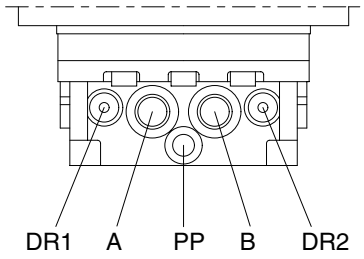
GROUP 4 TRAVEL DEVICE

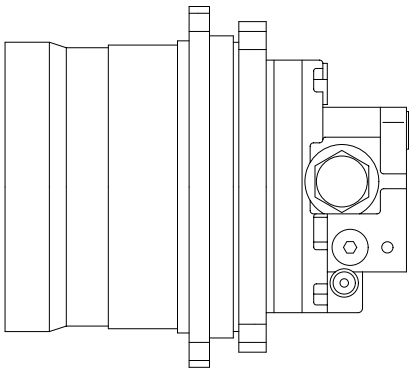
1. CONSTRUCTION

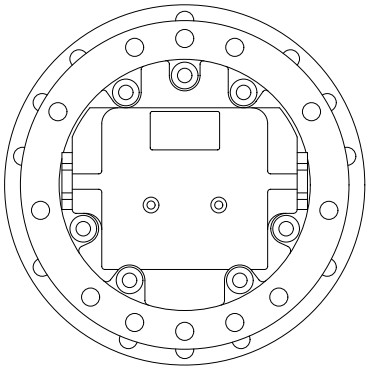
Travel device consists travel motor and gear box.

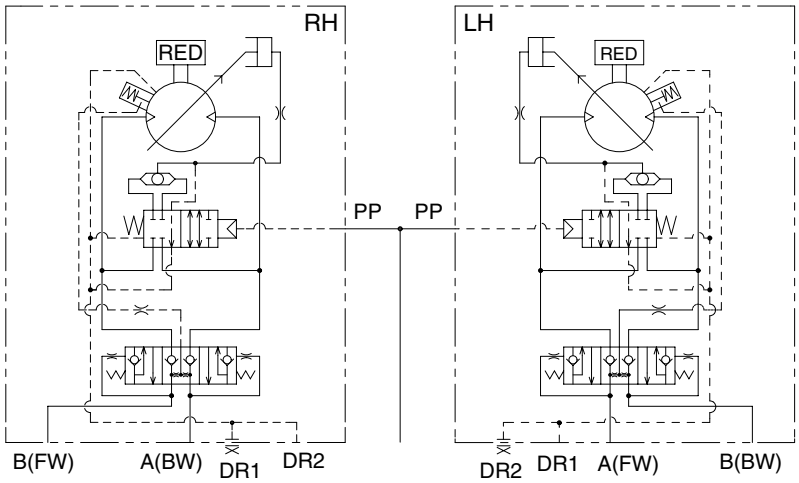
Travel motor includes counterbalance valve, parking brake and high/low speed changeover mechanism.

Port	Port name	Port size
A	Main port	PF 1/2
B	Main port	PF 1/2
DR1, DR2	Drain port	PF 3/8
PP	2 speed control port	9/16-18 UNF





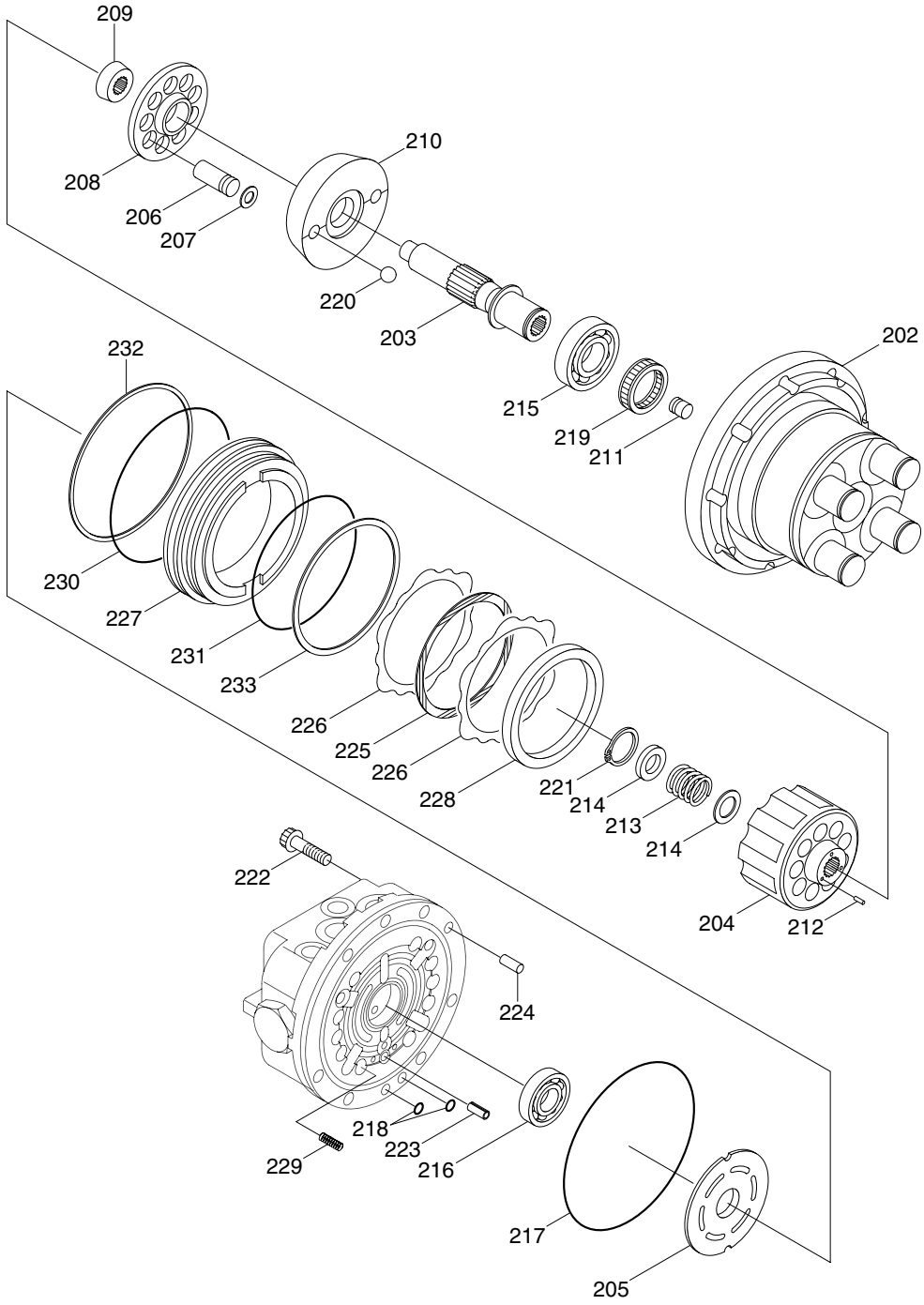




HYDRAULIC CIRCUIT

R27Z92TM20

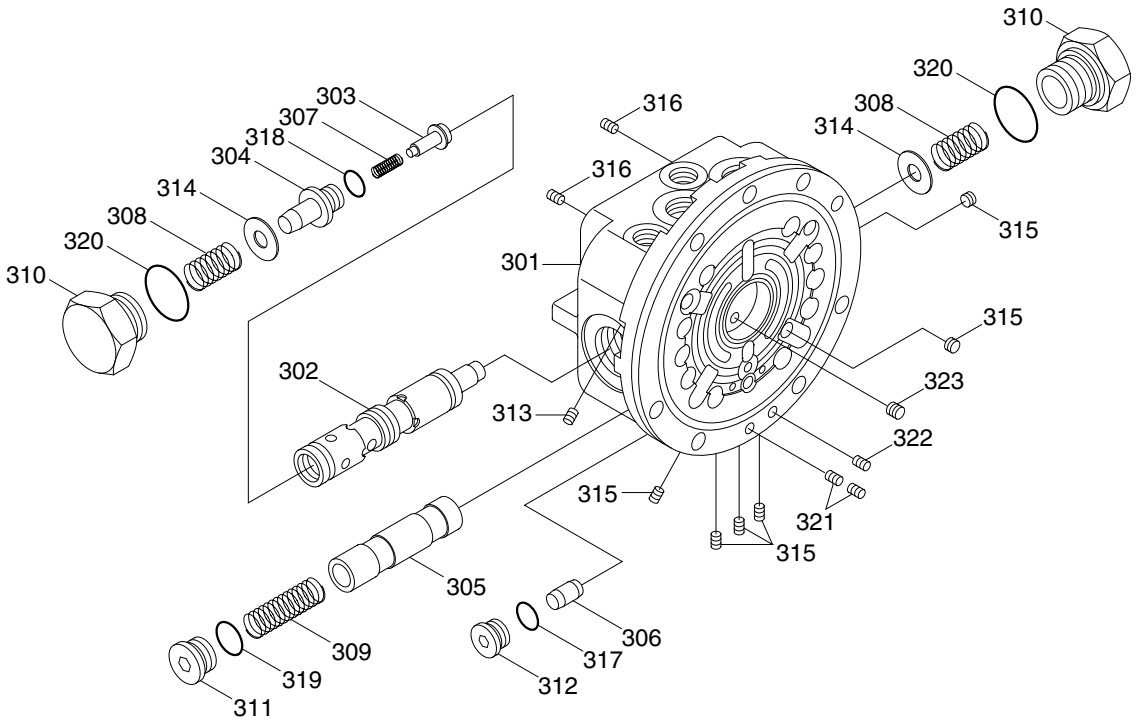
2) STRUCTURE (1/3)



R27Z92TM23

202	Body 2	213	Spring C	224	Pin
203	Shaft	214	Retainer	225	Disk plate
204	Cylinder barrel	215	Bearing	226	Steel plate
205	Valve plate	216	Bearing	227	Brake piston
206	Piston	217	O-ring	228	Brake spacer
207	Shoe	218	O-ring	229	Spring B
208	Shoe holder	219	Oil seal	230	O-ring
209	Barrel holder	220	Ball	231	O-ring
210	Swash plate	221	Snap ring	232	Back up-ring
211	Control piston	222	Screw	233	Back up-ring
212	Pin	223	Spring pin		

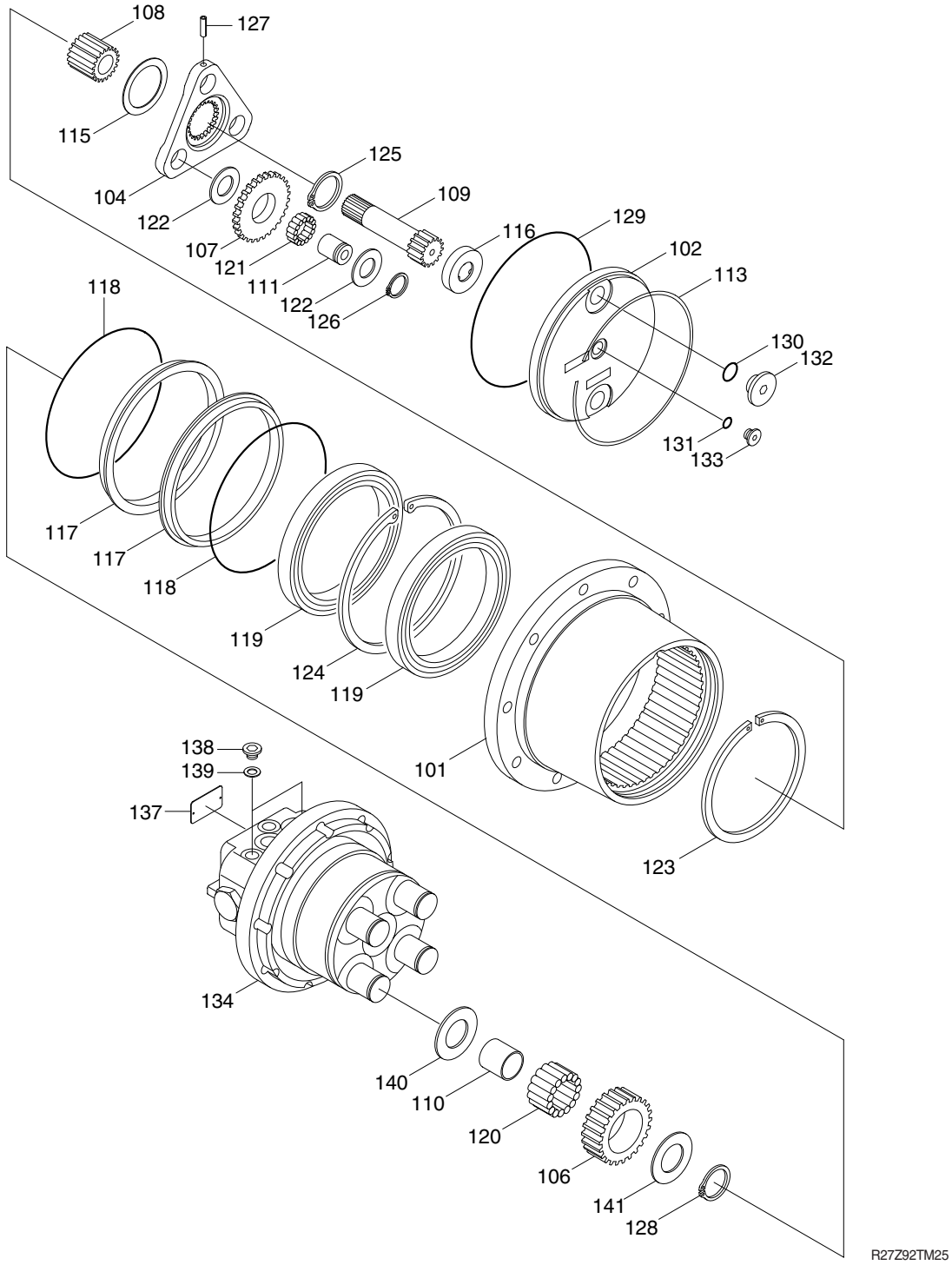
STRUCTURE (2/3)



R27Z92TM24

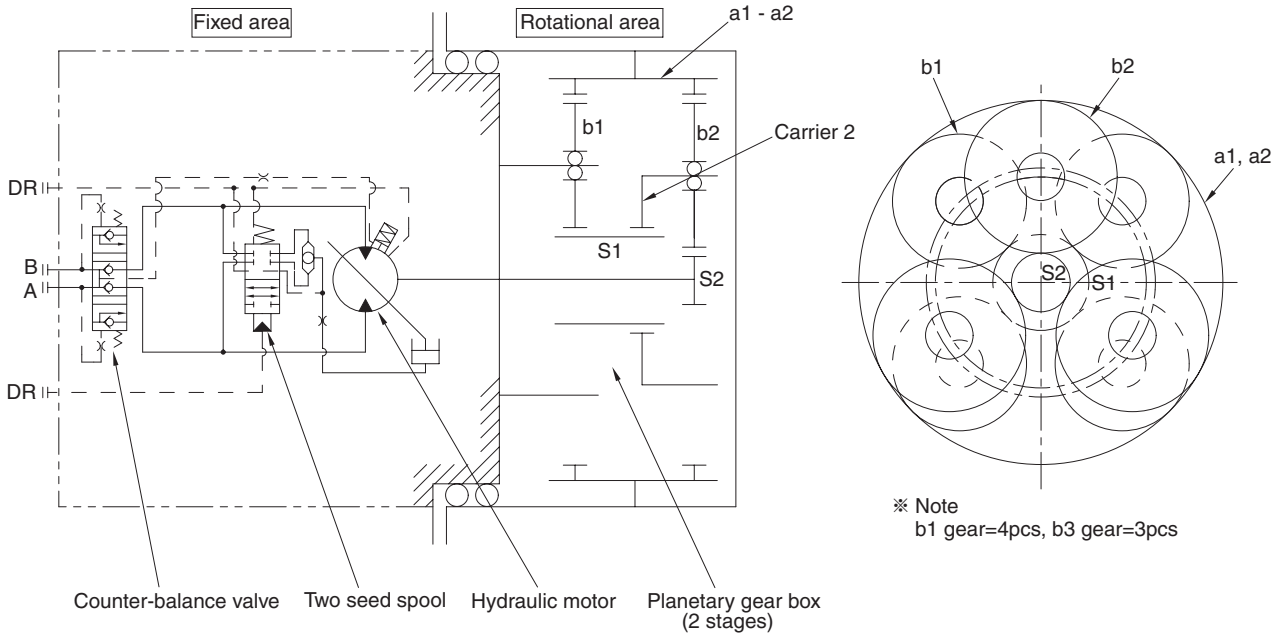
301	Body 1	309	Spring V3	317	O-ring
302	Spool	310	Plug	318	O-ring
303	Check valve	311	Plug	319	O-ring
304	Spring guide	312	Plug	320	O-ring
305	Spool	313	Choke	321	Choke
306	spool	314	Ring	322	Choke
307	Spring V1	315	Plug	323	Plug
308	Spring V2	316	Plug		

STRUCTURE (3/3)



101	Body	113	Snap ring	122	Thrust washer	131	O-ring
102	Cover	115	Thrust collar	123	Snap ring	132	Plug
104	Carrier 2	116	Slide ring	124	Snap ring	133	Plug
106	Gear B1	117	Floating seat	125	Snap ring	134	Hydraulic motor
107	Gear B2		(Incl 118)	126	Snap ring	137	Name plate
108	Gear S1	118	O-ring	127	Spring pin	138	Plug
109	Gear S2	119	Bearing	128	Snap ring	139	O-ring
110	Ring	120	Needle	129	O-ring	140	Thrust washer
111	Pin B2	121	Needle	130	O-ring	141	Thrust washer

2. DRAWING OF OPERATIONAL PRINCIPLE



R27Z92TM03

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

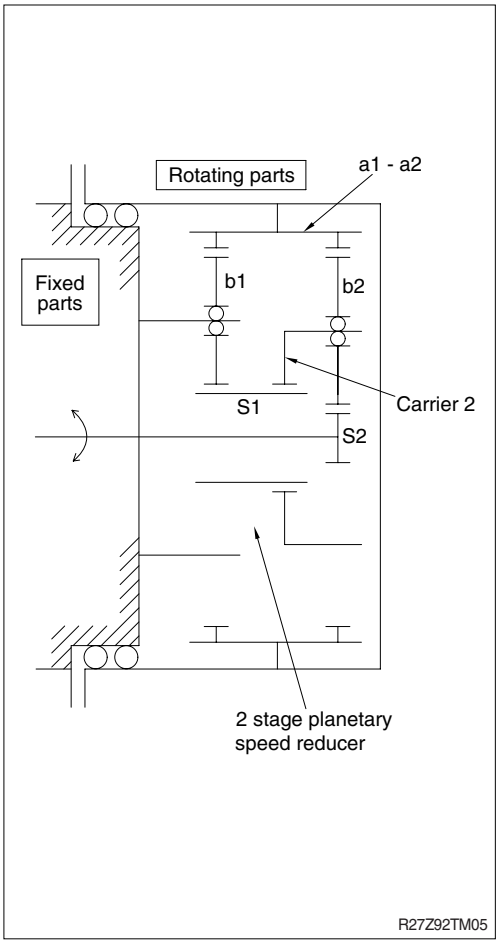
The speed reducer of travel motor is a simple planetary gear type with two stages. The high output speed of the hydraulic motor is reduced to low speed with high torque.

(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 ;

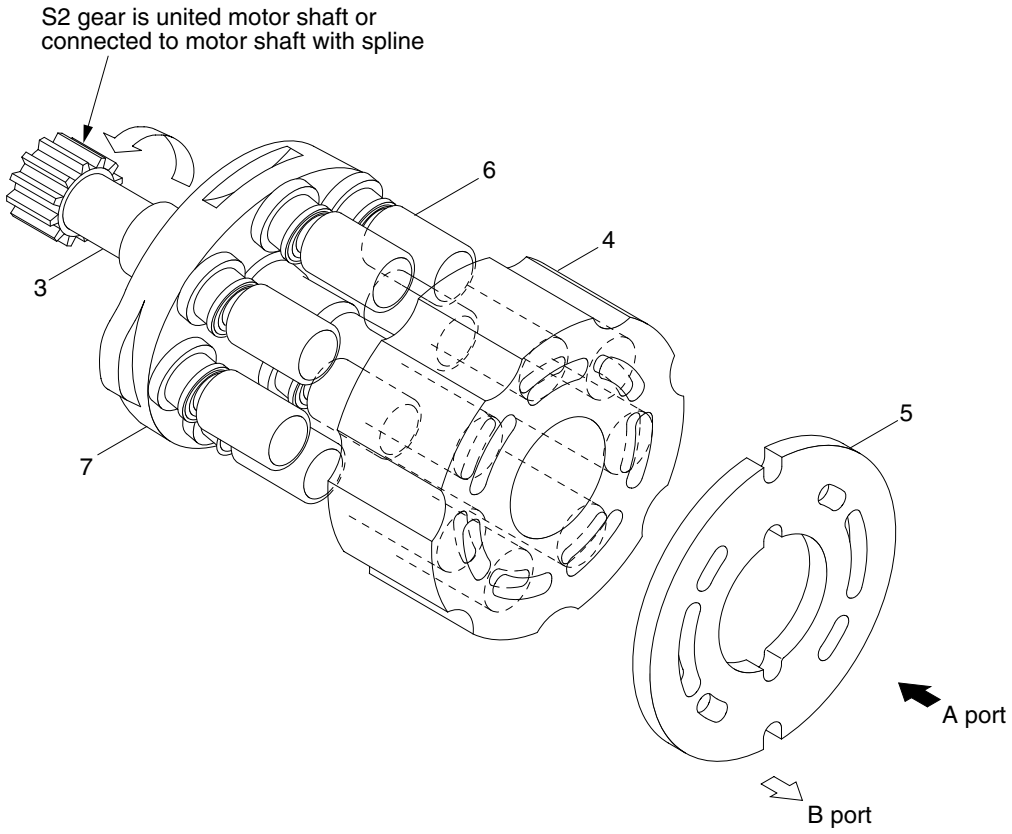
$$R' = \frac{1}{1-1/R}$$

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



R27Z92TM06

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.

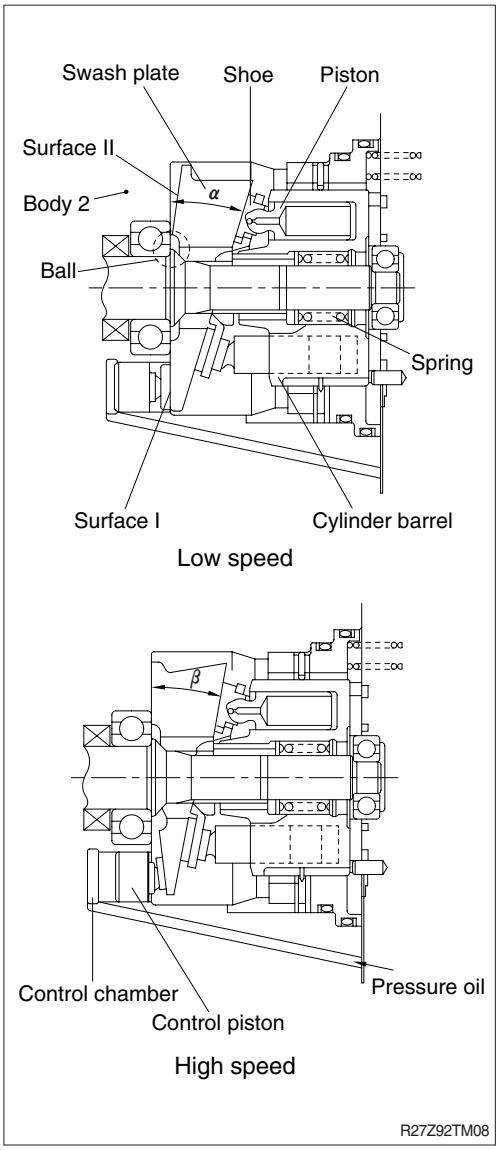
And the pressurized oil of inlet is led to the control chamber through the two-speed spool.

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.

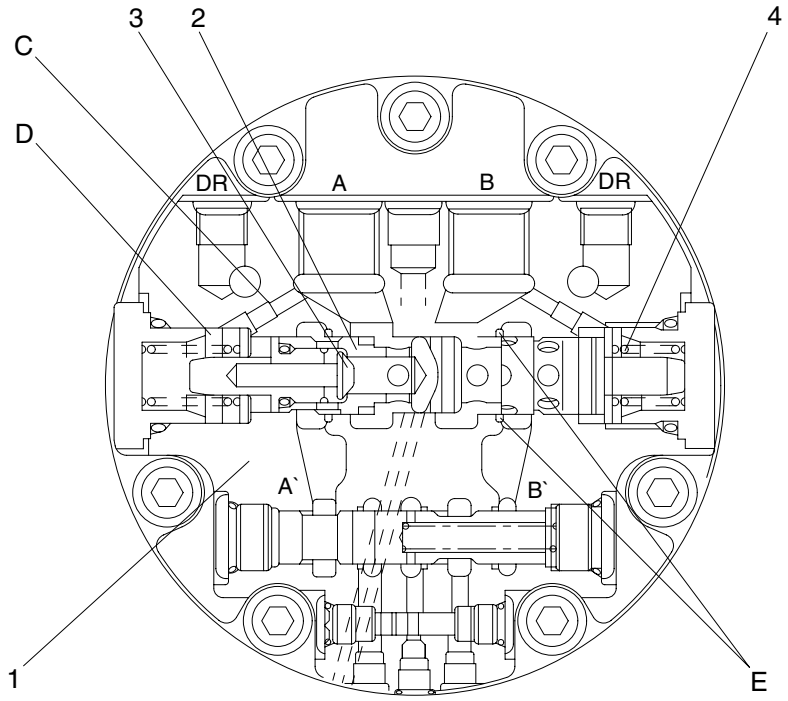


3) HYDRAULIC VALVE SECTION

(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.



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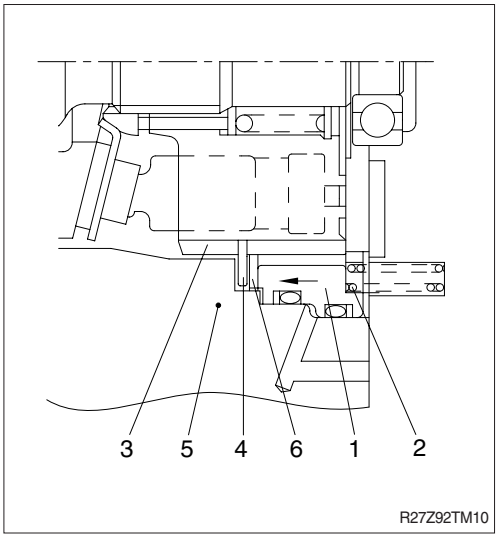
4) PARKING BRAKE SECTION

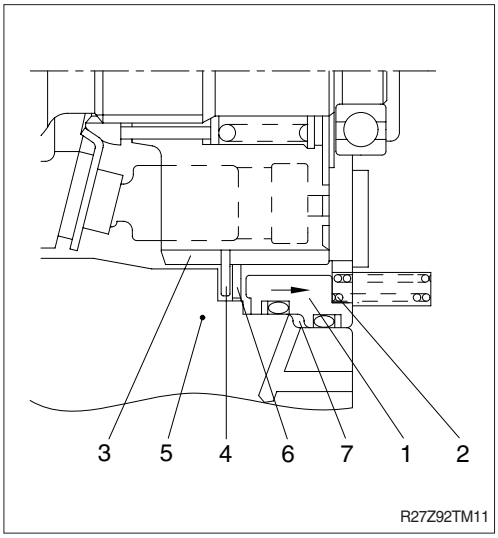
(1) Structure

The parking brake fixes the output shaft of hydraulic motor mechanically while the travel motor is stopped. And it is applied automatically in the following fashion.

When A and B ports are not pressurized, the brake piston (1) is pressed in the direction (shown as arrow) by the spring (2). Then the disk plate (4) which is fixed to the cylinder barrel (3) is held between the steel plate (6) which are fixed to the body 2 (5) and the body 2 (5). As a result, with the friction of these plates, the cylinder barrel (3) and the hydraulic motor are unable to rotate.

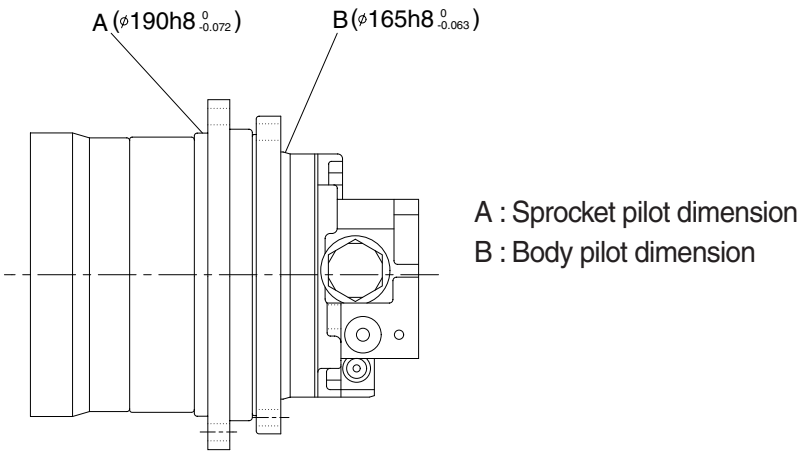


When A or B ports are pressurized, the oil is lead to chamber (7). Then the brake piston (1) is moved to the direction (shown as arrow) against the force of spring (2). As a result, the disk plate (4) is released from the steel plate (6) and the body 2 (5), and the cylinder barrel (3) can be rotated.



4. HANDLING

1) MOUNTING



(1) When installing the motor to the machine and/or attaching the sprocket to the motor, do not force the sections and/or strike them with a heavy object as damage may result. The best method is to use the mounting bolts as a guide and slowly slide it into place.

(2) Use the specified bolts (equivalent grade 12.9 or higher) for mounting the motor and the sprocket, and tighten using the following torque.

Bolt size	Torque
M12	9~11.5 kgf · m (65.1~83.2 lbf · ft)

2) PIPING

(1) Pay attention to the rotating direction and piping.

(2) When shipped, rubber plugs (or steel plugs for drain ports) are attached to the piping ports. When piping, pay attention as not to introduce dirt or welding scale into the ports.

(3) One of two drain ports is used as a drain line. Use the upper side port, and fill with 100 cm^3 of hydraulic oil, then connect the piping.

(4) The permissible drain pressure is limited by the oil seal. Therefore, pay attention to the size of drain piping so that the drain pressure does not exceed the limit especially in a low temperature environment. The permissible drain pressure is 3 kgf/cm^2 (42.7 psi) (rated) and 10 kgf/cm^2 (142 psi) (peak).

(5) Fine filtration prolongs the hydraulic system life and ensures high reliability. Install a 10 μ filter, or better in the circuit.

3) GEAR LUBRICATING OIL

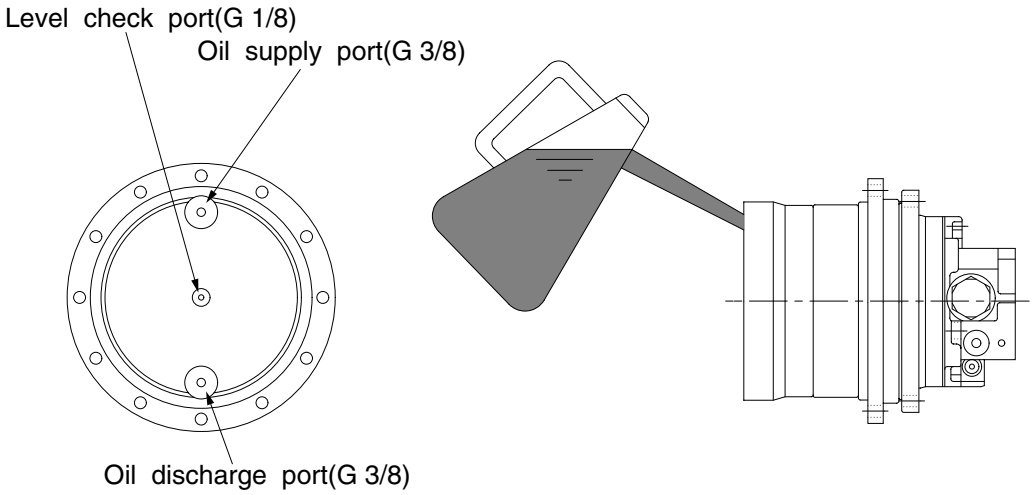
(1) Use diesel engine oil SAE-30-CD or equivalent as gear lubricating oil.
(When shipped, Idemitsu Apoloil Diesel Motive S-330 is used.)

(2) Any recommended gear oil can be used, but drain old oil completely, and do not mix.

(3) When shipped, gear box is pre-filled. Take the following steps to refill. All plugs are sealed by O-ring.

① Remove the oil supply port plug.
② Fill the oil from the oil supply port up to the "LEVEL".
③ Check the oil amount and install the oil supply port plug.

	Tightening torque
Oil supply, discharge port plugs	4.69~5.20 kgf · m (33.9~37.6 lbf · ft)
Level check port plug	1.22~1.84 kgf · m (8.82~13.3 lbf · ft)



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※ Remove the oil supply port plug before discharge port plug, when remove both the oil supply port plug and discharge port plug.

(4) Gear oil amount : 0.6ℓ (0.16 U.S. gal)
(5) Gear oil change period
First change : 200 hours or 2 months
Second and after : 1000 hours or 1 year

4) GENERAL PRECAUTIONS

(1) Always pay attention to oil leaks and loose bolts, detect and correct these problems as soon as possible to prevent damage to the motor or machine. Making a check sheet is recommended.