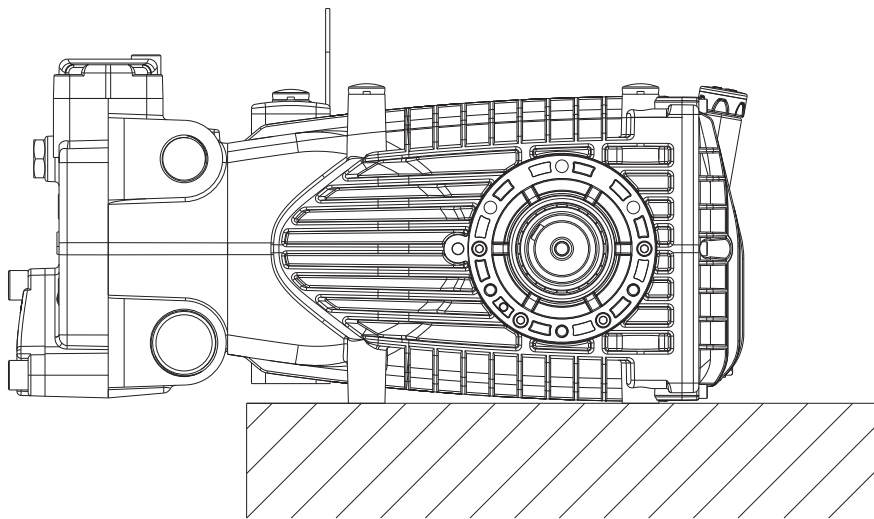
9.4 Power Driving and Transmission

1. The pump can be driven by an electric motor or a diesel engine, which must provide sufficient power to drive the pump and to start it under load, if necessary. Refer to the pump data sheet or contact to the dealer for Technical Assistance Service for advice on Power Selection.
2. If the pump is running at the same speed as the motor, use the suitable Flexible Coupling to drive directly.
3. Many pumps need to run slower than the motor/engine speed to provide the correct flow to operate reliably, the pump must be driven through a speed-reduction gearbox or via belts and pulley for the correct reduction ratio.

10. Installation

10.1 Positioning

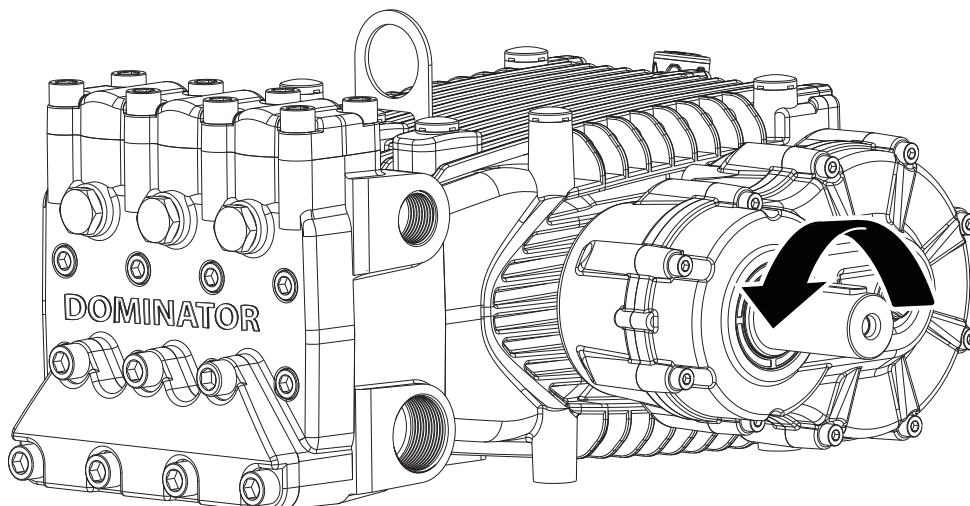
The pump must be mounted horizontally on a strong, rigid baseplate or frame by four bolt M16 with a torque 210Nm. The base should be sufficiently rigid to avoid any misalignment or flexing of the pump/transmission coupling axis due to the torque involved during operation. The fluid end should be left free and not subjected to any force.



10.2 Direction of rotation

The standard pump version (W/O Gearbox) crankshaft can be rotated in either direction, when a gearbox is mounted, it should always be rotated counter-clockwise.

The pump features a symmetrical power-end with top and bottom mounting holes allowing for left to right shaft conversion, when the version must be changed, please contact the dealer for Technical Assistance Service.



10. Installation (continued)

10.3 Water connections

In order to isolate the high pressure equipment from the pump vibrations it is suggested, where applicable, to use flexible hoses for both suction and delivery lines at least for the first length. The flexible suction hose must be sufficiently rigid to prevent it from collapsing during the suction stroke, when a partial vacuum may occur.

10.4 Suction line

1. The pumps are not self priming therefore a positive suction head should always be provided, at least +0.2M.
2. Minimum internal diameter as indicated (Size of The Pipeline Page13), and in any case equal or greater than the size of the pump's suction port.
3. By lay-out should be as straight as possible and minimize changes in size and direction and position.
4. It should be perfectly airtight.
5. Absolutely avoid 90° elbows, diameter reductions, counter slopes, "U" shaped curves, "T" type connections and should not be connected to other pipelines.
6. Should positioned in such a way to prevent the pipe emptying after the pump stops.
7. Do not use high pressure flexible hoses for the suction line.
8. Do not use high pressure hydraulic fittings like 90° elbows, and 3 or 4 way high pressure fitting or adapters.
9. Do not install any kind of detergent injector along the suction line.
10. Do not install standing valves, check valves or other kind of one-way valves.
11. Make sure that the feed tank capacity and the water minimum level do not give rise to turbulence at the tank outlet port, which, in turn, might create cavitation at the pump.
12. Do not connect the by-pass line from the valve directly to the pump suction line.
13. The water flow from the valve should be directed back in the tank. Make sure that the by-pass and tank feeding flows to not give rise to turbulence at the tank outlet port, which, in turn, might create cavitation at the pump. Proper baffle plates should be provided inside the tank.
14. Before connecting the suction line to the pump inlet port make sure the pipe is perfectly clean inside.

10.5 Filtration

1. The filter should be installed as close as possible to the pump, and allow easy inspection
2. The filter capacity should be at least three times the rated pump volume.
2. Filter port diameters should not be smaller than the pump inlet ports.
4. Filtration screen to be between 50 to 80 mesh (0.25 mm to 0.15mm)

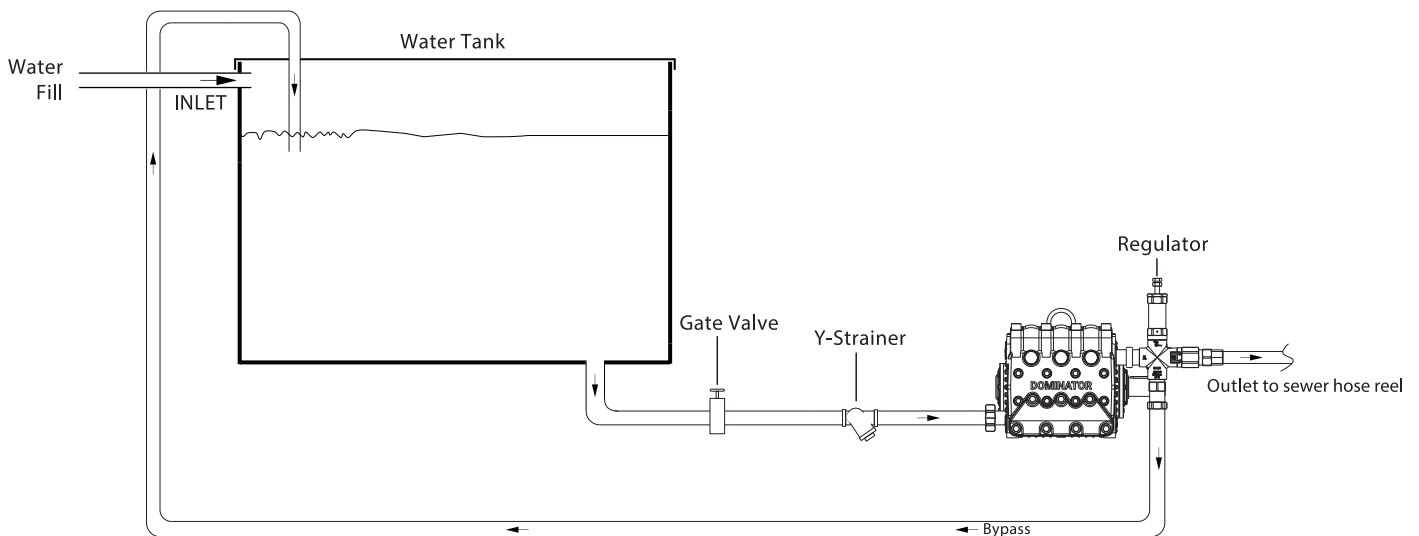


WARNING: In order to properly safeguard the pump it is very important to plan cleaning of the filter with a frequency depending on the water quality, filtration degree and number of hours of each application.

10. Installation (continued)

10.6 Delivery line

1. The first length of delivery hose should be flexible in order to isolate the pump vibrations from the rest of the system.
2. Use only high pressure hoses and fittings able to guarantee the largest possible safety margins in any working conditions.
3. A suitable relief valve should be installed in the delivery line.
4. Use glycerine filled pressure gauges, the most suitable for pulsating loads.
5. When designing the delivery line, take into proper account the unavoidable drop in pressure, due to its length and size.
6. The effects of the pump pulsations can be reduced by installing a proper pulsation dampener in the delivery line



10.7 Size Of The Pipeline

Please follow the chart of the size and flow for the suction and delivery pipeline. Suggested flow speed:

Suction: $\leq 2\text{m/s}$ 6.6 ft/s

Delivery: $\leq 5\text{m/s}$ 16.4 ft/s

NOTE: This chart does not take into consideration the pipe, fitting, and valve's resistance, the pressure dropping due to the pipe length, the viscosity, and the temperature of the pumping fluid.

PUMP MODEL	INPUT RPM	ID OF THE INLET PIPE	VELOCITY INLET PIPE	ID OF THE OUTLET PIPE	VELOCITY OUTLET PIPE
	RPM	MM/in	m/s & ft/s	MM/in	m/s & ft/s
DP2040GR	800	36MM / 1.4 in	1.4 m/s / 4.6 ft/s	19MM / 0.75 in	5 m/s / 16.4 ft/s
	900	36MM / 1.4 in	1.6 m/s / 5.2 ft/s	20MM / 0.79 in	5 m/s / 16.4 ft/s
	1000	36MM / 1.4 in	1.7 m/s / 5.6 ft/s	21.5MM / 0.85 in	4.9 m/s / 16.1 ft/s

11. Start Up Procedures

11.1 Before Start Up

Most pump damage is done when they are first starting, carefully check before start up to make sure that the following conditions have been met :

1. Make sure the pump and gearbox (if fitted) have been filled with correct oil amount and grade.
2. Check tightness and alignment of belts/joints in case they have been disturbed during transportation and installation.
3. Suction line must be perfectly air-tight, and should be connected to the pump, the pump must never run dry.
4. Open all valves in between the pump and water source
5. Back off the pressure adjustment of any pressure regulating or unloader valves.



WARNING: Before starting the pump after a long period of storage, check for the correct oil level, check the valves and then comply with the starting procedures.

11.2 Starting Up

1. When starting the pump up for the first time or after every wiring re-connection check for the proper direction of rotation.
2. Verify that the inlet water pressure is always adequate.
3. The pump and motor/engine should start with no load, and discharge the water unrestricted.
4. Check that the rotating speed does not exceed the rated value.
4. Before putting the pump under pressure let it run for some time until the oil flows freely.
5. Listen for unexplained noises and watch for leaks.
6. Gradually adjust the pressure regulator valve at correct working pressure.
7. Observe pump for the first few hours of running to ensure everything is working correctly.
8. Before stopping the pump release the pressure from the system by operating the dump device or by releasing the regulating valve and reduce RPM to a minimum (diesel applications).

11.3 Water Leakage

During operation a small amount of water (a few drops a minute) is released from the pump fluid end, this leakage is designed to provide lubrication for the pressure packing. The leakage is drained out of the pump through a hole in the lower cover (NO.18-2, on page17 Part List). This hole must always be kept open.

11.4 Extended periods without use

When a long inactivity is scheduled, drain the entire suction and delivery line and then run the pump dry, only for a few seconds in order to drain out the water collected inside the fluid end.

12. Maintenance

12.1 Maintenance Schedules.

ITEM	TASK DESCRIPTION	EVERY USE	WEEKLY	100HRS	500HRS	1000HRS
Engine Oil	Oil Level Check	●				
Pump and Gearbox Oil	Oil Level Check	●				
	Initial Oil Change			●		
	Oil Change				●	
Leaks	Oil Leaks	●				
	Water Leaks	●				
Belts/Pulley	Check/adjust		●			
Plumbing	Check/clean		●			
Water Filter	Check/clean		●			
Valves	Change					●
Water Seals	Change					●

NOTE:

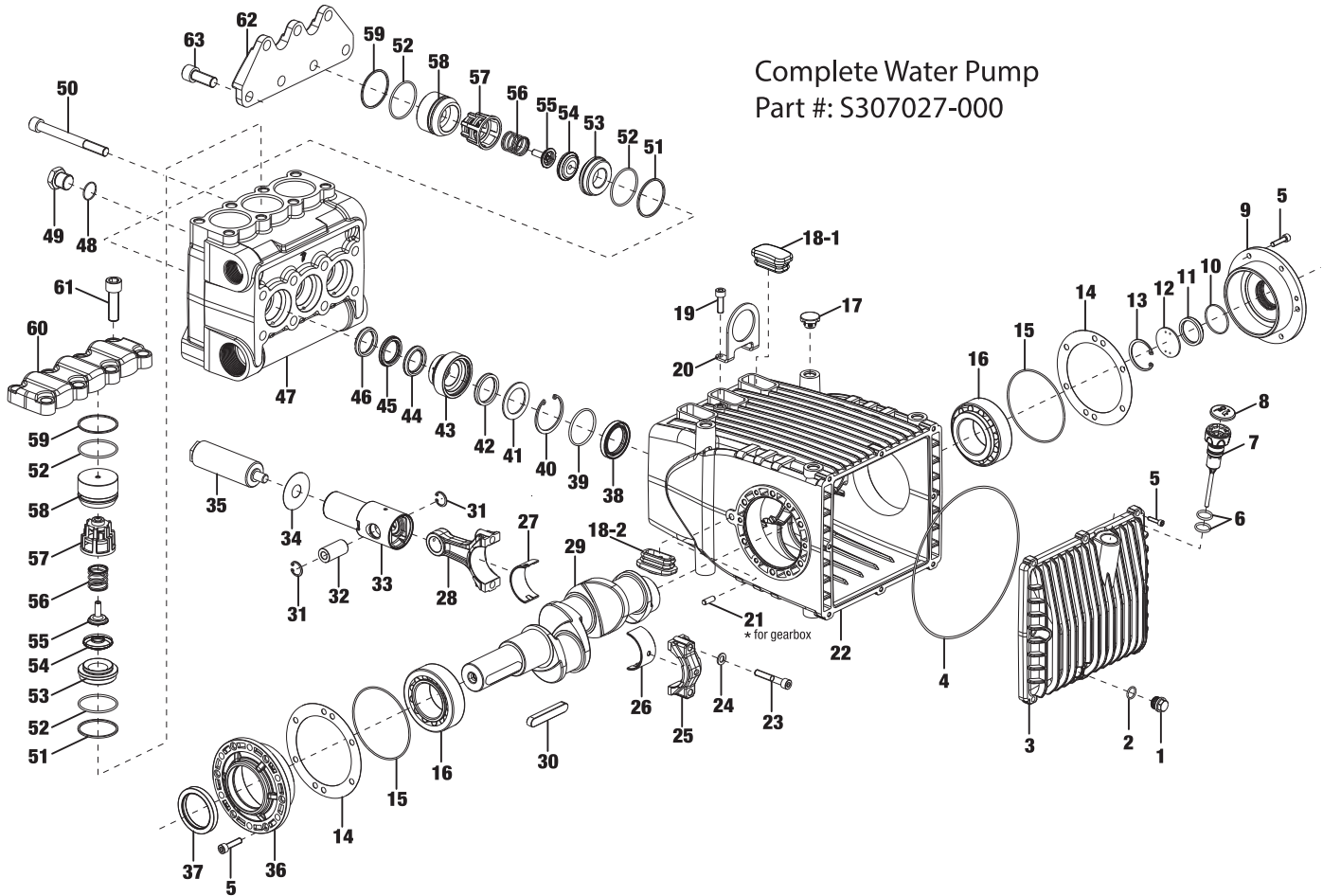
- * To determine when to change the engine oil please refer to engine's maintenance schedules.
- * Change pump and gearbox oil every year even if the usage hours have not reached 500hrs.
- * The maintenance schedule may accelerate if the pump performance decreases, check immediately.
- * Duty cycle, temperature, quality of pumped liquid and inlet feed conditions all affect the life of the pump parts and service cycle.

12.2 Anti-freezing Protection

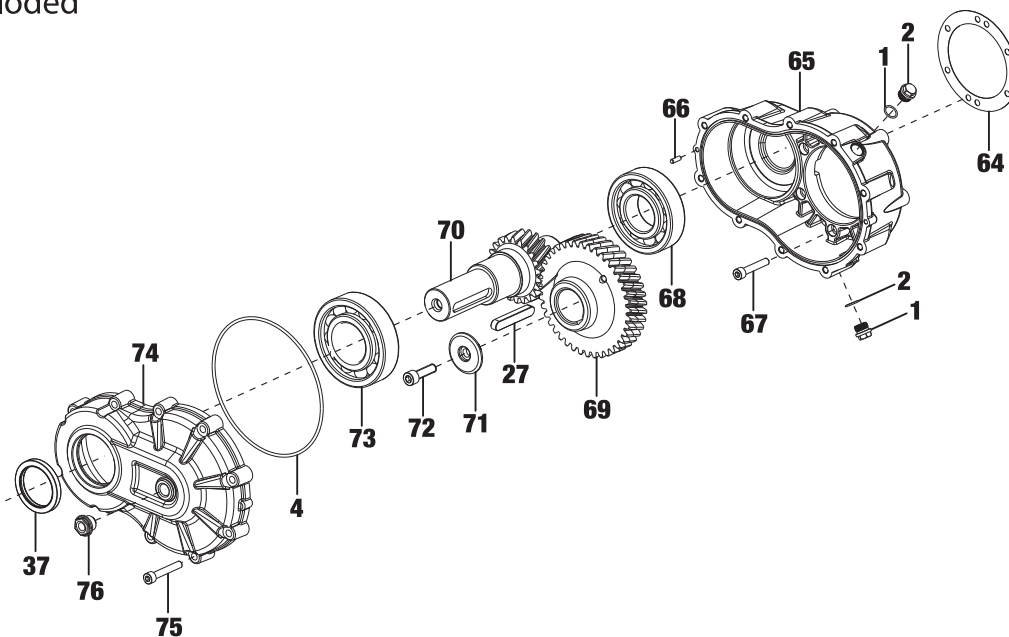
1. Drain the entire suction and delivery lines (filter included) by means of discharging devices, provided and positioned specifically for this purpose along the lowest point of the lines.
2. Run the pump only for a few seconds in order to drain the water collected inside the fluid end.
3. Add a recommended amount of non-toxic and biodegradable antifreeze solution into the water tank and run the pump until the solution works all through the system.

NOTE: If a pump is frozen or appears frozen ON NO ACCOUNT SHOULD THE PUMP BE OPERATED until the entire system has been thawed out.

13. Pump Exploded



Gearbox Exploded



14. Parts List

NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION
1	Oil drain plug	26	Rear bushing, Connecting rod	52	O-ring 49.5x2.65
2	O-ring 14x1.9	27	Pin 12x8x70	53	Valve seat
3	Crankcase cover	28	Crankshaft	54	Valve plate
4	O-ring 210x2.65	29	Front bushing Connecting rod	55	Valve guide
5	Bolt M6x25	30	Connecting rod body	56	Spring
6	O-ring 17x3	31	Circlip O 20	57	Valve housing
7	Vented plug	32	Pin, Connecting rod	58	Valve cap
8	Cover, Vented plug	33	Piston guide	59	Backup ring 50x54x1.5
9	Bearing cover	34	Water retaining	60	Outlet valve cover
10	O-ring 39x2	35	Ceramic plunger	61	Bolt M14x35
11	Oil gauge	36	Shaft cover	62	Inlet valve cover
12	Oil level plate	37	Oil seal, Shaft cover	63	Bolt M14x30
13	Circlip Φ 42	38	Oil seal, Plunger	64	Gasket
14	Shim pack	39	O-ring 51.5x2.65	65	Gearbox body
15	O-ring 100x2.2	40	Circlip O 52	66	Pin
16	Bearing 33210	41	Brass washer	67	Bolt M8x45
17	Hole plug	42	Low pressure seal	68	Bearing 6309
18-1	Checking hole cover	43	Locating ring	69	Gear
18-2	Draining hole cover	44	Compression flake, H-P seal	70	Gear shaft
19	Bolt M8x20	45	High pressure seal	71	Gear retainer
20	Lifting bracket	46	Supporting ring, H-P seal	72	Bolt M10x35
21	Pin (To be used with Gearbox)	47	Manifold	73	Bearing 6310
22	Crankcase	48	O-ring 17.8x1.8	74	Gearbox body cover
23	Bolt M8x55	49	Valve plug	75	Bolt M8x50
24	Spring washer	50	Bolt M12x135	76	Oil gauge
25	Connecting rod rear part	51	Backup ring 50x54x2		

15. Torque Chart of Pump Bolts

Item NO.	Description	Thread	Torque
5	Bolt, Crankcase Cover	M6x25	17.5 Nm
5	Bolt, Bearing Cover	M6x25	17.5 Nm
5-1	Bolt, Crankshaft Cover	M6x25	17.5 Nm
5-2	Bolt, Crankshaft Cover (Gearbox Version)	M8x45	35 Nm
19	Bolt, Lifting Bracket	M8x20	30 Nm
23	Bolt, Connecting Rod	M8x55	40 Nm
50	Bolt, Manifold	M12x135	75 Nm
61	Bolt, Outlet Valve Cover	M14x35	100 Nm
63	Bolt, Inlet Valve Cover	M14x30	100 Nm
67	Bolt, Gearbox Body	M8x45	35 Nm
72	Bolt, Gear	M10x35	60 Nm
75	Bolt, Gearbox Body Cover	M8x50	35 Nm

16. Troubleshooting

PROBLEM	PROBABLE CAUSE	SOLUTION
<p>Low Pressure</p> <p>1. Sucking Plumbing</p> <p>2. Checking Valve</p> <p>3. Unloader Valve</p> <p>4. Pressure Seals</p> <p>5. Nozzle</p> <p>6. Power Source</p>	<p>1.1 Water filter screen clogged or improperly sized.</p> <p>1.2 Air leak in inlet plumbing.</p> <p>1.3 Inadequate water supply.</p> <p>2.1 Valve clogged or worn.</p> <p>2.2 Worn O-ring or improperly Valve Spring.</p> <p>3.1 Worn valve core or valve seat.</p> <p>4.1 Worn seals.</p> <p>5.1 Nozzle size bigger or worn nozzle</p> <p>6.1 Insufficient power input, or low RPM</p> <p>6.2 Belt slippage.</p>	<p>1.1 Clean filter. Use adequate size filter. Check more frequently.</p> <p>1.2 Tighten fittings and hoses.</p> <p>1.3 Check the filter, hose and water source.</p> <p>2.1 Clean up the valve, replace if the spherical area is worn.</p> <p>2.2 Check and replace the O-ring. Contact with dealer for TAS.</p> <p>3.1 Check and replace the valve.</p> <p>4.1 Replace with new seals, and increase frequency observe.</p> <p>5.1 Replace with the properly sized nozzle.</p> <p>6.1 Refer to pump data sheet for the correct power and RPM rate.</p> <p>6.2 Tighten belts replace new belts if necessary</p>
<p>Water Leaking</p> <p>1. Unloader the manifold</p> <p>2. Into crankcase</p>	<p>1.1 Worn high or low pressure seals.</p> <p>1.2 Worn plungers.</p> <p>2.1 Humid air condensing into water inside crankcase.</p> <p>2.2 Excessive wear to seals and Pressure Packings.</p>	<p>1.1 Replace with new seals, and increase frequency observe.</p> <p>1.2 Replace with new plungers, increase frequency observe.</p> <p>2.1 Change oil, and keep the pump away from the water spray and increase frequency observe.</p> <p>2.2 Replace with new seals, and increase frequency observe.</p>
<p>Oil Leaking</p> <p>1. Crankcase oil seals</p> <p>2. Crankshaft oil seals and O-rings</p> <p>3. Drain plug</p> <p>4. Rear cover</p> <p>5. Filler cap</p>	<p>1.1 Worn crankcase oil seals.</p> <p>2.1 Worn crankshaft oil seals or O-ring on bearing cover.</p> <p>3.1 Loose drain plug or worn drain plug O-ring.</p> <p>4.1 Loose rear cover or worn rear cover gasket.</p> <p>5.1 Excessive oil amount in crankcase.</p>	<p>1.1 Replace crankcase oil seals.</p> <p>2.1 Remove bearing cover and replace O-ring and/or crankshaft oil seal.</p> <p>3.1 Tighten drain plug or replace O-ring.</p> <p>4.1 Tighten rear cover or replace gasket.</p> <p>5.1 Fill crankcase with specified capacity of oil, do not overfill.</p>
<p>Overheating</p> <p>1. Pump overload</p> <p>2. Low oil</p> <p>3. Water in oil</p> <p>4. Pump position</p> <p>5. Transmission</p>	<p>1.1 Pressure or RPM is over the rated values.</p> <p>2.1 Oil level is too low or incorrect type of oil.</p> <p>3.1 Water getting into the oil</p> <p>4.1 Excessive inclination of the pump in operation</p> <p>5.1 Excessive belt tension or incorrect alignment of the flexible joint or pulleys.</p>	<p>1.1 Refer to pump data sheet for the correct pressure & RPM rate.</p> <p>2.1 Full the correct type and amount of the oil, check frequently.</p> <p>3.1 Change oil, if reoccurring check the condition of seals.</p> <p>4.1 Refer to the installation chapter and set the pump correctly.</p> <p>5.1 Check the condition of installation, adjustment accordingly.</p>
<p>Premature seal failure</p> <p>1. Plunger</p> <p>2. Pressure</p> <p>3. Inlet water</p> <p>4. Inadequate water</p> <p>5. Water quality</p> <p>6. Dry running</p>	<p>1.1 Scored plungers.</p> <p>2.1 Over pressure build in manifold.</p> <p>3.1 Excessive pressure or temp. of inlet water.</p> <p>4.1 Starving pump of inadequate water supply.</p> <p>5.1 Abrasive material in the water.</p> <p>6.1 Running the pump dry.</p>	<p>1.1 Replace plungers, check the inlet conditions.</p> <p>2.1 Reduce inlet pressure per specifications.</p> <p>3.1 Check pressure and inlet water temperature.</p> <p>4.1 Check the size of the inlet hose and the flow rate.</p> <p>5.1 Install proper filtration at pump inlet and clean regularly.</p> <p>6.1 DO NOT RUN PUMP WITHOUT WATER.</p>
<p>Pipe Vibrations/Knocking</p> <p>1. Suction line</p> <p>2. Pressure regulator</p> <p>3. Bypass line</p> <p>4. Valves</p> <p>5. Transmission</p>	<p>1.1 Air suction.</p> <p>2.1 The pressure regulator does not work properly.</p> <p>3.1 The bypass line is undersized.</p> <p>4.1 Jammed up valves.</p> <p>5.1 Irregular drive transmission motion.</p>	<p>1.1 Tighten fittings and hoses.</p> <p>2.1 Check the condition of installation, adjustment accordingly.</p> <p>3.1 Increase the size of the bypass line.</p> <p>5.1 Take out the valves from manifold and clean up.</p> <p>6.1 Check the condition of installation, adjustment accordingly.</p>

16. Troubleshooting (continued)

PROBLEM	PROBABLE CAUSE	SOLUTION
Delivery less rated volume 1. Suction line 2. Input RPM 3. Pressure regulator 4. Valves 5. Pressure packing 6. Water temperature	1.1 Insufficient feeding 2.1 RPM are less than rated. 3.1 Excessive amount bypass by pressure regulator. 4.1 Worn out valves. 5.1 Excessive leakage from pressure packings. 6.1 High water temperature.	1.1 Check the size of the inlet hose and the flow rate. 2.1 Set the input RPM per specifications. 3.1 Check the pressure regulator setup, adjust accordingly. 4.1 Replace with new valves. 5.1 Replace with new pressure packings. 6.1 Check the inlet water temperature.
Pulsation (knocking) 1. Suction line 2. Inlet filter 3. Booster pump (if have) 4. Pump not priming 5. Checking valve 6. Pressure packing 7. Pressure regulator 8. Transmission	1.1 Air entering suction line. 1.2 Insufficient water supply. 1.3 Bends, elbows and fittings along the suction line throttle the amount of water flow. 2.1 Dirty or too small. 3.1 Not supply sufficient pressure or water flow. 4.1 Insufficient water head or suction line is closed during start up. 5.1 Some valves are stuck (i.e valve inactivity after long time period). Jammed or worn out valves. 6.1 Worn out pressure packings. 7.1 The pressure regulator does not work properly. 8.1 Clearance in the drive system.	1.1 Tighten fittings and hoses. 1.2 Check the size of the inlet hose and the flow rate. 1.3 Absolutely avoid 90° elbows, diameter reductions, counter slopes, "U" shaped curves, "T" type connections. 2.1 Install proper filtration at pump inlet and clean regularly. 3.1 Check the pressure and water flow of the booster pump. 4.1 Raise the water head and keep suction line open before start up. 5.1 Take out the valves from manifold accordingly, clean up and/or replace if worn out. 6.1 Replace with new pressure packings. 7.1 Check the pressure regulator setup, adjust accordingly. 8.1 Check the condition of installation, adjustment accordingly.

17. Warranty Terms

We warrant to the original purchaser that our products will be free from defects in material and workmanship under normal use for the period of one (1) year.* "Normal use" does not include use in excess of rated max speeds, pressures, and temperatures, or use requiring handling of fluids not compatible with component materials.

This warranty does not cover freight damage, freezing damage, normal wear and tear, or damage caused by misapplication, fault, negligence, alterations, or repair that affects the performance or reliability of the product.

To apply for warranty coverage, please provide full details of the issues for which you are requesting warranty coverage:

1. Model number, serial number and the date and from whom you purchased your pump.
2. A brief description of the pump problem, including the following:
 - Liquid pumped. State the pH and any non-soluble material in the liquid
 - Drive type (gas engine/electric motor, direct/belt drive) and input rpm.
 - Temperature of the liquid and ambient environment. • Viscosity (of oil, or other than water weight liquid).
 - Suction lift or vacuum (measured at the pump). • Elevation from the pump to the discharge point.
 - Discharge pressure. • Size and type of material of suction and discharge line.
 - Size, type, and mesh of the suction strainer. • Type of spray gun, orifice size, unloader/relief valve, if applicable.

* We reserve the right to offer the one (1) year warranty as a pro-rated warranty if the customer usage would void or cause unexpected/unusual wear & tear of any water pump component.

IMPORTANT! SAFETY FIRST!

Before attempting to use this product(s) please read all of the safety precautions and operating instructions outlined in this manual to reduce the risk of damage to the products and personal injury.

**PN S329006-000
Rev201702**

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