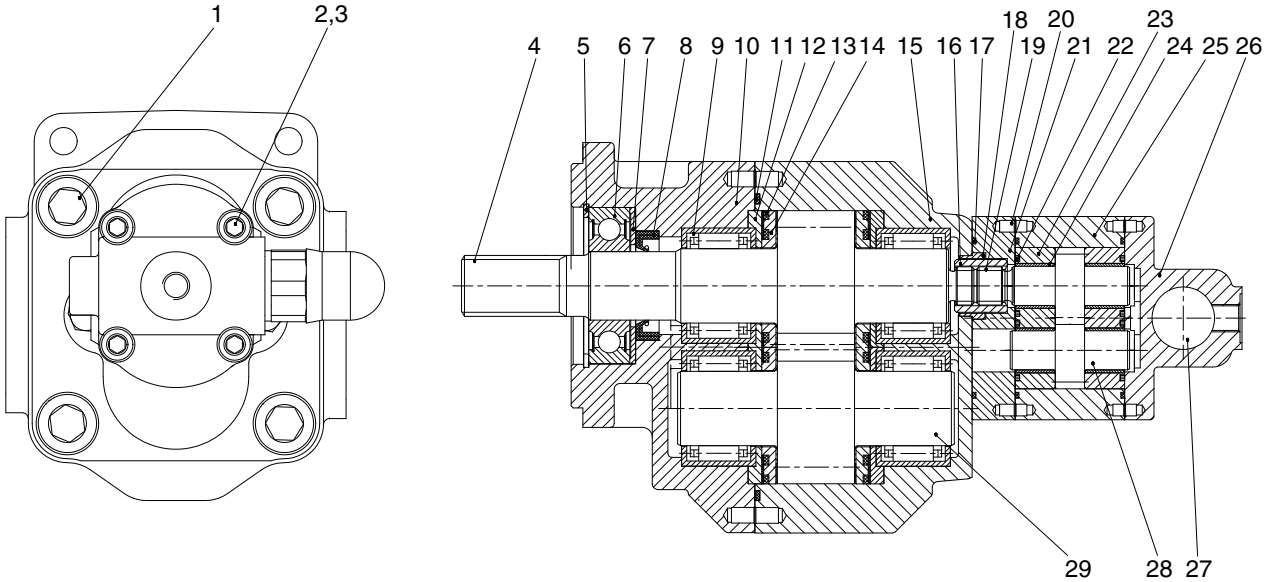


GROUP 2 STRUCTURE AND FUNCTION

1. MAIN PUMP (+PILOT PUMP)

1) STRUCTURE



7355WE15

1 Bolt	12 Plate	23 Bushing
2 Washer	13 Seal	24 Bearing
3 Bolt	14 Wear plate	25 Gear housing II
4 Drive gear	15 Gear housing	26 Port endcover
5 Snap ring	16 Spline sleeve	27 Relife valve
6 Bearing	17 Seal ring	28 Idler shaft
7 Seal	18 Supporting sleeve	29 Driven gear
8 Oil seal	19 Driving gear shaft II	30 Rivet
9 Bearing	20 Dowel pin	31 Name plate
10 Front cover	21 Transition cover	
11 Seal	22 Seal	

2) MOUNTING REQUIREMENTS FOR GEAR PUMP

- (1) Before mounting the gear pump, check its normal rotating direction and for being suitable to whole system.
- (2) 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.
- (3) 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

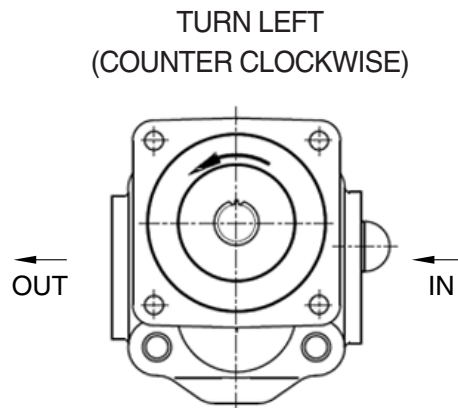
- (1) It's strictly prohibited for user to disassemble the product, or the manufacturer will not guarantee the performance of product.
- (2) Viscosity of oil is dependant to temperature. When oil temperature increases, its viscosity decreases. Therefore, oil temperature should be maintained under 80°C. 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 ISO VG46 (ISO VG32, ISO VG68) 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 0.05 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.

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.
	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.
	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.

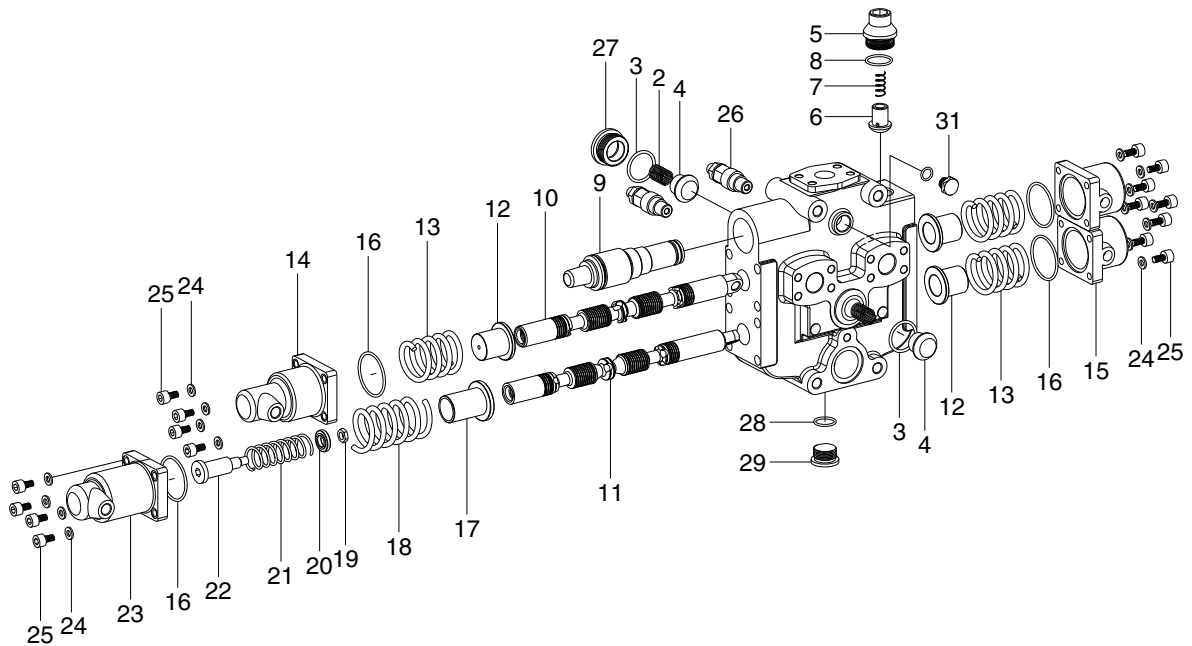
5) NOTICE IN PLACING ORDER



7355WE17

2. MAIN CONTROL VALVE

1) STRUCTURE



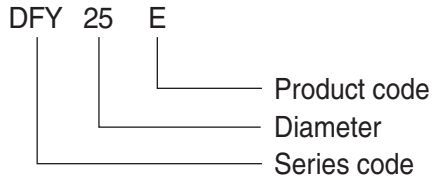
7355WE18

1	Valve body	11	Boom spool	21	Spring
2	Spring	12	Spring retainer	22	Spring retainer
3	O-ring	13	Spring	23	End cap
4	Poppet	14	End cap	24	Spring washer
5	Plug	15	End cap	25	Socket bolt
6	Poppet	16	O-ring	26	Relief valve
7	Spring	17	Spring retainer	27	Plug
8	O-ring kit	18	Spring	28	O-ring kit
9	Relief valve	19	Bolt	29	Plug
10	Bucket spool	20	Pressure plate		

2) OVERVIEW

The main control valve is of monolithic sliding structure, featuring series and parallel connection, port flange connection, including dual (bucket, boom) and triple (auxiliary, bucket, boom) type, and incorporates various service valves (relief valve, overload valve, make-up valve). This product features compactness, reliable operation, improved performance, good sealing and easy repair.

3) MODEL IDENTIFICATION

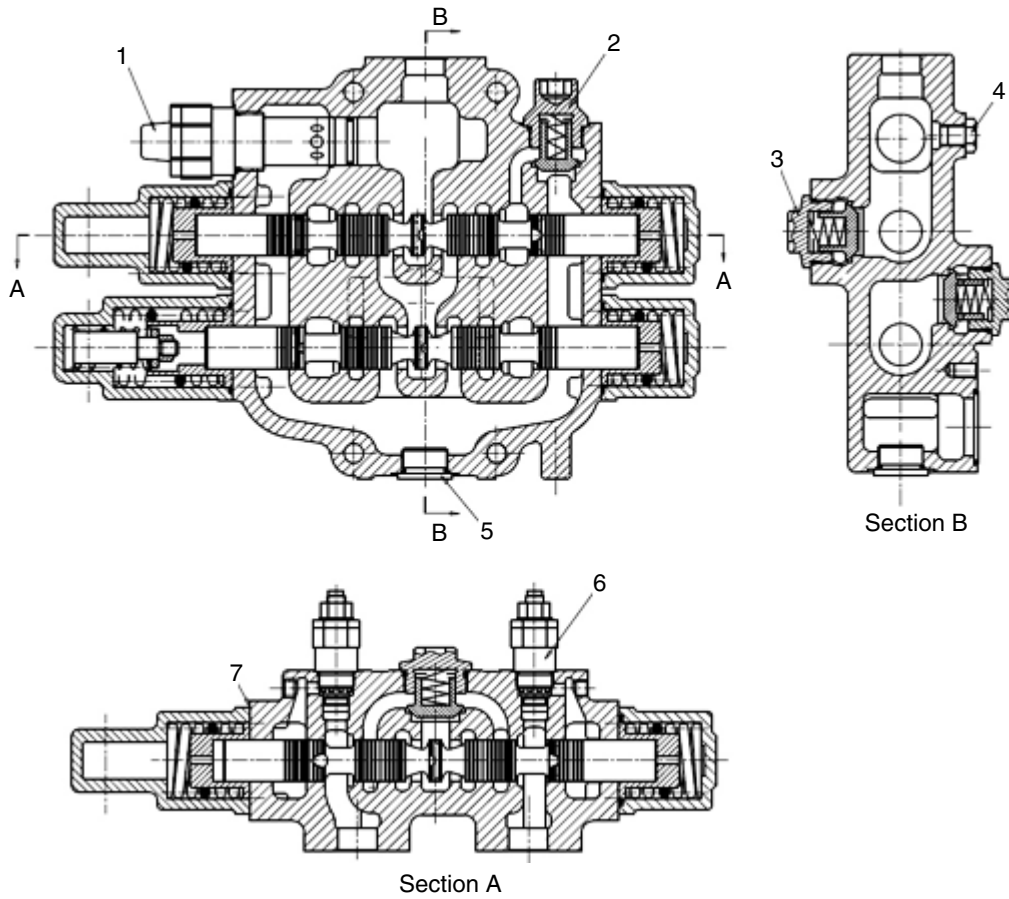


4) TECHNICAL SPECIFICATION

Item	Unit	Specification	
Nominated flow	ℓ /min	160	
Nominated pressure	MPa	16	
Pressure regulating range	MPa	8 ~ 20	
Pressure loss	Neutral	MPa	< 0.3
	Operation	MPa	< 0.6
Overload pressure regulating range	MPa	8 ~ 20	

5) STRUCTURE AND WORKING PRINCIPLE

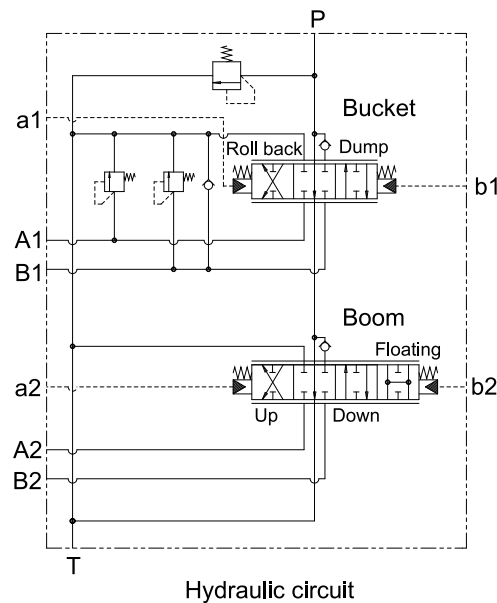
(1) Structure



7355WE30

Item	Size	Torque		Quantity
		kgf·m	lbf·ft	
1	M39 × 2	9.0 ~10.4	65.2~75.2	1
2	M36 × 2	13.3~18.4	95.9~133	1
3	M42 × 2	19.4~24.5	140~177	2
4	M14 × 1.5	2.0~2.5	14.8~18.4	1
5	M30 × 2	13.3~16.3	95.9~118	1
6	M24 × 1	3.9~4.5	28.5~32.3	2
7	M8	2.3~3.0	17.0~21.4	16

(2) Working principle



7355WE31

The main control valve has boom control spool and bucket control spool. The bucket lever has three positions, i.e. neutral, roll back and dump. Boom spool has four positions, i.e., hold, raise, lower and float. Port P is flow inlet, T is flow return port and port A1 and B1 are connected to large and small chamber of bucket cylinder, respectively, and port A2 and B2 to large and small chamber of boom cylinder. a1, a2, b1 and b2 are pilot ports.

① Neutral position

When bucket and boom pilot control lever are in neutral positions, and the flow from main pump returns directly to tank through port T of main control valve.

② Bucket roll back and dump

When the remote control lever is pulled left, the flow from pump opens one-way valve, and is directed to A1 cavity, then to large chamber of bucket cylinder to make the bucket roll back, while the fluid inside small chamber returns through B1 cavity. Likewise, when the remote control lever is pushed right, the flow from pump opens one-way valve, and is directed to B1 cavity, and then to the small chamber of bucket cylinder to make the bucket roll down, while the fluid in large cavity returns through cavity A1.

③ Raise and lower of boom

When the remote control lever is pulled back, the flow from pump opens one-way valve, and is directed to cavity A2, then to large chamber of boom cylinder raising the boom, while the fluid in small chamber returns through cavity B2. Likewise, when the remote control lever is pushed forward, the flow from pump opens one-way valve, and is directed to cavity B2, then to the small chamber of boom cylinder lowering the boom, while the fluid in large chamber returns through cavity A2. When the remote control lever is pushed further, it will get in float position, when inlet port P and large and small chambers of oil cylinder are all connected with return fluid, in low pressure, the cylinder becomes in floating state with the weight of working equipment and acting force of ground.

④ **Function of main relief valve, overload valve and make-up valve**

Main relief valve controls pressure in system. When pressure in system exceeds rated value, the main relief valve opens and the pressure flow returns to tank to protect the hydraulic system against overpressure. When the bucket receives external impact or is interfered with by other mechanism, overload valve opens for safety. Make-up valve functions to make up oil for cylinder to prevent a chamber to be evacuated.

6) TROUBLESHOOTING

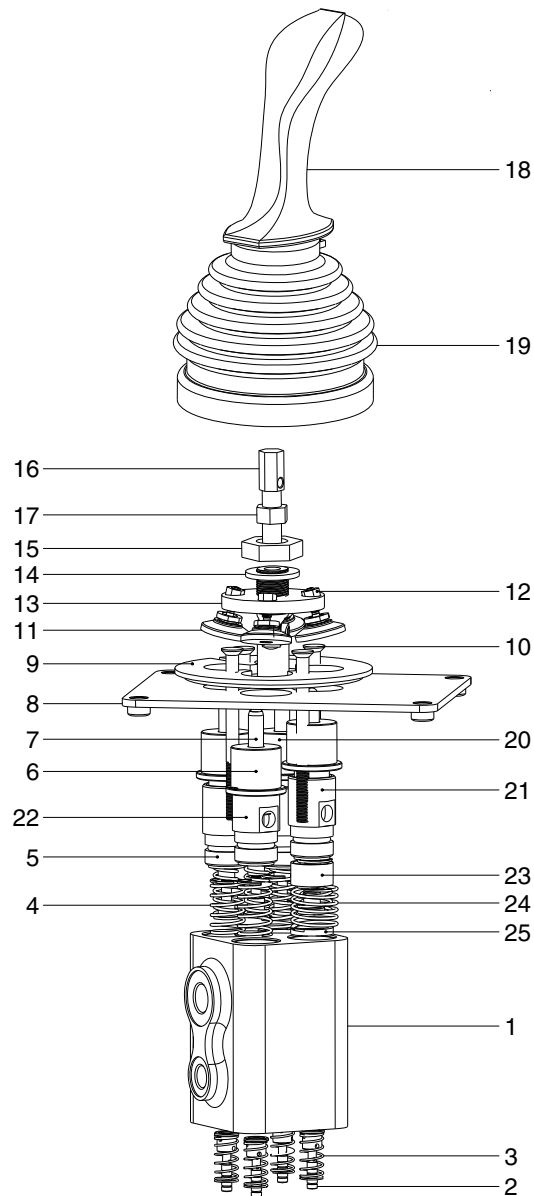
Problem	Cause	Remedy
Insufficient operating pressure	1. Pressure of main relief valve is on low side.	1. Regulate pressure of main relief valve.
	2. Spool of main relief valve is stuck.	2. Remove and clean, or replace valve spool.
	3. Damaged pressure regulating spring.	3. Replace with new product.
	4. Too much pressure loss in system line.	4. Replace piping, or regulate pressure of main relief valve within the allowable range of pressure.
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.
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.
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.

7) NOTES IN DISASSEMBLY

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

3. REMOTE CONTROL VALVE

1) STRUCTURE



- 1 Valve body
- 2 Metering spool unit
- 3 Spring set
- 4 Spring set
- 5 Compression bar unit 2
- 6 Shaft sleeve
- 7 Pressure pin group
- 8 Mounting plate unit
- 9 End cover

- 10 Screw
- 11 Pressure plate unit
- 12 Nut
- 13 Mounted plate
- 14 Washer
- 15 Nut
- 16 Handle joint
- 17 Nut
- 18 Handle unit

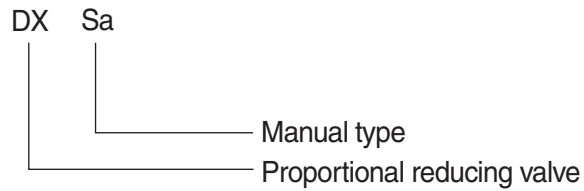
- 19 Rubber cover
- 20 Electromagnet
- 21 Compression bar unit 3
- 22 Compression bar unit 1
- 23 Positioning sleeve
- 24 Spring set
- 25 Spring set

735WE12

2) OVERVIEW

Remote control valve features solenoid positioning in boom raise, float and bucket roll back. The secondary pressure of control fluid at output port of the pilot valve shows linear change allowing better speed governing performance and wider speed range. Therefore, remote control valve is one of main hydraulic units for main working equipment of loaders.

3) MODEL DESCRIPTION

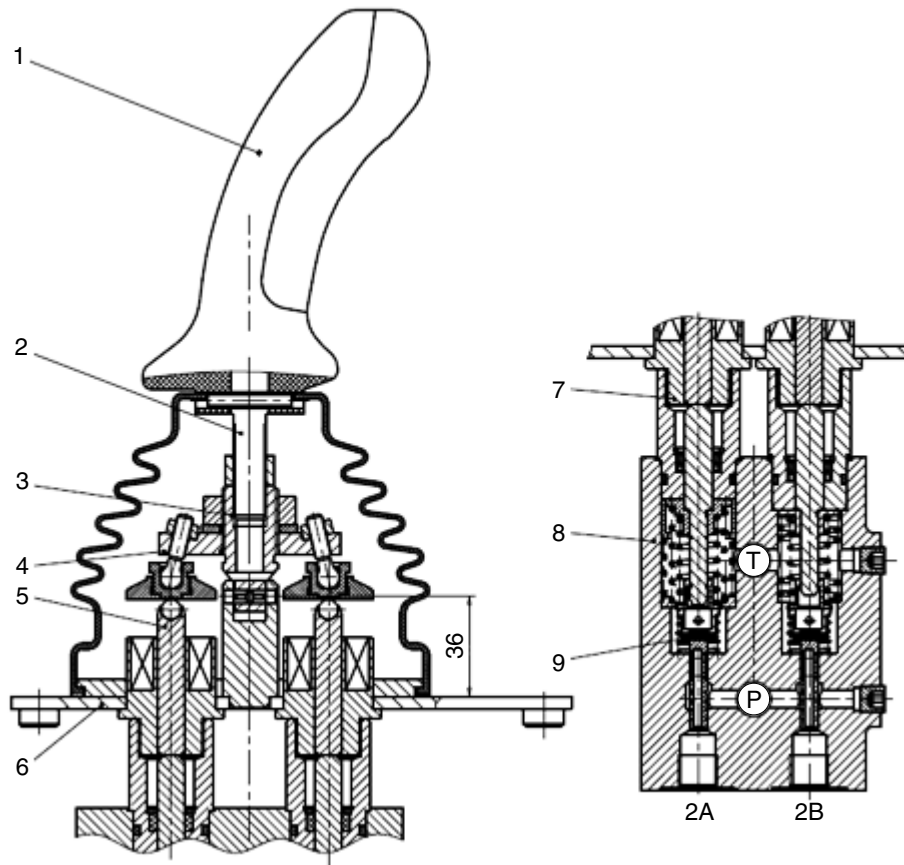


4) TECHNICAL DATA

Item	Unit	Specification
Nominal flow	ℓ /min	10
Max. pressure	MPa	5
Pressure control range	MPa	0.5~2.5
Solenoid operating voltage	Voltage	DC 24V

5) STRUCTURE AND PRINCIPLE OF WORK

(1) Structure



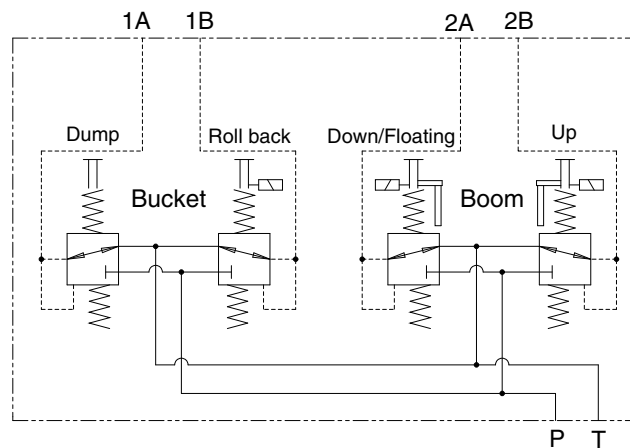
- 1 Lever
- 2 Joint
- 3 Pin joint

- 4 Plate
- 5 Valve pin
- 6 Mounting plate

- 7 Solenoid
- 8 Valve body
- 9 Reducing valve

7355WE25

(2) Working principle



Hydraulic circuit

7355WE23

This valve incorporates a bucket spool and boom spool. The bucket spool has three positions, i.e. dump, neutral and roll back, and boom spool has four positions, i.e. raise, hold, lower and float. A solenoid is attached in each boom raise, float and bucket roll back position, P is inlet port, T return port, 1A, 1B, 2A and 2B are control fluid ports, each of which is connected to correspondent port of control valve. When operating the lever to press the pin, the pushing rod is pressed down, causing the metering spring to push the metering rod to move down, cutting the way between control cavity and return cavity off, and connecting inlet cavity to control cavity, and the pressure fluid is directed to a port of control valve, pushing the control valve spool to do direction change work.

At the same time, the pressure in the control cavity acts on the bottom of metering valve rod and keep balance with spring force. When the lever is held in a certain position, force of the spring is fixed, so the counter force in control cavity is also fixed, like action process of a fixed pressure reducing valve. The force of spring varies by the angle of lever: larger is the angle, larger the spring force, and higher the pressure in control cavity, and larger the thrust what the control valve rod receives. The stroke of main valve rod keeps proportional to the angle of the lever of pilot valve to realize proportional pilot control. At the 2A port of this pilot valve, a set of spring is otherwise attached, allowing the operators to have sharp sense between lower and float position, to prevent from miss operation.

When the pilot lever is moved to full boom raise or full bucket roll back or boom float position, the solenoid is operated to hold the lever in the positions.

5) TROUBLESHOOTING

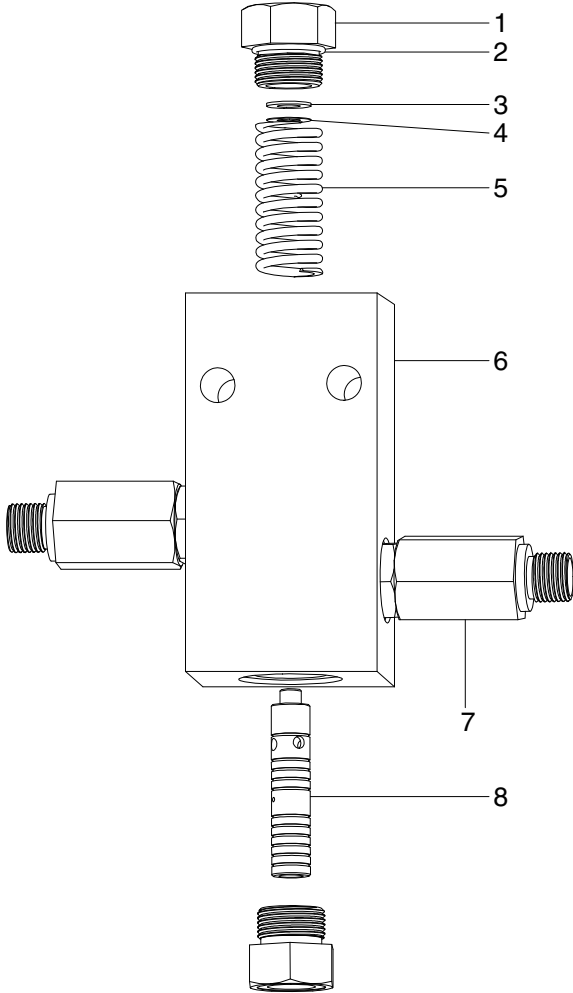
Problem	Cause	Remedy
Return failure	Deformed return spring of pilot valve.	Replace with new product.
	Dirt between pressure rod and bore.	Clean the parts.
Unreliable positioning	Insufficient suction force of solenoid.	Replace with new product.
	Circuit current and voltage do not meet requirements.	Repair.
	Dirt between solenoid and press plate.	Remove dirt.
	Clearance between press bar and rod is not adjusted appropriately.	Adjust to meet requirements.
Pilot valve control failure	Stuck metering spool or moving failure.	Check cleanliness of the fluid and clean valve spool and hole.
	Deformed metering spring.	Replace with new spring.
	Insufficient control flow or pressure.	Check control fluid supply system for normal operation.

6) NOTES IN DISASSEMBLY

- (1) Keep clean field for assembly. Dust and dirt shall be strictly prevented from entering the valves.
- (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.

4. PRESSURE SELECT VALVE

1) STRUCTURE



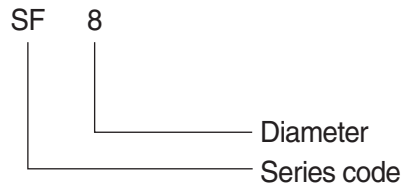
7615WE14

- | | | | | | |
|---|----------------|---|------------|---|-------------|
| 1 | Fitting | 4 | Thin shim | 7 | Check valve |
| 2 | O-ring | 5 | Spring | 8 | Spool |
| 3 | Adjusting shim | 6 | Valve body | | |

2) OVERVIEW

Pressure select valve is a hydraulic element developed for pilot control of wheel loader. this unit is installed inside oil control circuit to direct the flow into pilot valve and is used to lower the boom to the ground from a high position as engine suddenly dies.

3) MODEL DESCRIPTION

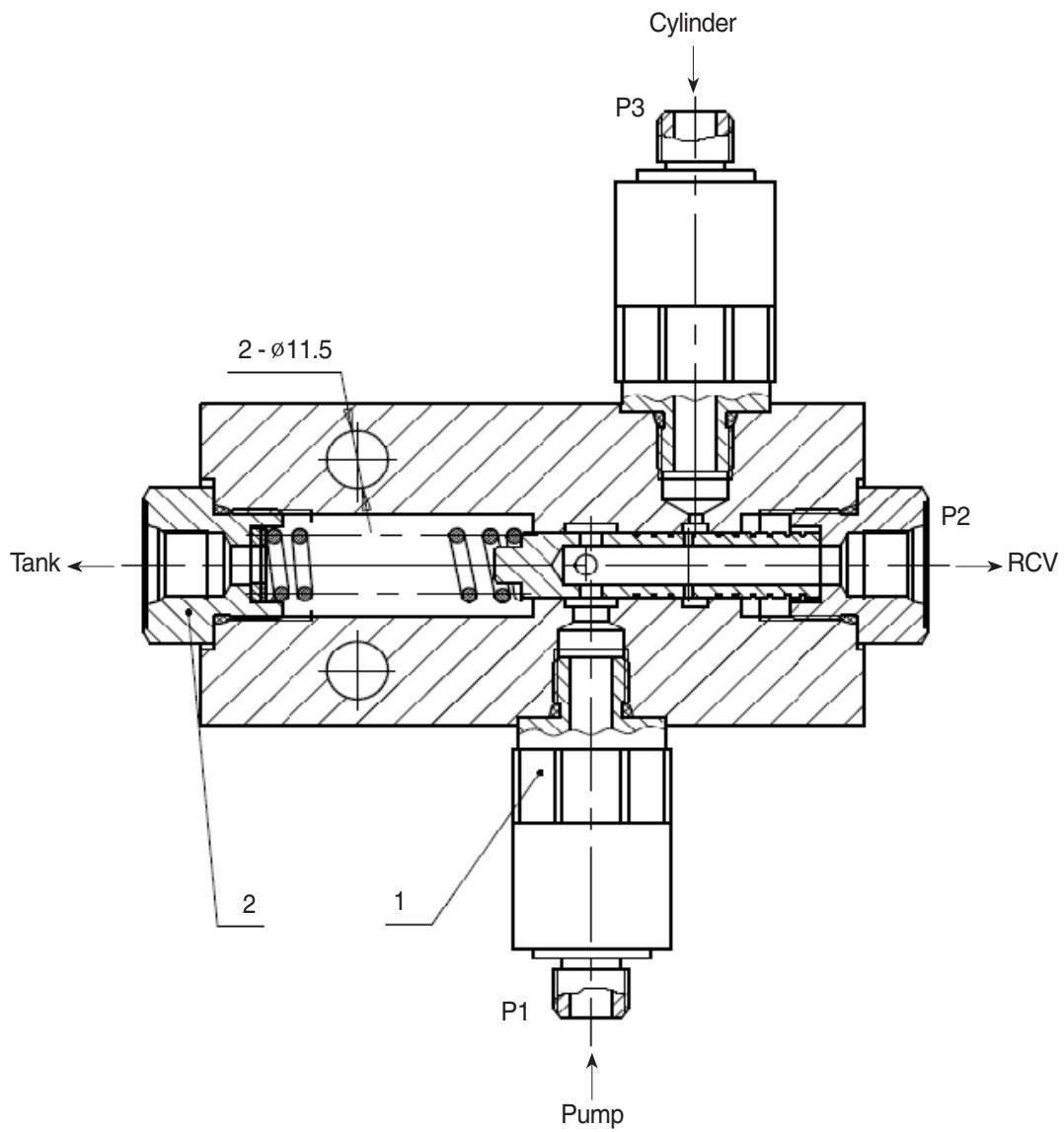


4) TECHNICAL DATA

Item	Unit	Specification
Nominal flow	ℓ /min	20
Nominal pressure	MPa	2.5

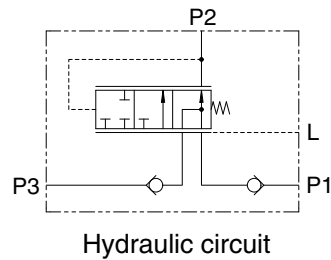
5) STRUCTURE AND WORKING PRINCIPLE

(1) STRUCTURE



Item	Size	Torque		Quantity
		kgf-m	lbf-ft	
1	M14×1.5	1.5 ~ 2.0	10.8 ~ 14.5	2
2	M22×1.5	5.1 ~ 7.1	36.9 ~ 51.4	2

(2) WORKING PRINCIPLE



7615WE25

Port P1 is connected to pilot pump, P2 to the inlet of remote control valve, P3 to large cavity of boom, and L returns. When pilot pump work normally, the flow from it is directed to P1, out from P2 after pressure reduction through internal cavity of valve lever, and then to remote control valve to perform control operation. The pressure of flow is generally set at 3 MPa (i.e., high pressure from P1 is reduced to 3 MPa and the flow runs out from P2). At the time, the way to large cavity of boom is cut off by check valve and thus P3 is blocked.

When engine dies, pilot pump does not supply fluid, and no pressure fluid is supplied from P1. When boom is in raise position, pressure fluid in large cavity push check valve to open and is exerted to P3 and directed to the inlet cavity of remote control valve and, when pilot valve is in hold position, then the way is blocked by pilot sliding valve. When pilot valve is in lower position, pressure fluid in P3 is connected, and directed to pilot valve after pressure reduction (Reduced pressure is approx. 1.5 MPa) to perform bucket dump and boom raising operation. At the time, the check valve at the other side shuts off the way of pilot pump.

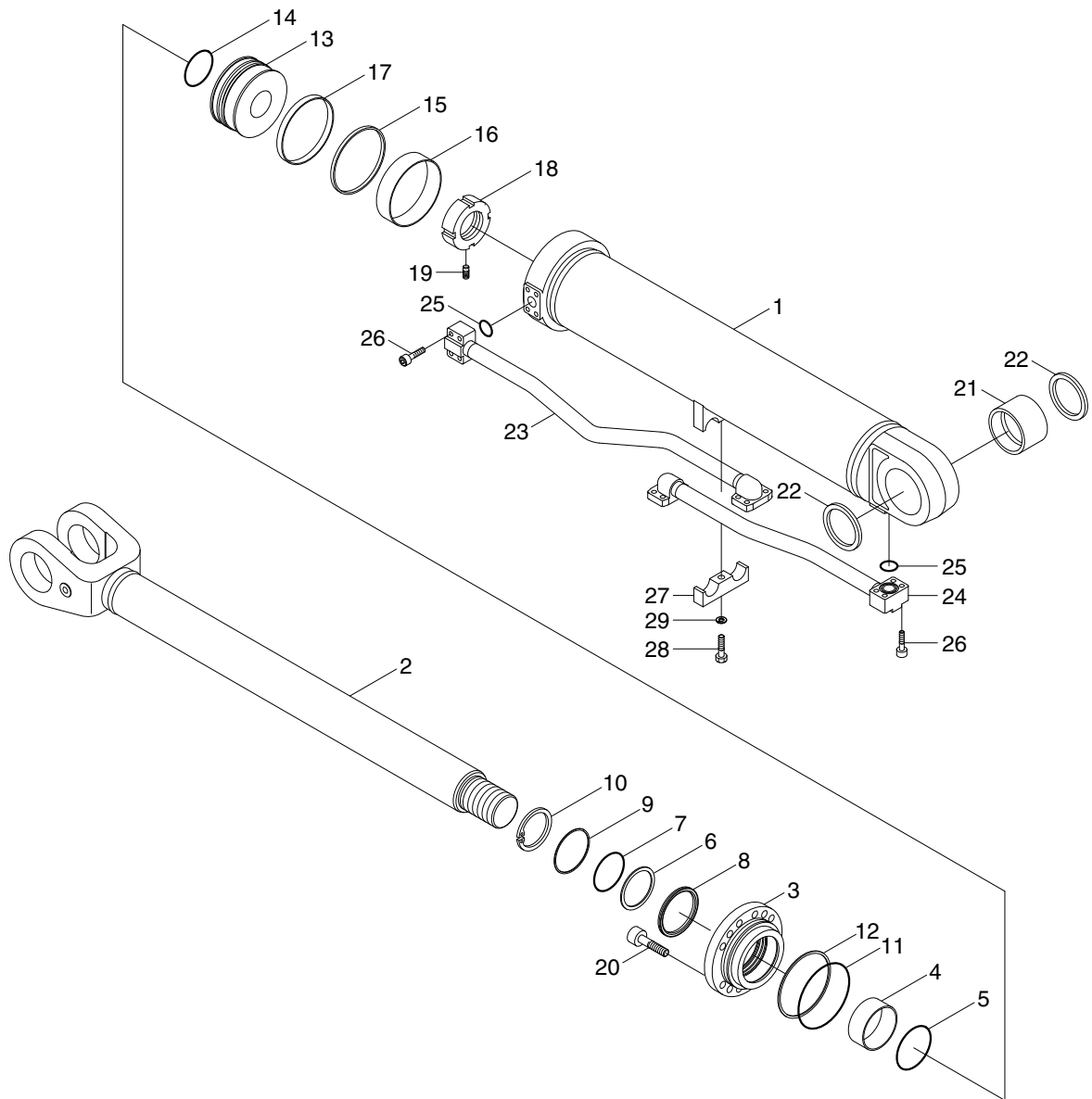
6) TROUBLESHOOTING

Problem	Cause	Remedy
External seeps and leaks	Damaged seal ring.	Replace with new product.
	Loose fastening pieces.	Fasten up related fastening pieces.
Unstable P2 port	Stuck spool or unsmooth moving.	Check fluid for cleanness, and clean spool and valve hole.
	Deformed spring.	Change spring.

7) NOTES IN DISASSEMBLY

- (1) Keep clean field for assembly. Dust and dirt shall be strictly prevented from entering the valves.
- (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.

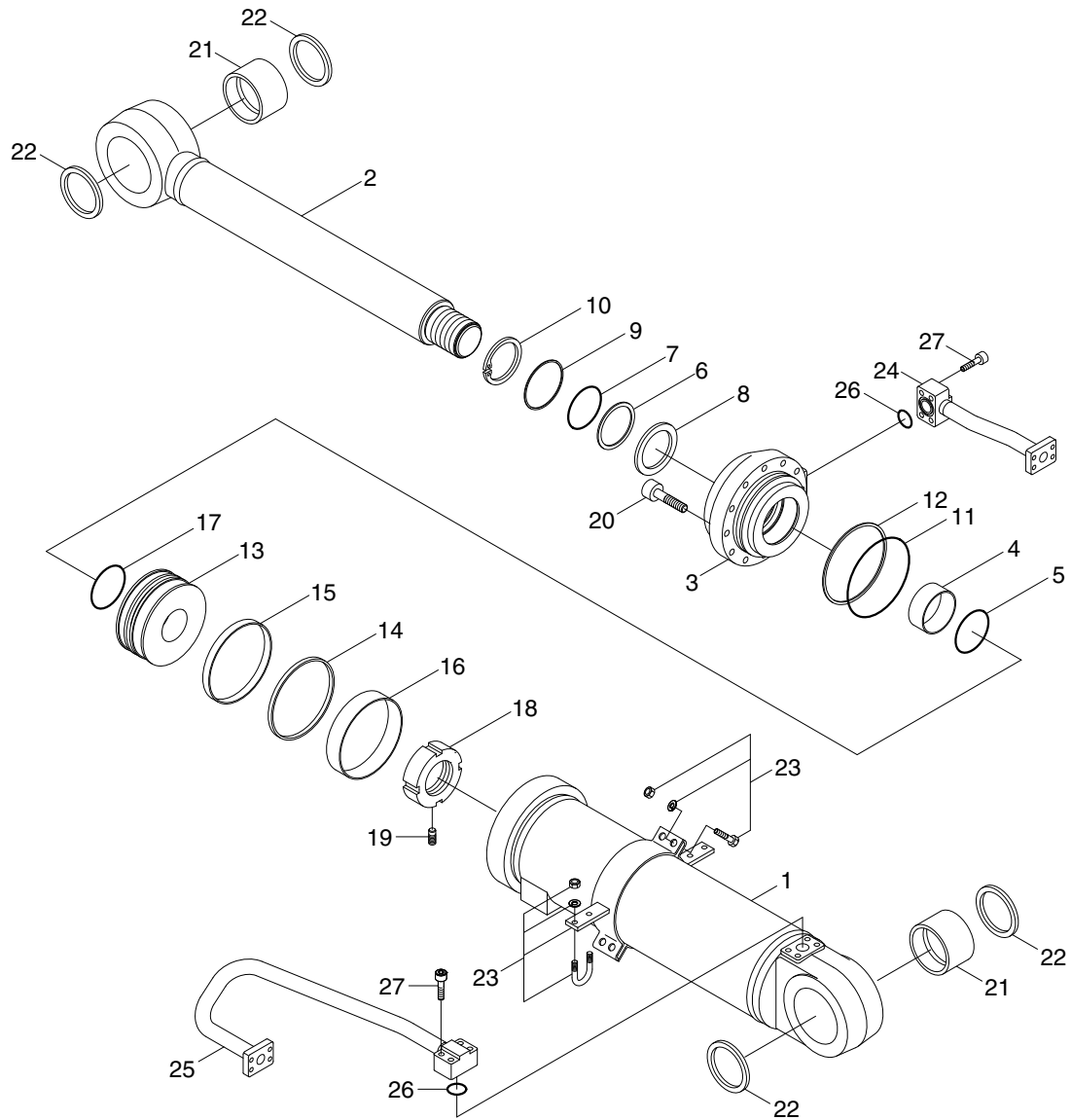
5. BOOM CYLINDER



7355WE21

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

6. BUCKET CYLINDER



7355WE22

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