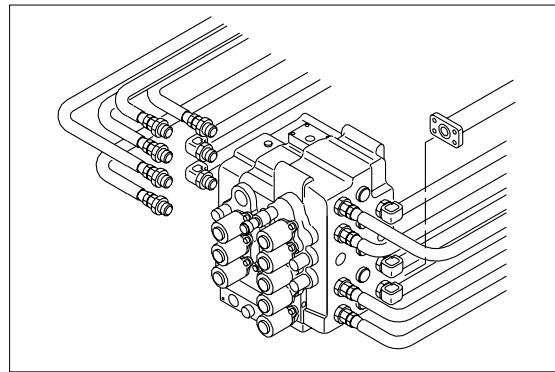


GROUP 4 MAIN CONTROL VALVE

1. REMOVAL AND INSTALL

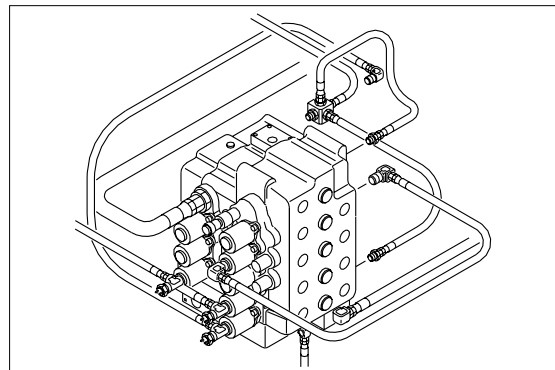
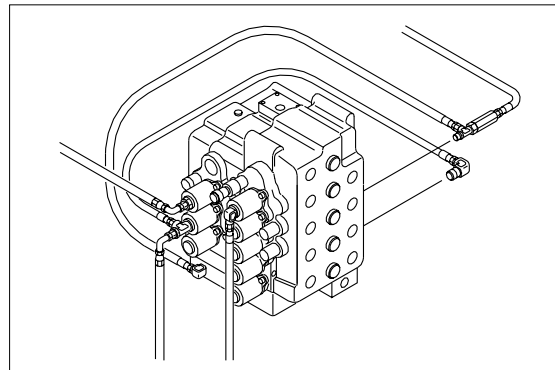
1) REMOVAL

- (1) Lower the work equipment to the ground and stop the engine.
- (2) Loosen the breather slowly to release the pressure inside the hydraulic tank.
 - ▲ Escaping fluid under pressure can penetrate the skin causing serious injury.
 - ※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.
- (3) Remove bolts and disconnect pipe.
- (4) Disconnect pilot line hoses.
- (5) Disconnect pilot piping.
- (6) Sling the control valve assembly and remove the control valve mounting bolt.
 - weight : 104kg
- (7) Remove the control valve assembly.
 - ※ When removing the control valve assembly, check that all the piping have been disconnected.

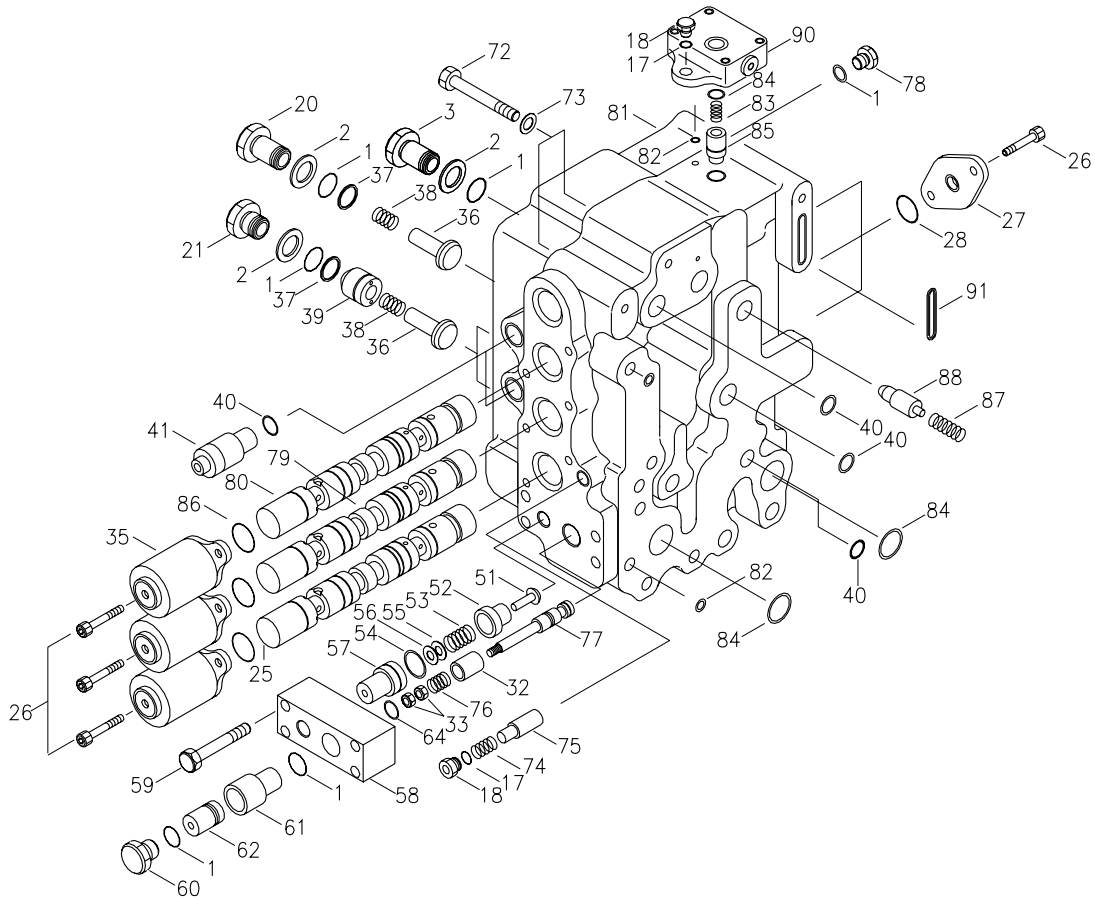


2) INSTALL

- (1) Carry out installation in the reverse order to removal
- (2) Bleed the air from below items.
 - ① Cylinder (boom, arm, bucket)
 - ② Swing motor
 - ③ Travel motor
 - ※ See each item removal and install
- (3) Confirmed the hydraulic oil level and recheck the hydraulic oil leak or not.

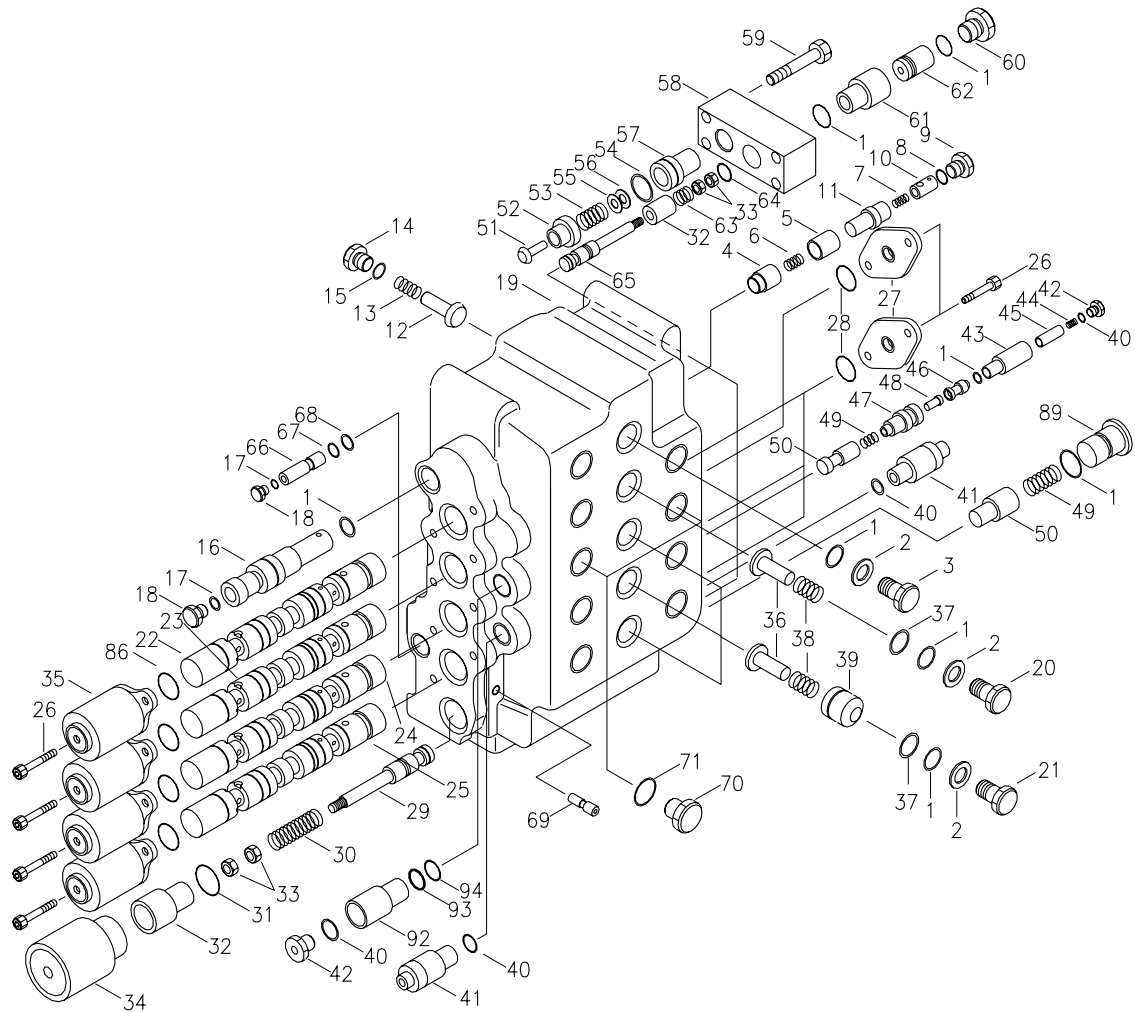


2. STRUCTURE (1/2)



1	O-ring	21	Cap	41	Over-load assy
2	Back-up ring	22	Plunger T assy	42	Cap
3	Cap	23	Plunger D assy	43	Cap
4	Check	24	Plunger A assy	44	Spring
5	Piston	25	Plunger M assy	45	Spring guide
6	Spring	26	Hex socket head bolt	46	Spool
7	Spring	27	Retainer	47	Sleeve
8	O-ring	28	O-ring	48	Piston
9	Cap	29	Spool	49	Spring
10	Piston	30	Spring	50	Check
11	Sleeve	31	O-ring	51	Poppet
12	Check	32	Spring guide	52	Sleeve
13	Spring	33	Hex nut	53	Spring
14	Cap	34	Cap	54	O-ring
15	O-ring	35	Cover	55	Shim
16	Main relief assy	36	Check	56	Shim
17	O-ring	37	Nylon chip	57	Spring guide
18	Cap	38	Spring	58	Cover
19	Housing	39	Check	59	Hex socket head bolt
20	Cap	40	O-ring	60	Cap

STRUCTURE (2/2)



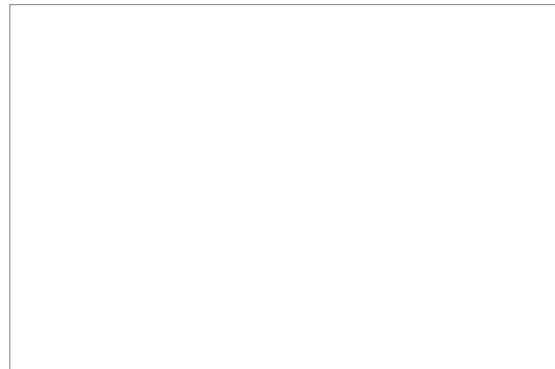
61	Cap	73	Spring washer	85	Poppet
62	Piston	74	Spring	86	O-ring
63	Spring	75	Check	87	Spring
64	O-ring	76	Spring	88	Check
65	Spool	77	Spool	89	Cap
66	Orifice	78	Cap	90	Cover assy
67	O-ring	79	Plunger C1 assy	91	O-ring
68	Back-up ring	80	Plunger B1 assy	92	Plug
69	Orifice	81	Housing	93	Back-up ring
70	Cap	82	O-ring	94	O-ring
71	O-ring	83	Spring		
72	Hex socket head bolt	84	O-ring		

3. DISASSEMBLY AND ASSEMBLY

1) PRECAUTION

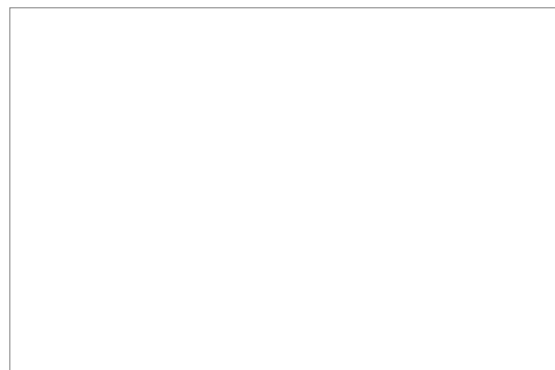
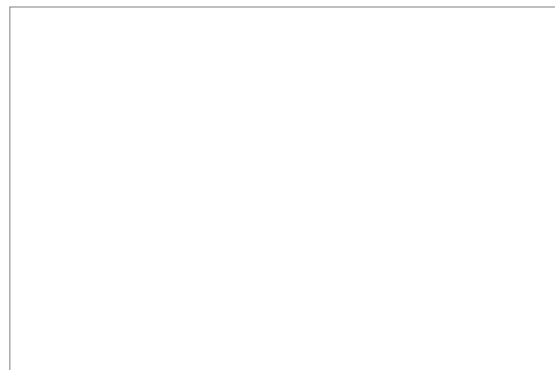
(1) Disassembly

- ① Handle the components carefully not to drop them or bump them with each other as they are made with precision.
- ② Do not force the work by hitting or twisting as burred or damaged component may not be assembled or result in oil leaked or low performance.
- ③ When disassembled, tag the components for identification so that they can be re-assembled correctly.
- ④ Once disassembled, O-rings and backup rings are usually not to be used again. (Remove them using a wire with its end made like a shoehorn. Be careful not to damaged the slot.)
- ⑤ If the components are left disassembled or half-disassembled, they may get rust from moisture or dust. If the work has to be interrupted, take measures to prevent rust and dust.



(2) Assembly

- ① Take the same precautions as for disassembly.
- ② When assembling the components, remove any metal chips or foreign objects and check them for any burrs or dents. Remove burrs and dents with oil-stone, if any.
- ③ O-rings and backup rings are to be replaced with new ones, as a rule.
- ④ When installing O-rings and backup rings, be careful not to damage them. (Apply a little amount of grease for smoothness.)
- ⑤ Tighten the bolts and caps with specified torque. (See "Disassembly /Assembly".)



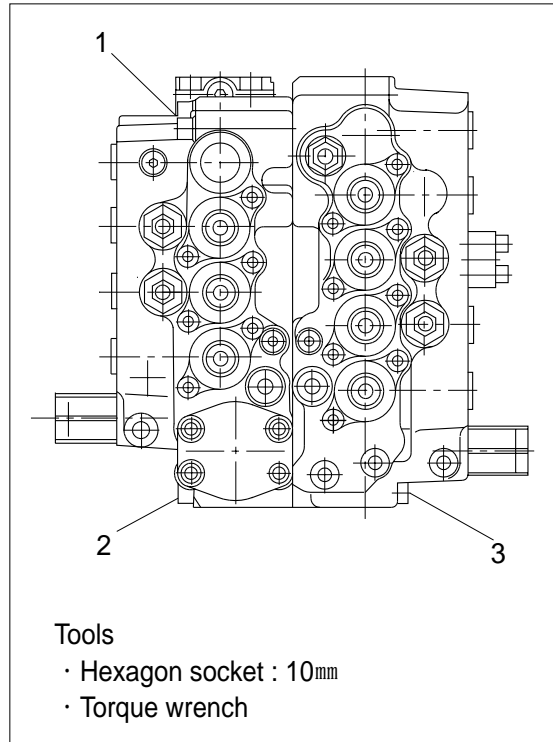
2) MOUNTING AND DISMOUNTING VALVES

(1) Disassembly

3-plunger valve can be removed by loosening socket bolts (1,2), while 4 plunger valve can be removed by loosening socket bolt (3).

(2) Assembly

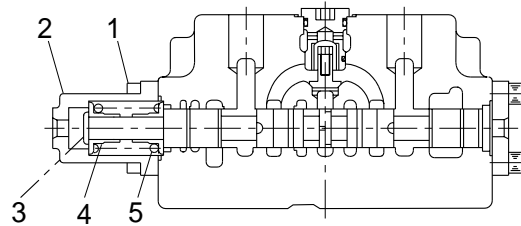
- ※ Valves should be mounted after making sure that all O-rings and check assy are placed on the assembling faces of 4-plunger valve and that check valve and spring are placed on assembling faces of 3-plunger valve.
- Place the valve assembly on plane surface.
- Tighten the socket bolts at specified torque after making sure that the assembly is leveled.
- Tightening torque.
10kgf · m (72.3lbf · ft)



3) OPERATING SECTION OF HYDRAULIC PACK

(1) Disassembling

- ① Loosen socket bolt (1) to remove cover (2).
- ② Pull the plunger out while holding the spring.
 - ※ Do not pull it out violently, but draw it out gently while making sure of its contact with HG hole.
- ③ Place the plunger between holders and loosen plunger cap (3) by using a vise.
- ④ Remove plunger cap (3), guide (4) and spring (5) in this order.



Tools

- Hexagon socket : 8mm
- Torque wrench

(2) Assembling

- ① Place the plunger between holders and clamp the holders with the vise.
- ② Mount guide (4), spring (5) and plunger cap (3) to the plunger.
- ③ Tighten plunger cap (3) at the specified torque.
Tightening torque : 6kgf · m (43.4lbf · ft)
- ④ Restore the plunger to the valve while holding the spring section.
 - ※ Insert the plunger into the valve hole while turning it slowly so that it is well aligned with the HG hole. In particular, be careful not to hit it against the first round corner.
- ⑤ Install cover (2) after making sure that O-ring is placed on the edge of the valve hole and tighten socket bolt (1) with the specified torque.
Tightening torque : 3kgf · m (21.7lbf · ft)

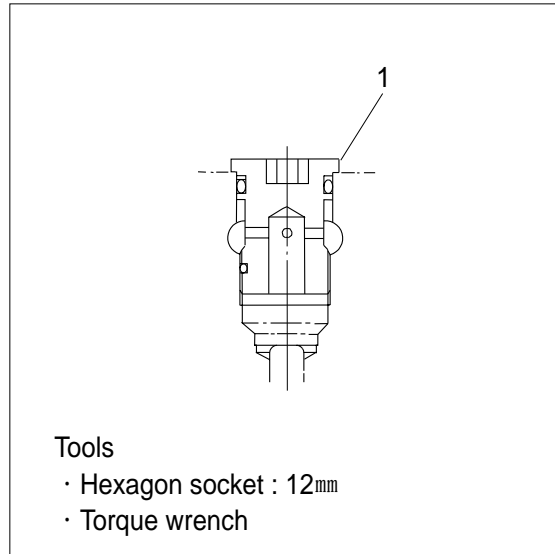
4) ORIFICE ASSEMBLY

(1) Disassembling

- ① Remove cap (1)

(2) Assembling

- ① Tighten cap (1) with the specified torque.
- ※ Be careful for the backup ring not to protrude.
- Tightening torque : 10kgf · m (72.3lbf · ft)



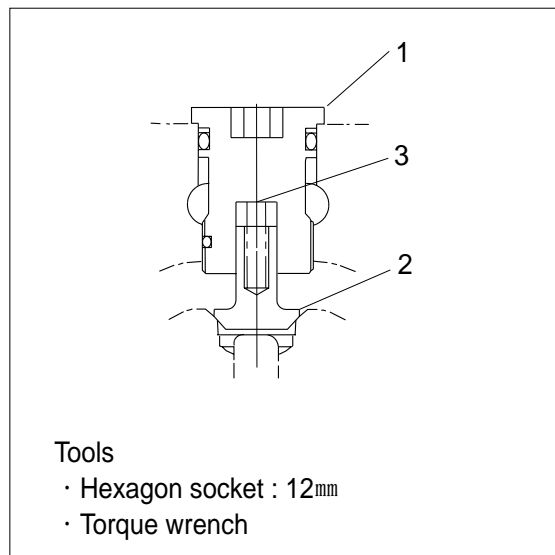
5) CHECK ASSEMBLY

(1) Disassembling

- ① Remove cap (1)
- ② Remove spring (2) and check valve (3).

(2) Assembling

- ① Mount check valve (3) and spring (2) to the valve housing.
 - ② Tighten cap (1) at the specified torque.
- ※ Be careful for the backup ring not to protrude.
- Tightening torque : 10kgf · m (72.3lbf · ft)



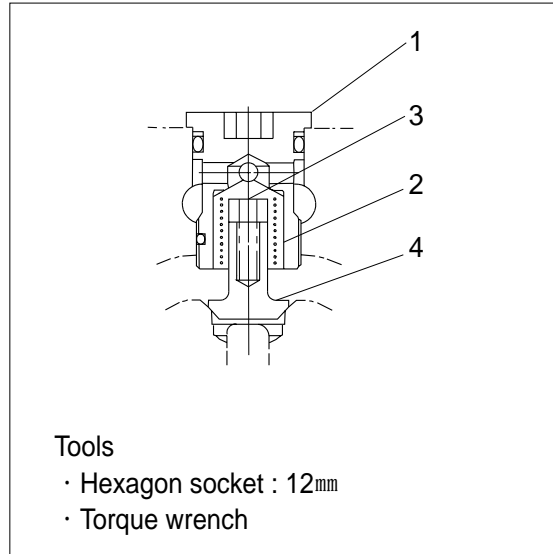
6) LOAD CHECK ASSEMBLY

(1) Disassembling

- ① Remove cap (1)
- ② Remove check valve (2), spring (3) and check valve (4).

(2) Assembling

- ① Mount check valve (4), spring (3) and check valve (2) to the valve housing.
 - ② Tighten cap (1) at the specified torque.
- ※ Be careful for the backup ring not to protrude.
Tightening torque : 10kgf · m (72.3lbf · ft)



7) MAIN RELIEF ASSEMBLY

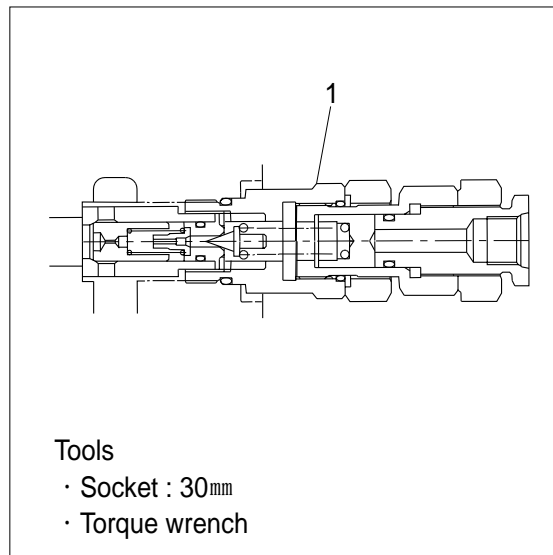
Relief assy is assembled into a single block as a cartridge. Do not disassemble the relief assembly as a rule.

(1) Disassembling

Remove the cartridge as it is while holding cap (1).

(2) Assembling

Install the cartridge and tighten cap (1) at the specified torque.
Tightening torque : 10kgf · m (72.3lbf · ft)



8) FOOT RELIEF ASSEMBLY

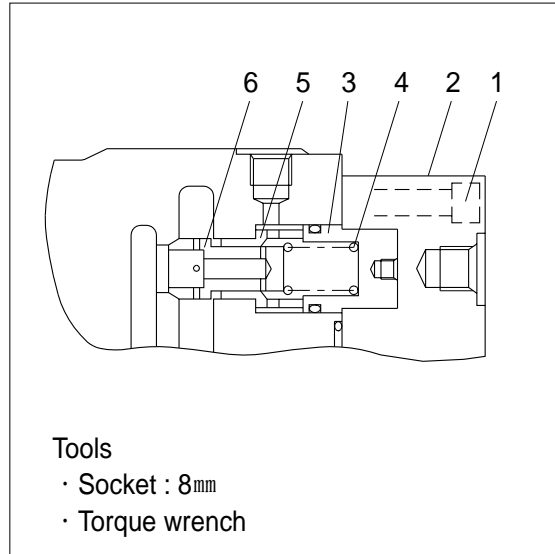
(1) Disassembling

- ① Loosen socket bolt(1) and remove cover(2).
- ② Remove spring seat(3) and spring(4).
- ③ Remove sleeve(5) and poppet(6).

(2) Assembling

Install in reverse order to removal.

Tightening torque : 5kgf · m (36.2lbf · ft)



9) RELIEF ASSEMBLY

Relief assembly is assembled into a single block as a cartridge. Do not disassemble the relief assembly as a rule.

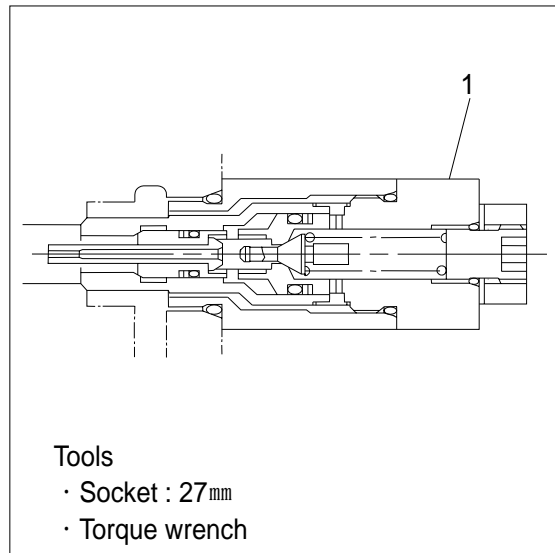
(1) Disassembling

Remove the cartridge as it is while holding cap (1).

(2) Assembling

Install the cartridge and tighten cap (1) at the specified torque.

Tightening torque : 4kgf · m (28.9lbf · ft)



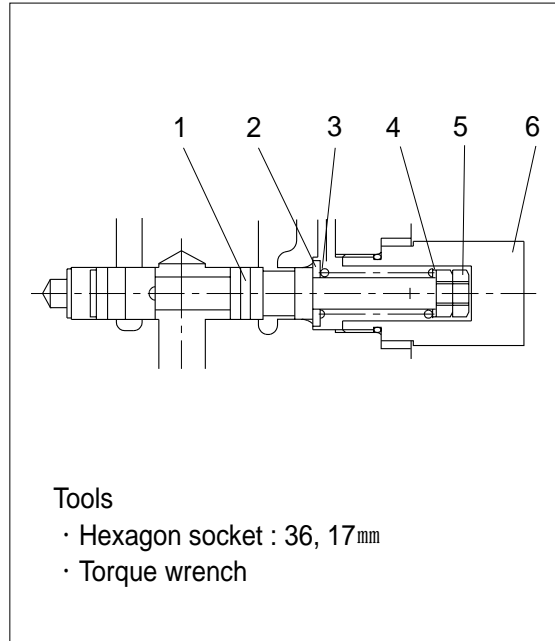
10) SELECTOR VALVE ASSEMBLY

(1) Disassembling

- ① Remove cap (6)
- ② Pull the spool out while holding. Torque wrench the spring.
- ③ Take the spool with a holder and clamp the latter with a vise.
- ④ Remove hexagon nut (5), washer (4), spring (3) and washer (2).

(2) Assembling

- ① Hold the spool with the holder and clamp the latter on the vise.
- ② Mount washer (2), spring (3) and washer (4) to spool (1).
- ③ Mount hexagonal nut (5) and tighten the outer hexagon nut at the specified torque. Tightening torque : 2.5kgf · m (18.1lb · ft)
- ④ Restore the spool while holding the spring.
- ⑤ Tighten cap (6) at the specified torque. Tightening torque : 10kgf · m (72.3lb · ft)



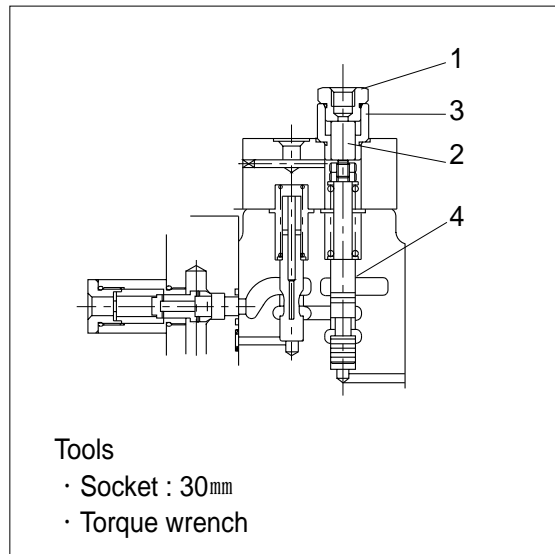
11) CENTER BYPASS SPOOL ASSEMBLY

(1) Disassembling

- ① Remove cap (1) to take piston (2) off.
- ② Remove cap (3) to take spool assy (4) off.

(2) Assembling

- ① Insert spool assembly (4) into the valve housing.
- ② Tighten cap (3) at the specified torque. Tightening torque : 6kgf · m (43.4lb · ft)
- ③ Insert piston (2) into cap (3). Tighten cap (1) with the specified torque. Tightening torque : 6kgf · m (43.4lb · ft)



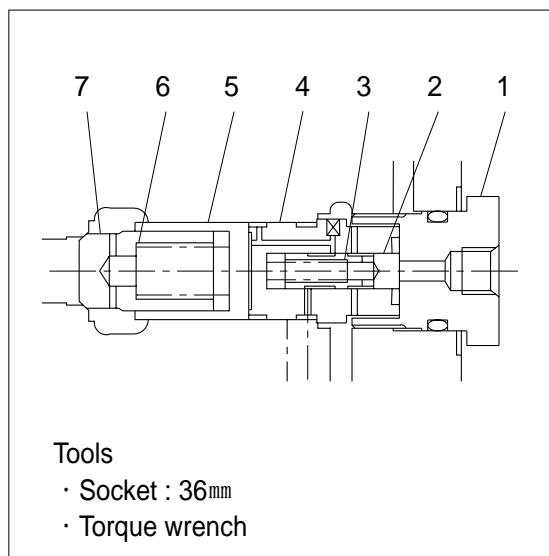
12) LOGIC CHECK ASSEMBLY

(1) Disassembling

- ① Remove cap (1) .
- ② Take off piston (2) and spring (3).
- ③ Extract sleeve (4) with a magnet or the like.
- ④ Take off piston (5), spring (6) and check valve (7).

(2) Assembling

- ① Mount check valve (7), spring (6) and piston (5) into the valve housing.
- ② Insert spring (3) and piston (2) into sleeve (4).
- ③ Mount sleeve (4) with spring (3) and piston (2) to the valve housing.
- ④ Tighten cap (1) at the specified torque.
Tightening torque : 10kgf · m (72.3lbf · ft)



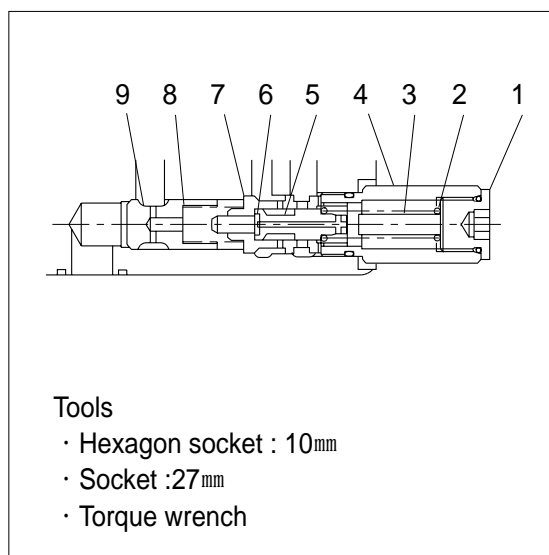
13) ARM REGENERATION

(1) Disassembling

- ① Remove cap (1) .
- ② Take off piston retainer (3) and spring (2).
- ③ Remove cap (4).
- ④ Take off spool (5), piston (6) and sleeve (7).
- ⑤ Take off spring (8) and check valve (9).

(2) Assembling

- ① Mount check valve (9) and spring (8) into the valve housing.
- ② Insert piston (6) and spool (5) into sleeve (7).
- ③ Mount sleeve (7) with piston (6) and spool (5) to the valve housing.
- ④ Tighten cap (4) at the specified torque.
Tightening torque : 6kgf · m (43.4lbf · ft)
Mount spring (2) and spring retainer (3) to the assembly.
Tighten cap (1) at the specified torque.
- ⑥ Tightening torque : 6kgf · m (43.4lbf · ft)



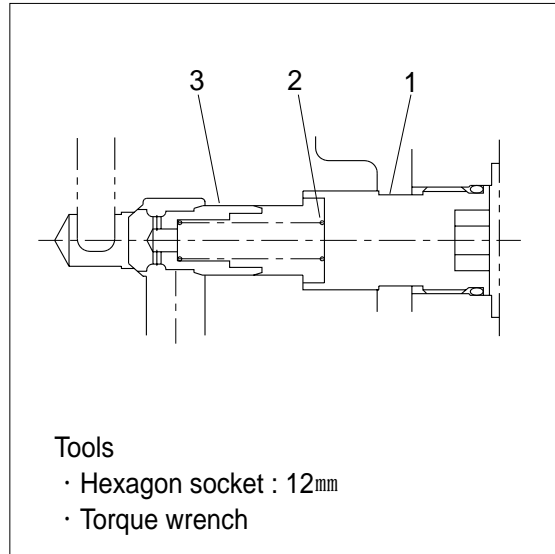
14) BUCKET FLOW SUMMATION CHECK

(1) Disassembling

- ① Remove cap (1) .
- ② Take off spring (2) and check valve (3).

(2) Assembling

- ① Mount check valve (3) and spring (2) to the valve housing.
- ② Tighten cap (1) at the specified torque.
Tightening torque : 10kgf · m (72.3lbf · ft)



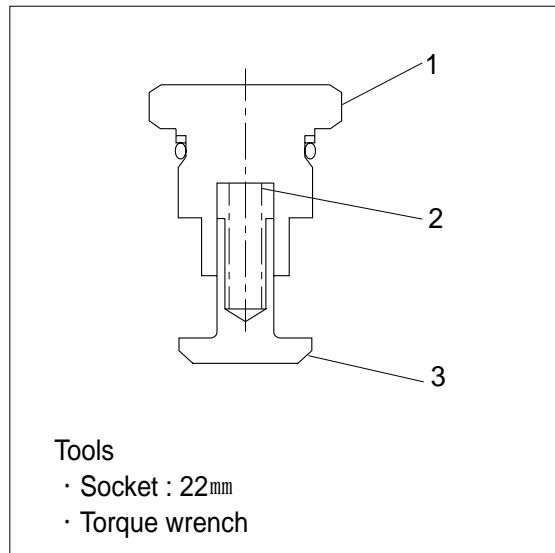
15) CHECK ASSEMBLY(4-plunger valve assembling face)

(1) Disassembling

- ① Remove cap (1) .
- ② Take off spring (2) and check valve (3).

(2) Assembling

- ① Mount check valve (3) and spring (2) to the valve housing.
- ② Tighten cap (1) at the specified torque.
Tightening torque : 4kgf · m (28.9lbf · ft)



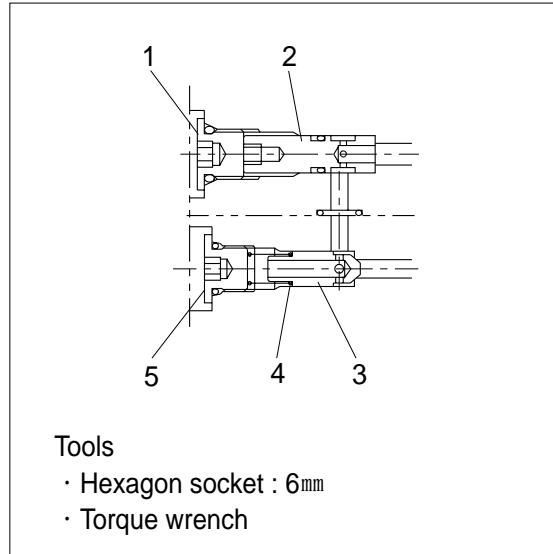
16) INTERNAL PARALLEL CIRCUIT

(1) Disassembling

- ① Remove cap (1) for 4-plunger valve.
- ② Screw M5 thread in the end extracting.
Torque wrench tap of orifice (2) and extract orifice (2).
- ③ Remove cap (5) for 3-plunger valve.
- ④ Take off spring (4) and check valve (3).

(2) Assembling

- ① Mount check valve (3) for 3-plunger valve and spring (4).
- ② Tighten cap (5) at the specified torque.
Tightening torque : 3kgf · m (21.7lbf · ft)
- ③ Mount orifice (2) to 4-plunger valve.
- ④ Tighten cap (1) at the specified torque.
Tightening torque : 3kgf · m (21.7lbf · ft)



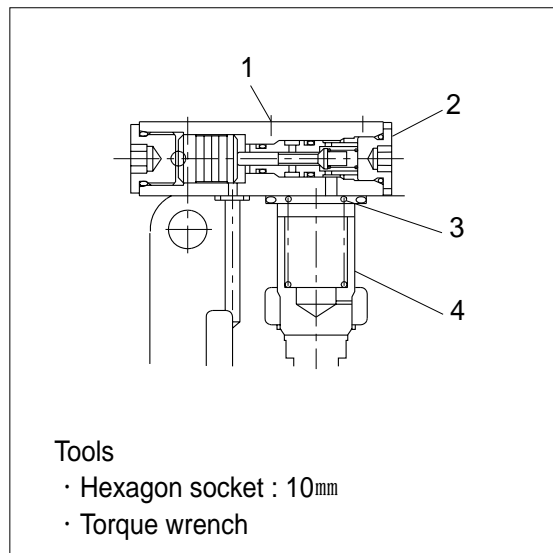
17) LOAD HOLDING VALVE

(1) Disassembling (basic unit)

- ① Loosen socket bolt (1) to remove cover assembly (2).
- ② Take off spring (3) and check valve (4).

(2) Assembling (basic unit)

- ① Mount check valve (4) and spring (3) to the valve housing.
- ② Mount cover assembly (2) to the valve housing and tighten socket bolt (1) at the specified torque.
Tightening torque : 10kgf · m (72.3lbf · ft)



(3) Disassembling (cover assembly)

- ① Remove cap (5).
 - ② Take off spring (6) and check valve (7).
 - ③ Remove cap (8).
 - ④ Take off piston (9).
 - ⑤ Remove cap (10).
 - ⑥ Extract spring (11) and check valve (12).
 - ⑦ Push sleeve (13) out with a rod or the like through the hole of cap (8).
- ※ Be careful not to damage the guideway of the sleeve.

(4) Assembling (cover assembly)

- ① Mount sleeve (13) to the cover.
- ② Mount spring (11) with check valve (12) to the cover.
- ③ Tighten cap (10) at the specified torque.
Tightening torque : 5kgf · m (36.2lbf · ft)
- ④ Insert piston (9) into the cover.
- ⑤ Tighten cap (8) at the specified torque.
Tightening torque : 6kgf · m (43.4lbf · ft)
- ⑥ Mount check valve (7) and spring (6).
- ⑦ Tighten cap (5) at the specified torque.
Tightening torque : 5kgf · m (36.2lbf · ft)

(5) Assembly/disassembly

Put the plunger between holders and clamp them by a vise after degreasing the plunger and holders as a special tool.

