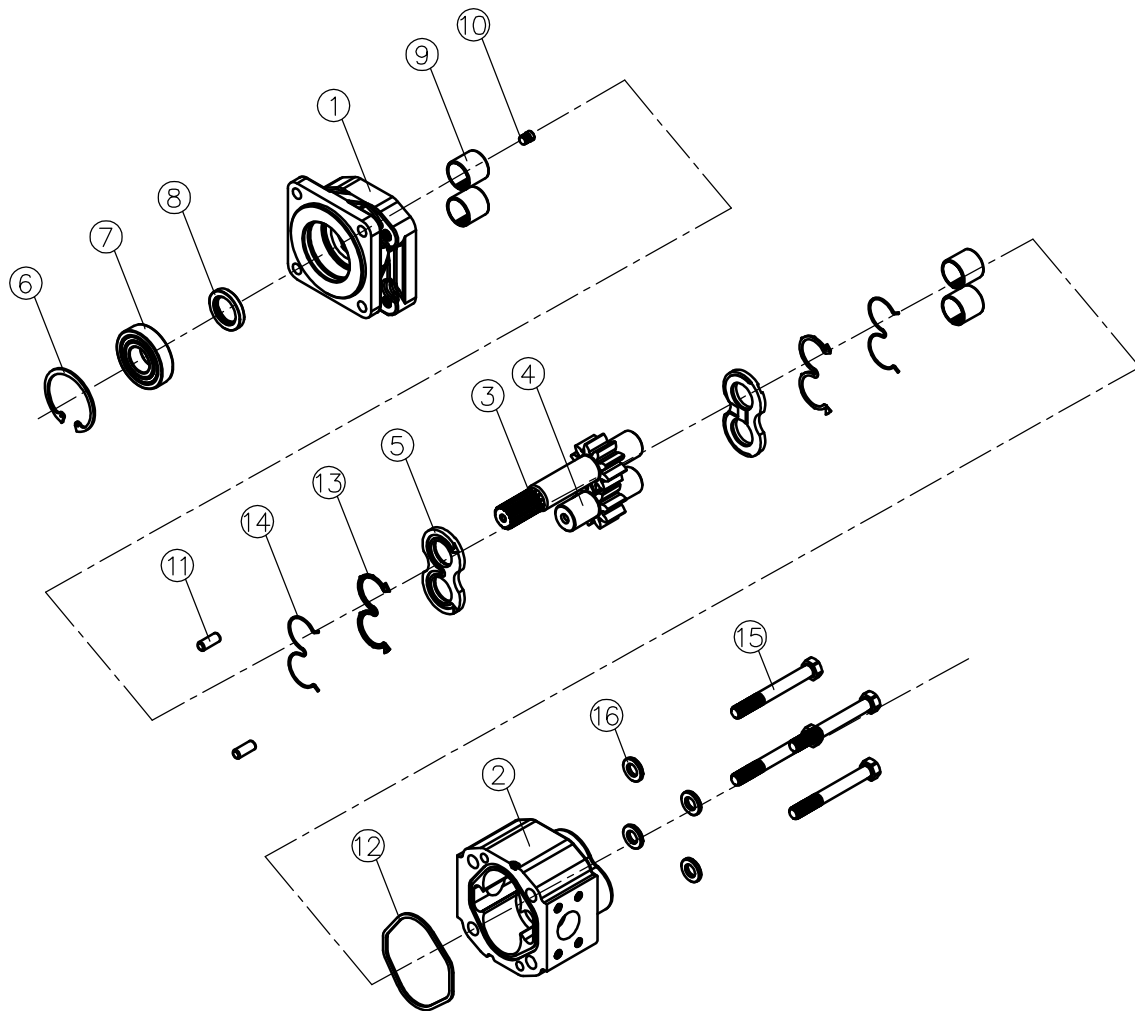


GROUP 2 STRUCTURE AND FUNCTION

1. MAIN PUMP

1) STRUCTURE



- 1 Front cover
- 2 Pump body
- 3 Drive gear
- 4 Driven gear
- 5 Side plate
- 6 Spring ring

- 7 Bearing
- 8 Seal
- 9 Bearing seal
- 10 Blocking screw
- 11 Pin
- 12 O-ring

- 13 E-ring
- 14 E-retain ring
- 15 Bolt
- 16 Washer

2) Mounting requirement and note in use

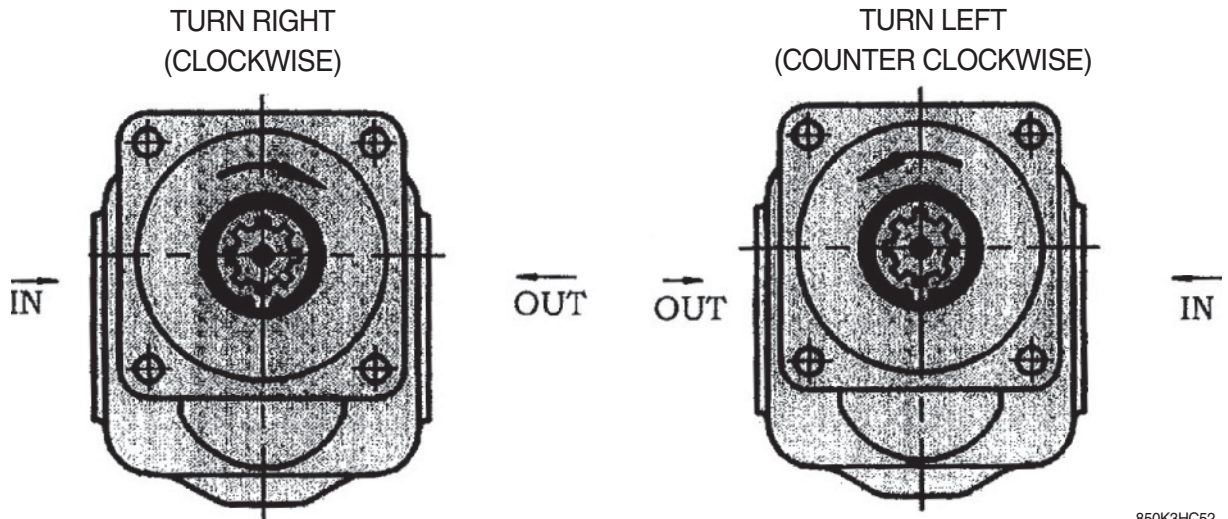
- (1) For transmissions of gear pump, the manner that may produce radial or axial force to pump (such as direct geared and pulley transmission) are not permitted. Requirements for concentricity: no more than 0.05mm for shaft bushing type, no more than 0.1mm for coupling type, for universal coupling, shaft angle deviation from drive shaft shouldn't exceed 1 degree.
- (2) Before mounting the gear pump, check its normal rotating direction be suiting the system. Push the gear into the pump body slightly. Knocking or compacting by screws are not permitted.
- (3) Sufficient oil is required. The entry of gear pump should be assembled securely and sealing be reliable. Proper section area of suction pipe is required. To keep the vacuum degree under 0.02 Mpa, suction port shouldn't be 0.5m higher than the oil level.
- (4) Check the oil frequently. No impurities from machine and corrosive substance should be in the oil.
- (5) Control the equipment under high system pressure or overload condition. Keep the pressure of gear pump below the rated pressure 21 Mpa.
- (6) If the oil temperature is low, please start the pump at a low speed until the temperature exceed normal.
- (7) Sudden acceleration is not permitted. Acceleration should be smooth.

3) Troubleshooting

Problems	Cause
Shaft fracture	<ul style="list-style-type: none"> ① Incorrect assembly of shaft and connections which produces radial force. ② Connections are not coaxial with shaft or too big clearance. (more than 0.05 mm) between mounting hole and connect plate. ③ Overload, sudden increasing of pressure, clogged pipe or invalid relief valve produced large deformation which result in severe touch between shaft and body. ④ Mismatching between path area of discharging pipe or other components and flow quantity of pump. ⑤ Fatigue or poor quality of shaft.
Body fracture	<ul style="list-style-type: none"> ① Overload, sudden increasing of pressure, clogged pipe or invalid relief valve produced large deformation which result in severe touch between shaft and body. ② Mismatching between path area of discharging pipe or other components and flow quantity of pump. ③ No safety protecting device is applied. ④ If the straight cracks are not lacerated, poor quality lead to the fracture.
Leakage form shaft end	<ul style="list-style-type: none"> ① Incorrect assembly of shaft and connections which produces radial force. ② Connections are not coaxial with shaft or too big clearance. (more than 0.05 mm) between mounting hole and connect plate. ③ Great negative pressure in the system result in invalid sealing. ④ Clogged air breather produces negative pressure in tank. ⑤ Assembled with reversed direction of rotating.
Leakage form pump body	<ul style="list-style-type: none"> ① Bolts to fasten pump body become loose or they are stretched due to the long-time over pressure working. ② High temperature damage the seals. ③ Poor quality in pump assembling.
Leakage form ports	<ul style="list-style-type: none"> ① Bolts become loose or screws mismatched. ② Interface surfaces are not parallel. Damage in the surfaces. ③ Unreliable sealing or small deflection of seals.
Noise and vibration	<ul style="list-style-type: none"> ① Wrong connection between transmission parts ② Insufficient oil in tank. Polluted oil. High viscosity of oil. ③ Air in the system. ④ Small path area or low strength or poor resistance of pressure of suction pipe. ⑤ Unreliable sealing of suction pipe.
No reactions or slow reactions	<ul style="list-style-type: none"> ① No power outputs. ② No hydraulic oil or insufficient oil. ③ Main relief valve is stucked or worn out. ④ Different rotating direction between pump and power source.
Serious side shaft splines indentation	<ul style="list-style-type: none"> ① Shaft loose fitting with connectors.

Touch between shaft and body (1)	Touch area more than one third of the gear hole: overload, sudden increasing pressure result in high deformation of shaft.
Touch between shaft and body (2)	Touch area less than one third of the gear hole: normal abrasion.
grinding burn of gear	No hydraulic oil or insufficient oil.
Impressions on gear shaft	① Long-time overload working. ② Normal abrasion.
Grinding burn of side plates. Side plates fall off. Uneven wear.	① No hydraulic oil or insufficient oil. ② Dirty oil. ③ Poor quality if copper coating fall off without burn phenomenon.
Clear impression or abrasion on one side of the side plate	Insufficient depth of hole for assembling drive shaft so that it produces axial force.
Flashes on seals	① High temperature of pump, bad cooling. ② Bolts to fasten pump body become loose or they are stretched due to the long-time over pressure working.
Scratches in the front plate.	Components connected with shaft have such a long length and might lead to shaft fracture or leakage from shaft end.

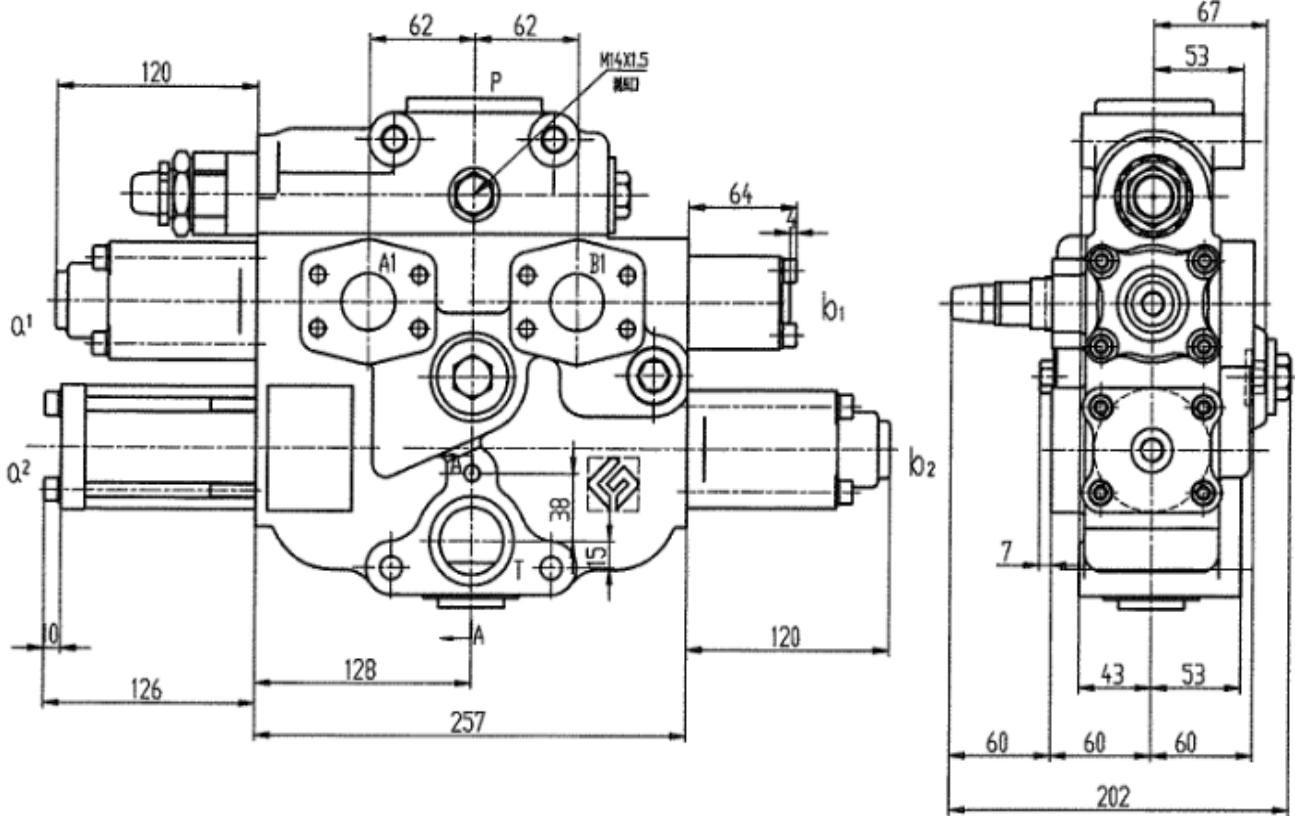
5) NOTICE IN PLACING ORDER



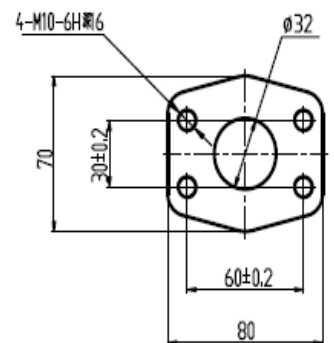
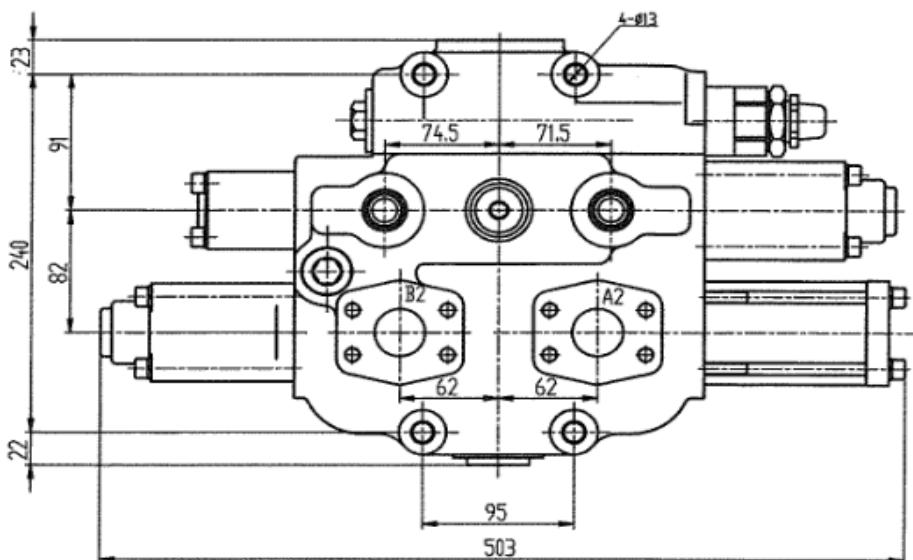
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2. MAIN CONTROL VALVE

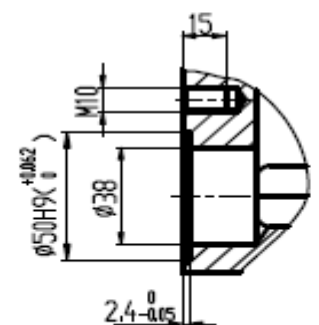
1) STRUCTURE



P,A,T port size



A-A

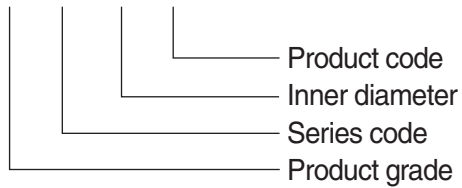


2) OVERVIEW

Multi-way directional valve is of integrated slide valve structure which includes 2 spools valve (bucket and boom spool) and triple multi-way valve (service spool, bucket spool, boom spool). Oil ways include parallel and series connection. Multi-way valve has also various service valves (overflow valve, overload valve, makeup valve) attached. As a hydraulic device for main equipment of large and medium loader, the valve features compact structure, reliable functions, high performance, good sealing, and convenient repair.

3) MODEL IDENTIFICATION

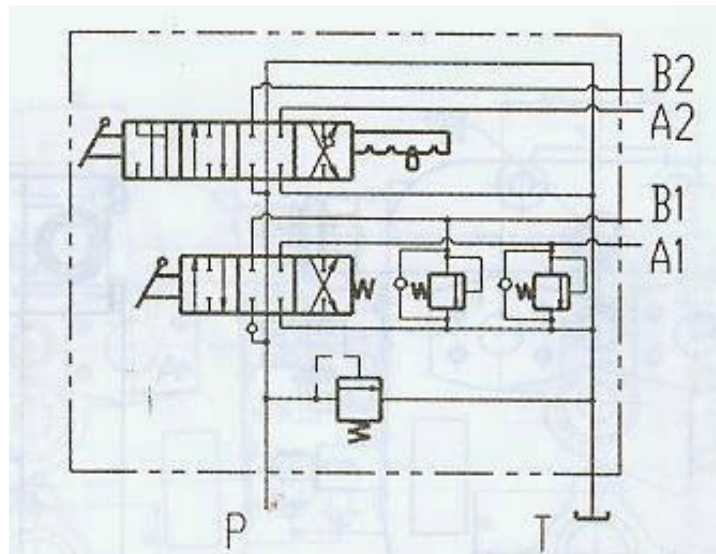
G - DF - XX -XX



4) TECHNICAL DATA

Item	Unit	Specification (GDF-32)
Nominated flow	ℓ /min	250
Nominated pressure	MPa	20
Pressure regulating range	MPa	8 ~ 20
Pressure regulating range of overload valve	MPa	8 ~ 25

(2) Working Principle



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Boom spool has 4 positions and 6 ways . It can realize the function of raising, holding, lowering and floating.

Main relief valve control the whole pressure of the system. Once the pressure exceeds the rated pressure, the valve would open a way direct to tank to protect the system against over pressure.

In the multi-way directional valve, port P is flow inlet , T is flow return. A1 and B1 connect to the large chamber and small chamber of bucket cylinder respectively. A2 and B2 connect to the large chamber and small chamber of boom cylinders respectively. Check valve is used to prevent pressure oil flowing back to the tank so that fix the “nodding” problem.

(1) Neutral position

When bucket spool and boom spool are at neutral positions, oil from pump returns to tank directly through port P.

(2) Boom raising

When the boom spool is pulled out, the oil way from P to T is closed. Fluid flows directly to A2 which is connected to the large chamber of boom cylinders. The oil in the small chamber would return to tank through B2. Then the boom raises.

(3) Boom lowering

When the boom spool is pushed in at the first position, the oil way from P to T is closed too.

Fluid flows directly to B2 which is connected to the small chamber of the boom cylinders. The oil in the large chamber would return to tank through A2. Then the boom lowers.

(4) Boom floating

When the boom spool is pushed in further more, all the inlet port P and large chamber and small chamber of boom cylinders are connected to tank. The cylinders become floating by the weight of equipment and bearing the force from ground.

(5) Bucket roll back

When the bucket spool is pulled out. The oil way from P to T is closed. Fluid flows directly to A1 which is connected to the large chamber of bucket cylinder. The oil in the small chamber would return to tank through B1. Then the bucket rolls back.

(6) Bucket dumping:

When the bucket spool is pushed in. The oil way from P to T is closed too. Fluid directly to B1 which is connected to the small chamber of bucket cylinder. The oil in the large chamber would return to tank through A1. Then the bucket dumps.

When the external force is not applied to the bucket spool. The spring would push or pull the spool back to the neutral position.

(7) Overload-make-up valve:

Overload and make-up valves are applied in both side of bucket cylinder.(Based on based on requirement). It would keep the system safety when the bucket receives external impact or interfered with by other mechanisms. Besides, it would make up oil for cylinder to prevent a chamber to be evacuated.

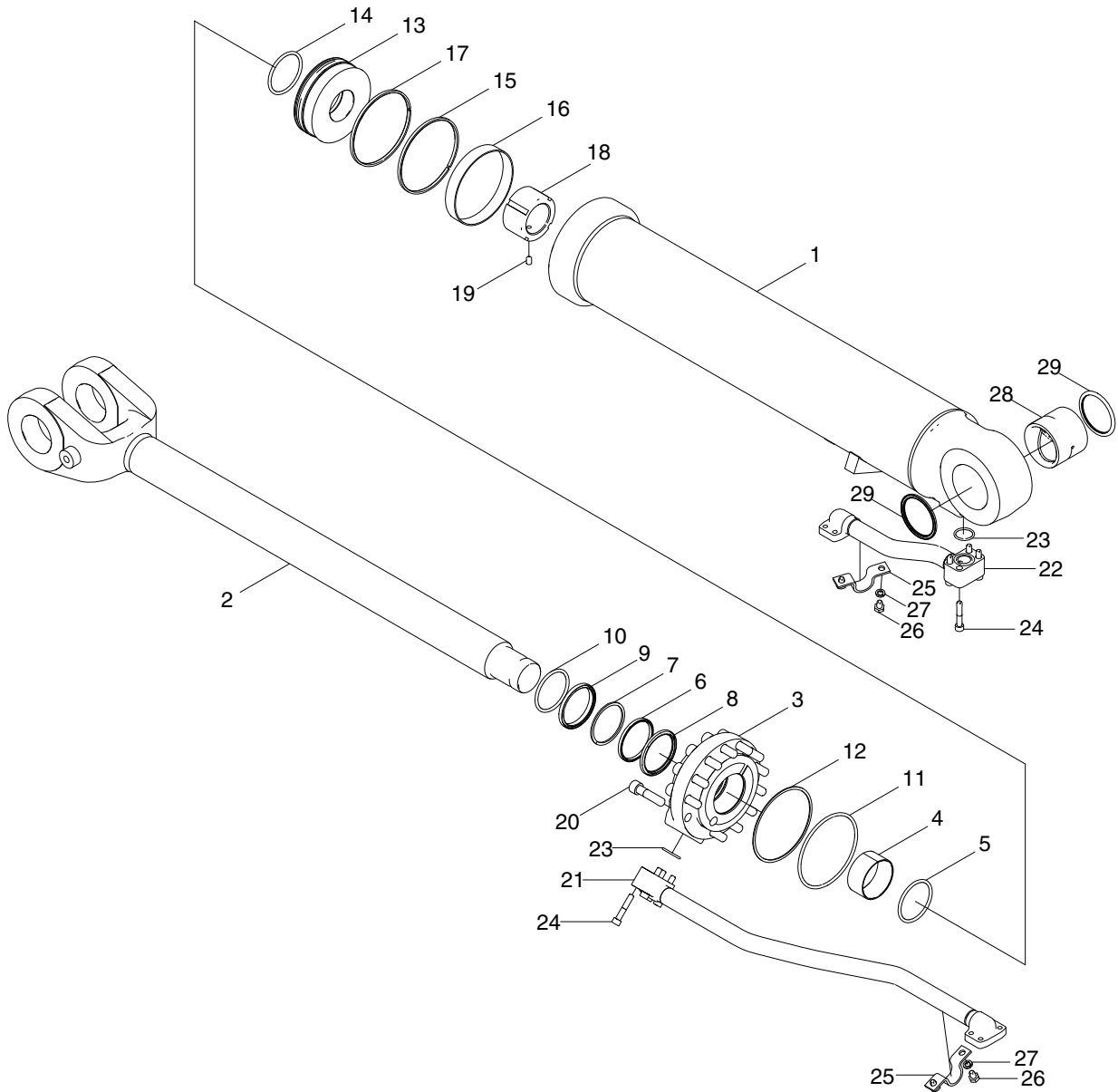
8) TROUBLESHOOTING

No.	Problem	Cause	Remedy
1	Insufficient operating pressure	1. Pressure of main relief valve is on low side.	1. Regulate pressure of main relief valve.
		2. Spool of main relief valve is stuck.	2. Remove and clean, or replace valve spool.
		3. Damaged pressure regulating spring.	3. Replace with new product.
		4. Too much pressure loss in system line.	4. Replace piping, or regulate pressure of main relief valve within the allowable range of pressure.
2	Insufficient operating flow	1. Oil supply to system is insufficient.	Check oil source and repair oil pump.
		2. Too much leaks inside valve.	
		a. Too high oil temperature, low viscosity	a. Take measures to reduce oil temperature.
		b. Improper hydraulic oil.	b. Change hydraulic oil.
		c. Too much clearance between slide valve and valve body.	c. Replace slide valve to keep a reasonable clearing.
		3. Main relief valve failure.	3. Repair or replace the main relief valve.
3	Malfunction in return	1. Damaged or deformed return spring.	1. Replace with new product.
		2. Dirt between valve lever and valve body.	2. Clean part.
4	External seeps and leaks	1. Damaged seal ring.	1. Replace with new product.
		2. Loose fastening pieces.	2. Fasten related fastening piece.
		3. Too high oil temperature, low viscosity.	3. Takes measures to reduce oil temperature.
		4. Poor sealing on flange surface.	4. Check fastening and sealing of related parts.
5	Bucket dumping	1. Overload valve is stucked.	1. Clean and reassemble.
		2. Dirty fluid.	2. Change fluid.
		3. Damaged O-ring.	3. Replace O-ring.
		4. Internal leakage of cylinder.	4. Inspect cylinder.

9) NOTES IN DISASSEMBLY

- (1) Keep clean field for assembly. Dust and dirt shall be strictly prevented.
- (2) Never clean rubber sealing pieces with gasoline.
- (3) To prevent from damage to part, never knock a part with an iron object when disassembling.
- (4) Be sure to clean all the parts with kerosene or cleaner before assembling.
- (5) After assembling, be sure to perform test and only passed product can be used.

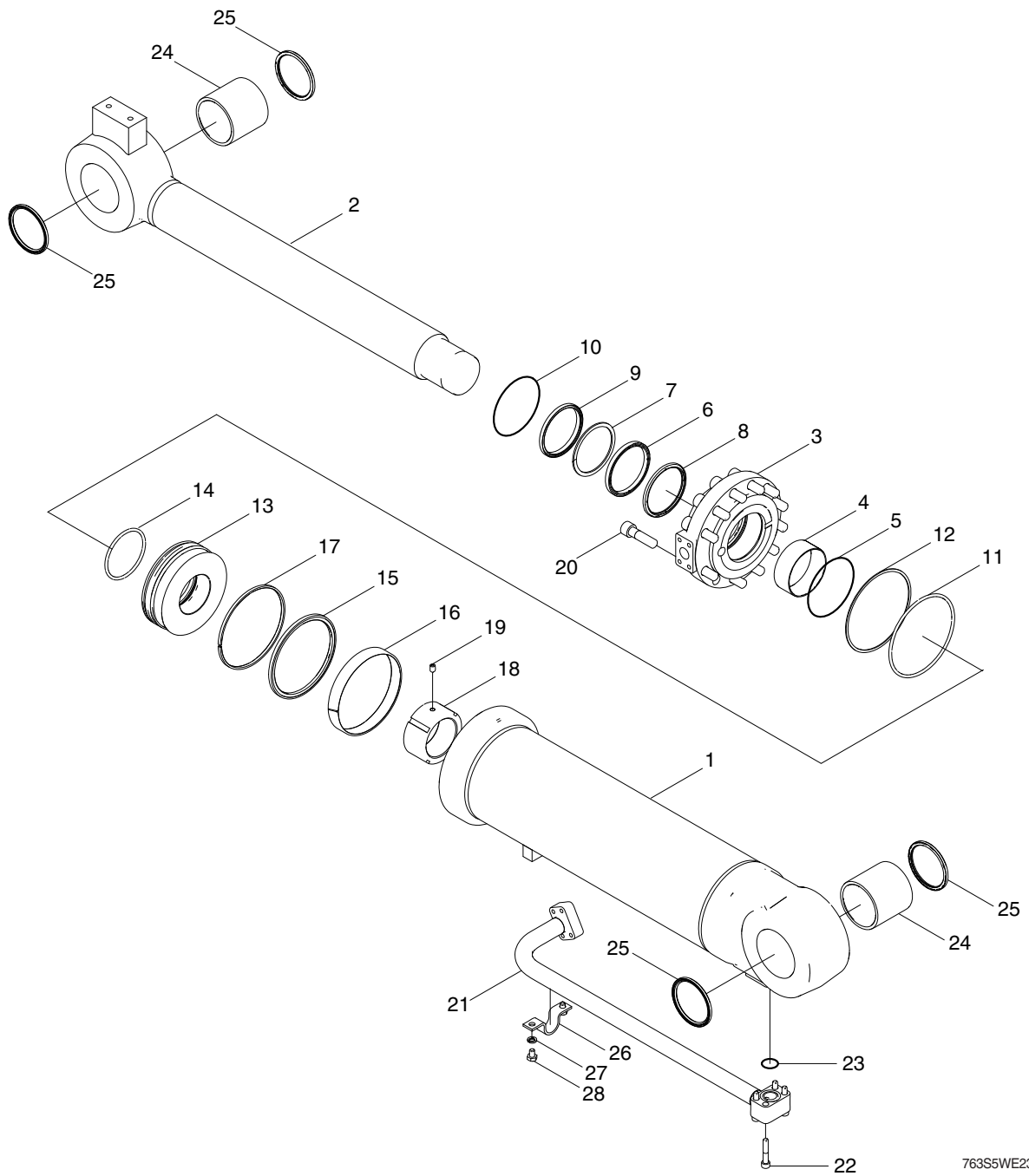
3. BOOM CYLINDER



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- | | | | | | |
|----|---------------|----|--------------|----|---------------|
| 1 | Tube assembly | 11 | O-ring | 21 | Pipe assembly |
| 2 | Rod assembly | 12 | Back up ring | 22 | Pipe assembly |
| 3 | Gland | 13 | Piston | 23 | O-ring |
| 4 | Bushing | 14 | O-ring | 24 | Socket bolt |
| 5 | Snap ring | 15 | Piston seal | 25 | Pipe clamp |
| 6 | Rod seal | 16 | Wear ring | 26 | Hexagon bolt |
| 7 | Back up ring | 17 | Dust ring | 27 | Spring washer |
| 8 | Buffer ring | 18 | Lock nut | 28 | Pin bushing |
| 9 | Dust wiper | 19 | Set screw | 29 | Dust seal |
| 10 | Snap ring | 20 | Socket bolt | | |

4. BUCKET CYLINDER



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- | | | | | | |
|----|---------------|----|--------------|----|---------------|
| 1 | Tube assembly | 11 | O-ring | 21 | Pipe assembly |
| 2 | Rod assembly | 12 | Back up ring | 22 | Socket bolt |
| 3 | Gland | 13 | Piston | 23 | O-ring |
| 4 | DU bushing | 14 | O-ring | 24 | Pin bushing |
| 5 | Snap ring | 15 | Piston seal | 25 | Dust seal |
| 6 | Rod seal | 16 | Wear ring | 26 | Pipe clamp |
| 7 | Back up ring | 17 | Dust ring | 27 | Spring washer |
| 8 | Buffer ring | 18 | Lock nut | 28 | Hexagon bolt |
| 9 | Dust wiper | 19 | Set screw | | |
| 10 | Snap ring | 20 | Socket bolt | | |