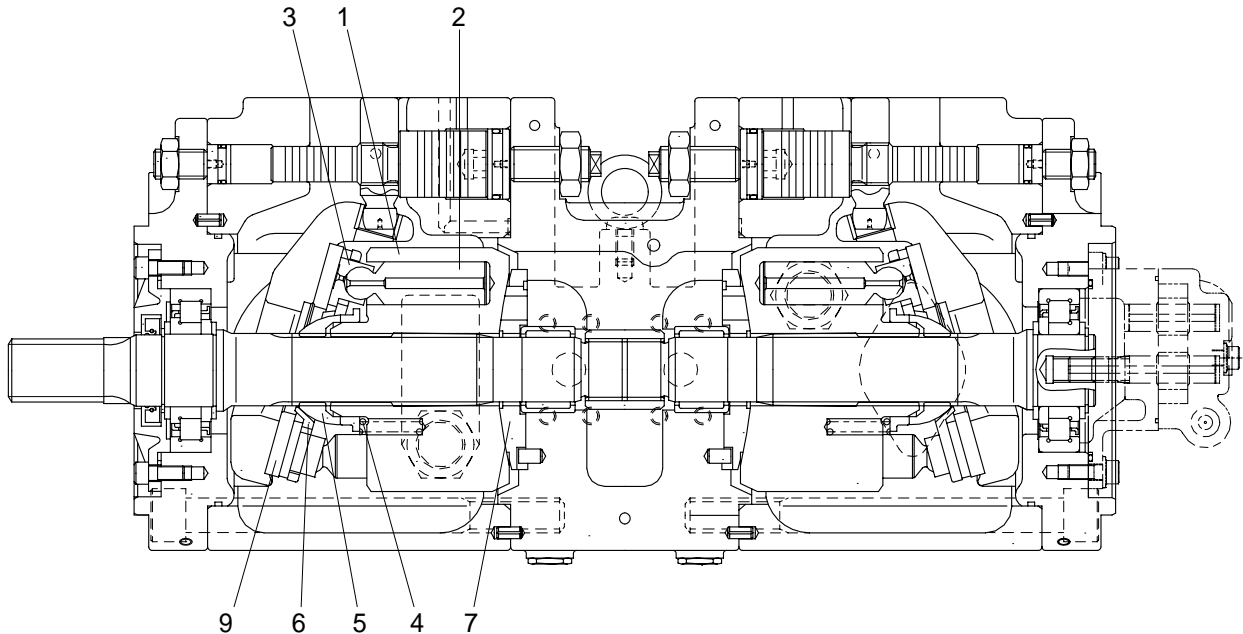


## GROUP 2 MAJOR COMPONENT

### 1. MAIN PUMP

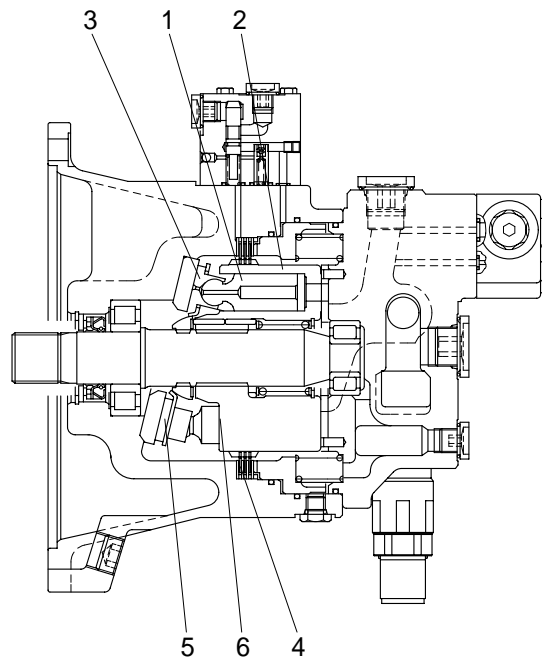


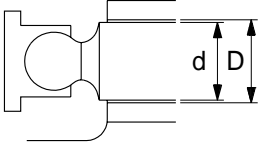
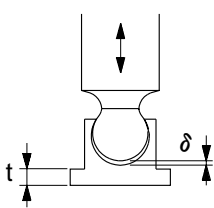
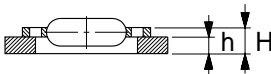
Part name & inspection item		Standard dimension	Recommended replacement value	Counter measures
Clearance between piston(1) & cylinder bore(2) (D-d)		0.028	0.056	Replace piston or cylinder
Play between piston(1) & shoe caulking section(3) ( $\delta$ )		0-0.1	0.3	Replace assembly of piston & shoe
Thickness of shoe (t)		3.9	3.7	
Free height of cylinder spring(t) (L)		31.3	30.5	Replace cylinder spring
Combined height of set plate(H) & spherical bushing(h) (H-h)		10.5	9.8	Replace retainer or set plate
Surface roughness for valve plate(Sliding face) (7,8), swash plate(Shoe plate area)(9), & cylinder(2) (Sliding face)	Surface roughness necessary to be corrected	3z		Lapping
	Standard surface roughness (Corrected value)	0.4z or lower		

## 2. MAIN CONTROL VALVE

Part name	Inspection item	Criteria & measure
Casing	<ul style="list-style-type: none"> <li>Existence of scratch, rusting or corrosion</li> </ul>	<ul style="list-style-type: none"> <li>In case of damage in following section, replace part               <ul style="list-style-type: none"> <li>Sliding sections of casing fore and spool, especially land sections applied with holded pressure</li> <li>Seal pocket section where spool is inserted</li> <li>Seal section of port where O-ring contacts</li> <li>Seal section of each relief valve for main, travel, and port</li> <li>Other damages that may damage normal functions</li> </ul> </li> </ul>
Spool	<ul style="list-style-type: none"> <li>Existence of scratch, gnawing, rusting or corrosion</li> <li>O-ring seal sections at both ends</li> <li>Insert spool in casing hole, rotate and reciprocate it</li> </ul>	<ul style="list-style-type: none"> <li>Replacement when its outside sliding section has scratch (Especially on seals-contacting section)</li> <li>Replacement when its sliding section has scratch</li> <li>Correction or replacement when O-ring is damaged or when spool does not move smoothly</li> </ul>
Poppet	<ul style="list-style-type: none"> <li>Damage of poppet or spring</li> <li>Insert poppet into casing and function it</li> </ul>	<ul style="list-style-type: none"> <li>Correction or replacement when sealing is incomplete</li> <li>Normal when it can function lightly without being caught</li> </ul>
Around spring	<ul style="list-style-type: none"> <li>Rusting, corrosion, deformation or breaking of spring, spring seat, plug or cover</li> </ul>	<ul style="list-style-type: none"> <li>Replacement for significant damage</li> </ul>
Around seal for spool	<ul style="list-style-type: none"> <li>External oil leakage</li> <li>Rusting, corrosion or deformation of seal plate</li> </ul>	<ul style="list-style-type: none"> <li>Correction or replacement</li> <li>Correction or replacement</li> </ul>
Main relief valve, port relief valve & negative control relief valve	<ul style="list-style-type: none"> <li>External rusting or damage</li> <li>Contacting face of valve seat</li> <li>Contacting face of poppet</li> <li>Abnormal spring</li> <li>O-rings, back up rings and seals</li> </ul>	<ul style="list-style-type: none"> <li>Replacement</li> <li>Replacement when damaged</li> <li>Replacement when damaged</li> <li>Replacement</li> <li>100% replacement in general</li> </ul>

### 3. SWING DEVICE



Part name & inspection item	Standard dimension	Recommended replacement value	Counter measures	
Clearance between piston(1) & cylinder bore(2) (D-d)		0.028	0.058	Replace piston or cylinder
Play between piston(1) & shoe caulking section(3) ( $\delta$ )		0	3	Replace assembly of piston & shoe
Thickness of shoe (t)		5.5	5.3	
Thickness of friction plate(4)	-	4.0	3.6	Replace cylinder friction plate
Combined height of set plate(5) & spherical bushing(6) (H-h)		6.5	12.5	Replace retainer or set plate

#### 4. TRAVEL DEVICE

##### 1) MOTOR

Part name	General view	Standard dimension	Recommended replacement value	Remedy
Piston subassembly(159)	· Sliding surface has a deep score or is roughened.	-	-	Replace cylinder block kit
	· The clearance between the piston and the cylinder block bore is large.	0.035	0.050	
	· Shoe ball has a large gap.	0.15	0.4	
Cylinder block(157)	· Sliding surface has a deep score or is roughened.	-	-	Replace cylinder block kit
	· Bore is worn very much.	-	-	
	· Wear or breakage occurred during meshing of gear teeth.	-	-	
Valve plate(158)	· Sliding surface has a deep cut, seizure, uneven wear or is roughened.	-	-	Replace cylinder block kit
Retainer plate(160) Retainer holder(161)	· Sliding surface has a deep cut, seizure, uneven wear or is roughened.	-	-	Replace cylinder plate kit
Swash plate(162)	· Sliding surface has a deep cut, seizure, uneven wear or is roughened.	-	-	Replace swash plate steel ball
	· The swash plate has deep score and seizure in the face in contact with steel ball(174).	Depth of sphere 14.3	Depth of sphere 14.5	
Shaft(156)	· Sliding surface of oil seal(163) is deeply scored or roughened.	-	-	Replace shaft
	· Meshing gear teeth have been abnormally worn or broken.	-	-	
Valve(145)	· Sliding surface is deeply scored or roughened.	-	-	Replace base plate subassembly
	· The clearance between the valve and base plate(103) is large.	0.025	0.050	
Collar(142)	· Sliding surface is deeply scored or roughened.	-	-	Replace base plate subassembly
	· The clearance between the collar and valve(145) is large.	0.030	0.060	
Spring guide(144)	· Sliding surface is deeply scored or roughened.	-	-	Replace base plate subassembly
	· The clearance between the spring guide and valve(145) is large.	0.030	0.060	

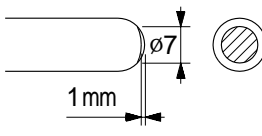
Part name	General view	Standard dimension	Recommended replacement value	Remedy
Free piston(136)	· The clearance between the piston and base plate(103) is large.	-	-	Replace valve subassembly
	· Sliding surface is deeply scored or roughened.	-	-	
Relief housing subassembly(122)	· Sliding surface of free piston is deeply scored or roughened.	-	-	Replace valve subassembly
Spring(107) Spring(111) Spring(118) Spring(126) Spring(150) Spring(169) Spring(183) Spring(194)	· Spring is deformed or broken excessively.	-	-	Replace spring
Brake piston(178) Friction plate(180)	· Sliding surface is deeply scored or roughened.	-	-	Replace brake piston Replace friction plate
Disc plate(181)	· Disc(Abrasive agent)is deeply scored or peeled off.	-	-	Replace disc plate
Roller bearing(165)	· Rolling surface has developed flaking or peeling.	-	-	Replace roller bearing
	· Rolling surface has blow marks.	-	-	
	· Rotation is abnormal. (Abnormal sound and unsmooth rotation)	-	-	
Piston subassembly (164)	· Sliding surface is deeply scored or roughened.	-	-	Replace piston case subassembly
	· The clearance between the piston and the casing is large.	0.020	0.040	
	· The shoe ball has a large gap.	0.5	1.0	
Steel ball(163)	· The contact surface of the steel ball with swash plate(162) is seized.	-	-	Replace swash plate steel ball
Plunger(105)	· Sliding surface is deeply scored or roughened.	-	-	Replace base plate subassembly
	· The clearance between the plunger and base plate(103) is large.	0.020	0.060	
Base plate(103)	· Sliding surface is deeply scored or roughened.	-	-	Replace base plate subassembly
	· Surface is so roughened that oil leak may occur.	-	-	

## 2) REDUCTION GEAR

Replace parts according to the standards of the below table : Handle parts with care so that too face and the sliding surface of bearings may not be scored. Do not reuse seals once used after disassembly, but replace all of them with new ones.

Part Name	Standard dimension	Recommended replacement value	Parts replacement standard
Holder A subassembly(301) Holder B subassembly(308) Holder C subassembly(315)	-	-	<ul style="list-style-type: none"> <li>· When gear teeth develop pitting or peeling.</li> <li>· When flaking occurs on the rolling surface of needle bearings, gear shafts and planetary gears.</li> <li>· Rotation of bearings is abnormal(Abnormal sound, unsmooth rotation, etc).</li> <li>· When gears have gap in their axial direction.</li> </ul>
Drive gear(323) Sun gear B(325) Sun gear C(327) Link gear(342)	-	-	<ul style="list-style-type: none"> <li>· When gear tooth face develops pitting or peeling.</li> </ul>
Planetary gear A(303) Planetary gear B(310) Planetary gear C(317)	-	-	<ul style="list-style-type: none"> <li>· When gear tooth develop pitting or peeling.</li> <li>· When the rolling surface of needle bearings develops pitting or peeling(Bore of gears).</li> </ul>
Needle bearing(304) Bar-shape roller(311) Bar-shape roller(318) Bar-shape roller(305) Bar-shape roller(312) Bar-shape roller(319) Floating bush(320)	-	-	<ul style="list-style-type: none"> <li>· When the needle and the rolling surface develop flaking and peeling.</li> <li>· When the needle and the rolling surface develop blow marks.</li> <li>· The rotation of bearings is unusual. (Abnormal sound, unsmooth rotation, etc.)</li> </ul>
Holder A(302) Holder B(309) Holder C(316)	-	-	<ul style="list-style-type: none"> <li>· Large gap is present between holder and gear shaft.</li> </ul>
Thrust plate(324)	2.0	1.9	
Thrust plate(346)	3.2 3.0 2.8 2.3 1.8	3.1 2.9 2.7 2.2 1.7	
Angular bearing(12)	-	-	<ul style="list-style-type: none"> <li>· When rotation is abnormal.(Abnormal sound, unsmooth rotation, etc)</li> </ul>
Floating seal(11)	-	-	<ul style="list-style-type: none"> <li>· When the sliding surface has such faults that may cause oil leakage.</li> </ul>

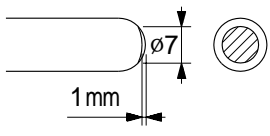
## 5. RCV LEVER

Maintenance check item	Criteria	Remark
Leakage	The valve is to be replaced when the leakage becomes more than 1000cc/m at neutral handle position, or more than 2000cc/m during operation.	Conditions : Primary pressure : 30kgf/cm <sup>2</sup> Oil viscosity : 23cSt
Spool	This is to be replaced when the sliding surface has worn more than 10μm, compared with the non-sliding surface.	The leakage at the left condition is estimated to be nearly equal to the above leakage.
Push rod	 <p>This is to be replaced when the top end has worn more than 1mm.</p>	
Play at operating section	The pin, shaft, and joint of the operating section are to be replaced when their plays become more than 2mm due to wears or so on.	When a play is due to looseness of a tightened section, adjust it.
Operation stability	When abnormal noises, hunting, primary pressure drop, etc. are generated during operation, and these cannot be remedied, referring to section 6 troubleshooting, replace the related parts.	

Notes 1. It is desirable to replace seal materials, such as O-rings, every disassembling. However, they may be reused, after being confirmed to be free of damage.

2. When loosening the hexagon socket head cap screw(125), replace the seal washers(121) without fail.

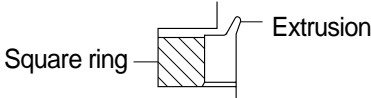
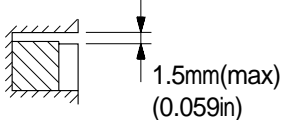
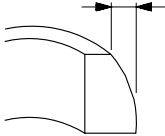
## 6. RCV PEDAL

Maintenance check item	Criteria	Remark
Leakage	The valve is to be replaced when the leakage effect to the system. For example, the primary pressure drop.	Conditions : Primary pressure : 30kgf/cm <sup>2</sup> Oil viscosity : 23cSt
Spool	This is to be replaced when the sliding surface has worn more than 10μm, compared with the non-sliding surface.	The leakage at the left condition is estimated to be nearly equal to the above leakage.
Push rod	 <p>This is to be replaced when the top end has worn more than 1mm.</p>	
Play at operating section	The pin, shaft, and joint of the operating section are to be replaced when their plays become more than 2mm due to wears or so on.	When a play is due to looseness of a tightened section, adjust it.
Operation stability	When abnormal noises, hunting, primary pressure drop, etc. are generated during operation, and these cannot be remedied, referring to section 6 troubleshooting, replace the related parts.	

Notes 1. It is desirable to replace seal materials, such as O-rings, every disassembling. However, they may be reused, after being confirmed to be free of damage.



## 7. TURNING JOINT

Part name		Maintenance standards	Remedy
Body, Stem	Sliding surface with sealing sections	Plating worn or peeled due to seizure or contamination	Replace
	Sliding surface between body and stem other than sealing section	• Worn abnormality or damaged more than 0.1mm (0.0039in) in depth due to seizure contamination	Replace
		• Damaged more than 0.1mm(0.0039in) in depth	Smooth with oilstone
	Sliding surface with thrust plate	• Worn more than 0.5mm(0.02in) or abnormality	Replace
		• Worn less than 0.5mm(0.02in)	Smooth
		• Damage due to seizure or contamination remediable within wear limit (0.5mm)(0.02in)	Smooth
Cover	Sliding surface with thrust plate	• Worn more than 0.5mm(0.02in) or abnormality	Replace
		• Worn less than 0.5mm (0.02in)	Smooth
		• Damage due to seizure or contamination remediable within wear limit (0.5mm)(0.02in)	
Seal set	-	<ul style="list-style-type: none"> <li>Extruded excessively from seal groove square ring</li> </ul> 	Replace
	-	<ul style="list-style-type: none"> <li>Slipper ring 1.5mm(0.059in) narrower than seal groove, or narrower than back ring</li> </ul> 	Replace
	-	<ul style="list-style-type: none"> <li>Worn more than 0.5mm(0.02in) ~ 1.5mm(MAX) (0.059in)</li> </ul> 	Replace

## 8. CYLINDER

Part name	Inspecting section	Inspection item	Remedy
Piston rod	• Neck of rod pin	• Presence of crack	• Replace
	• Weld on rod hub	• Presence of crack	• Replace
	• Stepped part to which piston is attached	• Presence of crack	• Replace
	• Threads	• Presence of crack	• Recondition or replace
	• Plated surface	• Plating is not worn off to base metal	• Replace or replate
		• Rust is not present on plating • Scratches are not present	• Replace or replate • Recondition, replate or replace
• Rod	• Wear of O.D.	• Recondition, replate or replace	
Cylinder tube	• Bushing at mounting part	• Wear of I.D.	• Replace
	• Weld on bottom	• Presence of crack	• Replace
	• Weld on head	• Presence of crack	• Replace
	• Weld on hub	• Presence of crack	• Replace
	• Tube interior	• Presence of faults	• Replace if oil leak is seen
	• Bushing at mounting part	• Wear on inner surface	• Replace
Gland	• Bushing	• Flaw on inner surface	• Replace if flaw is deeper than coating