SECTION 2 STRUCTURE AND FUNCTION

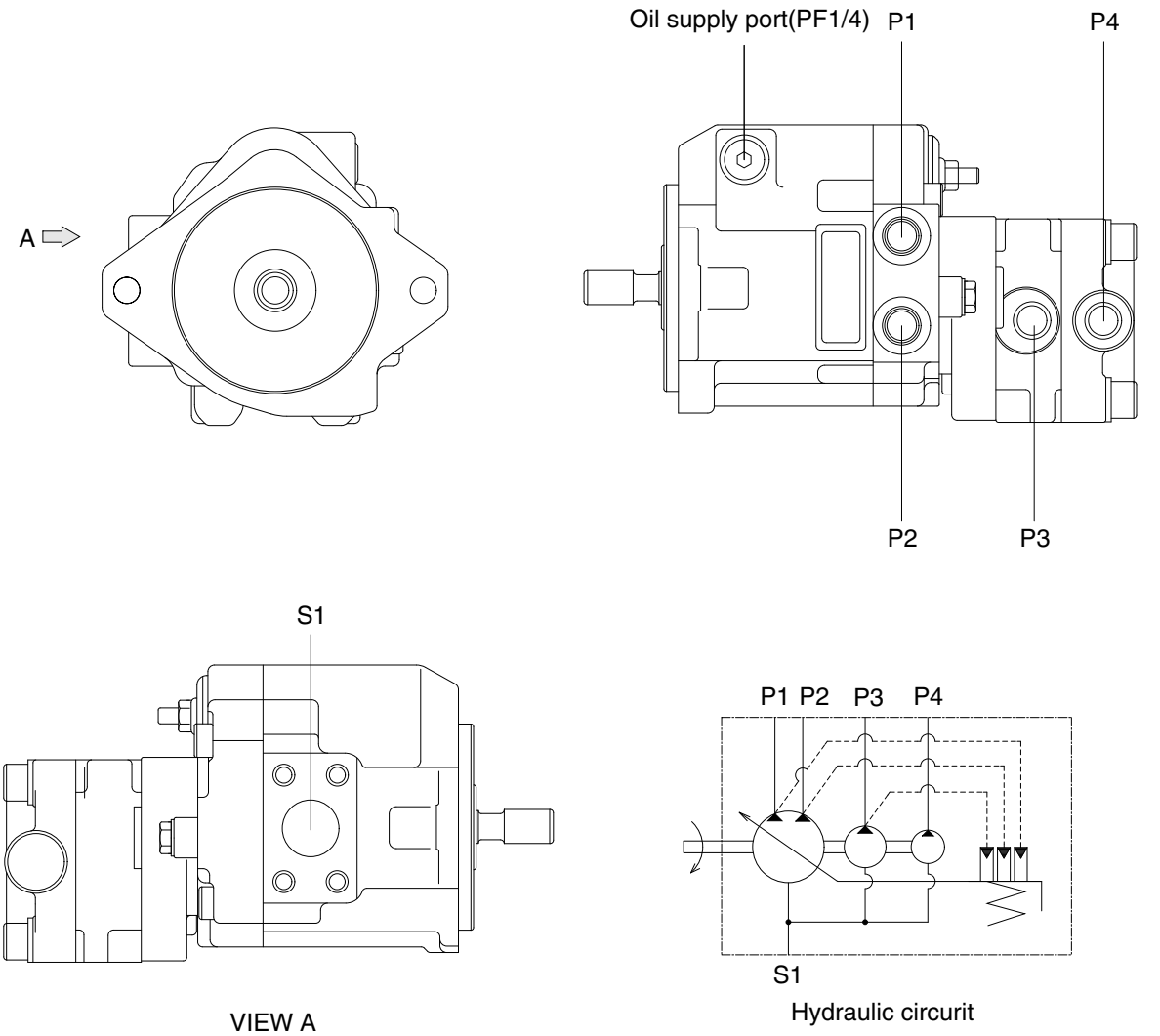
GROUP 1 HYDRAULIC PUMP

1. GENERAL

This is a variable displacement double-piston pump for discharge with equal displacements from one cylinder block. This pump is so compact as to appear a single pump though this is actually a double pump.

Because this pump has one swash plate, the tilting angle is the same for two pumps. Tilting of the pump changes in response to the total pressure of P1 + P2. Namely, the output is controlled to the constant value so that the relationship between the discharge pressure and flow rate Q becomes constant, (P1 + P2) * Q =Constant.

The third pump and pilot pump can be connected to the same shaft via a coupling.

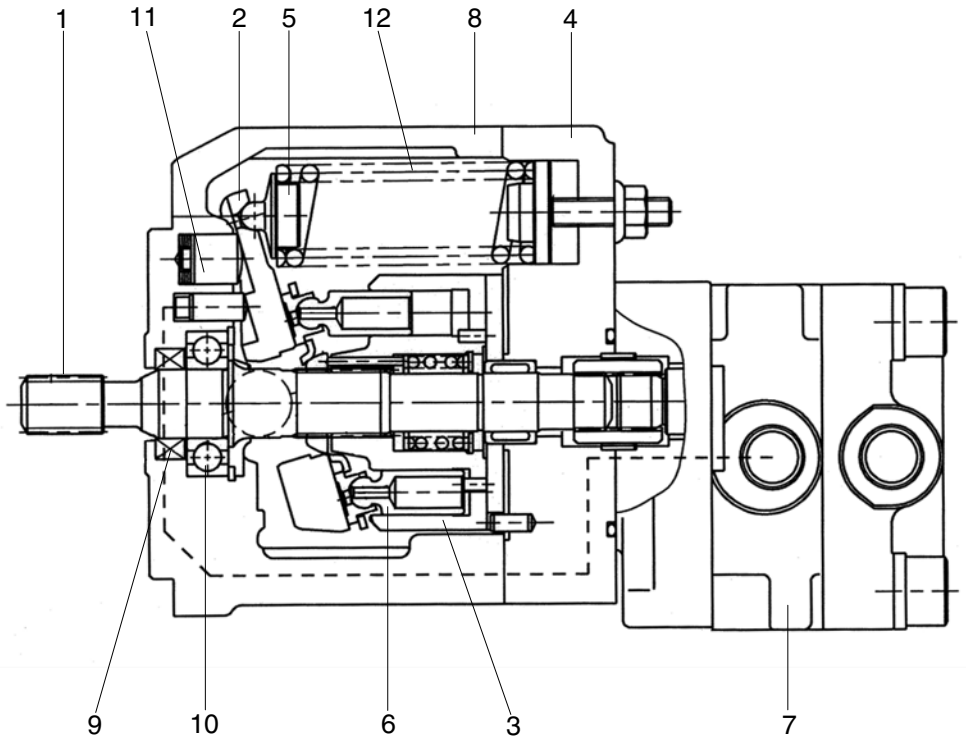


17AZ2MP01

Description of the ports

Port	Port name	Port size
S1	Suction port	SAE 1
P1, P2, P3, P4	Discharge port	PF 3/8

2. MAJOR COMPONENTS AND FUNCTIONS



17Z9A2MP02

1	Drive shaft assembly	7	Gear pump
2	Swash plate assembly	8	Body
3	Cylinder barrel	9	Oil seal
4	Port plate assembly	10	Bearing
5	Spring holder assembly	11	Stopper pin assembly
6	Piston	12	Spring

This is a variable displacement double-piston pump for discharge with two equal displacements from one cylinder block. Because this is one cylinder barrel, there is only one suction port.

The oil is divided into two equal flows by the control plate in the cover and directed to two discharge ports provided in the cover.

The discharge pressure directed to the piston tilts the hanger by overcoming the spring force.

Since the piston stroke changes according to the tilting angle of the hanger, the flow can be changed.

The simultaneous tilting angle constant-output control method is employed.

The pilot pump can be connected to the same shaft via a coupling.

1) PRINCIPLE OF OPERATION

(1) Function of pump

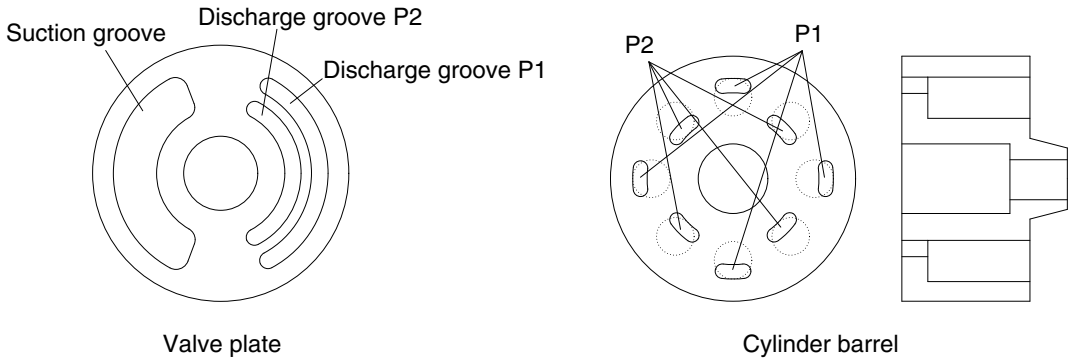


Figure 1 Working principle of PVD pump

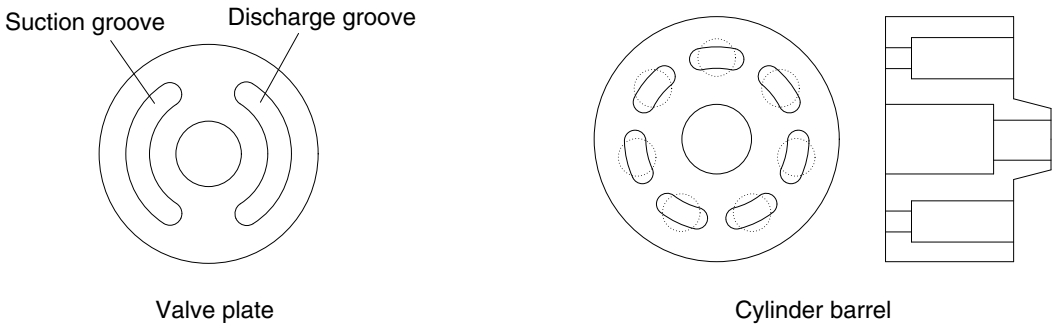


Figure 2 Working principle of Conventional type

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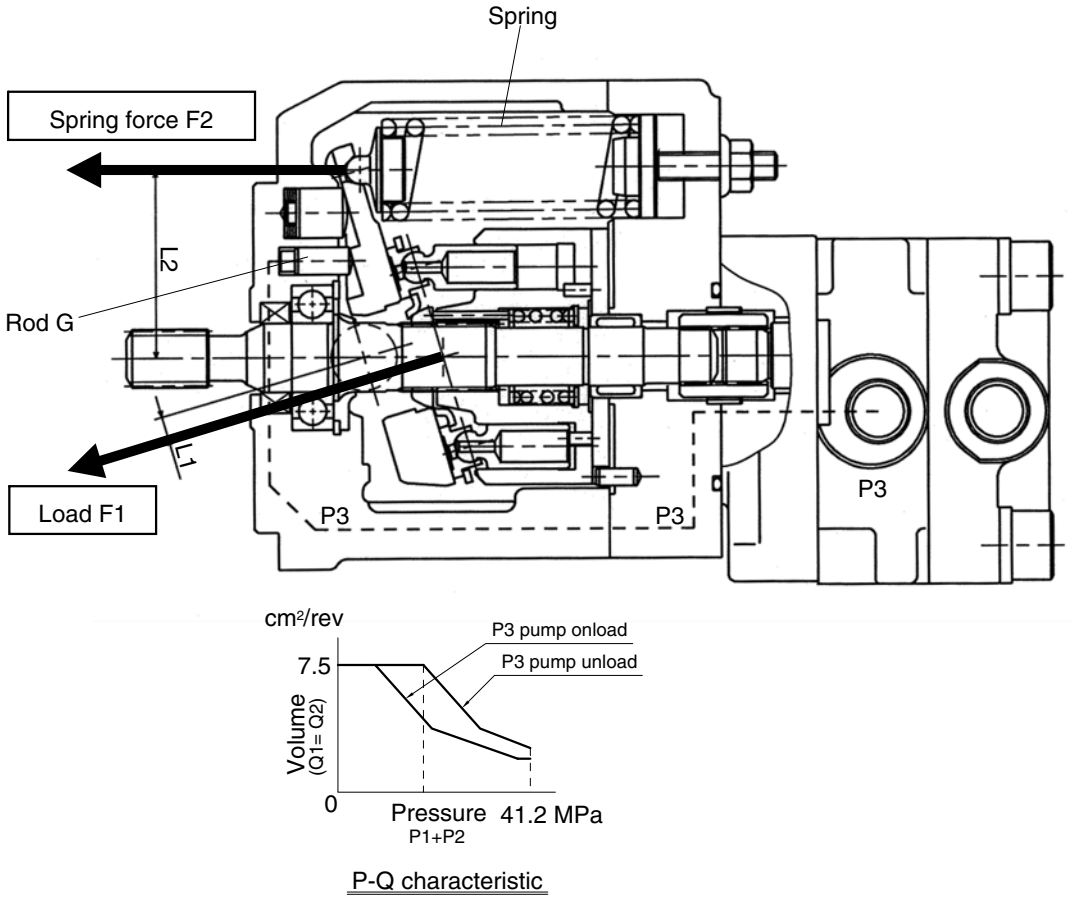
This pump adopts a new method using even numbered pistons to make functions of two same volume pumps available in one casing of a swash plate type variable volume piston pump.

Conventional valve plate has one suction groove and one discharge groove respectively as shown in figure 2. But this method adopts one common suction groove and two discharge grooves on the outer side (P1) and the inner side (P2) as shown in figure 1, the piston room in the cylinder barrel opens to either the outer side (P1) or the inner side (P2) discharge groove of the valve plate alternately, and the discharges are performed independently on the inner side and the outer side.

Since this model has even numbered pistons, same No of pistons open to the outer side and the inner side of the valve plate. All pistons are of same swash plate, so the discharges from the outer side (P1) and the inner side (P2) are equal.

Also, since only one swash plate is used, the discharges from P1 and P2 ports changes equally when the swash plate angle of rake changes in variable controls. So, there is no difference between the two discharges.

2) CONTROL FUNCTIONS



P-Q characteristic

17AZ2MP04

(1) Constant horse power variable structure

The pump output flow rate is variable depending on an angle of the swash plate which is controlled according to the pump output pressure. This control enables the pump consumption horse power to be sustained at the maximum. The tilt point of the swash plate is the balls located behind the swash plate. The load F1 from the pistons is in the direction shown in the illustration and generates a clockwise moment against the swash plate. Against this force the spring (force F2) is located in the opposite direction to keep the horse power constant and set at the appointed load. As the pressure increases, the above clockwise moment increases, and when it overcomes the counter-clockwise moment created by the spring force, the spring is sagged and the swash plate angle gets smaller. Then the output flow rate is reduced to keep the horse power constant.
This prevents engine stall and the engine horse power can be utilized at the maximum.

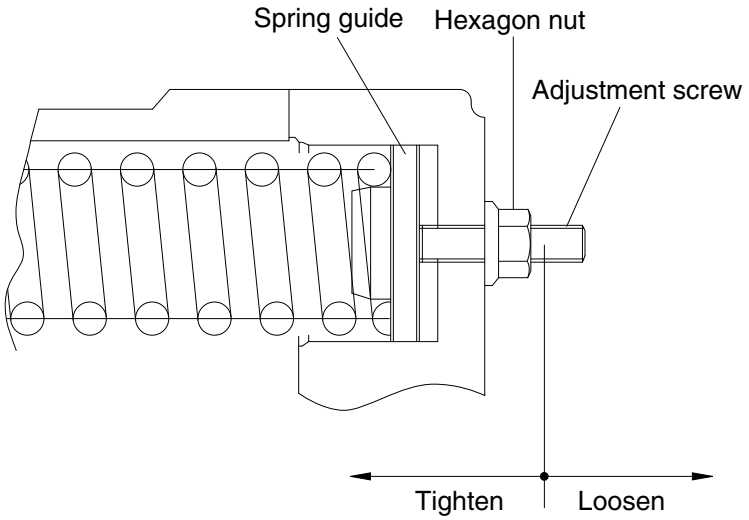
(2) Power shift mode (Reduced horse power control by P3 pressure)

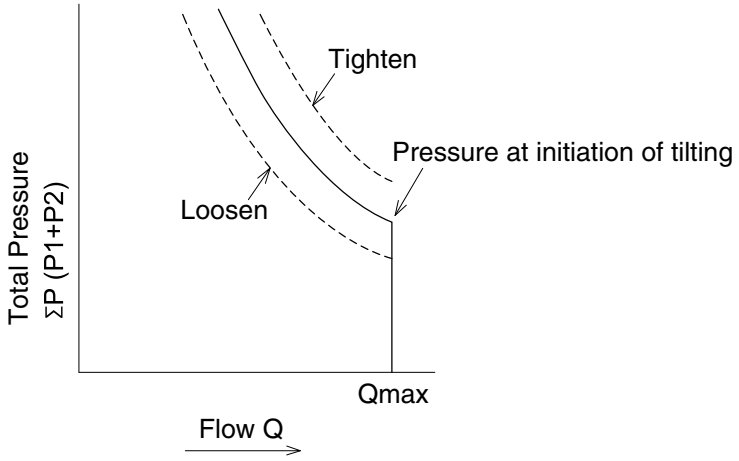
This control keeps the maximum value of the pump consumption horse power including the third pump (gear pump) constant. When the P3 (gear pump) pressure acts on the rod G, a clockwise moment proportion to the pressure acts on the swash plate and the P-Q characteristic shifts so that the total pump consumption horse power including the gear pump horse power is kept constant.

3) CONTROL / ADJUSTMENT PROCEDURE

(1) Loosen the hexagonal nut.

(2) Tighten or loosen the adjusting screw to set the power shifting line.

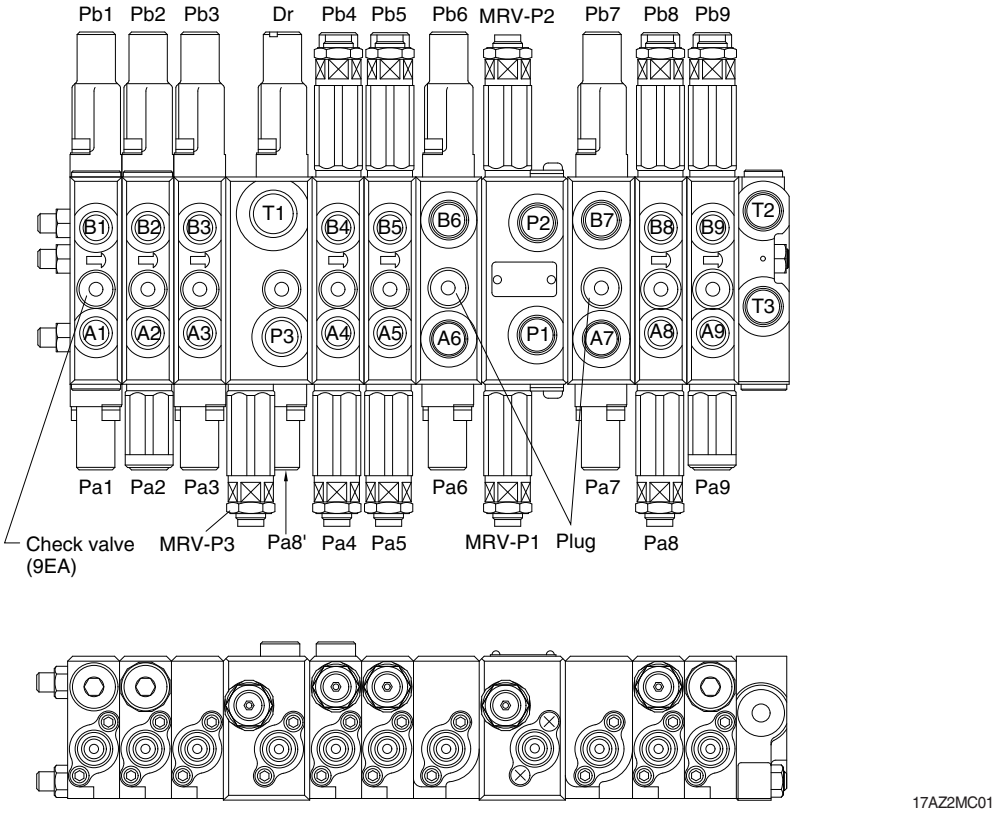




17Z9A2MP07

GROUP 2 MAIN CONTROL VALVE

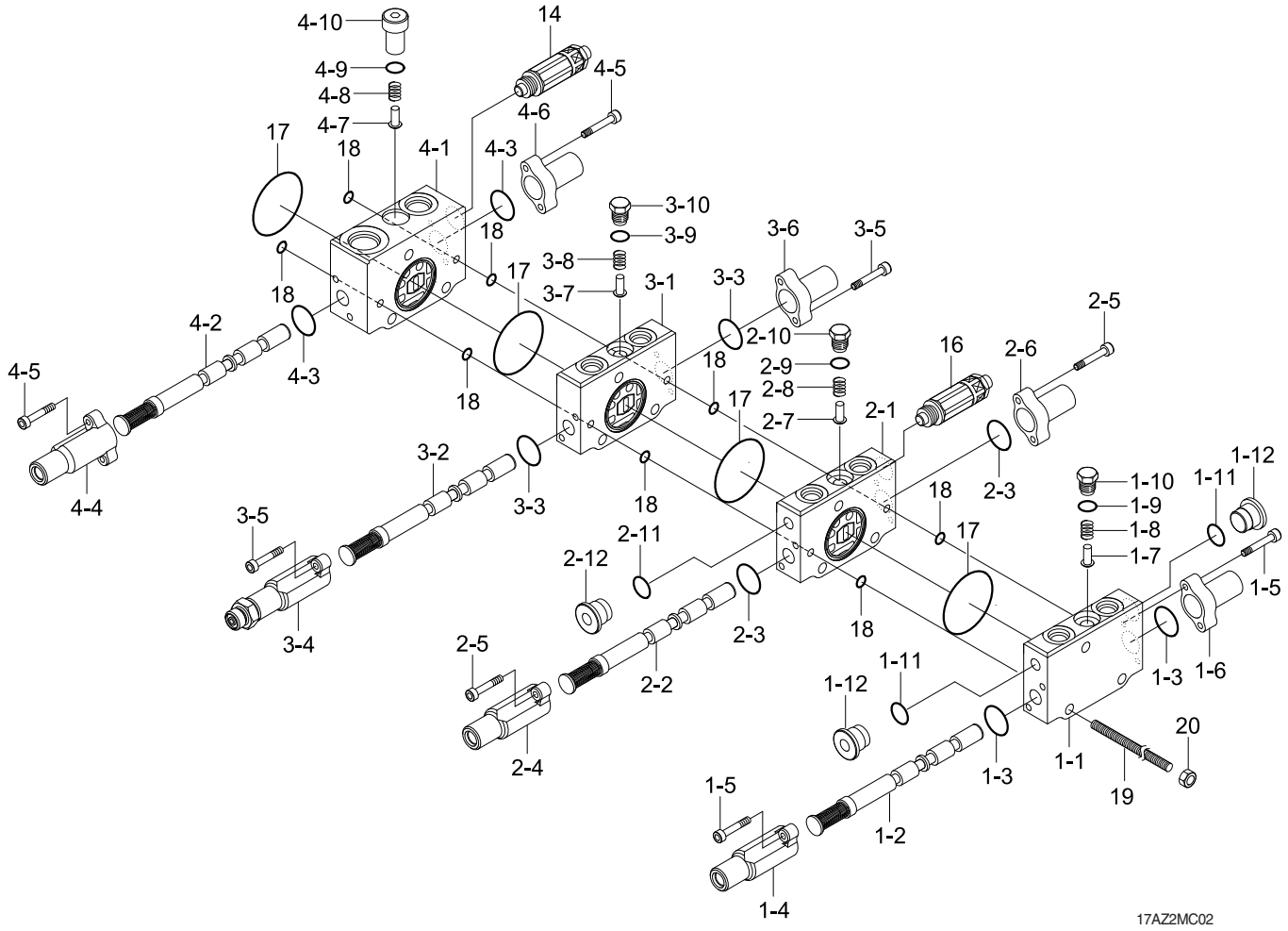
1. OUTLINE



Mark	Port name	Port size	Tightening torque
T1	Tank return port	PF 1/2	6~7 kgf · m
A6	Travel [RH/RR] port	PF 3/8	4.0~5.0 kgf · m
B6	Travel [RH/FW] port		
A7	Travel [LH/RR] port		
B7	Travel [LH/FW] port		
P1	P1 pump port		
P2	P2 pump port		
P3	P3 pump port		
T2	Tank return port		
T3	Tank return port		
A1	Dozer	PF 1/4	2.5~3.0 kgf · m
B1	Dozer		
A2	Boom swing (RH) port		
B2	Boom swing (LH) port		
A3	Swing (LH) port		
B3	Swing (RH) port		
A4	Option port		
B4	Option port		
A5	Arm out port		
B5	Arm in port		
A8	Boom up port		

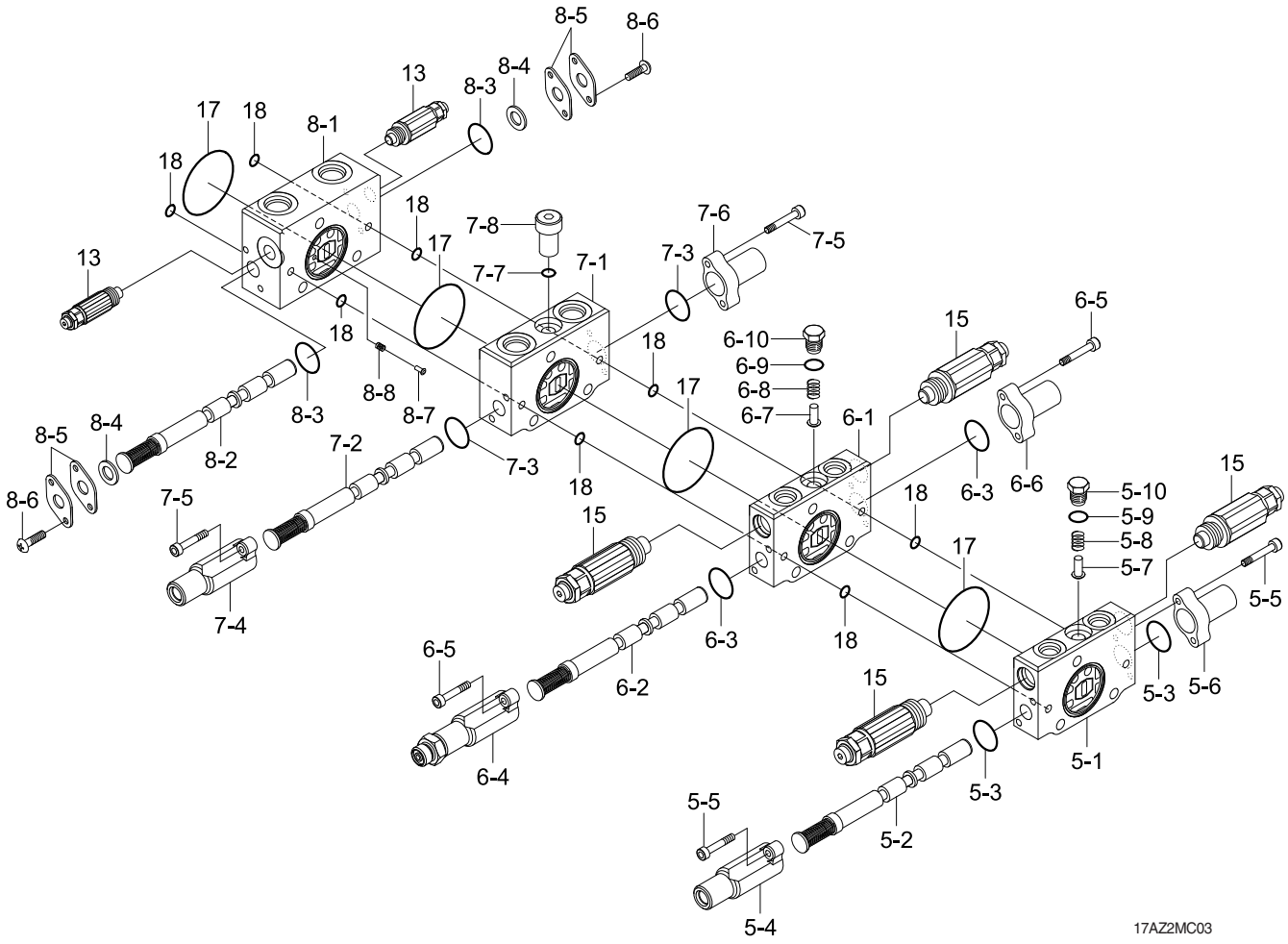
Mark	Port name	Port size	Tightening torque
B8	Boom down port	PF 1/4	2.5~3.0 kgf · m
A9	Bucket out port		
B9	Bucket in port		
Pa1	Dozer down pilot port	PF 1/8	1.0~1.5 kgf · m
Pb1	Dozer up pilot port		
Pa2	Boom swing (RH) pilot port		
Pb2	Boom swing (LH) pilot port		
Pa3	Swing (RH) pilot port		
Pb3	Swing (LH) pilot port		
Pa5	Arm out pilot port		
Pb5	Arm in pilot port		
Pa6	Travel [RH/RR] pilot port		
Pb6	Travel [RH/FW] pilot port		
Pa7	Travel [LH/RR] pilot port		
Pb7	Travel [LH/FW] pilot port		
Pa8	Boom up pilot port		
Pb8	Boom down pilot port		
Pa9	Bucket out pilot port		
Pb9	Bucket in pilot port		
Pa8'	Boom connecting pilot port		
Dr	Travel drain port		

2. STRUCTURE (1/3)



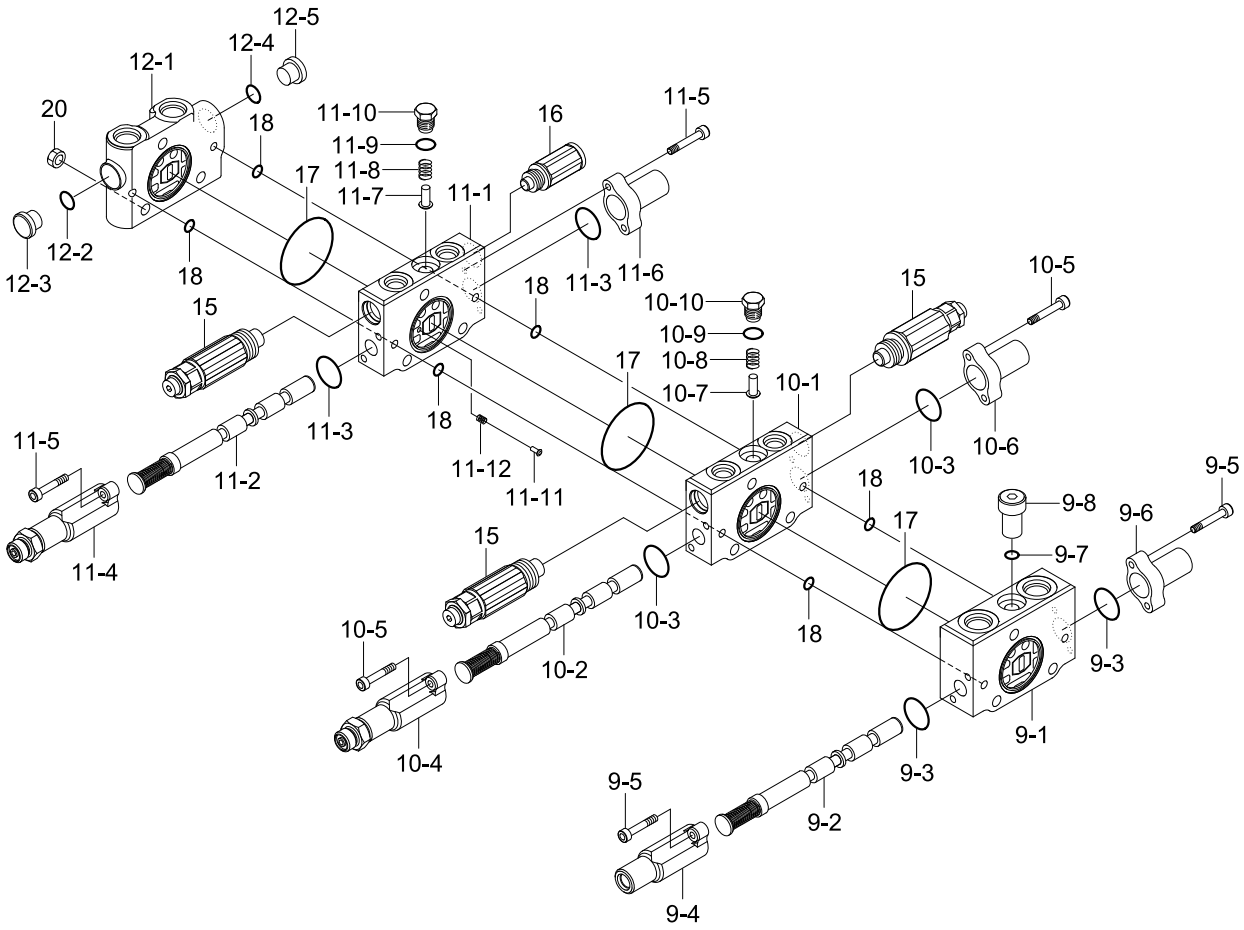
1	Dozer work body	2-5	Hex socket bolt w/washer	3-10	Check valve plug
1-1	Work body	2-6	Pilot cover	4	Connecting body
1-2	Dozer spool assy	2-7	Poppet	4-1	Work body
1-3	O-ring	2-8	Spring	4-2	Connecting spool assy
1-4	Pilot cover	2-9	O-ring	4-3	O-ring
1-5	Hex socket bolt w/washer	2-10	Check valve plug	4-4	Pilot cover
1-6	Pilot cover	2-11	O-ring	4-5	Hex socket bolt w/washer
1-7	Poppet	2-12	Plug	4-6	Pilot cover
1-8	Spring	3	Swing work body	4-7	Poppet
1-9	O-ring	3-1	Work body	4-8	Spring
1-10	Check valve plug	3-2	Swing spool assy	4-9	O-ring
1-11	O-ring	3-3	O-ring	4-10	Check valve plug
1-12	Plug	3-4	Cover	14	Relief valve assy
2	Boom swing work body	3-5	Hex socket bolt	16	Anticavitation valve assy
2-1	Work body	3-6	Pilot cover	17	O-ring
2-2	Boom swing spool assy	3-7	Poppet	18	O-ring
2-3	O-ring	3-8	Spring	19	Tie bolt
2-4	Pilot cover	3-9	O-ring	20	Hex nut

STRUCTURE (2/3)



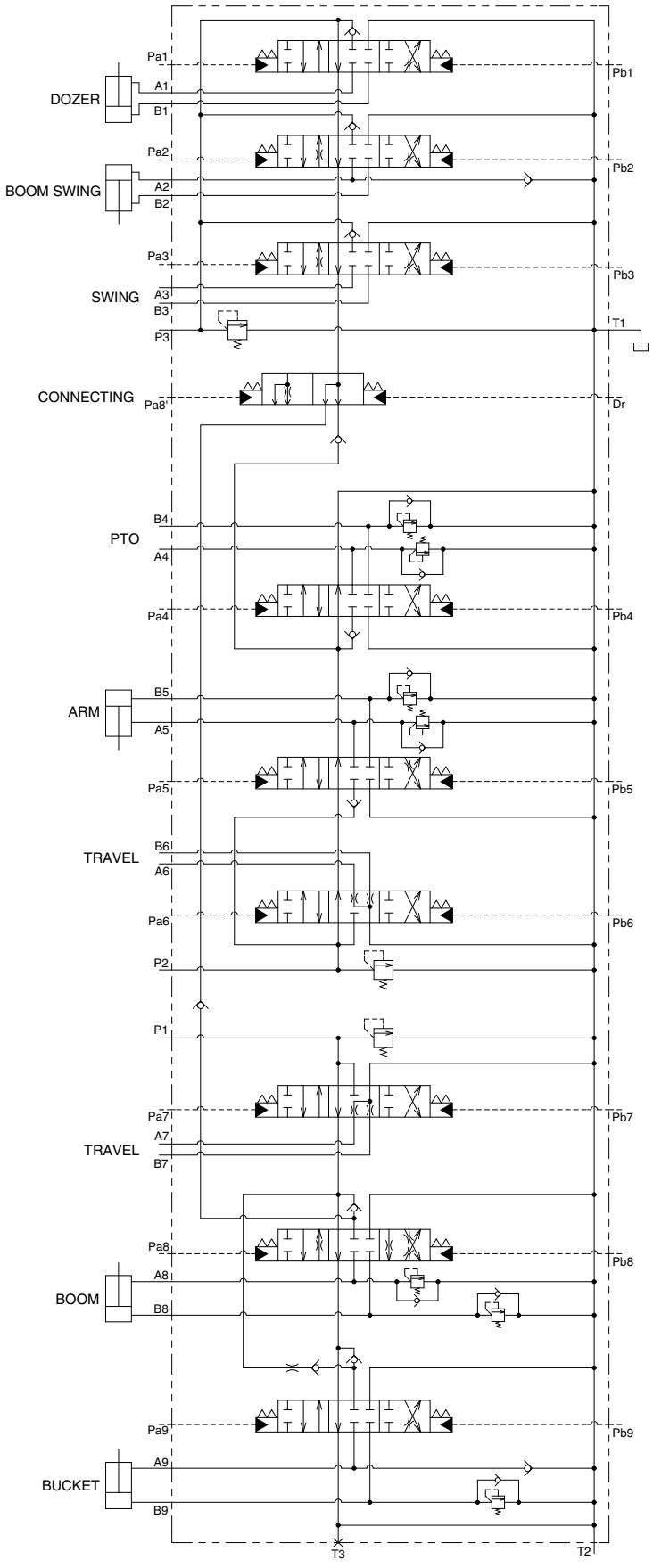
5	PTO work body	6-4	Pilot cover	7-8	Plug
5-1	Work body	6-5	Hex socket bolt w/washer	8	Inlet work body
5-2	Spool assy	6-6	Pilot cover	8-1	Work body
5-3	O-ring	6-7	Poppet	8-2	Spool
5-4	Pilot cover	6-8	Poppet	8-3	O-ring
5-5	Hex socket bolt w/washer	6-9	O-ring	8-4	Seat plate
5-6	Pilot cover	6-10	Check valve plug	8-5	Seat plate
5-7	Poppet	7	Travel work body	8-6	Cross recessed head screws
5-8	Spring	7-1	Work body	8-7	Poppet
5-9	O-ring	7-2	Travel spool assy	8-8	Spring
5-10	Check valve plug	7-3	O-ring	13	Relief valve assy
6	Arm work body	7-4	Pilot cover	15	Overload relief valve assy
6-1	Work body	7-5	Hex socket bolt w/washer	17	O-ring
6-2	Arm spool assy	7-6	Pilot cover	18	O-ring
6-3	O-ring	7-7	O-ring		

STRUCTURE (3/3)



9	Travel work body	10-6	Pilot cover	11-10	Check valve plug
9-1	Work body	10-7	Poppet	11-11	Poppet
9-2	Travel spool assy	10-8	Spring	11-12	Spring
9-3	O-ring	10-9	O-ring	12	Outlet work body
9-4	Pilot cover	10-10	Check valve plug	12-1	Work body
9-5	Bolt	11	Bucket work body	12-2	O-ring
9-6	Pilot cover	11-1	Work body	12-3	Plug
9-7	O-ring	11-2	Bucket spool assy	12-4	O-ring
9-8	Plug	11-3	O-ring	12-5	Plug
10	Boom work body	11-4	Pilot cover	15	Overload relief valve assy
10-1	Work body	11-5	Bolt	16	Anticavitation valve assy
10-2	Boom spool assy	11-6	Pilot cover	17	O-ring
10-3	O-ring	11-7	Poppet	18	O-ring
10-4	Pilot cover	11-8	Spring	20	Hex nut
10-5	Bolt	11-9	O-ring		

3. HYDRAULIC CIRCUIT



17AZ2MC05

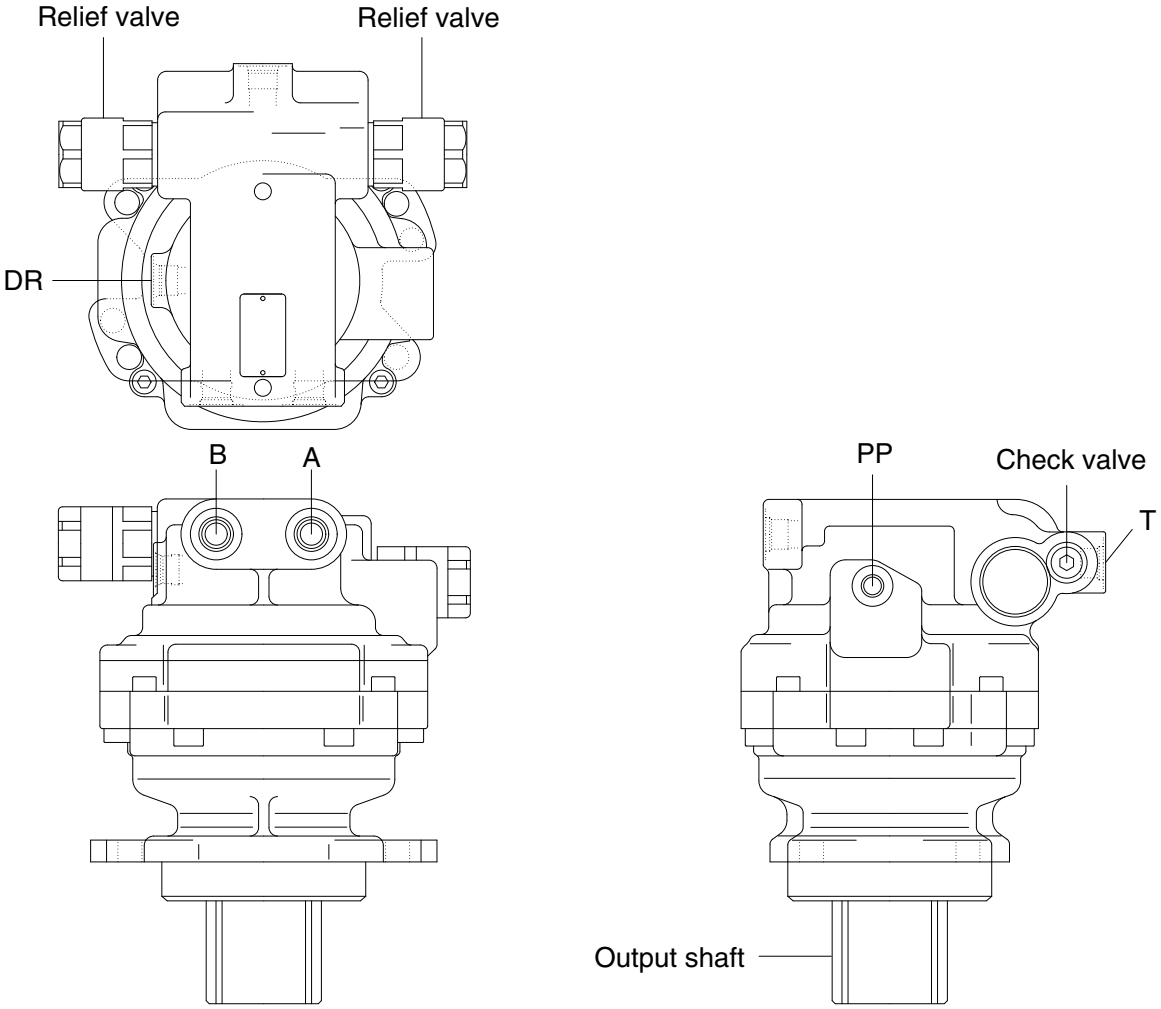
GROUP 3 SWING DEVICE

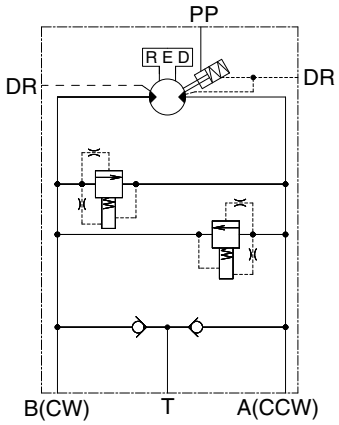
1. STRUCTURE

Swing device consists swing motor and swing reduction gear.

1) SWING MOTOR

Swing motor include mechanical relief valve, make up valve and check valve.



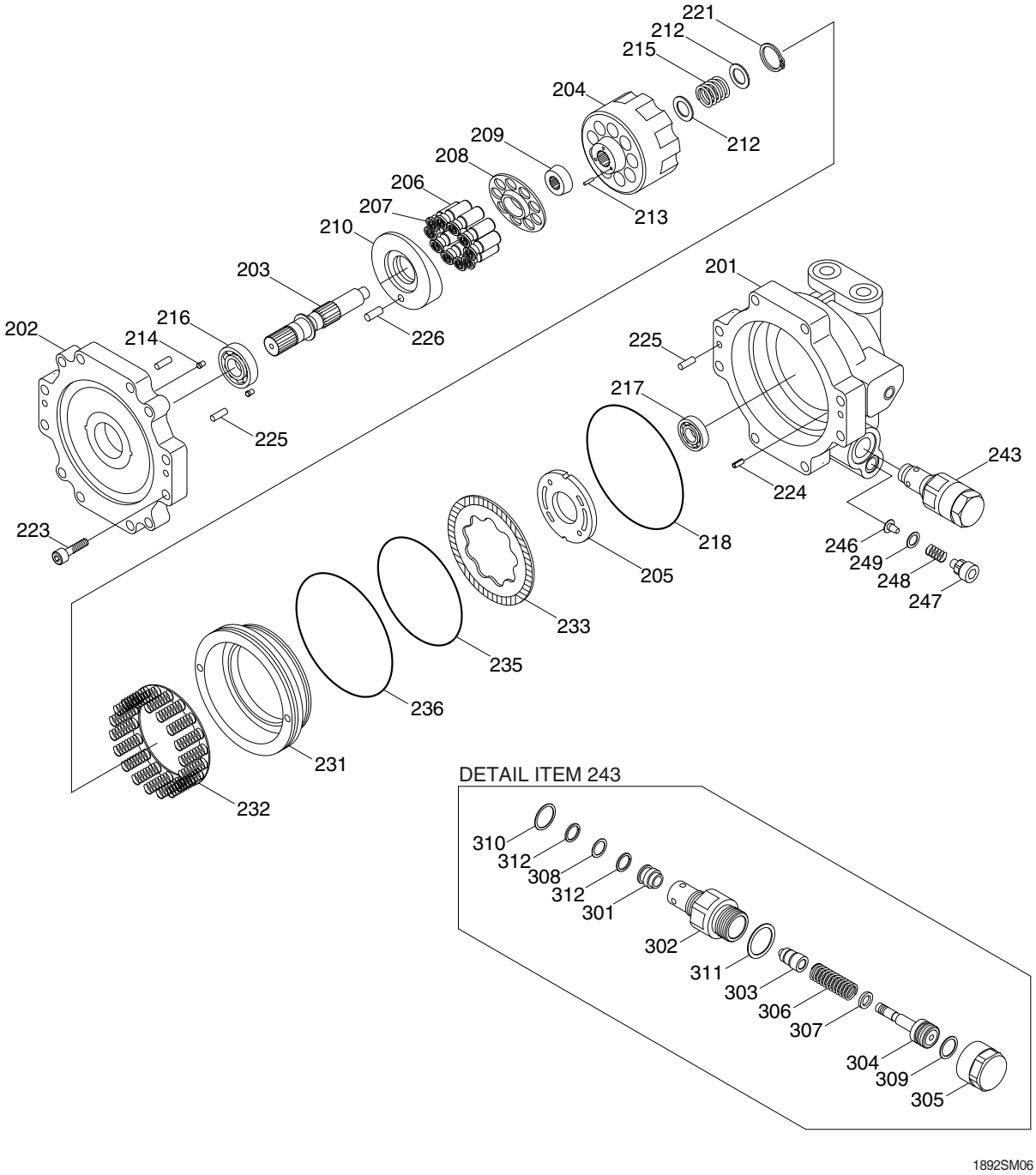


Hydraulic Circuit

17AZ2SM01

Port	Port name	Port size
A	Main port	PF 3/8
B	Main port	PF 3/8
DR	Drain port	PF 3/8
PP	Parking brake port	PF 1/4
T	Make up port	PF 3/8

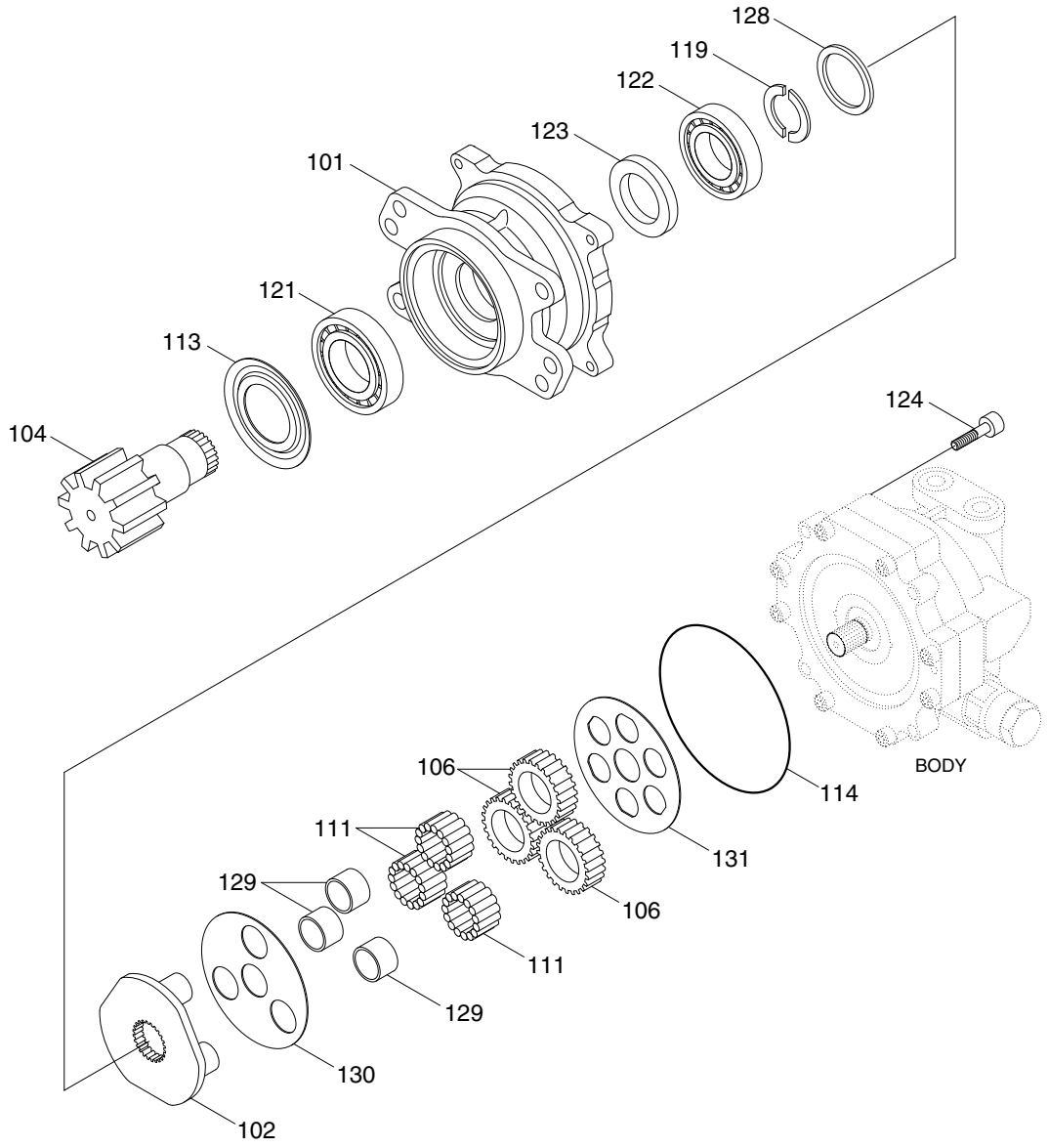
2) COMPONENTS (1/2)



1892SM06

201	Body	213	Pin	231	Brake piston	302	Retainer
202	Plate	214	Filter	232	Spring assy	303	Poppet
203	Shaft	215	Spring C	233	Disk plate	304	Piston
204	Cylinder barrel	216	Bearing	235	O-ring	305	Cap
205	Valve plate	217	Bearing	236	O-ring	306	Spring
206	Piston	218	O-ring	243	Relief valve assy	307	Spacer
207	Shoe	221	Snap ring	246	Check valve	308	O-ring
208	Shoe holder	223	Screw	247	Plug	309	O-ring
209	Barrel holder	224	Spring pin	248	Spring	310	O-ring
210	Swash plate	225	Pin	249	O-ring	311	O-ring
212	Retainer	226	Pin	301	Seat	312	Back up-ring

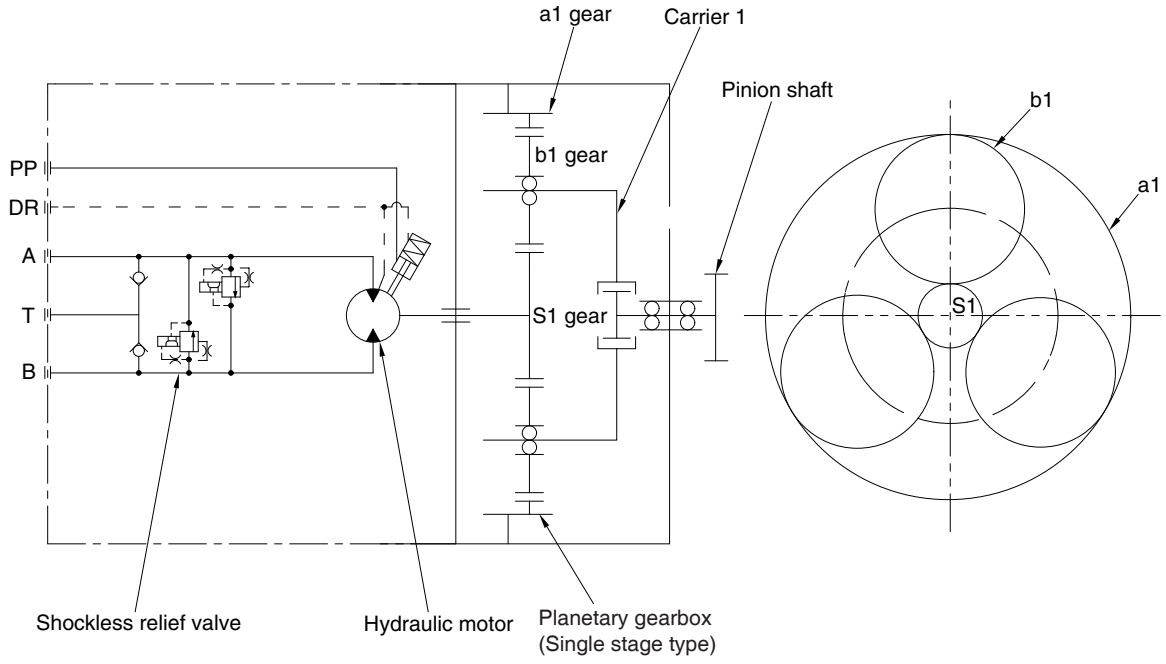
COMPONENTS (2/2)



1892SM08

101	Body	114	O-ring	128	Ring
102	Carrier 1	119	Preload collar	129	Ring 1
104	Pinion shaft	121	Bearing	130	Thrust plate 1
106	Gear B1	122	Bearing	131	Thrust plate 2
111	Needle	123	Oil seal		
113	Seal ring	124	Screw		

2. OPERATION PRINCIPLE



1892SM02

3. OPERATION

The swing motor consists of a planetary gear speed reducer, a hydraulic motor and the hydraulic valves.

1) REDUCTION GEAR SECTION

(1) Function

The speed reducer of swing motor is a simple planetary gear type with single stage. The high output speed of the hydraulic motor is reduced to low speed with high torque and obtaining the pinion shaft rotation.

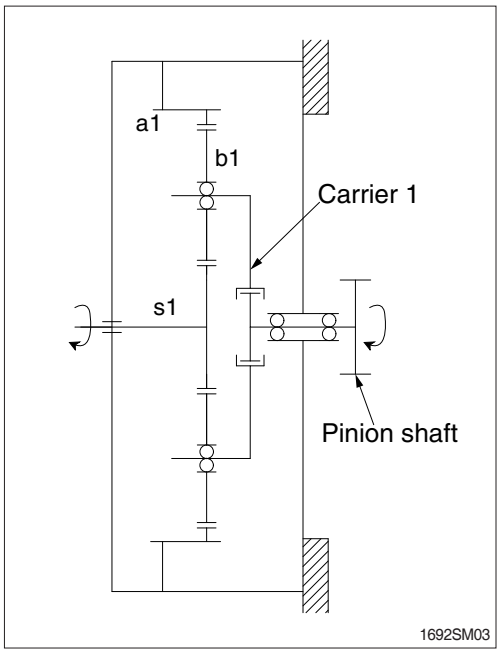
(2) Operation

The s1 gear is attached to the hydraulic motor shaft, and the s1 output speed is reduced between the gears (s1, b1, a1).
This reduced output speed is transmitted to the pinion shaft, and drives the machine.

The gear ratio of single stages simple planetary speed reducer is calculated using the following formula.

$$R = \frac{Zs1}{Zs1+Za1}$$

※ Z ** : Number of gear teeth.



2) HYDRAULIC MOTOR SECTION

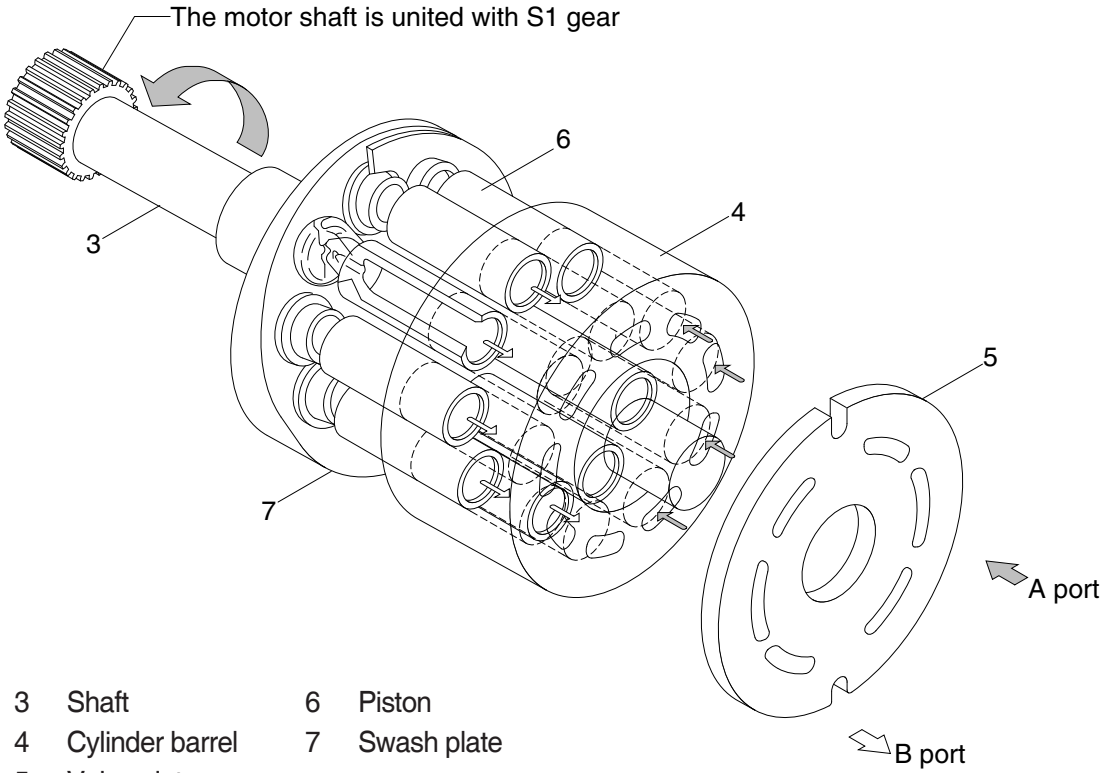
(1) Function

This hydraulic motor is an axial piston type, and changes the hydraulic energy supplied from the pump to the rotary motion.

(2) Structure

Through a hydraulic valve, the pressurized oil is supplied to the valve plate (5). When the pressurized oil is supplied to the A port, this pressurized oil pushes the piston (6) in the cylinder barrel (4). This pushing force is changed to the rotational power by the swash plate (7) and transmitted to the shaft (3) which is connected to the cylinder barrel (4) with the spline. The return flow from the cylinder port is going out through the B port of the valve plate (5).

To reverse rotation, pressurized oil is supplied to the B port and returning oil exits through the A port.



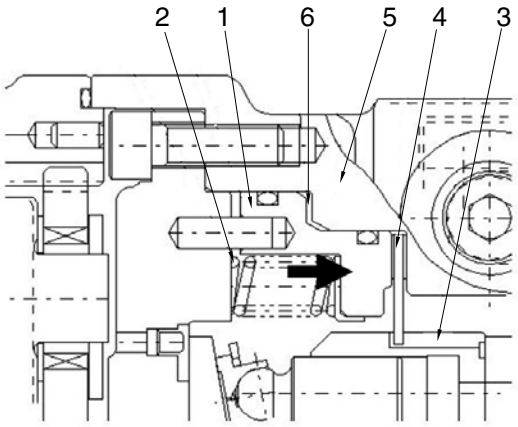
3	Shaft	6	Piston
4	Cylinder barrel	7	Swash plate
5	Valve plate		

1692SM04

(3) Parking brake

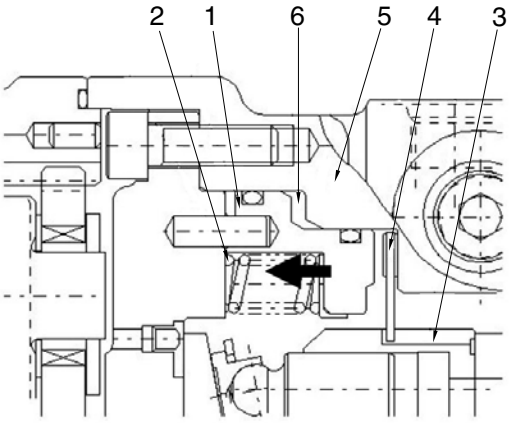
The parking brake fixes the output shaft of hydraulic motor mechanically while the swing motor is stopped.

When brake releasing pressure is not supplied, the brake piston (1) is pressed in the direction (shown as arrow in figure A) by the spring (2). Then the disk plate (4) which is fixed to the cylinder barrel (3) is held between the body (5) and the brake piston (1). As a result, with the friction of these parts, the cylinder barrel (3) and the hydraulic motor are unable to rotate.(figure A)



At the brake erleasing pressure OFF

Figure A



At the brake erleasing pressure ON

Figure B

1892SM07

When brake releasing pressure is supplied, the oil is lead to chamber (6) shown in figure B.

Then the brake piston (1) is moved to the direction (shown as arrow in figure B) against the force of spring (2). As a result, the disk plate (4) is released from the friction, and the cylinder barrel (3) can be rotated.(figure B)

3) HYDRAULIC VALVE SECTION

(1) Shockless relief valve

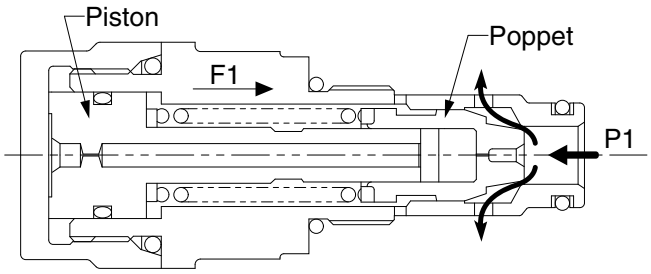
The shockless relief valve consists of the direct relief valve (poppet) and the piston for changing the spring force with two stages.

When the hydraulic motor is stopped, even after closing IN and OUT port of the hydraulic motor, the motor tries to run with inertia. Motor works as like a pump, and the pressure (brake pressure) is made on the OUT port side. The shockless relief valve releases this brake pressure with two stages of operation. This makes the shock smooth, and prevents the motor being damaged.

It also makes the start of the motor smooth.

① First stage

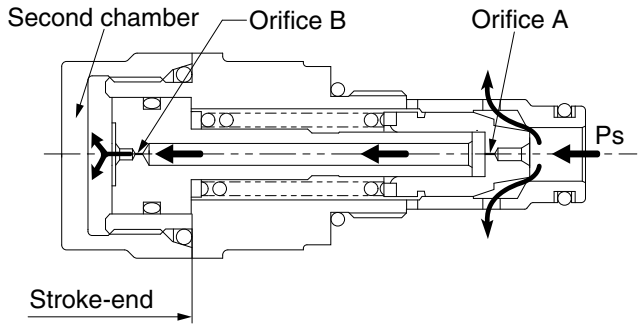
When the P1 pressure is going up, the poppet opens due to the pressure of the spring force F1.



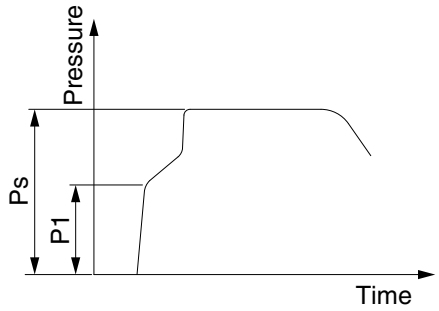
1692SM09

② Second stage

When P1 pressure enters the second chamber through the orifice A and B, the piston moves to its stroke-end. With this action, the spring is compressed, the spring force becomes stronger, and the P1 pressure is increased to the setting pressure Ps.



1692SM10



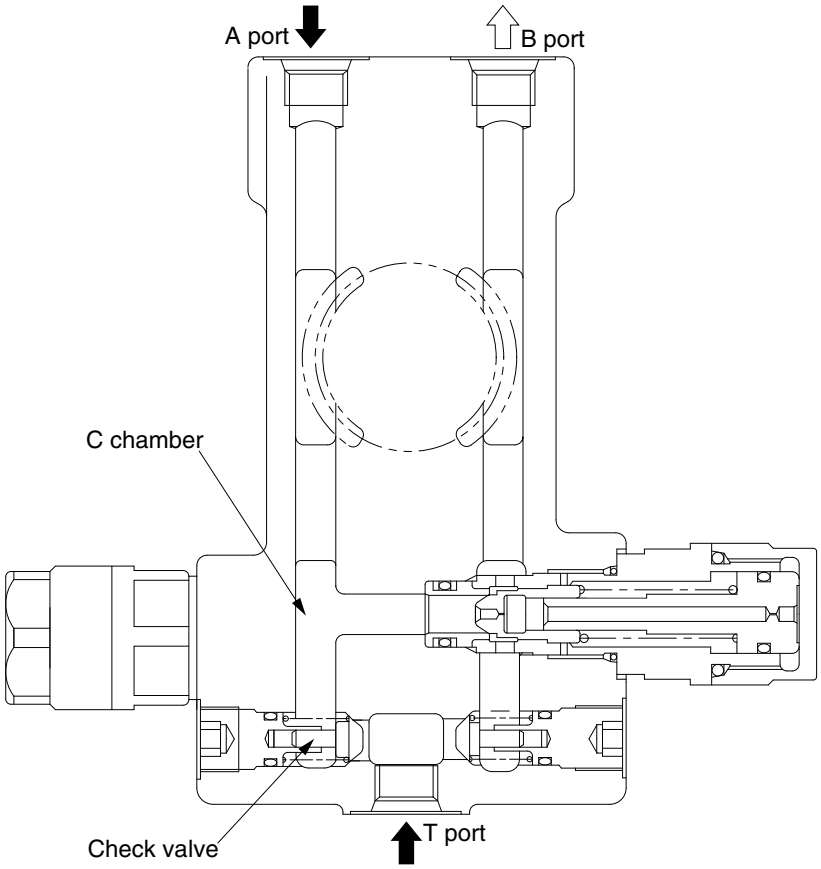
1692SM11

With the above two stages of operation, the motor starts and stops smoothly.

(2) Check valve

When the swing motor is decelerated by operating the control valve, it continues to be moved by the inertia of the machine. Then, it works as pump, and the pressure of C chamber tends to become negative. However, when B port pressure is below cracking pressure of the relief valve, all flow in A port goes out from B port through the motor.

Therefore, if C chamber can get flow only from the control valve, the flow will not be enough to prevent the negative pressure; as a result, cavitation could occur. The check valve works to supply the flow from T port to C chamber; and prevents cavitation.



1692SM05

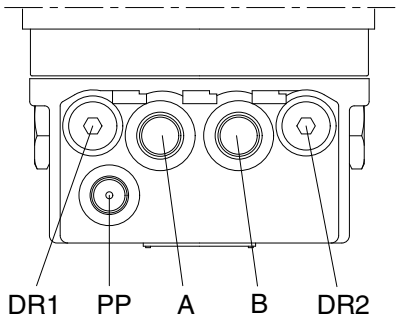
GROUP 4 TRAVEL DEVICE

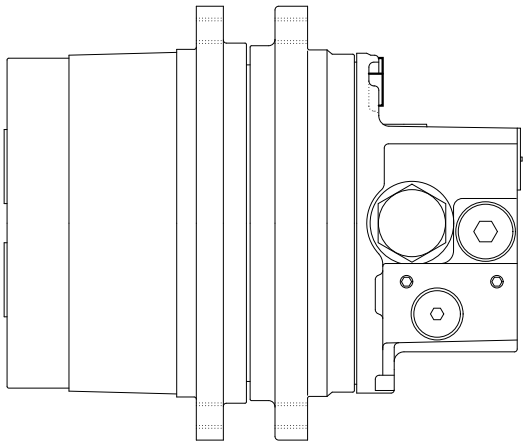
1. CONSTRUCTION

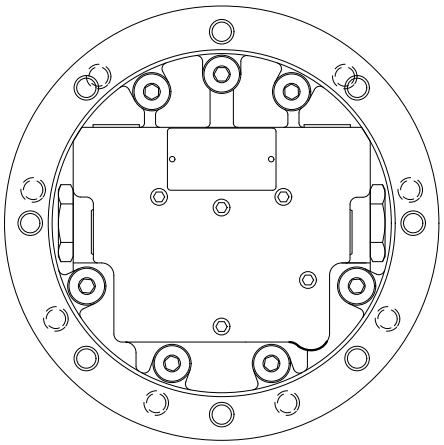
Travel device consists travel motor and gear box.

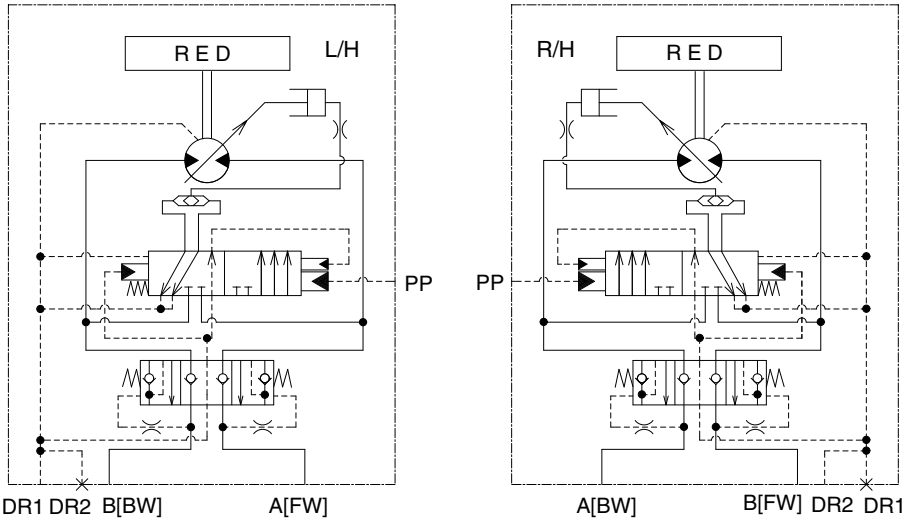
Travel motor includes counterbalance valve, parking brake and high/low speed changeover mechanism.

Port	Port name	Port size
A	Main port	PF 3/8
B	Main port	PF 3/8
DR1, DR2	Drain port	PF 1/4
PP	2 speed control port	PF 1/4





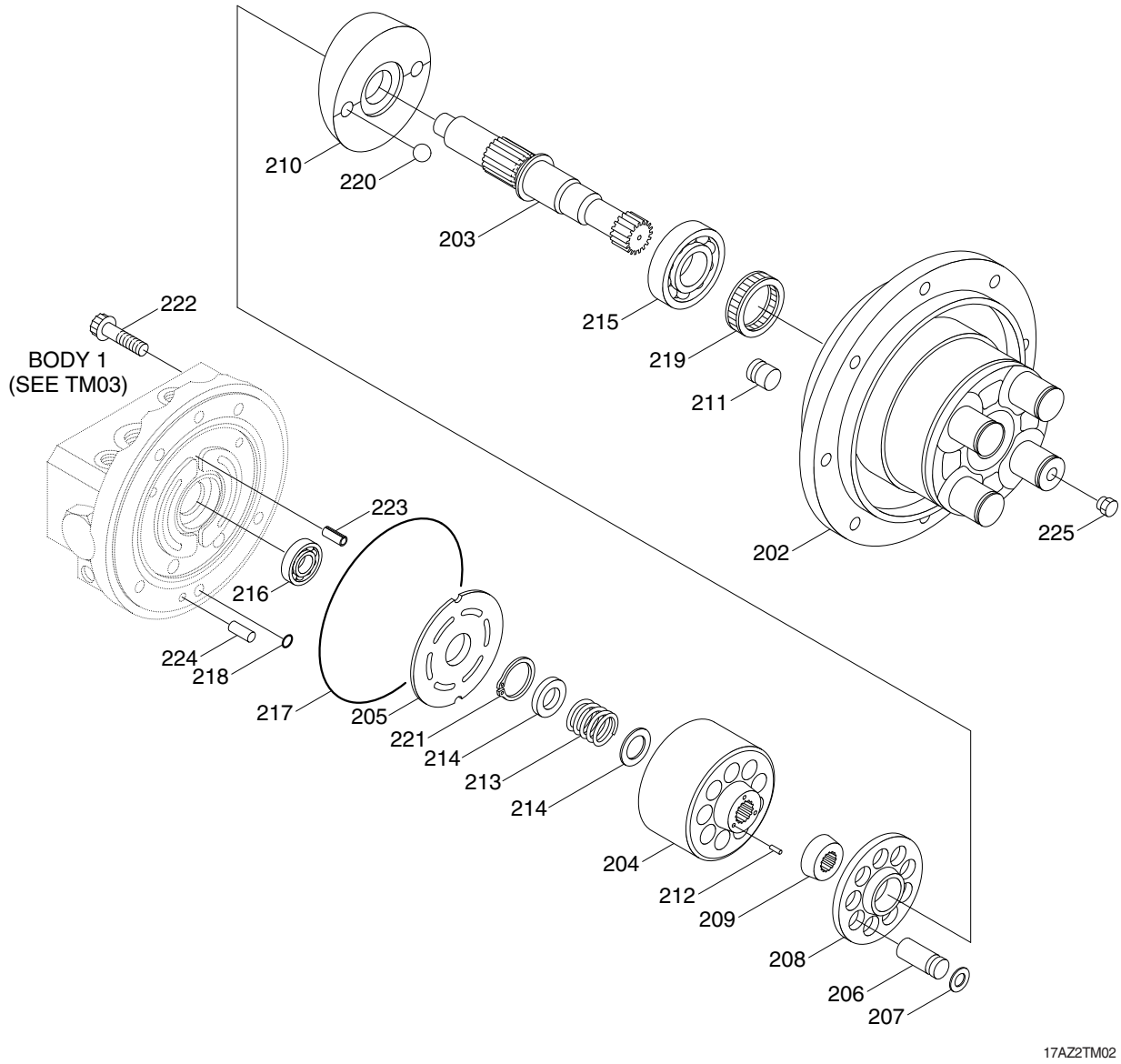




HYDRAULIC CIRCUIT

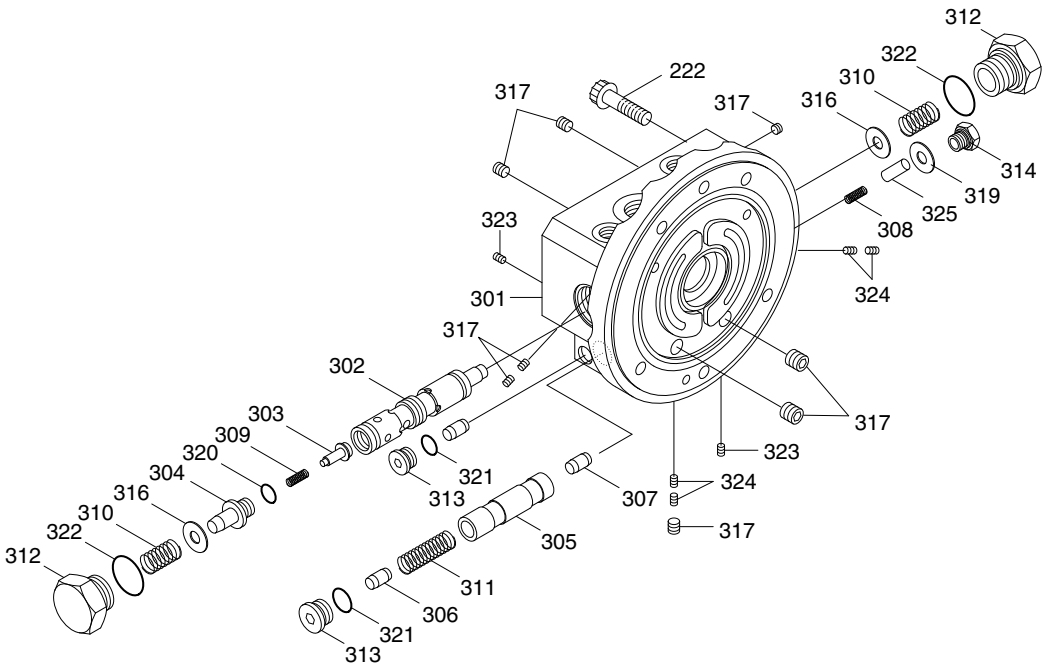
17AZ2TM01

2) STRUCTURE (1/3)



202	Body 2	210	Swash plate	218	O-ring
203	Shaft	211	Control piston	219	Oil seal
204	Cylinder barrel	212	Pin	220	Steel ball
205	Valve plate	213	Spring C	221	Snap ring
206	Piston	214	Retainer	222	Screw
207	Shoe	215	Bearing	223	Spring pin
208	Shoe holder	216	Bearing	224	Pin
209	Barrel holder	217	O-ring	225	Plug

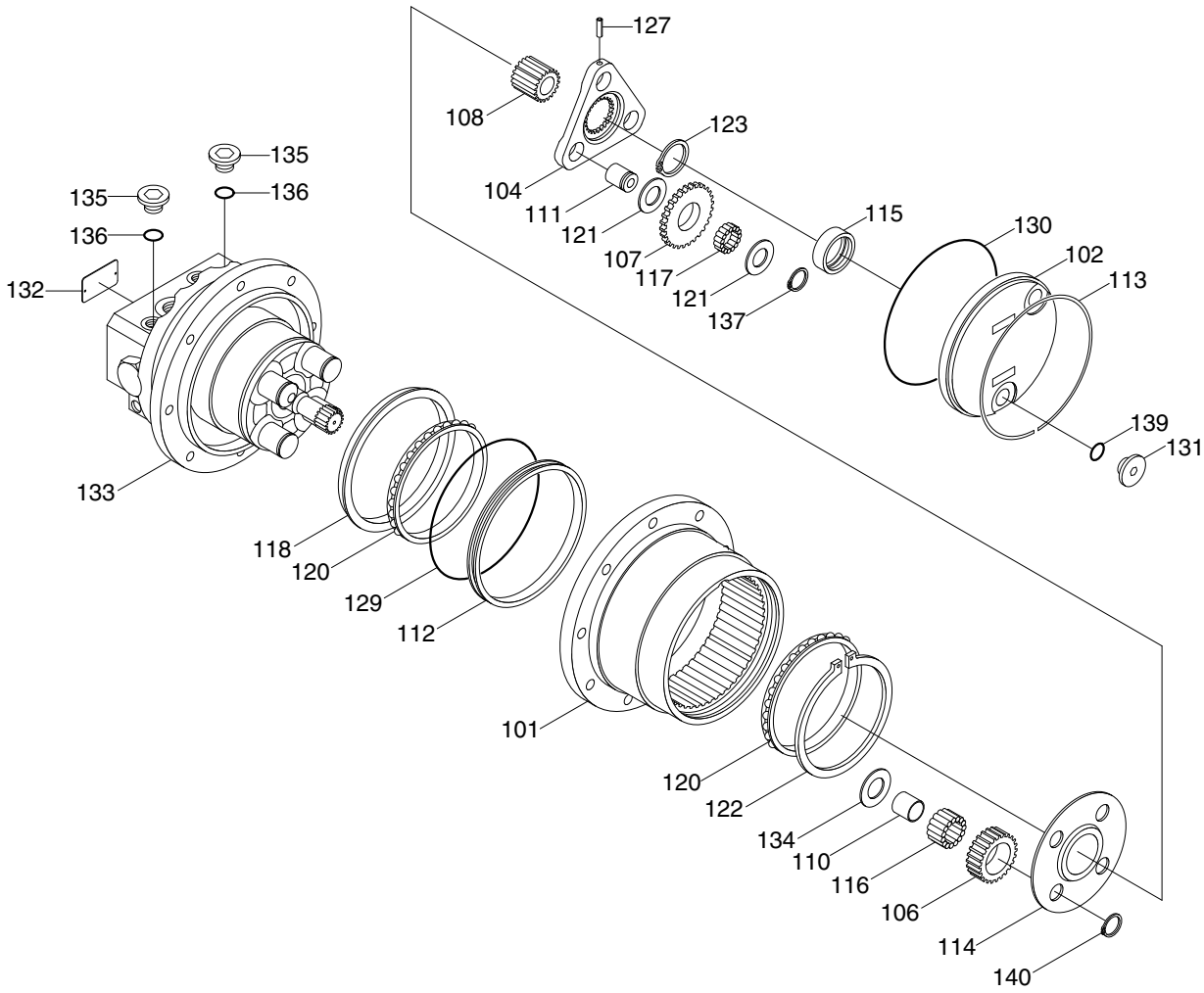
STRUCTURE (2/3)



17AZ2TM03

301	Body 1	309	Spring V1	319	O-ring
302	Spool	310	Spring V2	320	O-ring
303	Check valve	311	Spring V3	321	O-ring
304	Spring guide	312	Plug	322	O-ring
305	Spool	313	Plug	323	Chock
306	Spool B	314	Ring	324	Chock
307	Spool C	316	Plug	325	Pin
308	Shuttle spool	317	Plug		

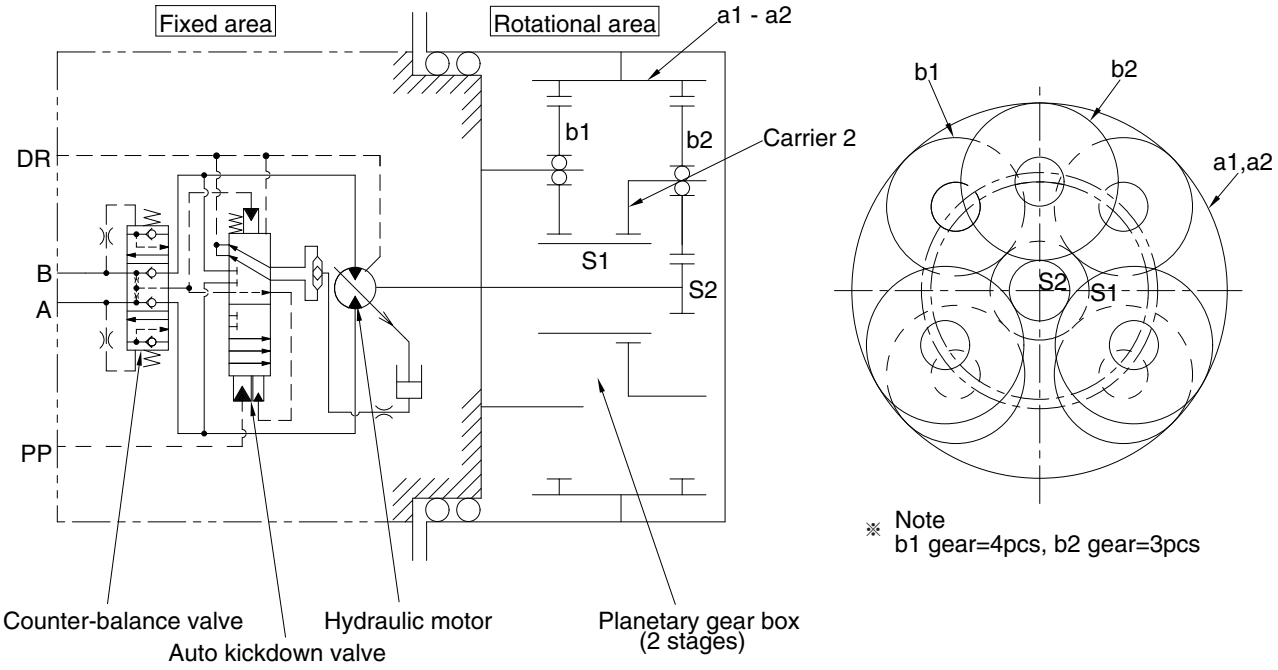
STRUCTURE (3/3)



17AZ2TM04

101	Body	112	Seal ring	121	Thrust washer	134	Thrust washer
102	Cover	113	Snap ring	122	Snap ring	135	Plug
104	Carrier 2	114	Thrust plate	123	Snap ring	136	O-ring
106	Gear B1	115	Slide ring	127	Spring pin	137	Snap ring
107	Gear B2	116	Needle bearing	129	O-ring	139	O-ring
108	Gear S1	117	Needle bearing	130	O-ring	140	Snap ring
110	Ring	118	Floating seat	131	Plug		
111	Pin B2	120	Bearing	133	Hydraulic motor		

2. DRAWING OF OPERATIONAL PRINCIPLE



17Z9A2TM05

3. OPERATION

Travel motor consists of a hydraulic motor "Fixed parts" and a planetary gear speed reducer "Rotating parts".

1) REDUCTION GEAR SECTION

(1) Function

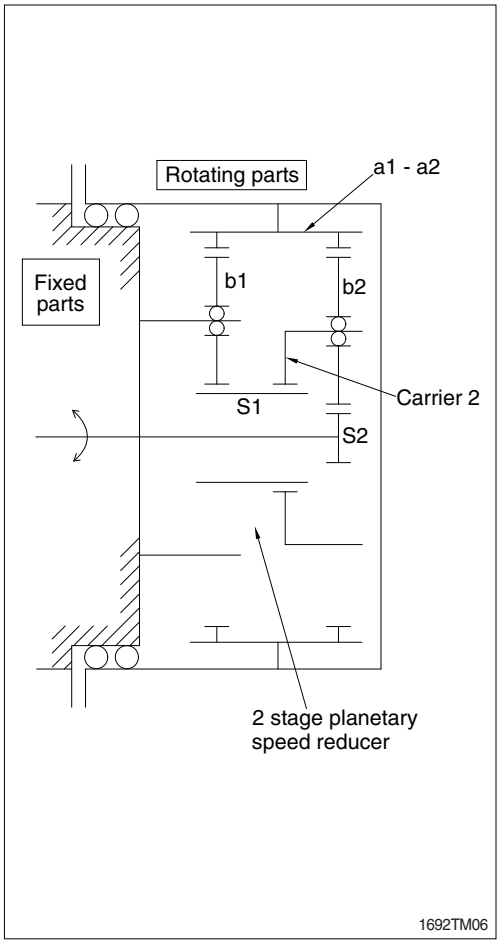
The speed reducer of travel motor is a simple planetary gear type with two stages. The high output speed of the hydraulic motor is reduced to low speed with high torque.

(2) Operation

The S2 gear is attached to the hydraulic motor shaft and the S2 output speed is reduced between the gears (s2, b2, a2) as a first stage speed reducer.

The reduced output speed of this first stage is reduced again between the gears (s1, b1, a1) which are connected to the carrier 2 with the spline.

This reduced output speed of the second stage is transmitted to the body case "rotating parts" through the inner gears (a1, a2) and drives the machine.



The gear ratio of 2 stage simple planetary speed reducer is calculated using the following formula.

$$R = \frac{Zs1}{Zs1+Za1} \times \frac{Zs2}{Zs2+Za2}$$

※ Z_{**} : Number of teeth

With the travel motor, the body case rotating, so the gear ratio is ;

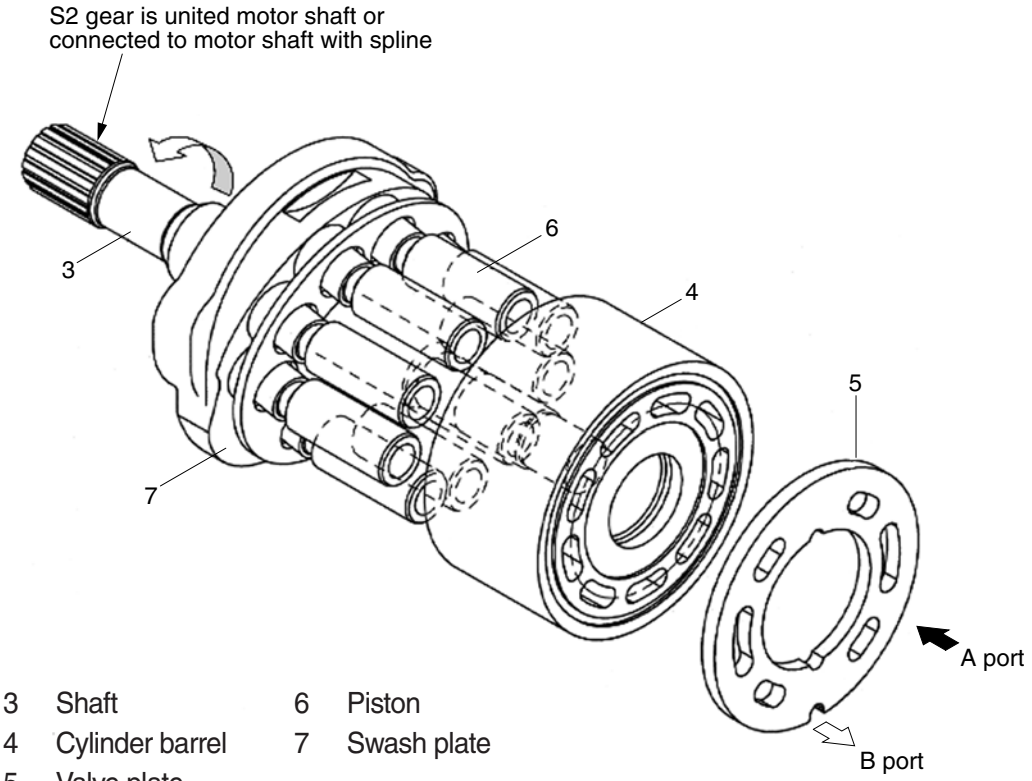
$$R' = \frac{1}{1-1/R}$$

2) HYDRAULIC MOTOR SECTION

(1) Function

This hydraulic motor is an axial piston type, and changes the hydraulic energy supplied from the pump to the rotary motion.

(2) Structure



3	Shaft	6	Piston
4	Cylinder barrel	7	Swash plate
5	Valve plate		

17Z9A2TM06

Through a hydraulic valve, the pressurized oil is supplied to the valve plate (5).
When the pressurized oil is supplied to the A port, this pressurized oil pushes the piston (6) in the clylinder barrel (4). This pushing force is changed to the rotational power by the swash plate (7) and transmitted to the shaft (3) which is connected to the cylinder barrel (4) with the spline. The return flow from the cylinder port is going out through the B port of the valve plate (5). To reverse rotation, pressurized oil is supplied to the B port and returning oil exits through the A port.

(3) 2 speed motor operation

The swash plate, which has surface Ⅰ and Ⅱ in the opposite side to the shoe sliding surface, is supported by the 2 balls which are fixed to the body 2.

Since the balls are located in the eccentric position, in the low speed range, the surface Ⅰ is faced to the body 2 by the oil pressure in the piston and the spring force in the cylinder barrel. The swash plate angle is α (max capacity).

When the pressurized oil is supplied to the (PP) port, the two-speed spool moves to the high position.

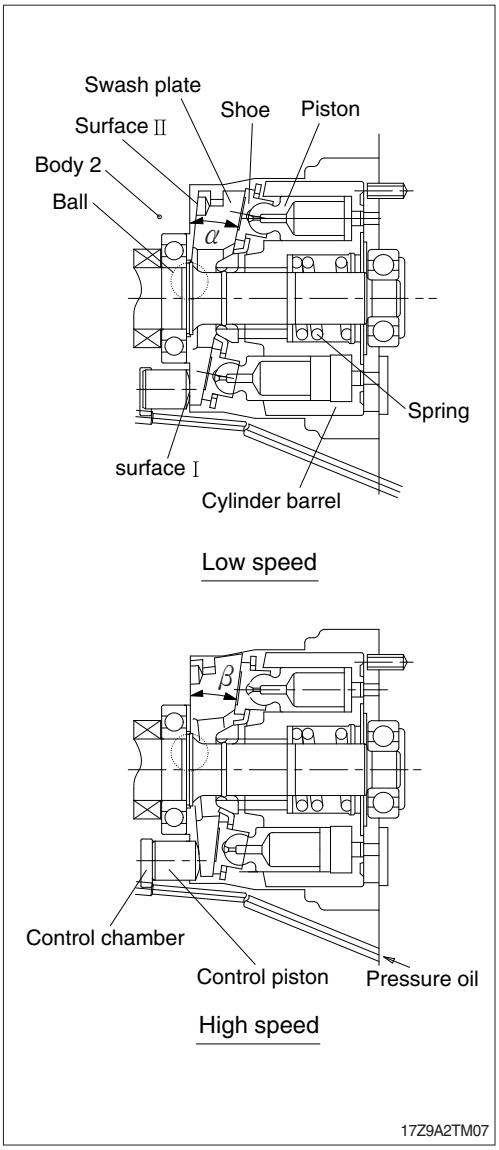
And the pressurized oil of inlet is led to the control chamber through the two-speed spool.

The control piston moves forward until the surface Ⅱ of the swash plate is in contact with the body 2, and the swash plate angle becomes β.

The capacity of the hydraulic motor is made small.

The pressurized oil of the (PP) port is shut off (or the engine is stopped), the two-speed spool moves to the low position.

And the control chamber is led to the tank port through the two-speed spool and the swash plate position comes to the low speed by the spring force.

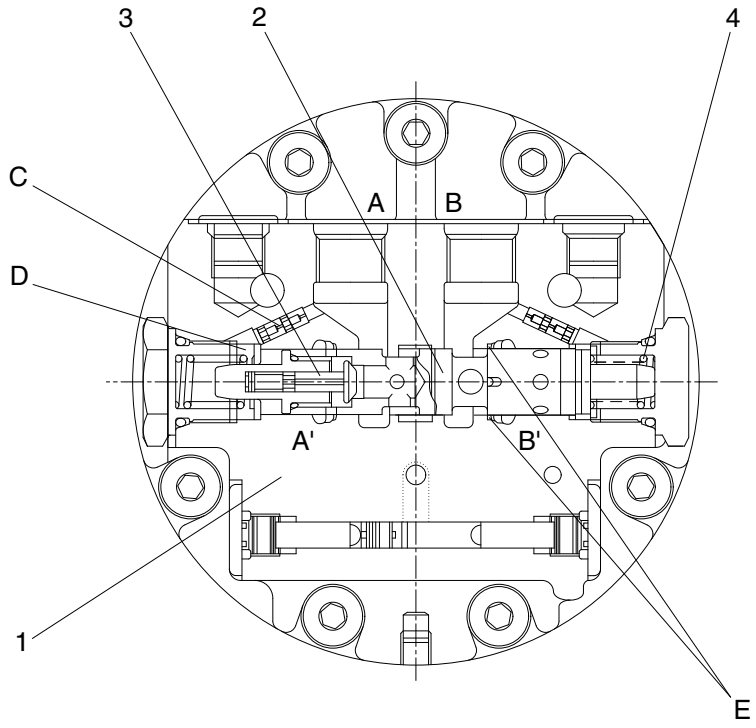


3) HYDRAULIC VALVE SECTION

(1) Counter-balance valve

When the pressurized oil is supplied from the A port, the pressurized oil opens the check valve (3) and flows into the hydraulic motor inlet A' port. At the same time, the pressurized oil goes through the orifice C into the chamber D, pushes the spring (4) and moves the spool (2) to right. Then the returned oil from the hydraulic motor flows into the B port, goes through area E and drives the hydraulic motor. When the pressurized oil is supplied from the B port, the hydraulic motor rotates in reverse.

Even the pressurized oil of the A port is shut off, the hydraulic motor tries to rotate by inertia force. When the pressurized oil from the A port is shut off, the spool (2) tries to return to left by the spring (4) force. At this time, the oil in the chamber D tries to go out to the A port through the orifice C, but due to the throttle effect of orifice C, the spool (2) speed is reduced. With the orifice and notches on the spool, the returned oil is controlled gradually and the hydraulic motor stops smoothly.



17Z9A2TM08

(2) Auto kick down valve

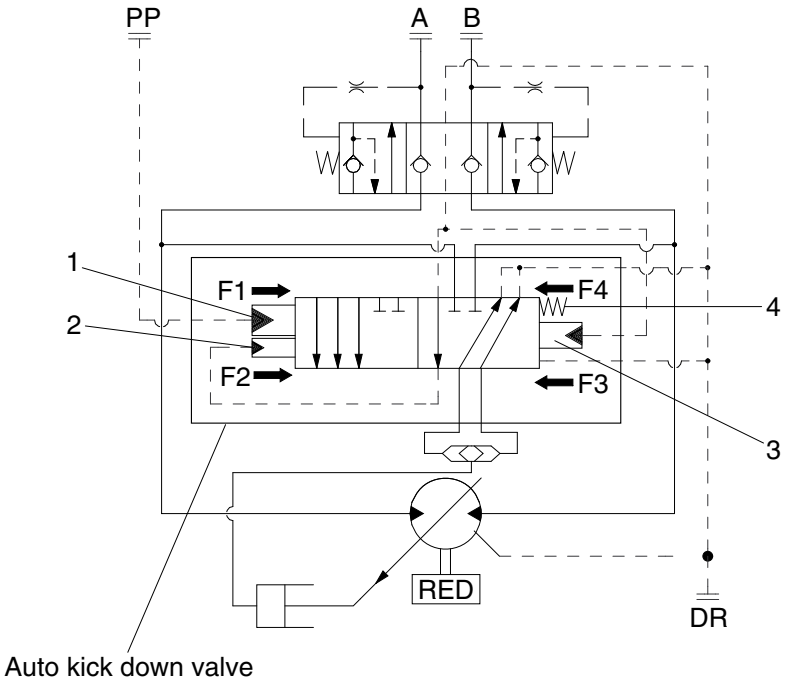
When the travel speed control switch for Hi speed mode is turned on, the pilot pressure for Hi speed mode comes from PP port to the hydraulic pilot (1), then the force F1 occurs. The auto kick down valve moves to the right direction because the F1 is larger than F4, which is by spring (4). Then the speed of track motor is changed to the Hi speed mode.

On the other hand, the operating pressure comes from A or B port to the hydraulic pilot (2) and (3), then the force F2 and F3 occur. The F3 is larger than F2 because the area of (3) is wider than the area of (2). Therefore, if the operating pressure increases, the difference between F2 and F3 also increases.

When the operating pressure is larger than the setting pressure of Hi speed to Lo speed, the right direction resultant of F1 and F2 is smaller than the left direction resultant of F3 and F4.

Therefore the auto kick down valve moves to the left direction, then the speed of track motor is changed to the Lo speed mode. When the operating pressure is smaller than the setting pressure of Lo speed to Hi speed, the right direction resultant of F1 and F2 is larger than the left direction resultant of F3 and F4.

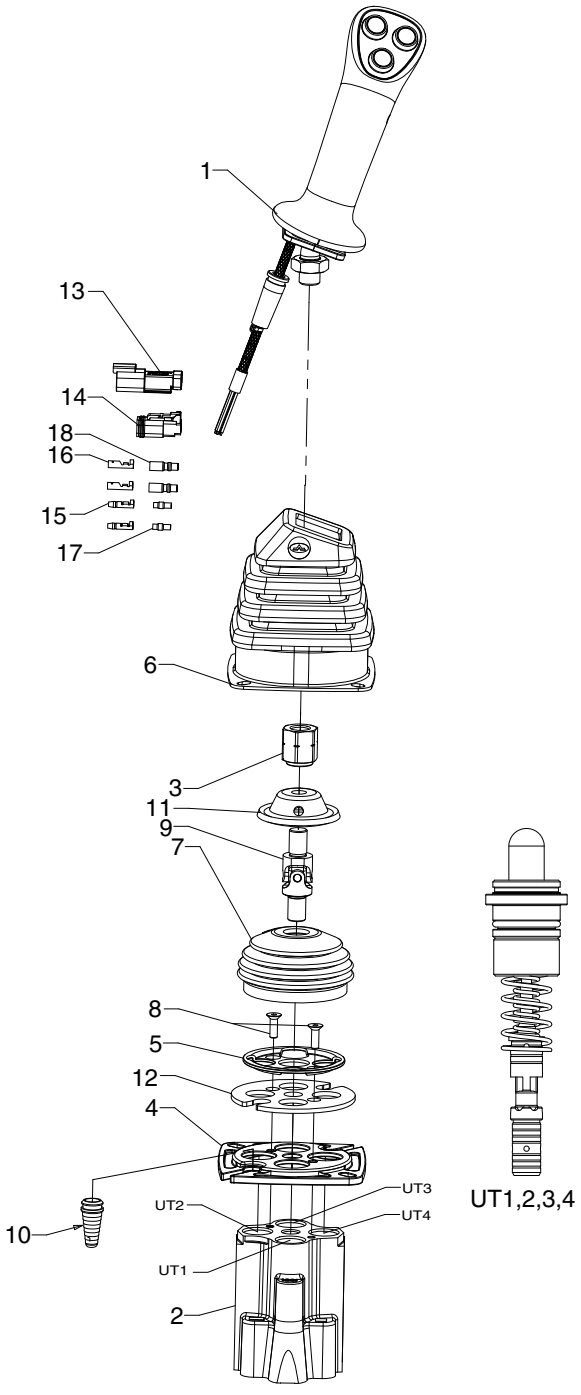
Therefore the auto kick down valve moves to the right direction, then the speed of track motor is changed to the Hi speed mode.



17AZ2TM10

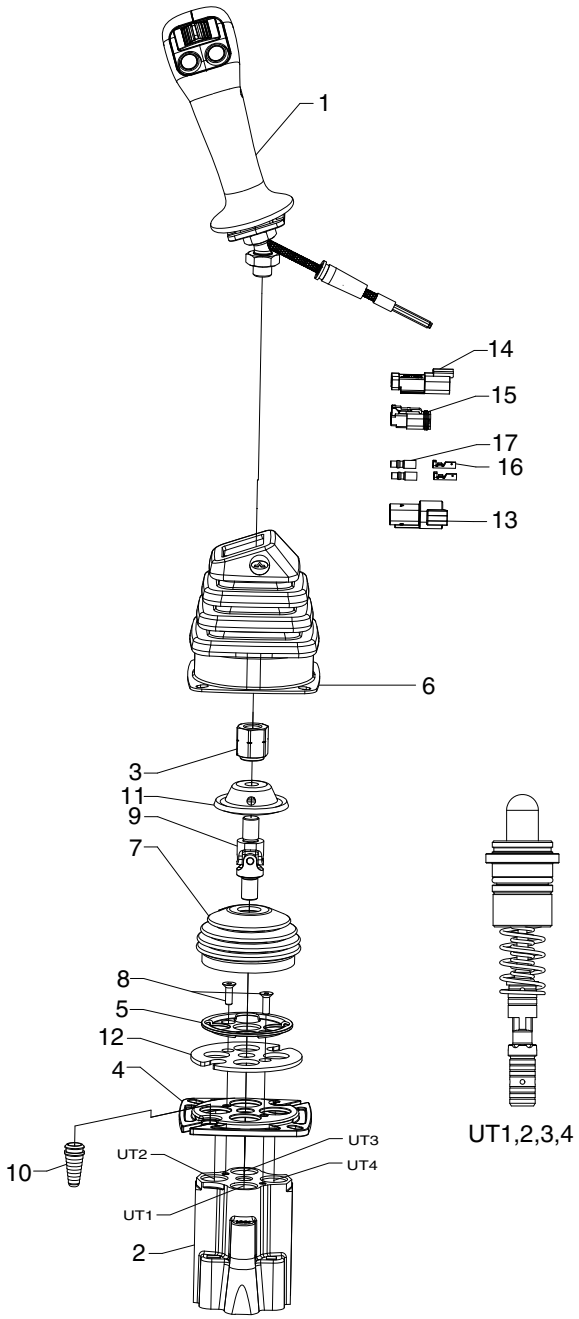
GROUP 5 RCV LEVER

1. TYPE 1 (STANDARD)



1	Handle assy	7	Boot	13	Harness connector
2	Case	8	Bolt	14	Harness connector
3	Connector	9	Joint assy	15	Harness sleeve
4	Plate	10	Harness connector	16	Harness sleeve
5	Plate	11	Swash plate	17	Harness pin
6	Boot	12	Plate	18	Harness pin

2. TYPE 2 (PROPORTIONAL, OPTION)



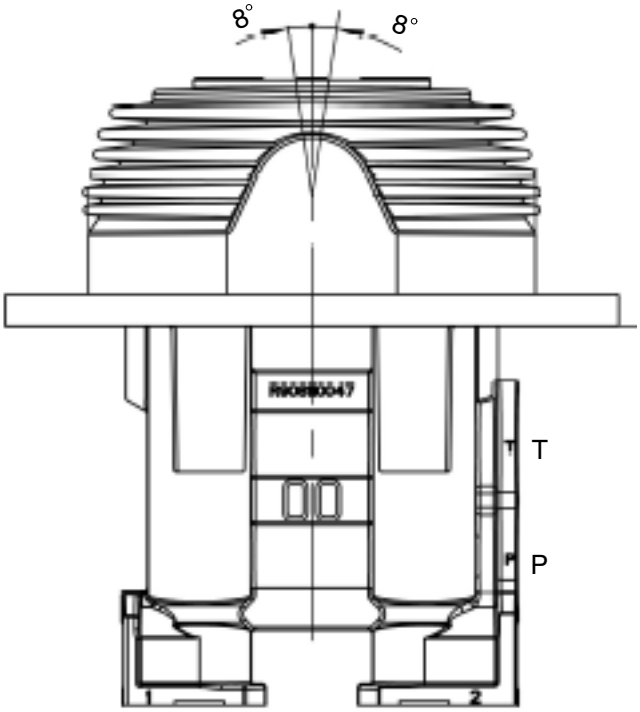
17AZ2RL02

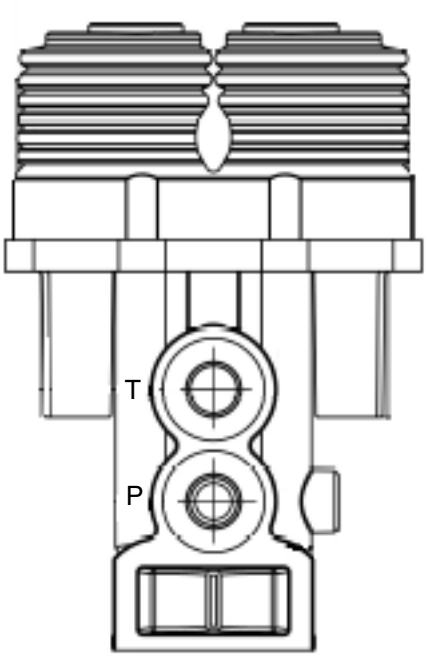
1	Handle assy	7	Boot	13	Harness connector
2	Case	8	Bolt	14	Harness connector
3	Connector	9	Joint assy	15	Harness connector
4	Plate	10	Harness connector	16	Harness sleeve
5	Plate	11	Swash plate	17	Harness pin
6	Boot	12	Plate		

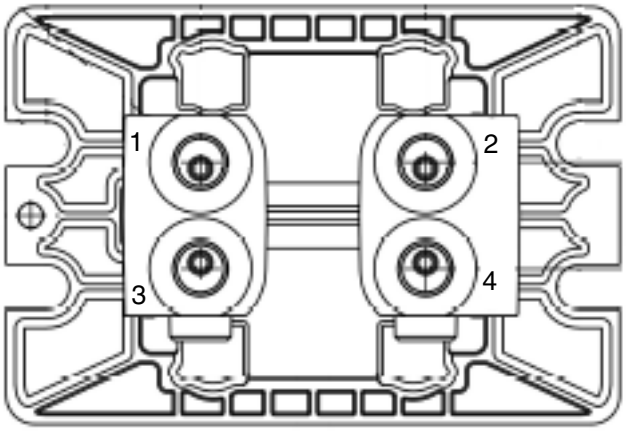
GROUP 6 RCV PEDAL

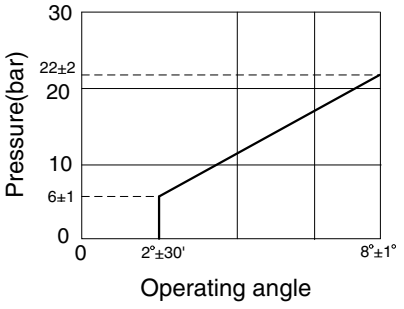
1. STRUCTURE

The casing has the oil inlet port P (primary pressure), and the oil outlet port T (tank). In addition the secondary pressure is taken out through ports 1, 2, 3 and 4 provided at the bottom face.

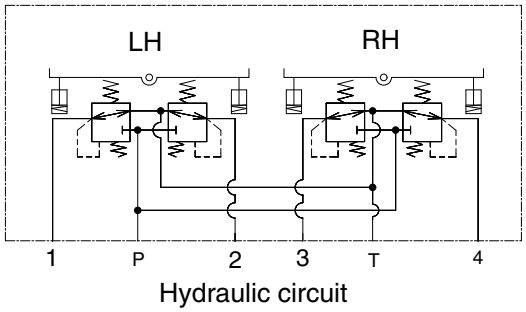








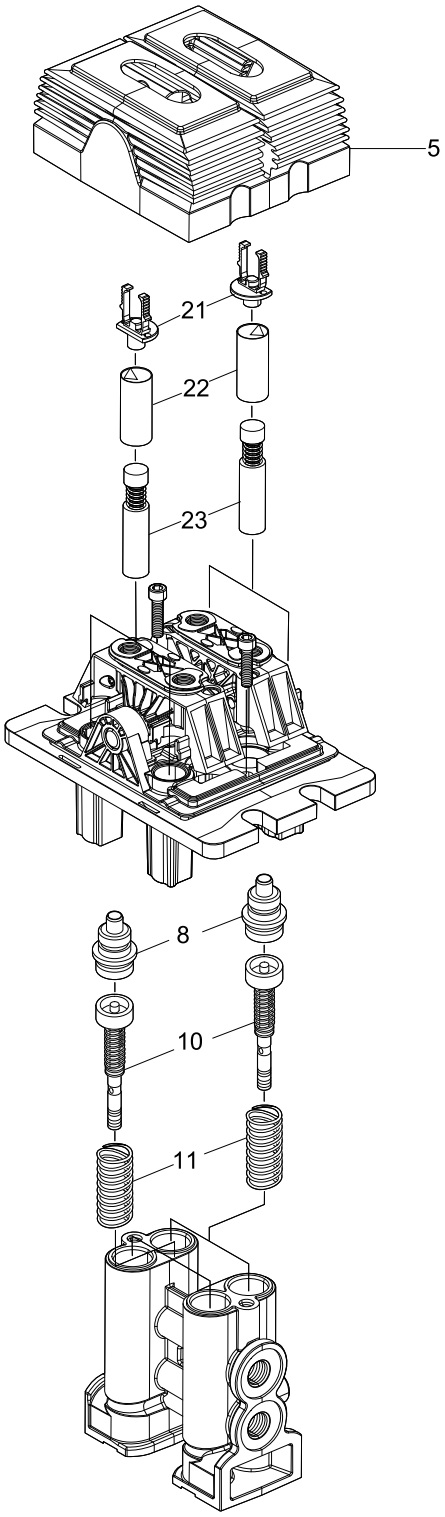
17AZ2RP01



Hydraulic circuit

Port	Port name	Port size
P	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	
1	Travel (LH, Backward)	
2	Travel (LH, Forward)	
3	Travel (RH, Backward)	
4	Travel (RH, Forward)	

MAJOR COMPONENTS



17AZ2RP02

5	Boot	11	Spring kit	23	Damper kit
8	Guide	21	Clip kit		
10	Regulator kit	22	Piston kit		

2. FUNCTION

1) FUNDAMENTAL FUNCTIONS

The pilot valve is a valve controls the spool stroke, direction, etc of a main control valve. This function is carried out by providing the spring at one end of the main control valve spool and applying the output pressure (secondary pressure) of the pilot valve to the other end.

For this function to be carried out satisfactorily, the pilot valve is composed of the following elements.

(1) Inlet port (P) where oil is supplied from hydraulic pump.

(2) Output port (1, 2, 3 & 4) to apply pressure supplied from inlet port to ends of control valve spools.

(3) Tank port (T) necessary to control the above output pressure.

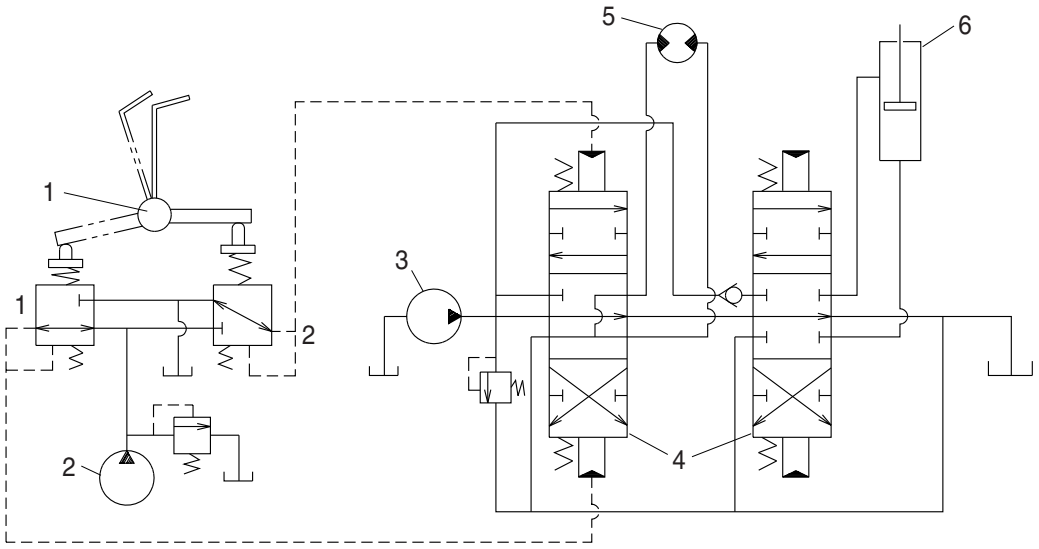
(4) Spool to connect output port to inlet port tank port.

(5) Mechanical means to control output pressure, including springs that work on the above spools.

2) OPERATION

The operation of the pilot valve will be described on the basis of the hydraulic circuit diagram shown below ant the attached operation explanation drawing.

The diagram shown below is the typical application example of the pilot valve.



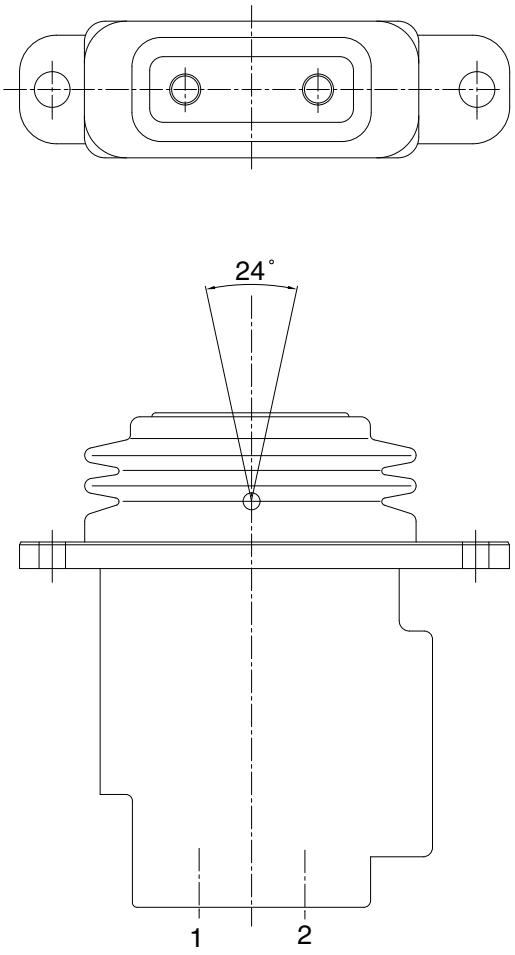
140LC-7 기타2-76

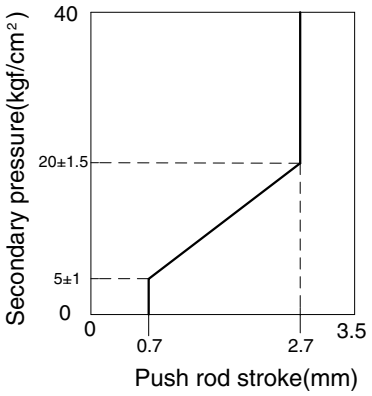
1	Pilot valve	3	Main pump	5	Hydraulic motor
2	Pilot pump	4	Main control valve	6	Hydraulic cylinder

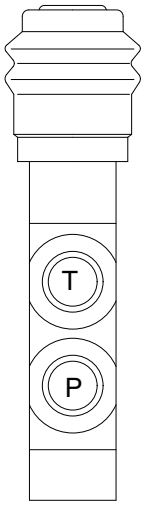
3. BOOM SWING PEDAL

1) STRUCTURE

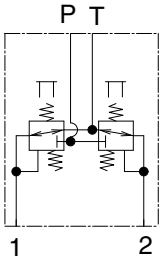
The casing has the oil inlet P (primary pressure) and the oil return port (tank).
In addition the secondary pressure is taken out through port 1 and port 2 provided at the housing bottom face.







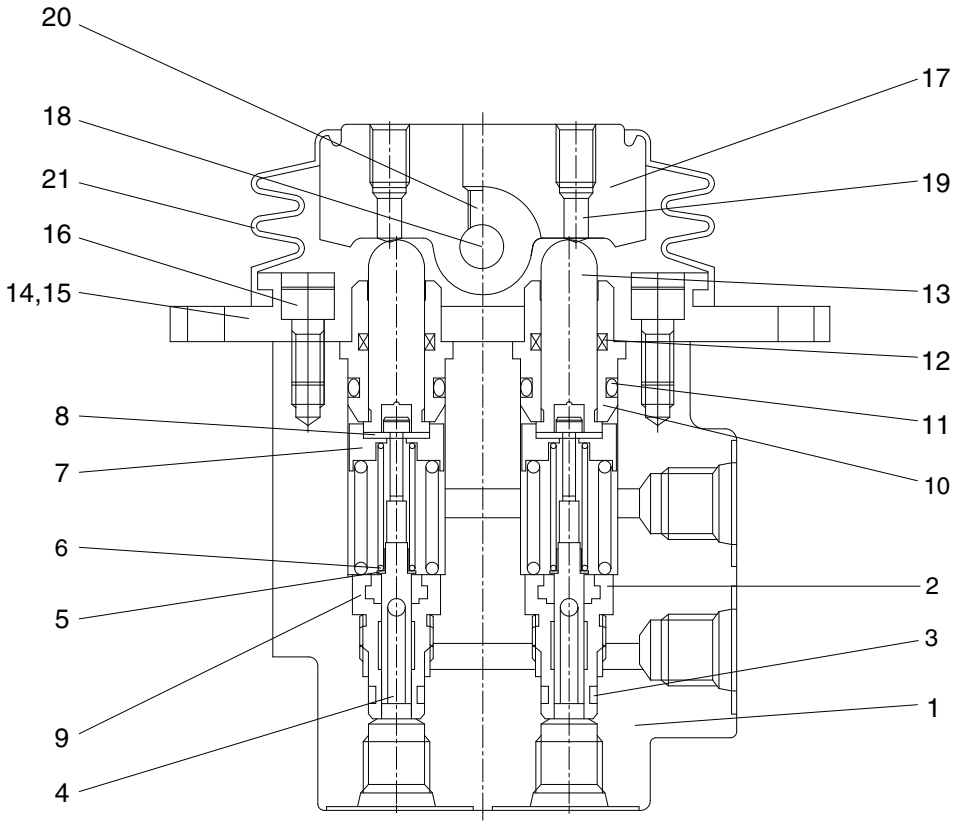
35AZ2BS01



Hydraulic circuit

Port	Port name	Port size
P	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	
1	Boom swing (LH)	
2	Boom swing (RH)	

2) COMPONENT



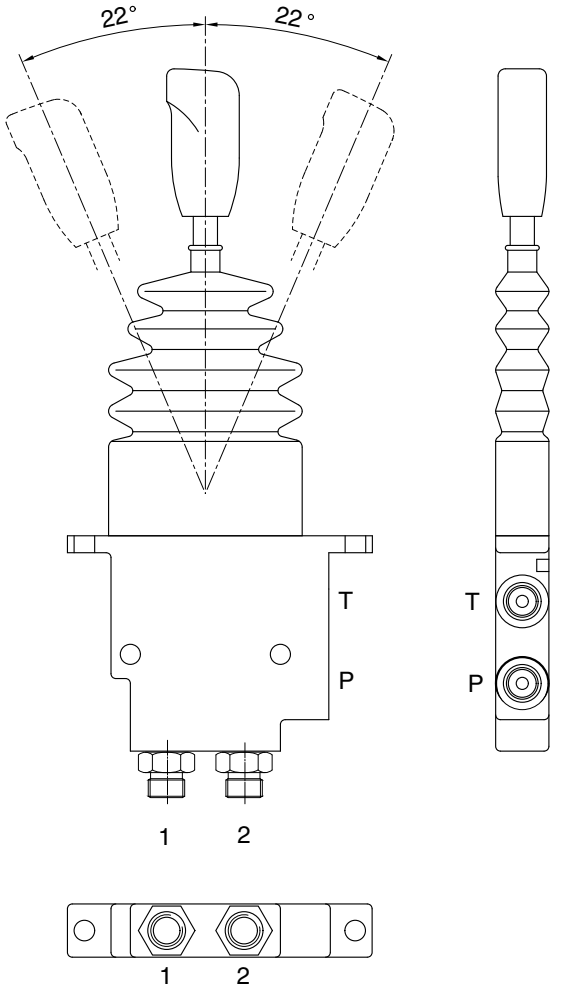
31MH-20050

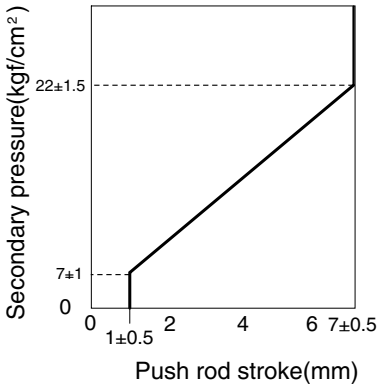
1	Body	8	Stopper	15	DU bush
2	Plug	9	Spring	16	Wrench bolt
3	O-ring	10	Plug	17	Cam
4	Spool	11	O-ring	18	Pin
5	Spring seat	12	Rod seal	19	Adjust screw
6	Spring	13	Push rod	20	Socket bolt
7	Spring seat	14	Cover	21	Bellows

4. DOZER LEVER

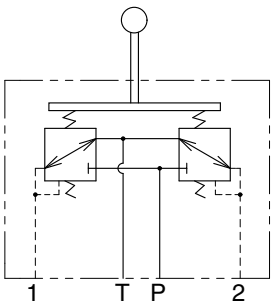
1) STRUCTURE

The casing has the oil inlet P (primary pressure) and the oil return port (tank).
In addition the secondary pressure is taken out through port 1 and port 2 provided at the housing bottom face.





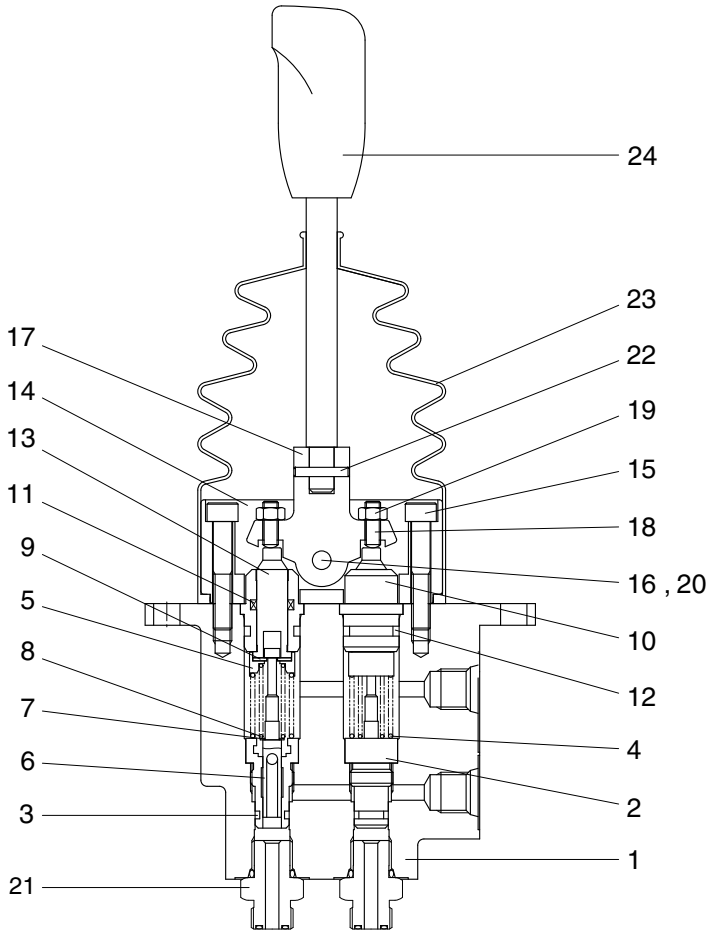
17AZ2DL01



Hydraulic circuit

Port	Port	Port size
P	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	PF 1/4
1	Dozer blade up port	9/16 UNF
2	Dozer blade down port	9/16 UNF

2) COMPONENT



17AZ2DL02

1	Body	9	Stopper	17	Guide
2	Plug	10	Plug	18	Socket bolt
3	O-ring	11	Rod seal	19	Nut
4	Spring	12	O-ring	20	Snap ring
5	Spring seat	13	Push rod	21	Connector
6	Spool	14	Cover	22	Spring pin
7	Spring seat	15	Wrench bolt	23	Bellows
8	Spring	16	Pin	24	Lever