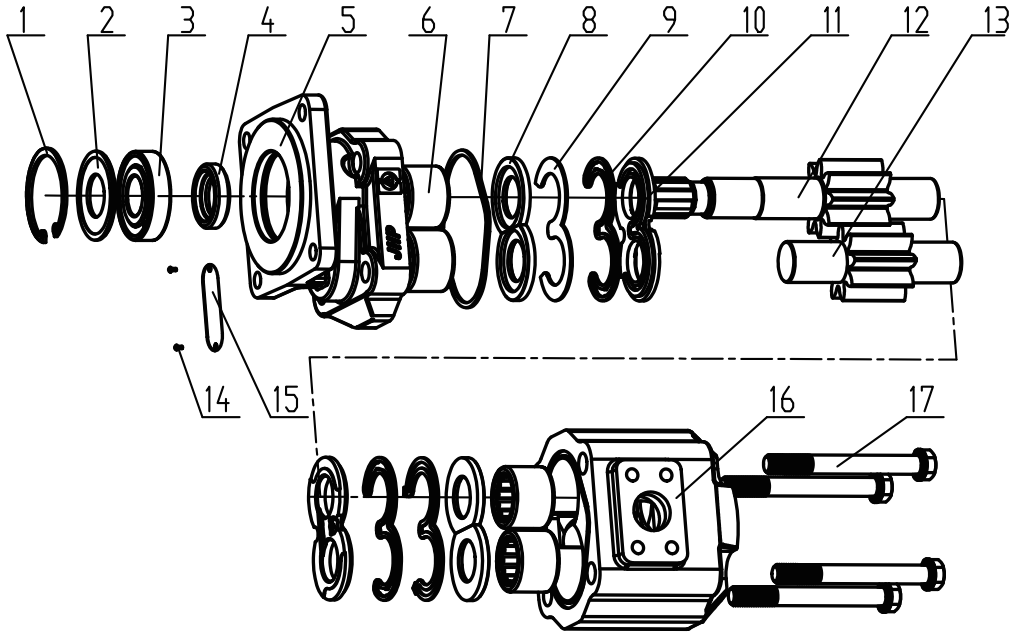
GROUP 2 STRUCTURE AND FUNCTION

1. MAIN PUMP

1) STRUCTURE



HL830S5WE03

1	Snap ring	7	Seal	13	Driven gear
2	Oil seal	8	Gasket	14	Rivet
3	Rolling bearing	9	Seal	15	Decal
4	Seal	10	Seal	16	Rear cover body
5	Front cover	11	Side plate	17	Bolt
6	Bearing	12	Drive gear		

2) MOUNTING REQUIREMENTS FOR GEAR PUMP

(1) Entry of gear pump should keep clean and no pollution. Interfacing surface of entry and discharge should not be damaged and good sealing with O-ring seal should be guaranteed.

(2) Check if the depth of mounting hole for gear pump is longer than the length of the shaft of pump so to prevent potential impact to the shaft and gear pump from burning out. Key shaft should be assembled normally.

3) NOTES IN USING

(1) It's strictly prohibited for user to disassemble the product, or the manufacturer will not guarantee the performance of product.

(2) Viscosity of oil is dependant to temperature. When oil temperature increases, its viscosity decreases. Therefore, oil temperature should be maintained under 80℃. To secure the gear pump working normally under different operating temperature, selected oil should feature little change by variation of temperature, and have good chemical durability and foam resistance. Use of L-HM46 (GB11118.1-94) anti-wear hydraulic oil is recommended.

(3) No impurities from machine and corrosive substance should be in oil. There should be filtering devices with a precision of 25 μm in the system where the gear pump is working for.

(4) For transmission of gear pump, the manners that may produce radial force to pump (such as direct geared and pulley transmission) are not permitted. Shaft bushing or elastic coupling can be used. Requirements for concentricity: not more than 0.5 mm for shaft bushing type, no more than 0.1 mm for coupling type. Axial force is not permitted.

(5) The entry and discharge of gear pump should be assembled securely and sealing be reliable. Or air may be included and oil leaks caused to lower the performance of gear pump.

(6) Max. pressure and max. rate of gear pump means momentary peak values permitted during operation. Long time of continued use of gear pump may shorten its life span.

(7) Check if the depth of mounting hole for gear pump is longer than the length of the shaft of pump so to prevent potential impact to the shaft and gear pump from burning out.

(8) Before mounting the gear pump, check the rotating direction of pump meets requirement.

(9) Installation position of the pump as possible the pump oil inport below the oil tank level, if the oil inport installed must be above the oil level, it should not exceed the height difference is generally 0.5m, pump inlet velocity should not exceed 2.5m / s, inport pressure: -0.05 ~ +0.1 Mpa, connection the outlet of the pump inlet tank, if neel to install filters, strainers installed only allowed 50 or less, otherwise it will cause early damage to the pump.

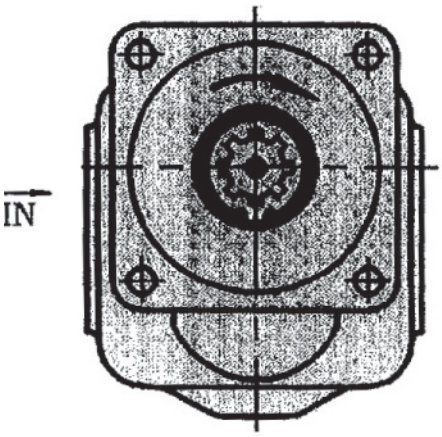
4) TROUBLESHOOTING

Problem	Cause	Remedy
Noise in pump	Air in system.	Fasten up all the connectors.
	Insufficient oil supply.	Refill oil to an adequate level.
	Cold oil.	Run slowly.
	Contaminated suction filter.	Clean or replace the filter.
	Too thin suction pipe.	Use a larger pipe.
	Suction pipe is clogged.	Remove the obstruction.
	Clogged air filter in oil tank.	Clean or replace the air filter.
	Poor concentricity of pump and input shaft.	Inspect.
	Severe resonance with tank, peripheral parts of piping.	Check piping, elements and bolts for being securely fastened.
Pump lags in response or no response	Insufficient oil supply.	Refill oil to an adequate level.
	Improper pressure setting of relief valve.	Regulate the pressure of relief valve.
	Worn or damaged pump.	Repair or replace.
	Worn, leaking or stuck valve.	Repair or replace.
High oil temperature	Too low pressure setting at overflow valve.	Regulate pressure of overflow valve.
	Too low viscosity of hydraulic oil.	Use recommended hydraulic oil.
	Too low oil level.	Refill oil to an adequate level.
	Small tank.	Add an oil cooler or replace with larger tank.
	Worn or damaged pump.	Repair or replace.
Foam forms in oil	Air has entered into oil tank through suction pipe.	Fasten up all the connectors.
	Incorrect selection of oil.	Use recommended oil.
	Too low oil level.	Refill oil to an adequate level.
	Tank baffle design is unreasonable	Correction baffle design
	Return pipe above the oil level	The return pipe installed under the oil level
	Worn or damaged lip seal for main shaft.	Replace the lip seal for main shaft.

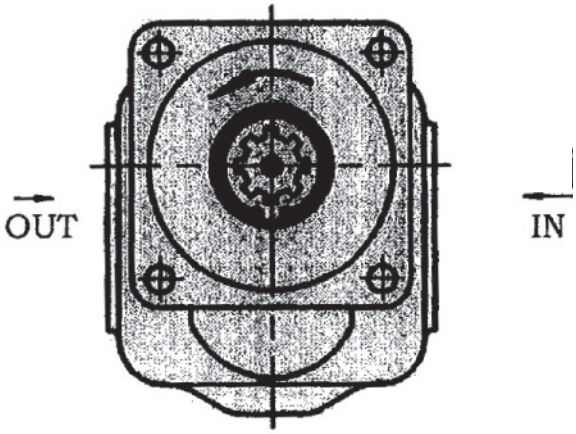
Problem	Cause	Remedy
Insufficient flow of pump or pressure	Damaged side plate.	Replace side plate.
	Overload valve failure	Replace the overload valve
	Air has entered into the system.	Fasten up all the connectors.
	Too high viscosity of oil.	Use recommended oil.
Leaks occur even after replacing lip seal for main shaft	Contaminated oil.	Change all the oil.
	Damaged lip seal for main shaft has damaged the sealing area of drive gear.	Replace drive gear shaft.
	Worn or damaged seal ring.	Replace seal ring.

5) NOTICE IN PLACING ORDER

TURN RIGHT
(CLOCKWISE)

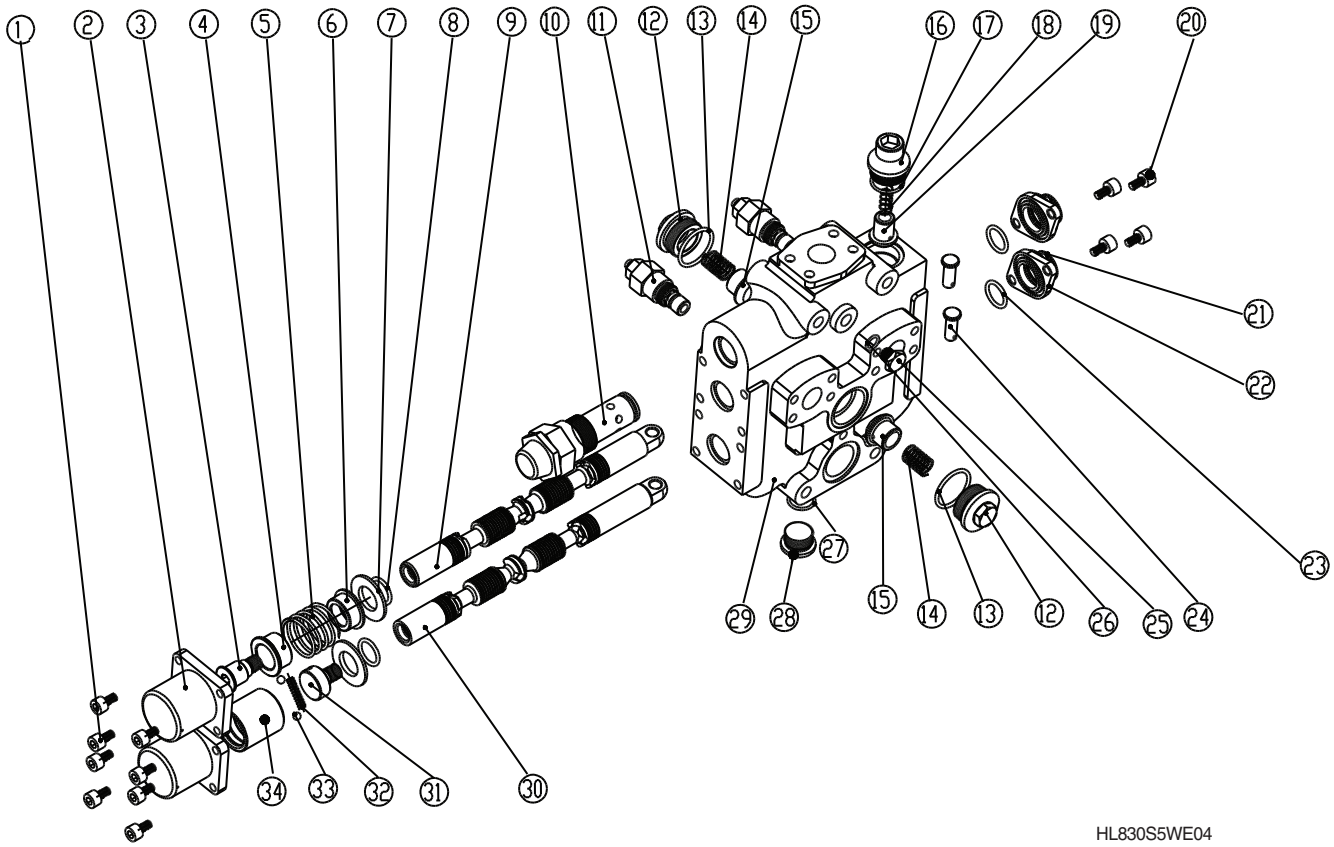


TURN LEFT
(COUNTER CLOCKWISE)



2. MAIN CONTROL VALVE

1) STRUCTURE



1	Bolt	14	Spring	27	O-ring kit
2	End cover	15	Poppet	28	Plug
3	Stopper	16	Plug	29	Body
4	Spring retaine	17	O-ring kit	30	Spool
5	Spring	18	Spring	31	Spacer
6	Spring retaine	19	Poppet	32	Spring
7	Spacer	20	Bolt	33	Ball
8	O-ring kit	21	Dust seal	34	Spool positioner
9	Spool	22	End cap		
10	Relief valve	23	O-ring kit		
11	Overload valve	24	Pin		
12	Plug	25	Plug		
13	O-ring	26	O-ring		

2) OVERVIEW

The valve has the following characteristics,

1. The ultra-low leakage to prevent excessive sedimentation.
2. Reduce the deformation of the stem of high temperature and high pressure and reduce the operating force and avoid hydraulic clamping.
3. Valve body structure design more optimized to increase the capacity to accept the pressure.
4. Lower pressure loss.

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 AND TECHNICAL DATA

(1) Model identification

(2) Technical data

Product series	GDF-25 Series
Nominated flow L / min	160
Nominated pressure Mpa	20
Pressure regulating range Mpa	8-20
Pressure regulating range of overload valve Mpa	8-25

4) STRUCTURE AND WORKING PRINCIPLE

(1) Structure

See figure 1 in the next page.

(2) Working Principle

This valve is designed with serial-parallel conception (figure 2). It changes the directions of flow to control bucket cylinder and boom cylinders or leave the specific components at a certain position so that it can fullfil the basic requirement of construction equipment.

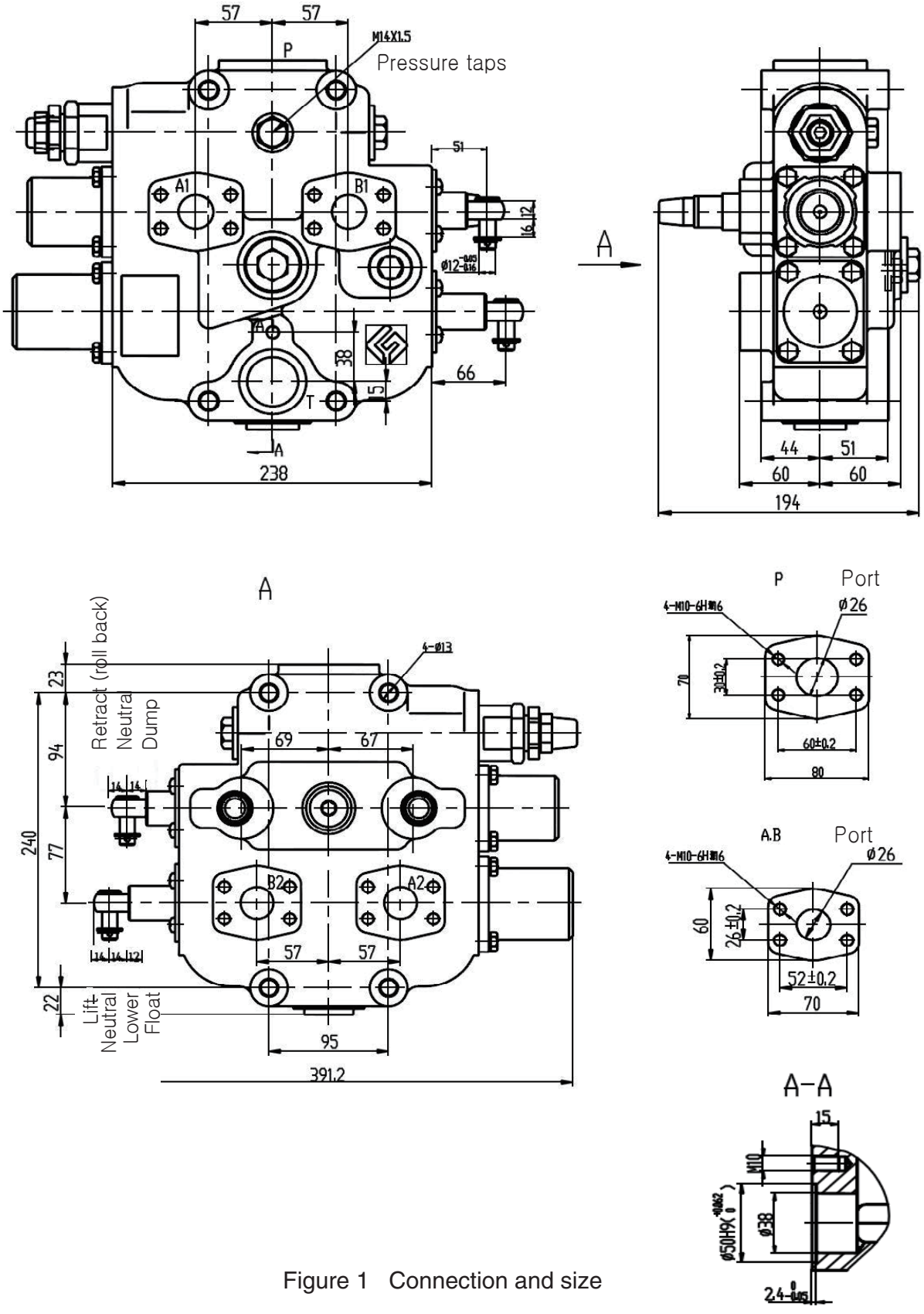


Figure 1 Connection and size

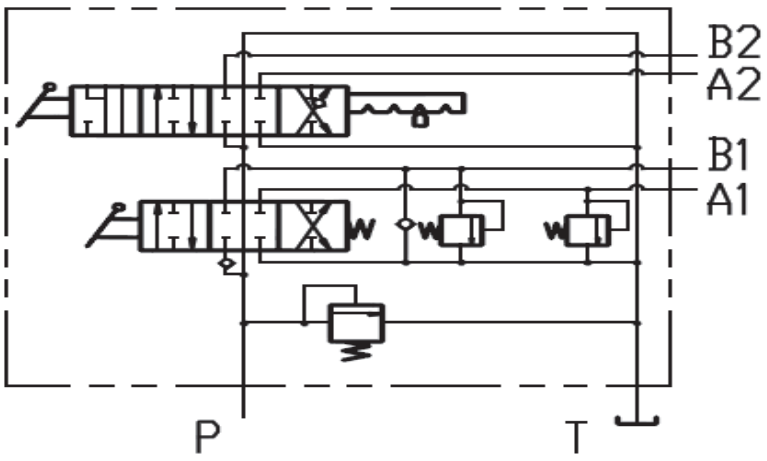


Figure 2 Hydraulic circuit

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 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.

5) MOUNTING AND USING

(1) When transporting, mounting, and storing the product, be careful that the product does not receive impacts that may damage the machined surface or flange face.

(2) Mounting plate should be level, mounting screws fastened in even torque.

(3) Never disassemble the product in dust before assembling to machine to prevent dust from entering.

(4) Operating fluid should be clean, cleanliness meeting ISO4406 19/16 or NAS1638 11 grade and up.

(5) The oil viscosity index V>9%, the best viscosity for work(recommended) is 20-30m ㎡/S.

(6) The user without pressure detection conditions, it is strictly prohibited to adjust the safety valve and overload valve pressure.

6) TROUBLESHOOTING

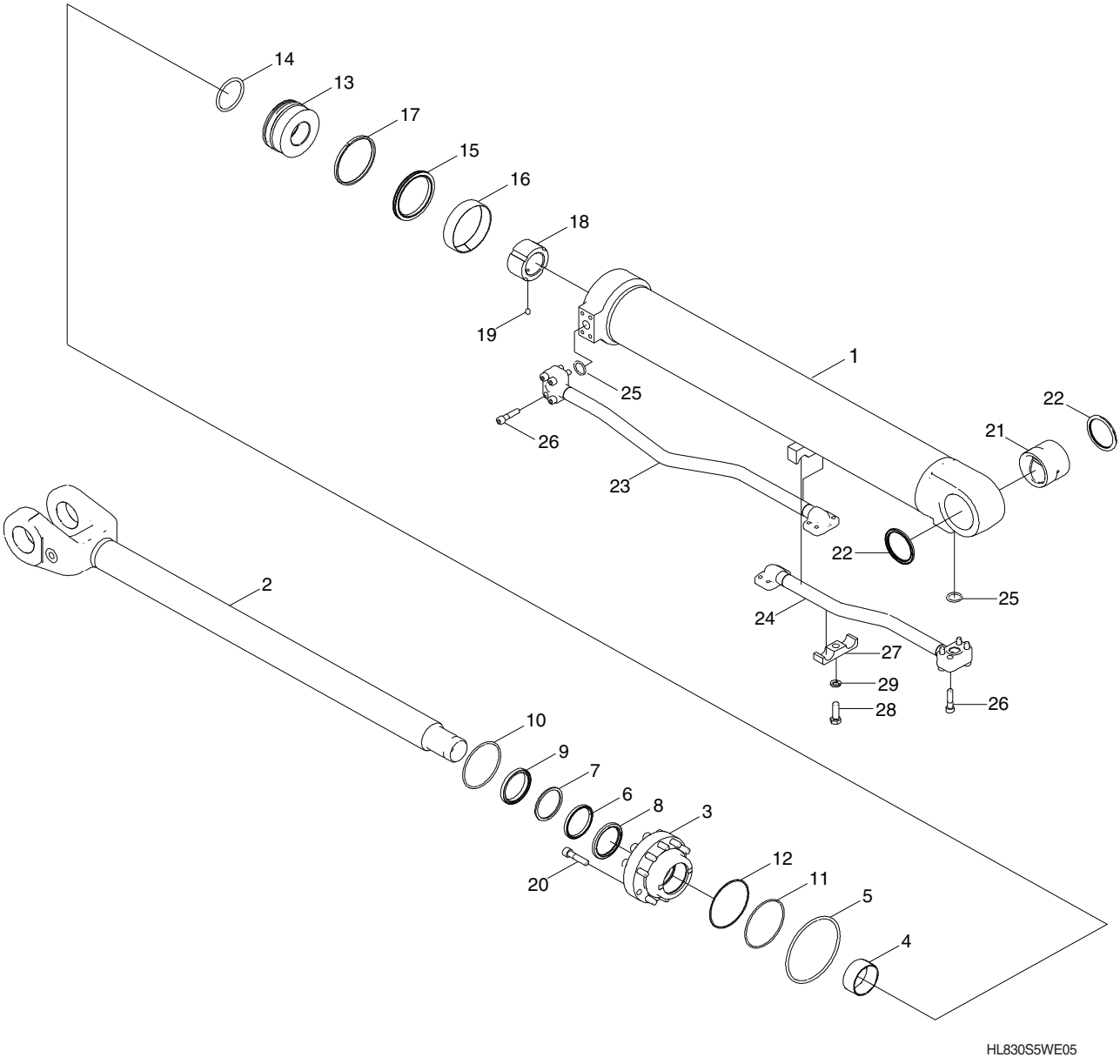
No.	Problem	Cause	Remedy
1	Insufficient operating pressure	1. Pressure of main relief valve is on low side.	1. Regulate pressure of main relief valve.
		2. Spool of main relief valve is stuck.	2. Remove and clean, or replace valve spool.
		3. Damaged pressure regulating spring.	3. Replace with new product.
		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	Malfunction in return.	1. Damaged or deformed return spring.	1. Replace with new product.
		2. Reset parts have different concentricity	2. Reassemble, remain concentricity
		3. Dirt between valve lever and valve body.	3. Clean part.

No.	Problem	Cause	Remedy
4		1.Overload valve is stuck with dirt.	1.Clean and install.
		2.Oil is not clean.	2.Change oil.
		3.Damaged O - ring.	3.Replace with new product.
		4.Leak of cylinder.	4.Check and repair cylinder.
5	External seeps and leaks	1. Damaged seal ring.	1. Replace with new product.
		2. Poor sealing on flange surface.	2. Check fastening and sealing of related parts.
		3. Loose fastening pieces.	3. Fasten related fastening piece.

7) NOTES IN DISASSEMBLY

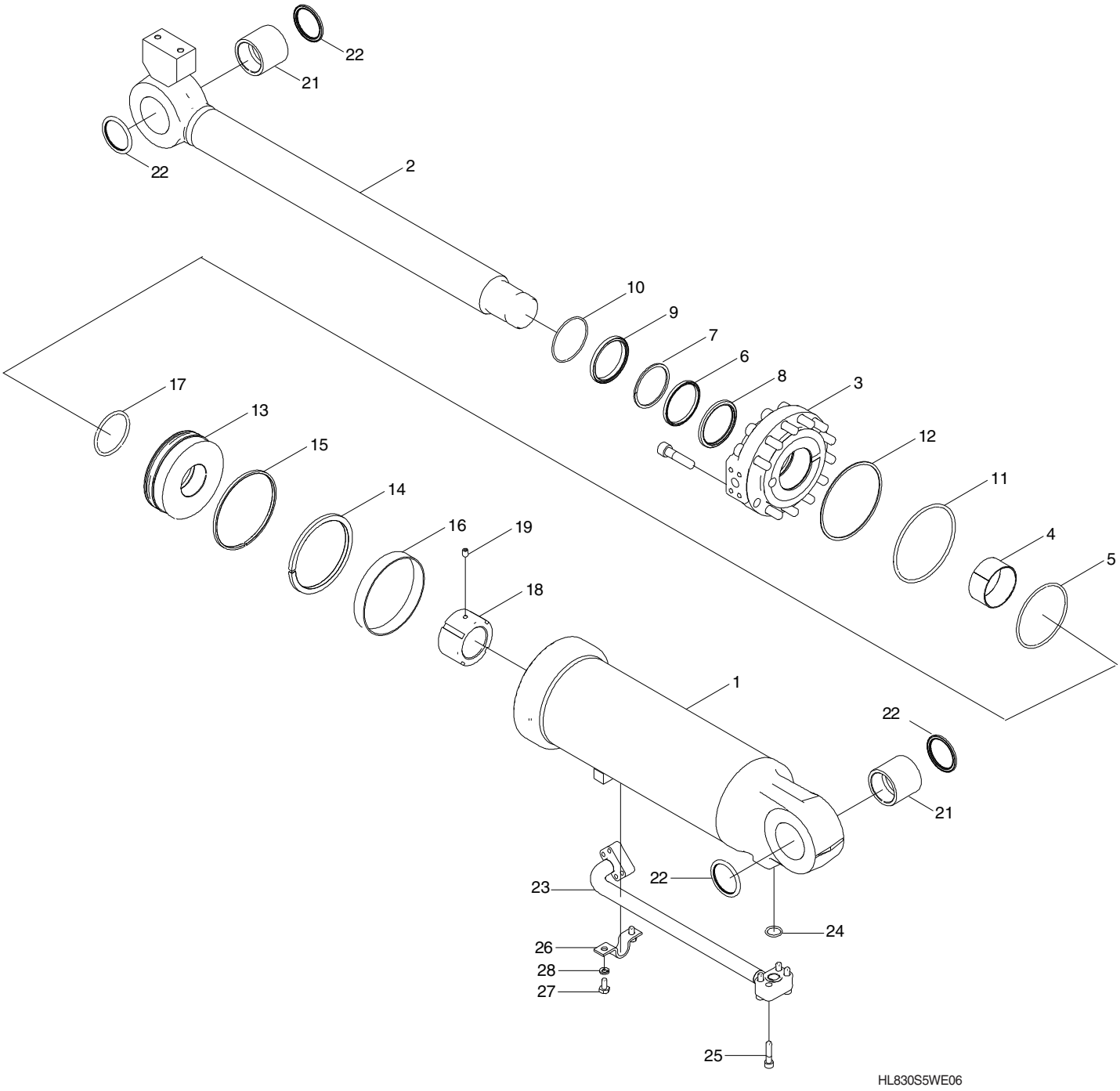
(1) Keep clean field for assembly. Dust and dirt shall be strictly prevented.
(2) Never clean rubber sealing pieces with gasoline.
(3) To prevent from damage to part, never knock a part with an iron object when disassembling.
(4) Be sure to clean all the parts with kerosene or cleaner before assembling.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

3. BOOM CYLINDER



1	Tube assy	11	O-ring	21	Bushing
2	Rod assy	12	Snap	22	Dust seal
3	Cylinder head	13	Piston	23	Pipe assy - R
4	Bushing	14	O-ring	24	Pipe assy - B
5	Snap ring	15	Piston ring	25	O-ring
6	Snap ring	16	Wear ring	26	Hexagon screw
7	Snap	17	Dust seal	27	Clamp
8	Buffer ring	18	Nut	28	Bolt
9	Dust seal	19	Screw	29	Spring Washer
10	Snap ring	20	Hexagon screw		

4. BUCKET CYLINDER



1	Tube assy	10	Snap ring	19	Screw
2	Rod assy	11	O-ring	20	Hexagon screw
3	Cylinder head	12	Snap ring	21	Bushing
4	Bushing	13	Piston	22	Dust seal
5	Snap ring	14	Piston ring	23	Base pipe assy
6	Snap ring	15	Dust seal	24	O-ring
7	Snap ring	16	Wear ring	25	Hexagon screw
8	Buffer ring	17	O-ring	26	Clamp
9	Dust seal	18	Nut	27	Bolt
				28	Washer