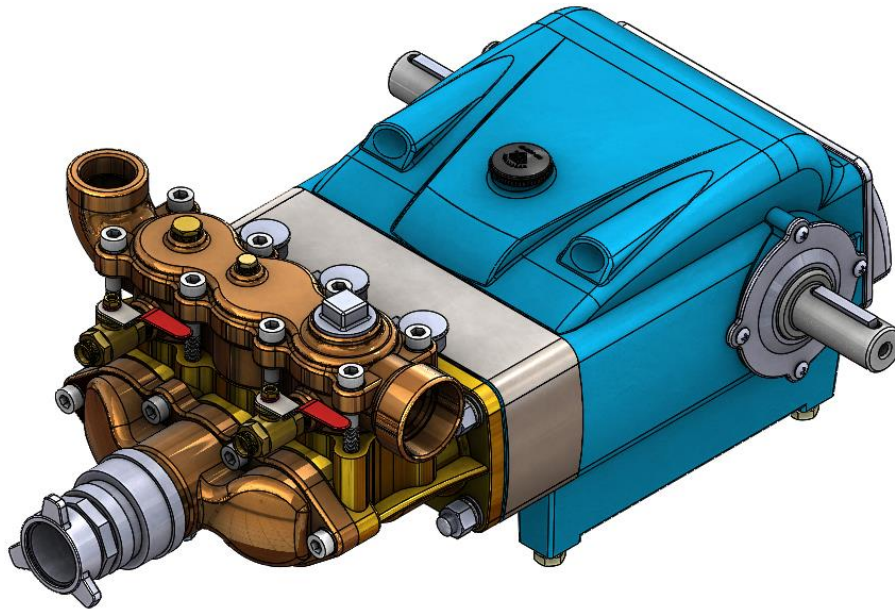




# TS-600

## Agricultural Plunger Pump

### Operation & Maintenance Manual





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## 1. General Information

This manual provides you with the information for proper use and maintenance of the TS-600 triplex plunger pump. Please, carefully follow the instructions provided. The manufacturer / supplier is not liable for any damage to people or goods, or to the system itself, if the equipment is used differently from as described in this manual.

This manual is provided to the user / technician for correct use of the TS-600 triplex plunger pump. Information provided in this manual does not replace regulations on safety at work currently in force. Therefore, the user should comply with the regulations in the country where the pump is installed, as well as following common sense rules.

Do not use the product if you notice any defect or wear that may compromise the original safety standards. The user or the maintenance technician must report any fault to the supplier. The machine is meant for specific applications. Do not modify and /or use it for applications other than the specified ones.


Instructions, drawings, tables and all the contents of this document are confidential technical documentation and are the exclusive property of **TANONG Precision Technology Co. Ltd.** No information may be released to third parties without written permission by **TANONG Precision Technology Co. Ltd.** Descriptions and images in this document are meant as indications and practical examples. They may be modified at any time and without prior notice. If further technical and functional details are needed, please contact the manufacturer / supplier.


### IMPORTANT :

- Please, read the information contained in this manual since they will provide you with the information and instructions required for safe installation, use and maintenance.
- Keep this booklet in a safe place and make it available for future reference.
- On delivery, check for any possible damages due to transport.

### Related Symbols and Meanings :

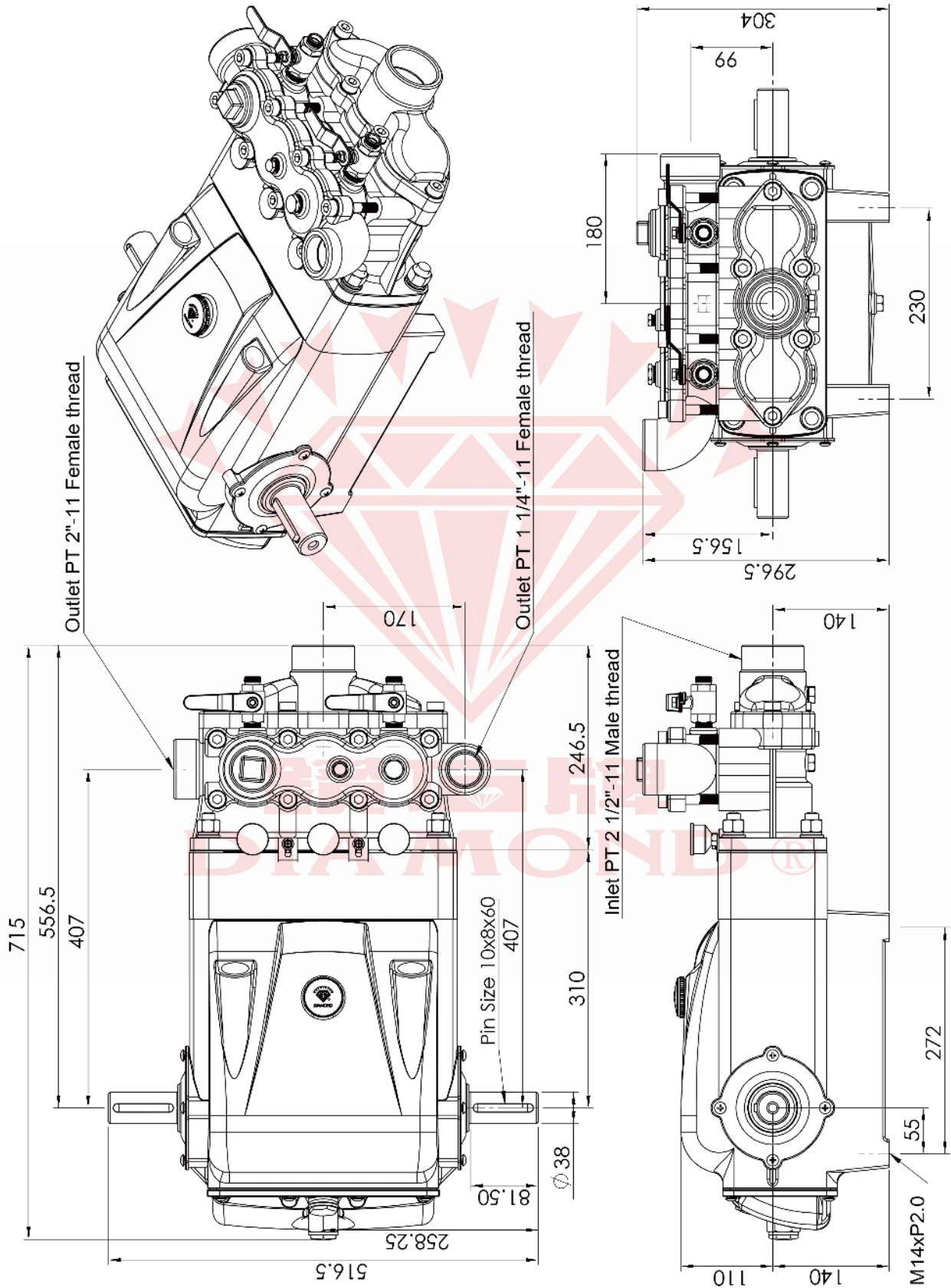
 **DANGER** It indicates that an unfair use can cause possible death or sustain serious injury.

 **WARNING** It indicates that an unfair use may highly cause possible death or sustain serious injury.

 **CAUTION** It indicates that an unfair use may highly wound the user and/or damage the product, also is possible to bring out an unpredictable event.

## 2. Specification

### 2.1 Dimension of TS-600 Triplex Plunger High Pressure Pump

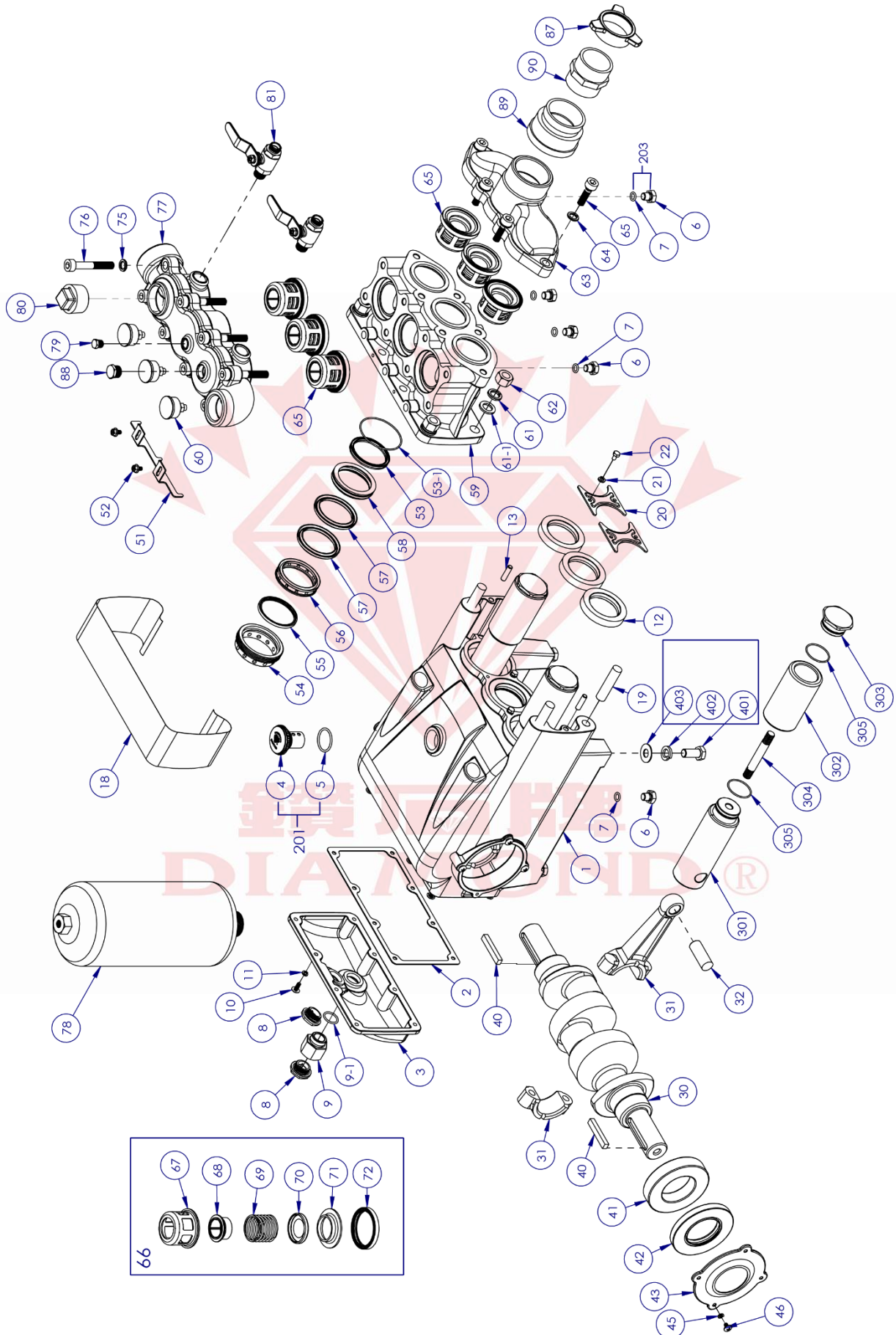


### 2.2 Specification of TS-600 Pump

Model	TS-600
Flow rate	249.5 L/min (66.9 GPM)
Max. Operating pressure	35 bar ( 507.5 psi)
Rotational speed	550 ~ 650 RPM
Power required	Irrigation: at least 15 Hp Sprayer: at least 25 Hp
Dimensions	L×W×H: 715×516.5×304 mm
Weight	36.5 kg
Inlet	2 1/2" G
Outlet	2" G
Inlet supply temp.	45 °C
Inlet pressure	0 ~ 5 bar
REMARK	<ul style="list-style-type: none"> <li>※ Strongly recommended to use outside the house on rainy days.</li> <li>※ Strongly recommended to add water pressure motor.</li> </ul>



### 2.3 Exploded Drawing



## 2.4 Part List

NO.	Parts Number	Parts Name	Quantity
1	010-3601-240	Crank case	1
2	013-2401-900	Gasket, crank case	1
3	011-2401-240	Cover, crank Case	1
4	014-2400-001	Oil Cap	1
5	120-3440-000	O-Ring	1
6	017-2401-271	Plug, Fuel Drain	5
7	120-1015-000	O-Ring	5
8	924-1000-000	Oil Gauge	2
9	059-2401-002	Joint, Oil Gauge	1
9-1	120-2227-000	O-Ring	1
10	142-0600-006	Screw	8
11	144-0104-002	Spring Wash	8
12	130-2400-000	Oil Seal, plunger	3
13	012-1300-000	Pin	2
18	016-3600-270	Plunger Cover	1
19	141-1600-002	Stud Bolt	4
20	019-1300-000	Stop Slice, Oil Seal	2
21	144-0600-002	Washer, Spring	4
22	140-0600-002	Bolt	4
30	020-6000-290	Crank Shaft	1
31	021-3600-210	Connecting Rod	3
32	023-2400-000	Plunger Pin	3
40	025-6000-000	Key	2
41	024-3600-003	Bearing	2
42	131-6000-000	Oil Seal, Crank Shaft	2
44	026-3600-001	Cover, Oil Seal	2
45	144-0104-002	Spring Wash	8
46	142-0600-002	Bolt	8
51	047-6001-000	Stopper, Grand	1
52	140-0600-006	Bolt	2
53	043-6001-000	U-Packing	3
53-1	120-7075-000	O-ring	3
54	044-6001-000	Grease Ring, Packing	3
55	041-6001-000	Grease Packing	3
56	042-6001-000	Grease Ring	3
57	043-6001-002	V-Packing	6



NO.	Parts Number	Parts Name	Quantity
58	045-6001-000	V-Packing Seat	3
59	040-6001-210	Cylinder	1
60	046-2401-000	Grease Cup	3
61	144-1600-002	Washer, Spring	4
61-1	145-1600-001	Washer, Spring	4
62	146-1600-002	Nut	4
63	030-6001-210	Suction Metal	1
64	144-1200-002	Washer, Spring	6
65	140-1200-015	Round Head Bolt, Stove	6
66	080-6000-000	Valve Ass'y	6
67	081-6000-000	Valve Box	6
68	087-6000-000	Valve Stopper	6
69	086-6000-000	Valve Spring	6
70	082-6000-000	Valve Flat	6
71	083-6000-000	Valve Seat	6
72	085-6000-000	Valve Seal	6
75	144-1200-002	Washer, Spring	8
76	140-1200-014	Round Head Bolt, Stove	8
77	050-6001-210	Discharge Metal	1
78	052-2401-250	Air Chamber (Optional)	1
79	053-2800-001	Plug	1
80	058-1300-000	Cap	1
81	051-1250-000	Cock	2
87	057-2401-210	Coupling	1
88	053-8000-000	Plug	1
89	059-6001-001	Joint	1
90	059-6001-002	Joint	1
201	923-2400-001	Oil Cap & O-Ring	1
203	925-2401-000	Plug, Fuel Drain &	1
301	022-6001-001	Plunger Head	3
302	022-6001-003/1	Bush	3
303	022-6001-004	Plunger Cap	3
304	022-6001-002	Bolt	3
305	120-3943-000	O-ring	6
401	140-1400-002	Bolt (Parts kit)	4
402	144-1400-002	Washer, Spring (Parts kit)	4
403	145-1400-002	Washer (Parts kit)	4

SPECIFICATION

**2.5 Torque for the Screw**

TS-600 TORQUE CHART			
PUMP ITEM	Spec.	Torque (kgf-cm)	Torque (N•m)
Connecting Rod	M12 x P1.75	408	40
Cover, Crankcase	M6 x P1.0	117.3	11.5
Cover, Oil seals	M6 x P1.0	117.3	11.5
Bush, Plunger (need size treatment, Loctite 577)	M14 x P2.0	652.8	64
Discharge Manifold	M12 x P1.75	652.8	64
Crank Case & Discharge Manifold	M16 x P2.0	652.8	64



### 3. Preparation before Operation

#### 3.1 Specification limit

Maximum specifications refer to individual features. When set up the TS-600 triplex plunger high pressure pump, the manufacturer does not suggest performing all maximums simultaneously. If more than one maximum is considered, check with the manufacturer or your supplier to confirm the proper performance and pump selection.

#### 3.2 Lubrication

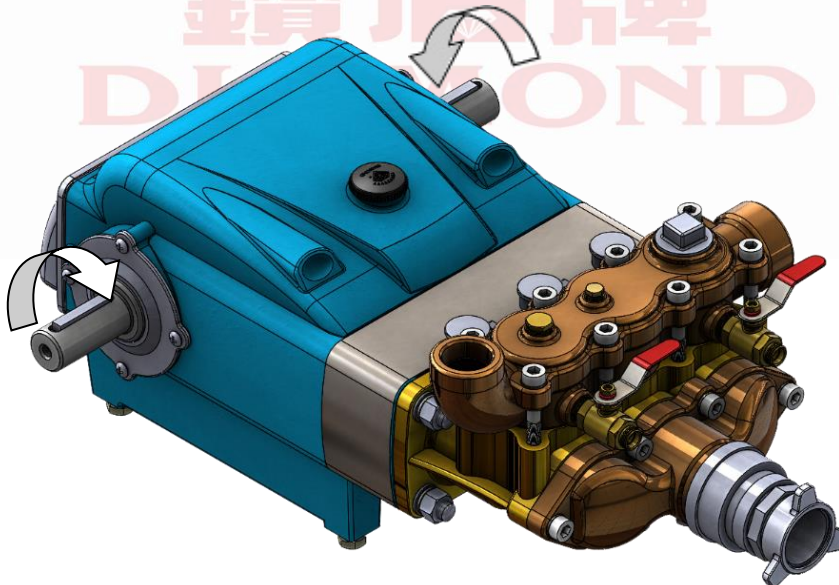
Fill crankcase with ISO VG68 gear oil 3,700 ml per pump specifications, the amount of oil added is slightly lower than the center point of the oil lens and higher than the lowest point of the oil lens.

- Suggest using ISO VG 68 or VG 100 gear oil, oil level have to reach at least SAE GEAR 80W90.

**DO NOT RUN PUMP WITHOUT OIL IN CRANKCASE.** Change initial fill after 50 hours running period. Thereafter, change oil every 300 hours intervals and fill in 3,300 ml to 3,700 ml each time. Additional lubrication may be required with increased hours of operation and temperature.

#### 3.3 Pump Rotation

The TS-600 Pump was designed for forward rotation shown as below to allow optimum lubrication of the crosshead area. When facing the pump, the pulley device is on the left and the rotation direction is clockwise rotation drive, and when the pulley device is on the right, the rotation direction is counterclockwise rotation drive.



### 3.4 Selection of the Driving Shaft

We provide left and right  $\phi 38$  solid shaft. (Please refer to 2.1 Dimensions)

Please use the correct power unit drive that conform to mentioned specification and run the pump at 550 RPM.

### 3.5 Pulley Selection

The manufacturer suggests to select V type x3 or x4 of motor pulley. The size of the pulley as much to do with the desired RPM of the pump. The following equation will help you to decide a proper size of the pulleys.

$$\frac{\text{Motor pulley O. D.}}{\text{Pump's RPM}} = \frac{\text{Pump pulley O. D.}}{\text{Motor's RPM}}$$

### 3.6 Motor Selection

The motor or engine driving the pump must be of adequate horsepower to maintain full RPM when the pump is under load. According to required pump flow rate, maximum pressure at the pump and drive losses of approximately 3- 5%, the user shall be able to select a suitable driving power source. Consult the manufacturer of gas or diesel engine for the performance curve of engine. The following equation will help you to decide the required horsepower.

$$\text{The required horsepower } H_p = \frac{\text{flow rate } \left(\frac{\text{L}}{\text{min}}\right) \times \text{operating pressure (bar)}}{450\delta}$$

- The factor of  $\delta$  stands for mechanical efficiency, normally shown as 85%.



### 3.7 Mounting

Mount the pump on a rigid, horizontal surface in a manner to permit drainage of crankcase oil. An uneven mounting surface will cause damage to the pump base.

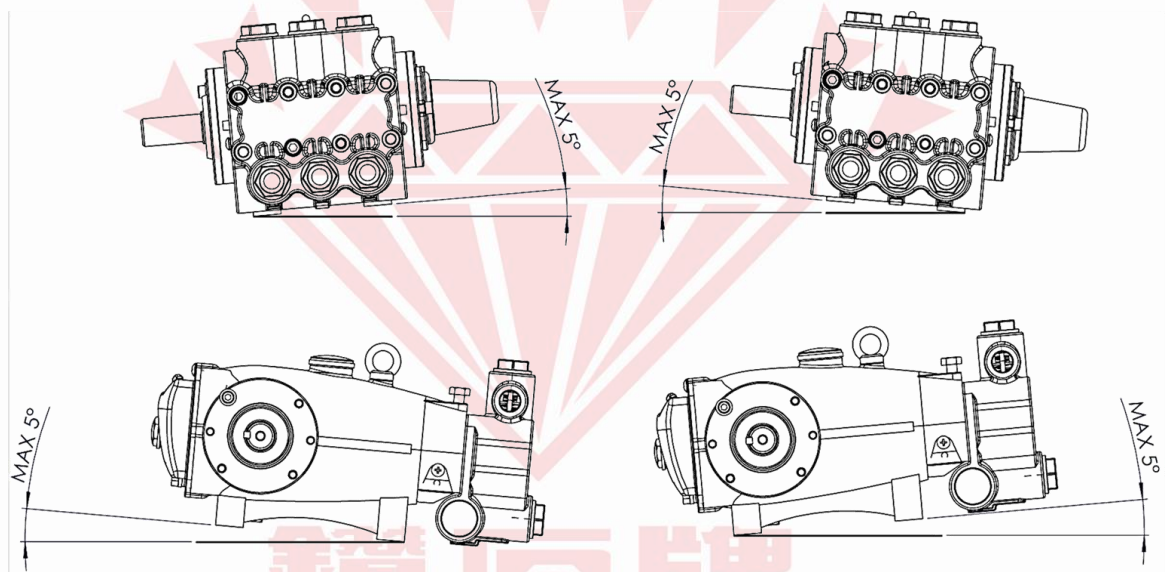
Kindly note the pump shaft and the power source shaft (electric motor or gas/diesel engine PTO shaft) should be well connected to each other.

Please use appropriate flexible hose to inlet and discharge ports.

The pump must be installed on horizontal surface with in flexible components between It and the mounting surface.

The illustration shows the maximum permitted pump installation angle beyond which proper lubrication of the crank mechanism is not ensured.

Secure the pump with screws of suitable diameter and length, fixing them through the holes provided in the pump body.



### 3.8 Location

If the pump is used in extremely dirty or humid conditions, it is recommended the pump to be equipped with a proper cover. Do not store or operate in excessively high temperature areas without proper ventilation.

### 3.9 Discharge Conditions

OPEN ALL VALVES BEFORE STARTING SYSTEM to avoid overpressure condition. The overpressure condition may be caused by a deadhead and will severely damage the pump or system. Install a Pulsation Dampener device or a regulator on the discharge head or in the discharge line as close to the head as possible. Be certain the pulsation dampener is properly pre-charged for the system pressure.

### 3.10 BY-PASS Conditions

If a large portion of the pumped liquid goes through by-pass (not through nozzles) when the high pressure pump is running, this by-passed liquid should be routed to an adequately sized, baffled tank. If routed to the pump inlet, the **by-passed liquid can quickly produce excessive heat and result in damage to the pump**. A temperature control device to shut the system down within the pump is suggested to be installed in the by-pass line to protect the pump.

### 3.11 Pumped Liquid

Some liquids may require a **flush between operations or before storing**. For pumping liquids other than water, contact TANONG or your supplier.

### 3.12 Other Conditions Needed To Pay Attention

- Make sure that the inlet and outlet ports have been connected firmly and the supply of liquid that has to be pumped is sufficient. **Insufficiency of liquid supply may damage the pump seriously.**
- **DO NOT RUN PUMP DRY.** All running components of a dry run pump will be severely damaged.
- A reliable 100(kg/cm<sup>2</sup>) Pressure Gauge should be installed near the discharge outlet of the high pressure manifold. This is extremely important for adjusting pressure regulator and also for proper sizing of the nozzle or restricting orifice.
- All systems require a primary pressure regulator or unloader. The primary pressure device must be installed on the discharge side of the pump. The function of the primary pressure regulator is to protect the pump from over pressurization, which can be caused by a plugged or closed off discharge line. Over pressurization can severely damage the pump, system components and injury users' body.
- A safety valve is strongly suggested to be installed in-line between the primary regulator and pump or on the opposite side of the manifold to ensure pressure relief of the system if the primary regulator fails.

#### **DANGER**

- **DO NOT IGNORE THE POTENTIAL RISKS OF THE HIGH PRESSURE PUMP OR IT WILL CAUSE SERIOUS INJURY TO THE HUMAN BODY.**

#### **CAUTION**

- **THE PRESSURE GAUGE SHOULD DISPLAY THE CORRECT PRESSURE OF THE PUMP. NEVER LET THE OPERATING PRESSURE OVER ITS RATED PRESSURE.**



## 4. Safety Instructions

### DANGER

- Never approach the moving parts of the pump, even if adequately protected. **Approaching the moving parts while the pump is operating may cause a serious damage on body.**
- Do not carry out the maintenance on the pump if it is running.
- Be sure the pump system is on a stable, flat location. Set the whole system with good ventilation and keep at least 1 meter away from other equipment.
- Untrained people or unauthorized workers are not allowed to run the high pressure pump system.
- Ignoring the potential hazard of a high pressure pump can cause serious injury.

### WARNING

- Before carry out maintenance, shut off drive (electric motor, gas or diesel engine) and turn off water supply to pump. Relieve all discharge line pressure by triggering gun or opening valve in discharge line.
- All parts of the pump are designed for high pressure purpose. If any part gets damaged, please replace it with the parts from original manufacturer. **DO NOT** modify the pump without being authorized by the manufacturer.
- High pressure hoses, pipes, connectors, guns, nozzles all have much to do with the safety operation of the high pressure pump system. Please contact to TANONG or your supplier for more information.

### CAUTION

- Check the oil level and oil quality before running the pump. Inadequate oil will damage those running parts inside the crankcase.
- Make sure that the inlet and outlet ports have been connected firmly and the supply of liquid that has to be pumped is sufficient. **Insufficiency of liquid supply may damage the pump seriously.**
- Do not exceed the max operating pressure, RPM and volume indicated by pumps' manual. **Over operating pressure may break the pump and hurt operators.**
- DO NOT operate the pump when the temperature is below 0°C since the remaining water may freeze. (If necessary, please make sure you add anti freezing agent and then operate the pump.)
- Do not run the pump under freezing point (for water is below 0°C). Running pump with frozen liquid in the hose or pump will cause damage to the pump. Run the pump dry approximately 10 seconds to drain the water before storing under freezing temperature.
- Check the oil quality and whether all the hoses and connectors are all firmly fixed before operation.
- The line connect to the inlet and outlet port of the pump must be a flexible hose instead of a rigid pipe, and reinforced on suction systems to avoid fail of water supply.

## 5. Trouble Shooting

PROBLEM	PROBABLE CAUSE	SOLUTION
Low Pressure	<ul style="list-style-type: none"> <li>• Worn nozzle.</li> <li>• Air leak in inlet plumbing.</li> <li>• Pressure gauge inoperative or no registering accurately.</li> <li>• Unloader stuck partially plugged or improperly adjusted.</li> <li>• Worn seat or valves.</li> <li>• Inlet filter clogged or improperly sized.</li> <li>• Worn seals. Abrasives in pumped fluid.</li> <li>• Severe cavitation, inadequate water supply, stressful inlet conditions.</li> <li>• Fouled or dirty inlet or discharge valves.</li> <li>• Leaky discharge hose.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace nozzle of proper size.</li> <li>• Use PTFE liquid or tape on all connections.</li> <li>• Check pressure with new gauge and replace as needed.</li> <li>• Clean and reset relief valve to system pressure and correct by-pass. Service valve on seal replacement schedule.</li> <li>• Replace the valve kit. Use covered reservoir, do not pump abrasive fluids.</li> <li>• Initiate a more frequent service cycle. Check supply tank for contamination.</li> <li>• Replace the Seal Kit. Install and maintain proper filter.</li> <li>• Check line size, use reinforced flexible hose at pump inlet and eliminate elbows.</li> <li>• Increase line size. Clean filter. Check water temperature.</li> <li>• Clean inlet and discharge valves and replace with kit as needed</li> <li>• Replace hose. Check connections.</li> </ul>
Pulsation, pump runs extremely rough, pressure low	<ul style="list-style-type: none"> <li>• Restricted inlet or air entering inlet plumbing.</li> <li>• Stuck inlet or discharge valve.</li> <li>• Worn Hi-Pressure Seals.</li> <li>• Foreign particles in the inlet or discharge valve.</li> <li>• Worn or pitted inlet and/or discharge valves.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean filters as needed. Check fittings and use PTFE liquid or tape for airtight connection. Check line size and flow to pump.</li> <li>• Clean or replace Valve Kit. Check supply tank for contamination.</li> <li>• Replace with Seal Kit. Initiate more frequent service cycle</li> <li>• Check for smooth surfaces on inlet and discharge valve seats. Replace with kit.</li> <li>• Check supply tank for contamination.</li> <li>• Install and regularly clean filter.</li> <li>• Do not pump abrasive fluids.</li> </ul>

PROBLEM	PROBABLE CAUSE	SOLUTION
Water in crankcase	<ul style="list-style-type: none"> <li>• Humid air condensing into water inside of the crankcase.</li> <li>• Continued operation with worn seals and packings.</li> <li>• Crankcase oil seals leaking or seals installed backward.</li> </ul>	<ul style="list-style-type: none"> <li>• Change oil every 3 months or 500 hours intervals.</li> <li>• Initiate more frequent service cycle. Change oil.</li> <li>• Replace seals. Follow proper installation procedure.</li> </ul>
Water leakage under the manifold	<ul style="list-style-type: none"> <li>• Worn High and Low-Pressure Seals.</li> <li>• Worn adapter.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace with Seal Kit.</li> <li>• Check inlet pressure and temperature.</li> <li>• Examine adapter when servicing Seals and replace as needed.</li> <li>• Initiate more frequent service cycle.</li> </ul>
Frequent or premature failure of seals and packings	<ul style="list-style-type: none"> <li>• Excessive heat from prolonged by-pass.</li> <li>• Abrasive in fluid.</li> <li>• Scored plungers.</li> <li>• Excessive inlet pressure.</li> <li>• Running pump dry.</li> </ul>	<ul style="list-style-type: none"> <li>• Install Thermo Valve.</li> <li>• Replace seals with kit.</li> <li>• Install inlet filter.</li> <li>• Replace plungers. Review fluid specifications.</li> <li>• Install pressure reducing valve.</li> <li>• Check inlet fluid supply line for adequate size. Clean filters.</li> </ul>
Oil leak between crankcase and pumping section	<ul style="list-style-type: none"> <li>• Worn crankcase oil seals.</li> </ul>	<ul style="list-style-type: none"> <li>• Check and replace crankcase oil seals when doing seal servicing.</li> </ul>
Oil leaking around crankshaft	<ul style="list-style-type: none"> <li>• Worn crankshaft oil seal.</li> <li>• Bad bearing.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace damaged oil seals.</li> <li>• Replace bearing.</li> </ul>
Excessive play in the end of the crankshaft	<ul style="list-style-type: none"> <li>• Worn bearing.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace bearing.</li> </ul>
Loud knocking noise from pump	<ul style="list-style-type: none"> <li>• Worn bearing, connecting rod or crankshaft.</li> <li>• Stressful inlet conditions.</li> </ul>	<ul style="list-style-type: none"> <li>• Consult TANONG or your supplier for crankcase servicing.</li> <li>• Increase line size, use flexible hose to pump inlet, install properly sized baffled supply tank.</li> </ul>

## 6. Periodic Inspection & Maintenance

### 6.1 Periodic Inspection Checking List

Check	Daily	Weekly	Every 50 hr	Every 300 hr	Every 1500 hr	Every 3000 hr
Oil level/quality	●					
Oil leaks	●					
Water leaks	●					
Crank Shaft Driving Section		●				
Initial oil change			●			
Oil change				●		
Seals change					●	
Valve change						●
Plunger bush / connecting rod						●
Clean filter	●					

- If system performance decreases, check immediately. If no wear after 1500hr operating, check again at every 500hr until wear is observed.
- Check unloader and oil at each seal service.
- After maintenance is completed, turn on water supply to pump, start drive, reset pressure regulating device and secondary valve. Check for any leaks, vibration or pressure fluctuations and resume operation.
- The manufacturer offers a maintenance kit for all kind of seals. Contact with the supplier if necessary.

## 7. The time to change oil and attention

Issue	Reason	Method
<p>The effect of oil selection, time of change and working environment on machine.</p>	<ul style="list-style-type: none"> <li>For changing the oil, it should follow the regulation of using hrs. Or regular interval. Overdue or expired will cause components damage because of lack of lubricity.</li> </ul>	<ul style="list-style-type: none"> <li><b>Change oil regularly or whichever occurs first. (see table 1)</b></li> </ul>
	<ul style="list-style-type: none"> <li>1. Using improper or inferior quality oil (e.g. recycle oil) cannot achieve proper lubricant function and components protection.</li> <li>2. If used oil is not drained completely whenever changing oil, the left impurities of used oil will be dissolved in new oil. That will accelerate the oil deterioration.</li> <li>3. Please do not mix up with different group oil because their chemical composition and additives are different. Mixed oil could cause deterioration.</li> <li>4. Please avoid using PAG oil.               <ul style="list-style-type: none"> <li>a. Most common rubber and plastics are closed to polarity that will be affected by PAG, led to swell or shrinkage.</li> <li>b. The paint will be eroded and then peeled off by PAG oil.</li> <li>c. Light metals (e.g. Aluminum alloy) will be eroded or cracked by PAG under the effect of stress.</li> <li>d. PAG oil is hydrophilic; thus, water cannot be filtered out by filtering system.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><b>1.1 Please choose good quality oil sold from us or other qualified brands. Please avoid using inferior oil such as recycled oil.</b></li> <li><b>2.1 Whenever the time of changing oil, please ensure the used one is as drained as possible for the quality of new oil.</b></li> <li><b>3.1 For replacing oil with different group oil, the used one needs to be drained completely and then washing the oil tank with replaced oil before refill it.</b></li> <li><b>4.1 Please avoid using PAG oil.</b></li> </ul>

The time to change oil & attention

Issue	Reason	Method
	<ol style="list-style-type: none"> <li>1. The interval between the highest and the lowest temperature will directly affect the liquidity and lubricity of oil.</li> <li>2. Under wretched work environment (e.g. heat, stuffy, directly exposed under sunlight or rain, dusty, high humidity, bad air quality), the selection of oil and time of changing oil will directly affect the maintenance and lubricity of the machine.</li> </ol>	<ul style="list-style-type: none"> <li>• <b>1.1 Please select the oil with adequate viscosity according to workplace environment in order to have best lubricity and protection. (see table 2)</b></li> <li>• <b>2.1 The time of changing oil is based on regular operation. Operator should consider the affection of workplace, temperature and humidity for increasing or decreasing the interval of changing oil, and should also shorten the interval, depending on the condition of the liquidity, impurity, odor and deterioration.</b></li> </ul>
<p>The effect of oil selection, time of change and work environment on machine.</p>	<ol style="list-style-type: none"> <li>1. If the operator uses the machine under constant overpressure, it will lead to losing of oil lubricity rapidly.</li> <li>2. If the machine is left unused for long time or only used rarely. It will lead to oil deterioration by oxidation, or even cause internal components rusted.</li> </ol>	<ul style="list-style-type: none"> <li>• <b>1.1 If operational condition is strict such as operation in constant overpressure, then the interval of changing oil should be shortened.</b></li> <li>✳ <b>The performance of machine is limited. Overpressure operation will lead to component damage and then reduce life of machine. Please follow the instructions of pressure specification for the sake of long- term use.</b></li> <li>• <b>2.1 Please change the oil regularly when the machine remains unused for long time.</b></li> <li>• <b>2.2 If the machine needs to be used after long-term unused status, please check the internal components and also change oil.</b></li> <li>• <b>2.3 If the components are rusty, please do not use it and return it to the manufacturer.</b></li> </ul>



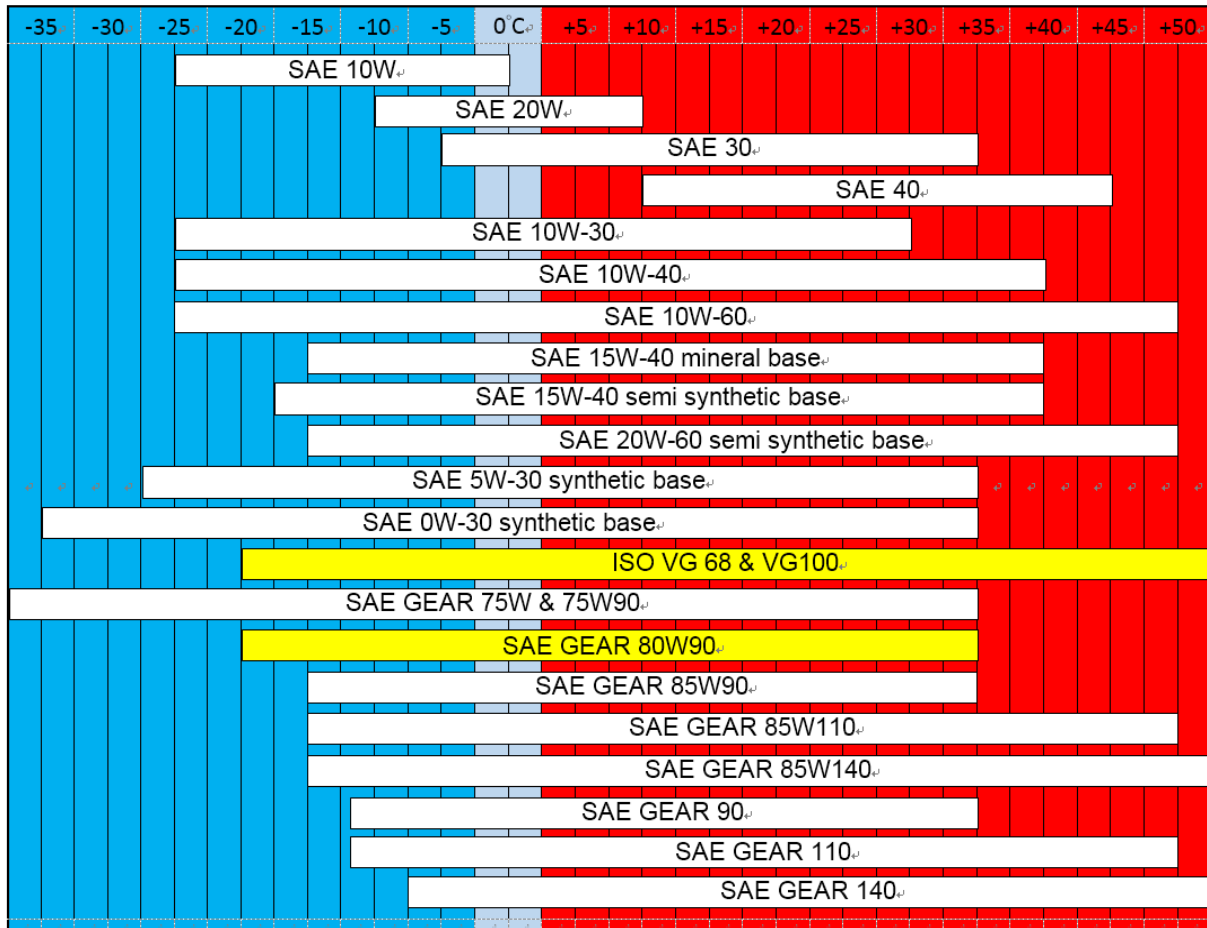
**Table 1: Oil Changing Interval (hours or months)**

Oil Type Interval Frequency	Above ISO VG68 Mineral base	Above ISO VG68 Semi synthetic base	Above ISO VG68 synthetic base	Remarks
First time use	50 hrs. or 1 month	50 hrs. or 1 month	50 hrs. or 1 month	<ul style="list-style-type: none"> <li>• First time use is for component running in period result in scraps. It is important to change oil.</li> </ul>
Monthly average 8 hrs. /days above	500 hrs. or 2 months	600 hrs. or 2.5 months	700 hrs. or 3 months	<ul style="list-style-type: none"> <li>• For reference only. The affection of workplace and environmental elements also should be considered.</li> </ul>
Monthly average 2 hrs. /days above	300 hrs. or 1.5 months	400 hrs. or 2 months	500 hrs. or 2.5 months	<ul style="list-style-type: none"> <li>• For reference only. The affection of workplace and environmental elements also should be considered.</li> </ul>
Monthly average 8 hrs. /days below or only use occasionally	100 hrs. or 1 month	200 hrs. or 1.5 months	300 hrs. or 2 months	<ul style="list-style-type: none"> <li>• For reference only. The affection of workplace and environmental elements should be considered.</li> </ul>
Left unused for long time.	Once every 2 months	Once every 3 months	Once every 4 months	<ul style="list-style-type: none"> <li>• If the machine is left unused for long time. It will lead to oil deterioration by oxidation, or even causes internal components rusted.</li> <li>• If the machine needs to be used after long-term unused status, please check the internal components and change the oil. If the internal components are rusty, please do not use it and then return to the manufacturer.</li> </ul>

The time to change oil & attention

**Table 2 : 【Oil selection】**

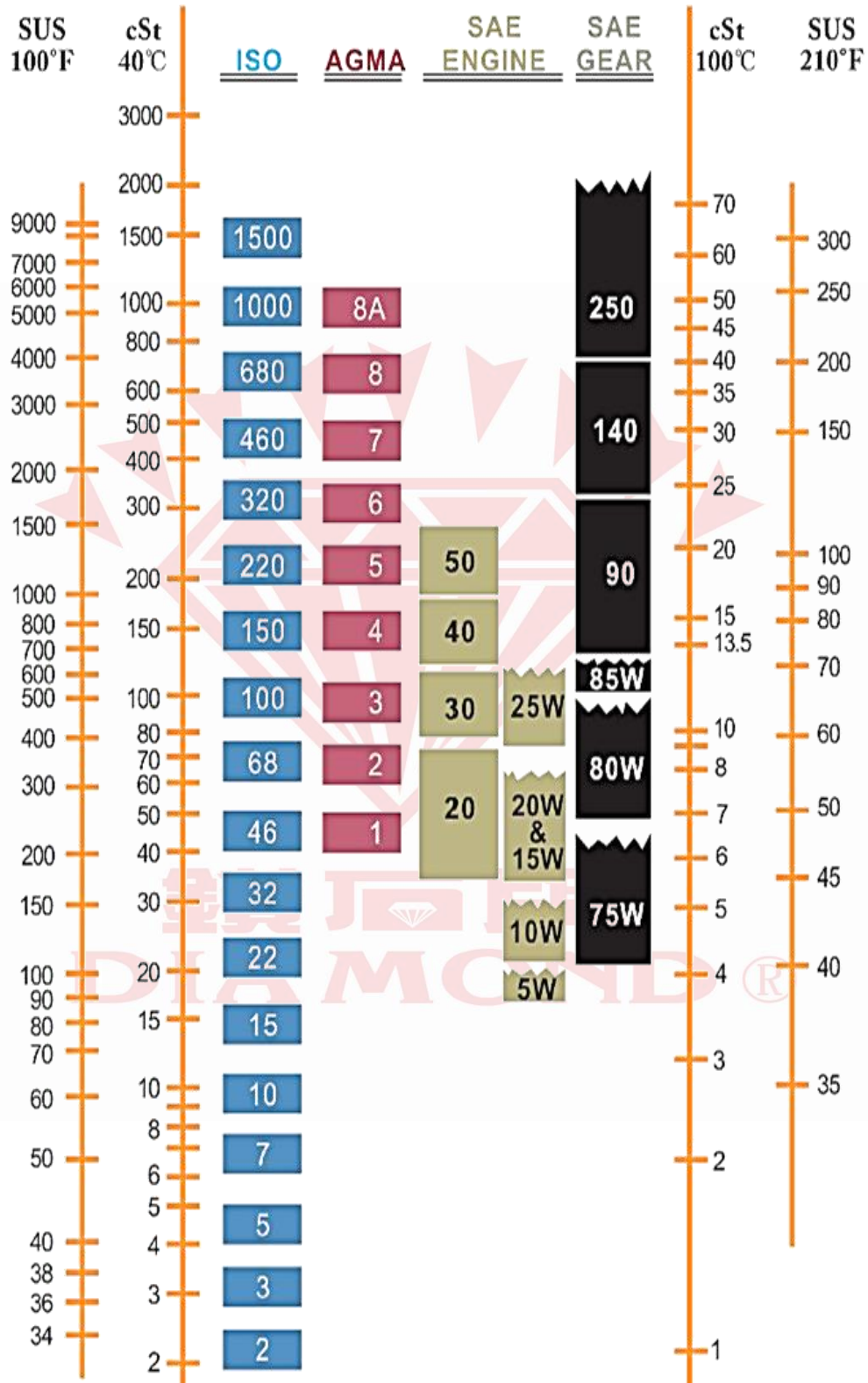
Please select the oil with adequate viscosity according to workplace environment in order to have best lubricity and protection.



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The time to change oil & attention

## Viscosity Classification Equivalents

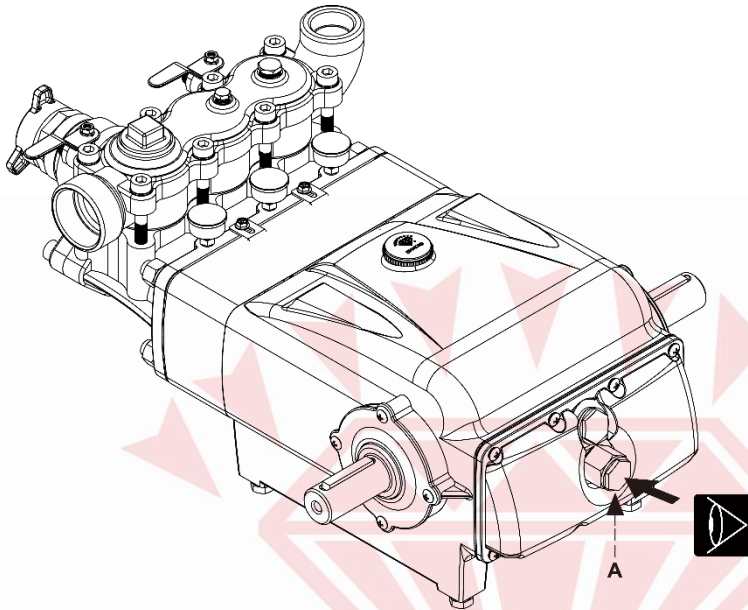


The time to change oil & attention

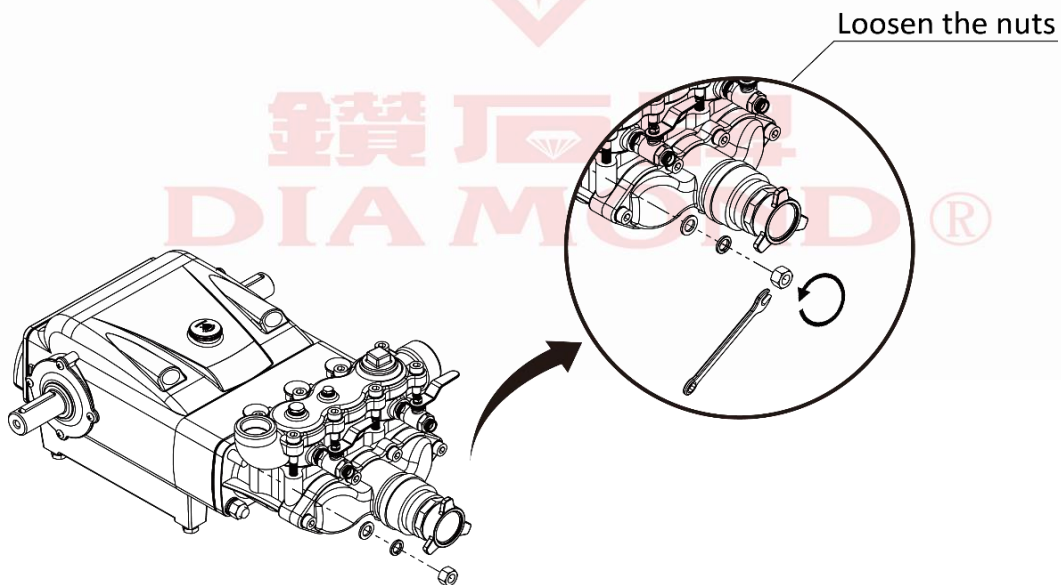
## 8. Maintenance for the Pump

### 8.1 Maintenance of Crank Case Section

- Take pump accessories and piping apart before maintenance.
- Check if there's water mix with oil through the Oil Gauge.



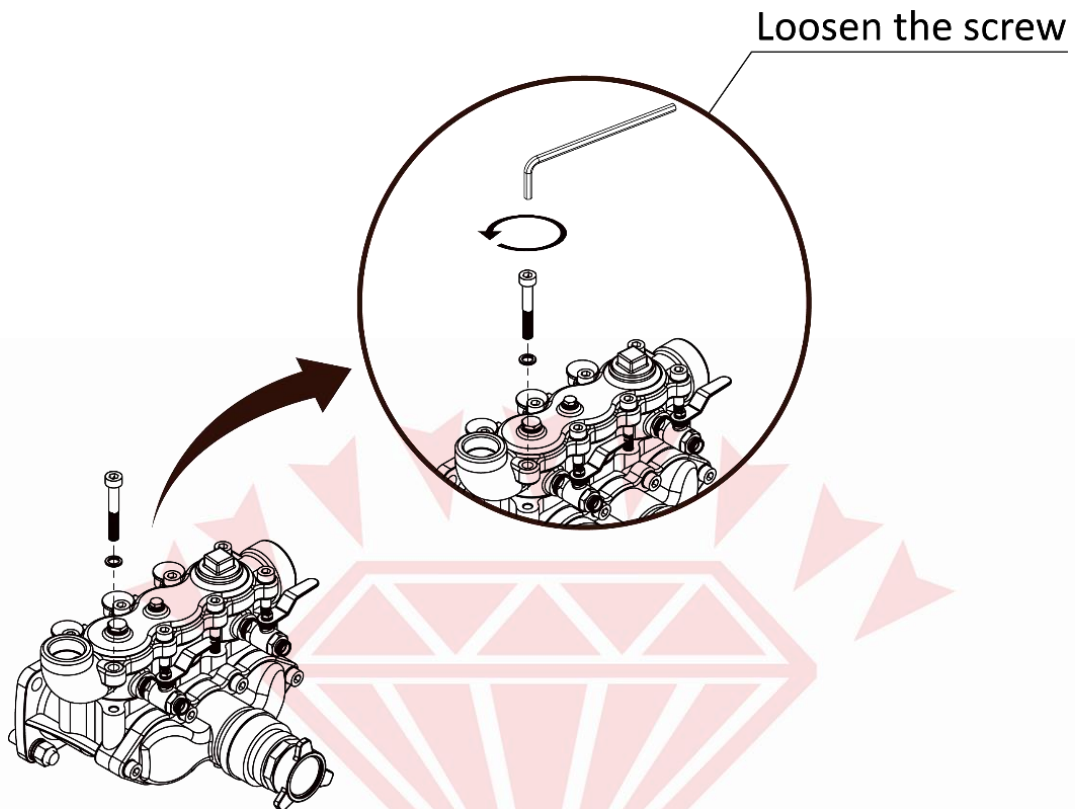
- Examine crankshaft oil seal externally for drying, cracking or leaking.
- Use a wrench to loosen the nuts and take the cylinder and pump apart.



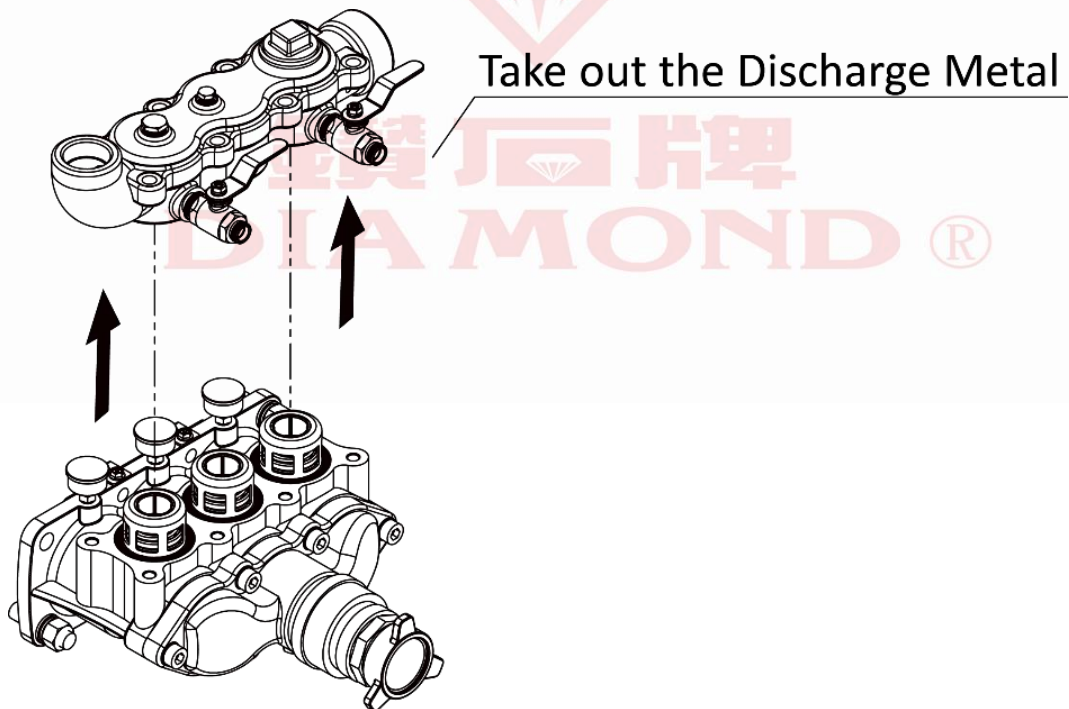
- When the cylinder and the Crank case are taken apart, check the oil seal of the plunger to see if there is any damage on it.
- Rotate crankshaft by hand to check for smooth bearing movement.
- Consult the manufacturer or your local distributor if crankcase service is needed.

## 8.2 Maintenance of Valves

- a. Loosen the bolts between the Discharge Metal and cylinder with a 10mm hex key.

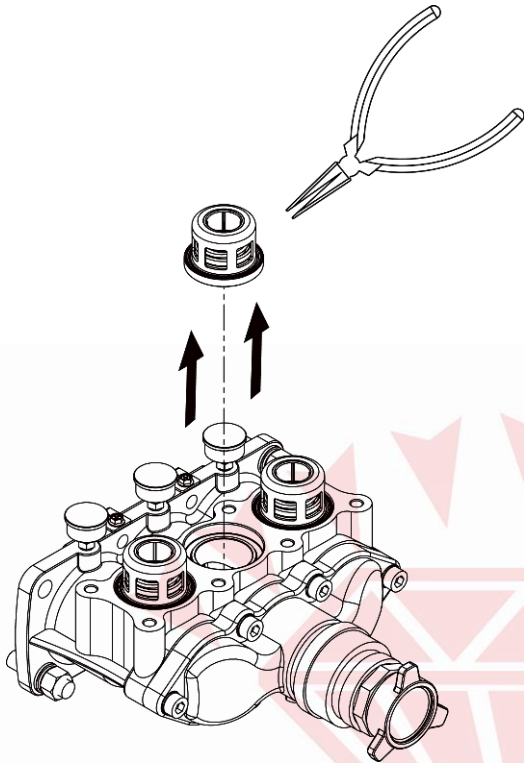


- b. Take out the Discharge Metal.



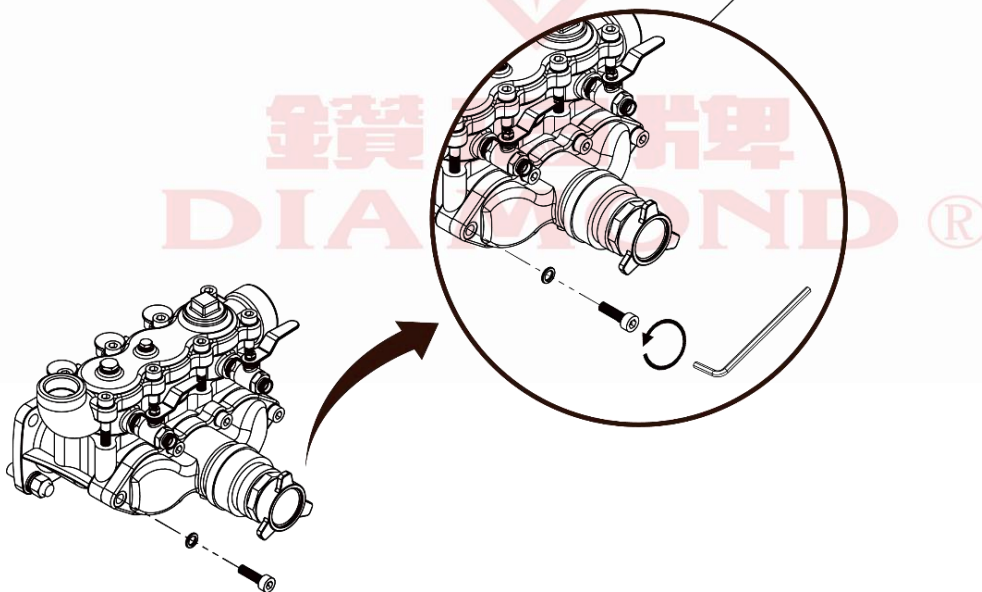


- c. Take out the valve ass'y from the cylinder or manifold with pliers or a flathead screwdriver. Usually the valve ass'y will be taken out as a set.



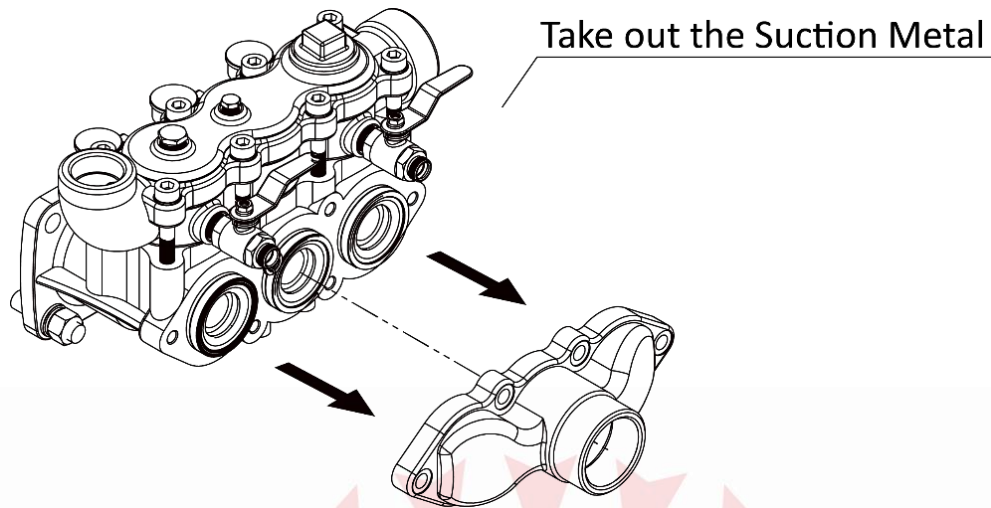
- d. Loosen the bolts between the Suction Metal and cylinder with a 10mm hex key.

Loosen the screws

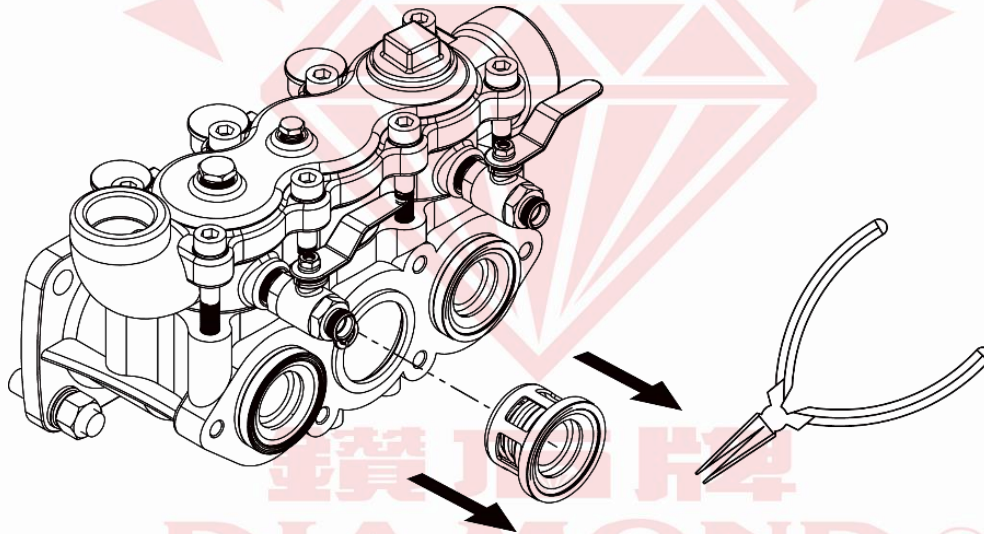




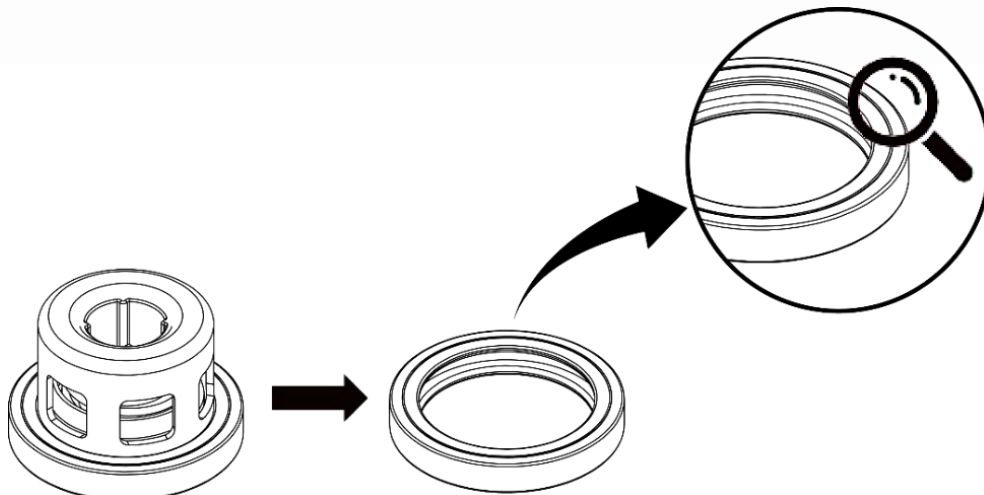
e. Take out the Suction Metal.



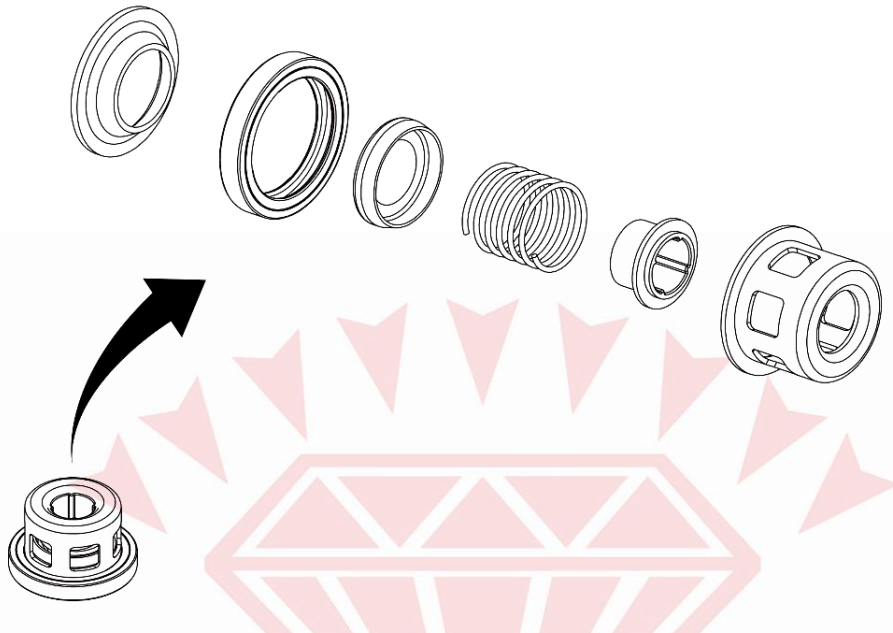
f. Take out the valve ass'y from the cylinder or manifold with pliers or a flathead screwdriver. Usually the valve ass'y will be taken out as a set



g. Check if there is break or deformation in the valve seals. If so, replace the worn or broken valve seals with the new ones.



- h. Take out valve ass'y and please note do not damage the inner side of the valve chamber.
- i. Check if there is any damage or wear out on the valve parts. Replace the damaged valves with the ones in the repair kit when necessary.
- j. Valve Set includes valve box, spring, valve flat, valve seat, valve stopper and valve seal.

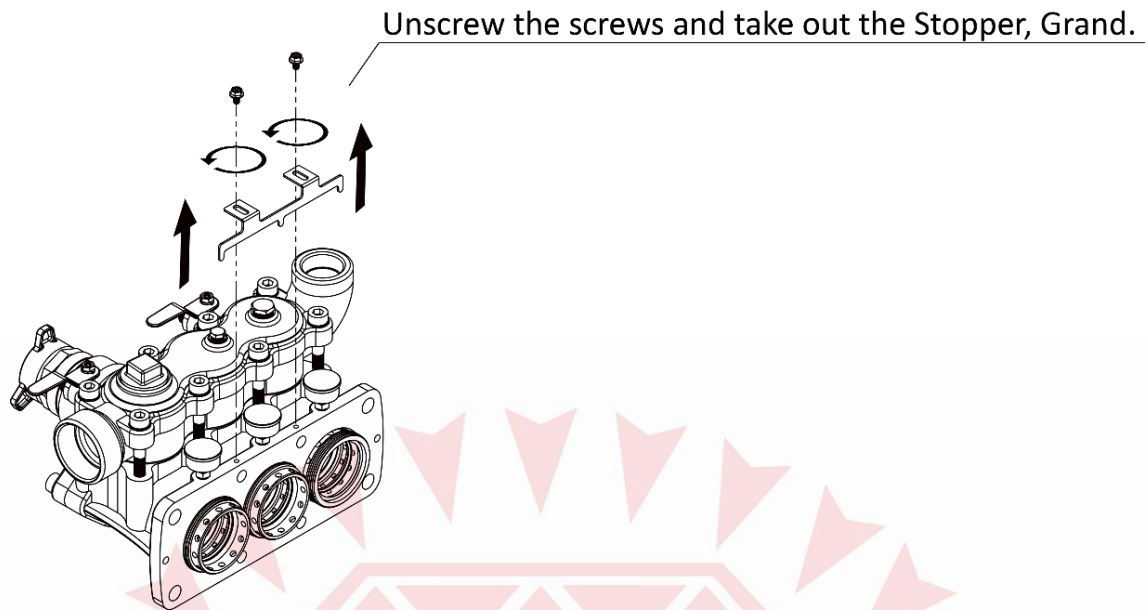


**⚠ CAUTION**

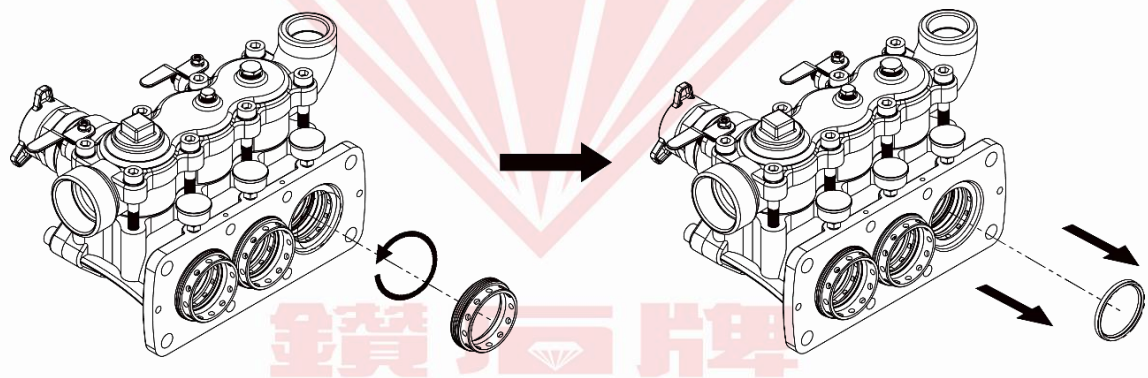
- Inlet and Discharge Valve Assemblies are interchangeable.
  - Complete changing procedure for the valves is that the large valves and small valves need to be changed at the same time.
- k. Put new valves into the cylinder. Please note the install direction should be the same as shown on the exploded drawing.
  - l. Please make sure the valves are well fixed in the chamber of the cylinder.

### 8.3 Maintenance of Water Ring

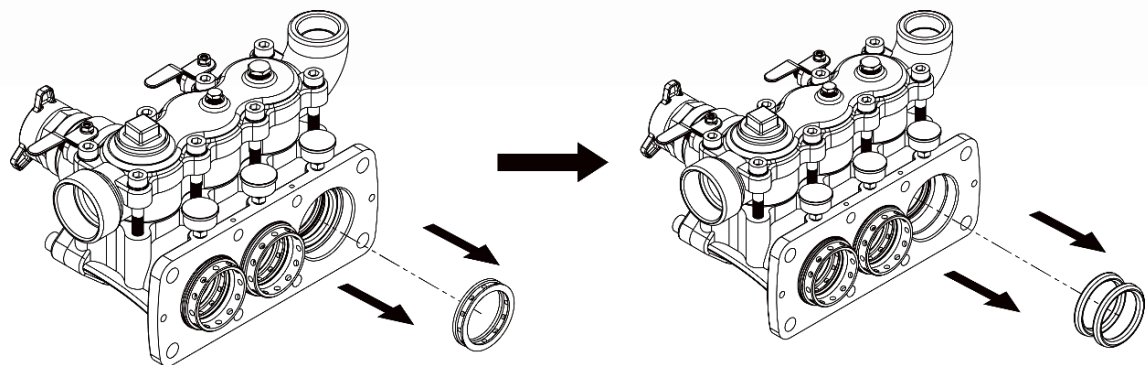
- a. Unscrew the screws and take out the Stopper, Grand.



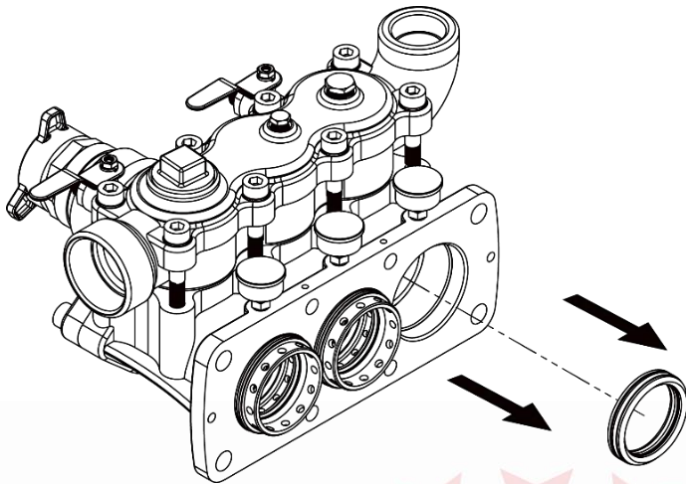
- b. Unscrew the Oil Ring, Packing, then take out the Grease Packing.



- c. After taking out the Grease Packing, the Grease Ring can be pulled out directly. If not, use a puller to take it out. Then take out 2 pieces of the V-Packing.



d. Take out the V-Packing Seat.



e. Check the U packing and O-ring for the large water seal ring to see if there is any damage or break in the spring. Change the U packing and O-ring or the complete set if necessary.

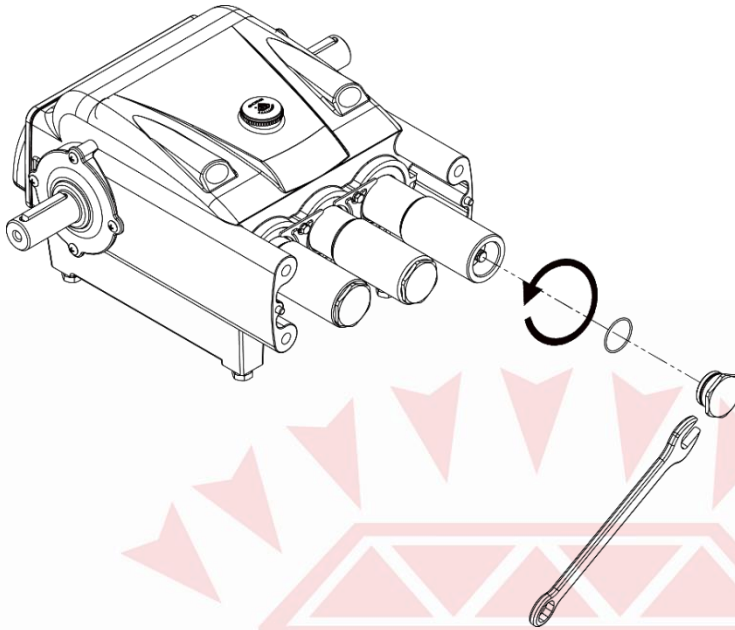


**⚠ CAUTION**

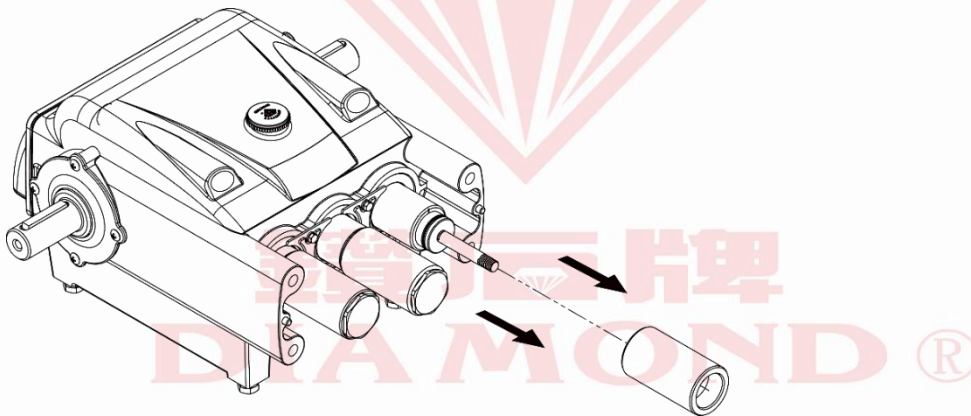
- Do not run the pump when the water seals and O-rings are already worn out.

## 8.4 Maintenance of Plunger Bush

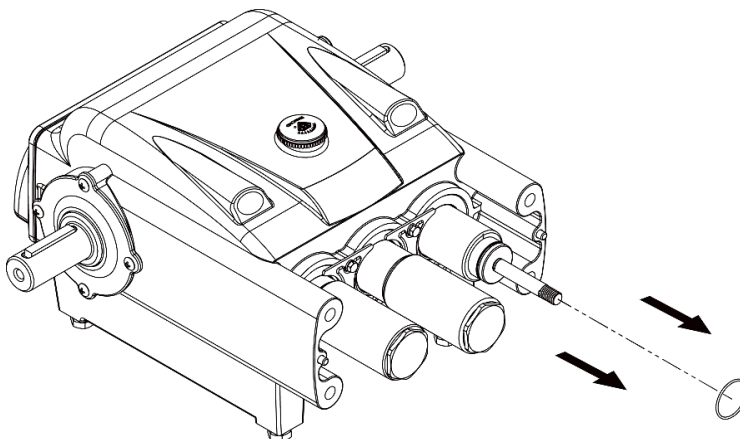
- a. Use a wrench to loosen the Plunger cap and take out the Plunger bush, then replace the O-ring on the Plunger cap.



- b. Pull out the plunger bush and check if there is apparent wear on it. Replace new plunger bush when necessary.



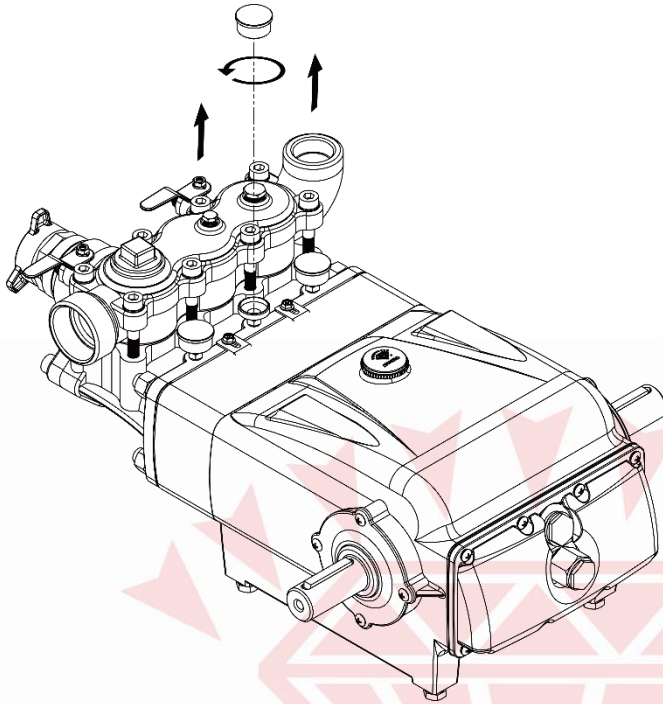
- c. After pull out the plunger bush, the O-ring can be pulled out directly. If not, use a puller to take it out. Then replace it.



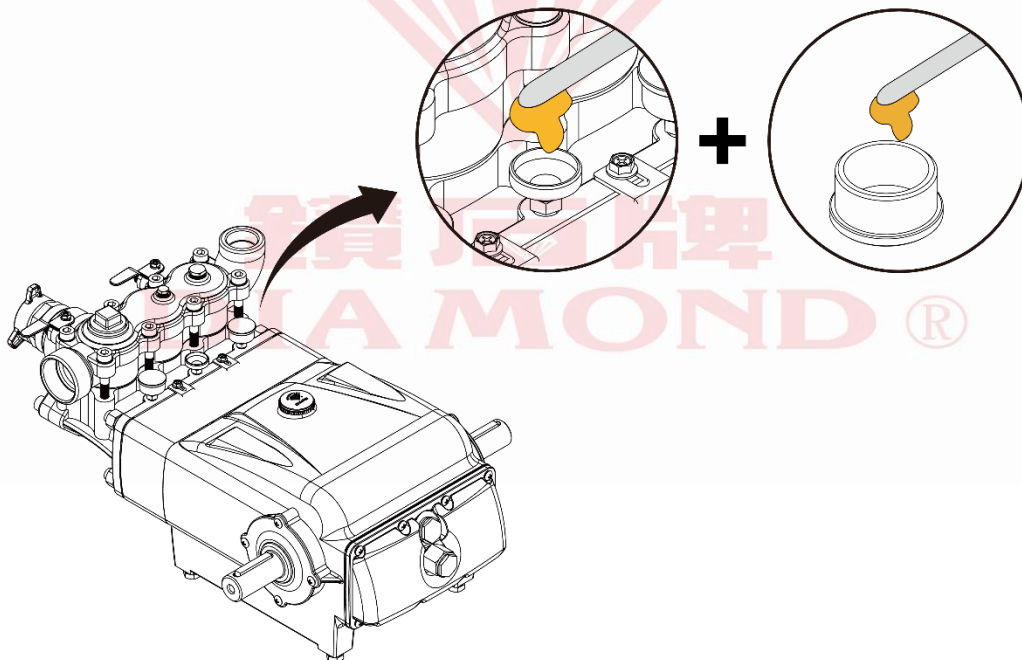


## 8.5 Maintenance of Grease cup

- a. Unscrew the grease cup.



- b. Dig the right amount of grease and fill it into the grease cup.



- c. Screw the grease cup back.



## 9. Warranty

These TS-600 triplex plunger high pressure pumps are warranted for one full year from date of shipment to the purchaser to be free from any defect in materials and workmanship. This warranty does not cover damages from abuse, failure to properly install, operate or maintain the product in accordance with the printed materials provided.

### Listed below is void of the warranty :

- ❖ Any modifications or interventions which are not authorized by the manufacturer.
- ❖ Use contrary to specific normative in force.
- ❖ Use of pump different from those indicated in this manual and/or lack of regular maintenance.
- ❖ Result from the malfunction or improper use of customer due to force majeure caused by the incident.
- ❖ Any parts or labor to repair or adjust any system that the customer has installed themselves or by a third party other than an authorized installer.
- ❖ Use of non-original or not specified parts for the pump.
- ❖ The damages caused by natural disasters, faulty usages or consumable purposes.
- ❖ Seal, bearing, valve, connecting rod kits for pumps.
- ❖ Pump crankcase oil or other lubricants.
- ❖ Manufacturer shall not be liable for any further loss, damages or expenses, including incidental or consequential damages, directly or indirectly arising from the sale or use of this product.
- ❖ This warranty does not cover repair or replacement of any item that should be replaced or maintained under normal operating and maintenance practices within the stated warranty period of one year.

➤ All products subject to the warranty shall be returned TANONG via local distributor. ◀



## Quality Assurance Certificate

Name : **Agricultural Plunger Pump**

Model : **TS-600**

Serial Number :

Date of purchase :                      Date                      Month                      Year

1. This product is made through strict quality management and inspection process.
2. When there is an abnormality in this product, free after-sales service can be obtained within 1 year after installation.
3. Even if the quality guarantee period is not exceeded, the following items will still be charged for the service (repair fee + parts fee + travel fee, etc.)
  - ◆ Failure caused by improper maintenance and repair.
  - ◆ Natural disasters (fire, flood and others).
  - ◆ Failure or damage caused by falling, etc. after installation.
  - ◆ The life of the part itself is exhausted (filter, etc.)
  - ◆ Unspecified matters, as stated in the warranty terms.
4. This warranty must be presented when repairs are required.

### Service Application

1. Before contacting, please reconfirm the usage method in the instruction manual and the inspection items at the time of failure.
2. If the abnormality still exists after confirmation, please stop using it and consult the sales office or the company.



Qualification chapter : \_\_\_\_\_

Quality assurance supervisor : \_\_\_\_\_



Note:



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