

JSI - EN - 05 - 3C - 002		Date	Jun 17th, 2005
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Written by	HAN SEONG, SEOL	Approved by	IN JAE, HWANG
Subject	Manual volume con	trol with allen wrench	n(Rexroth new-type)

## ■ Main hydraulic circuit

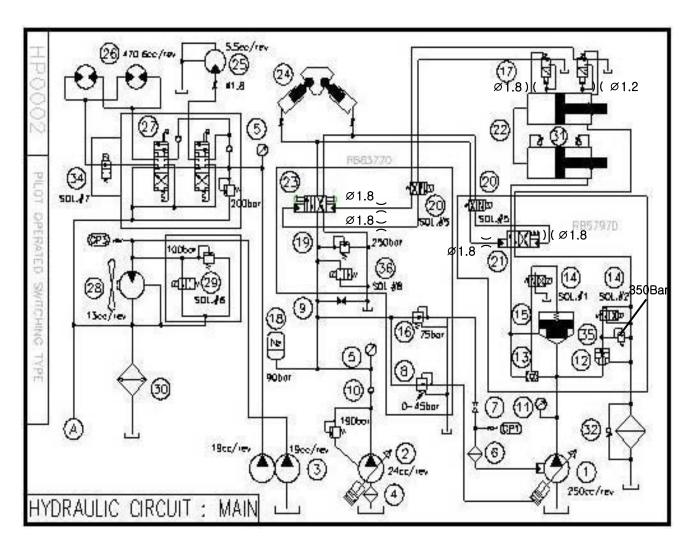


Fig. 1 Main hydraulic circuit(A4VSO250 main pump)

## ■ Hydraulic circuit(pumping)

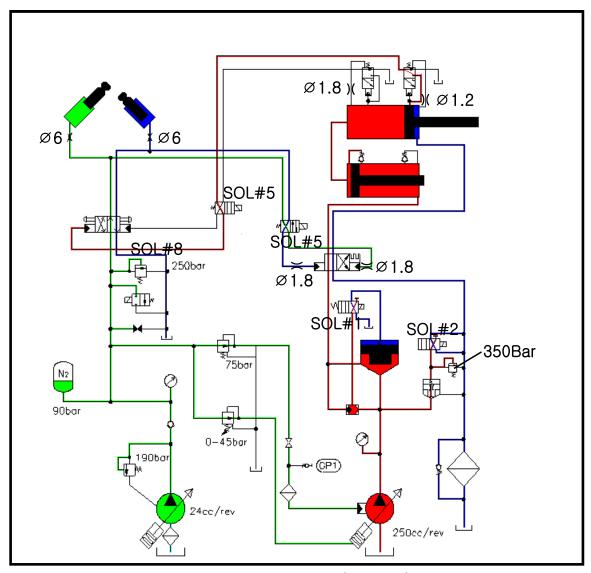


Fig. 2 Hydraulic circuit(pumping)

## Explanation of each component

- Main pump : component #(1)
  - 1. The main pump sucks hyd. oil from the reservoir and supplies the oil to the main pumping cylinder.

Domestic : Kawasaki K3V tandem(140cc/rev X 2)

Export : Rexroth A4VSO(250cc/rev)

2. The main pump is axial piston type variable displacement pump and the max. system pressure is set at 350 Bar.



Fig. 3 A4VSO250 main pump

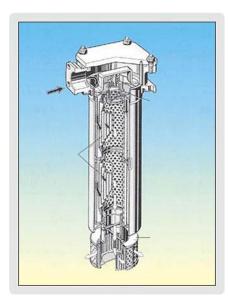


Fig. 4 Return filter

- O Return filter: component #(32)
  - 1. Hyd. oil returns to the reservoir through the return filter after finishing pumping. The strainer inside the filter should be cleaned up every year or when replace the hyd. oil.
  - 2. Max. oil flow = 650L/min,  $10\mu$

○ Main pump pressure gauge: component #(11)
 This gauge is located just next to the hopper with the agitator pump gauge.
 Under normal pumping condition, the pressure is about 80 - 120Bar and the max. pressure is set at 350Bar.





Fig. 5 Main pump pressure gauge

#### ○ Shuttle valve : component #(13)

This shuttle valve controls the direction of the oil flow. (Double check valve) As the solenoid valve is engaged, (logic valve open) it change the direction and the oil is supplied to the main cylinder.



Fig. 6 Shuttle valve next to the solenoid valve

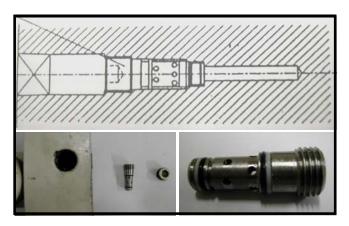


Fig. 6-1 Shuttle valve and section drawing

- \* Remark: The failure of this shuttle valve may cause the problem. The main cylinder rod would keep moving even though the operator stops pumping.
- O Logic element: component #(15), (12)

  This logic valve protects the system from the load of concrete and opens when the solenoid valve is engaged.

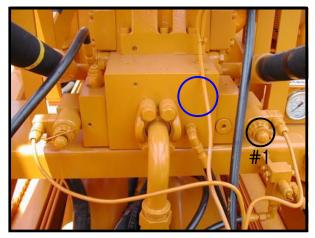






Fig. 7-1 Logic element

- Main relief valve : component #(35)
   This relief valve is set at 350Bar and can be adjusted by loosening the jam nut when setting.
  - ※ Over-loading the system After engaging the P.T.O, push one of reverse pumping solenoid valve or push the #2 solenoid v묖e.

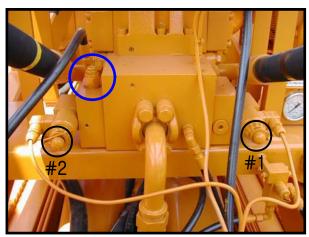


Fig. 8 Main relief valve

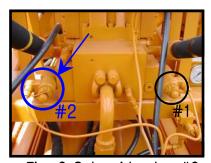


Fig. 9 Solenoid valve #2

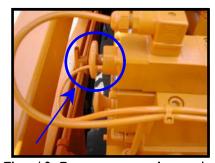


Fig. 10 Reverse pumping sol.



Fig. 11 Reverse pumping sol.

\* Check the each solenoid valve when improper pumping.

Main relief solenoid valve: component # (14)
 When the pumping switch is engaged, both sol#1 and sol#2 are engaged.
 Also the operator can pump manually by pushing these solenoid valves.



Fig. 12 Manual pumping by 2 solenoid valves

#### Manual pumping

- The operator can run the main pump manually using these 2 valves. Manual pumping can be performed when the mechanic test the system.

Failure of the solenoid valve coil might cause a problem on pumping.

O Main 4-way valve: component # (21)

By the signal from sensing valve on the main cylinder this 4-way valve change the flow direction to the main cylinder.



Fig. 13 Main 4-way valve

O Check valve: component # (31)

This check valve works to protect the main cylinder tube as the piston of main cylinder reaches the end of its stroke.

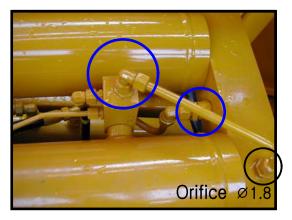


Fig. 14 Check valve #1 (Orifice : PF1/2" X 12L X  $\varnothing$ 1.8)

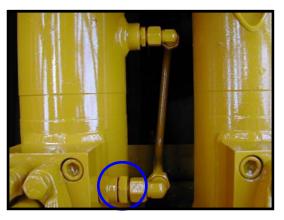
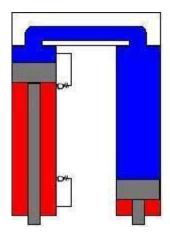


Fig. 15 Check valve #2

#### \* Remark



The change-over is not done properly. Both hyd. sensing valves and these check valves have to be checked when service.

Fig. 15-1 Improper change-over due to the check vavle

- O Main cylinder: component # (22)

  This component is the actuator of the main pump for concrete-pumping.
- O Pilot operated sensing valve: component # (17)

  2 of hyd. sensing valve are located on the main cylinder.(passenger side)

  These valve senses the pressure difference as the piston reaches the end

  of the cylinder and send signal to the 4-way valve.
- \* Old JUNJIN machine might be equipped with electric proximity switch.

Remark: This sensing valve failure might cause a problem with change-over.



Fig. 16 Hyd. sensing valve (Rod side)



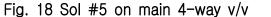
Fig. 17 Hyd. sensing valve (Pistin side)

- \* An orifice is installed to protect the seat from the spool inside the sensing valve.
- O Solenoid valve for reverse pumping solenoid valve: component # (20) 2 of solenoid valve(sol. #5) is located on both main 4-way valve and 4-way valve(accumulator pump). Both solenoid valve is engaged by the coil at the same time when the reverse pumping switch is engaged.

#### Manual reverse pumping

- Manual reverse pumping is performed manually by pushing these 2 buttons of solenoid valves.
- The solenoid valve button returns automatically by the spring.





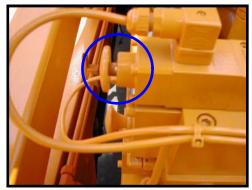


Fig. 19 Sol #5 on 4-way v/v(accum. pump)

#### ○ Accumulator pump : component # (2)

1. This accumulator pump supplies the hyd. oil to the plunger cylinder for S-valve change-over. Also it generates the pilot pressure to the main pump for the output volume control.(45 Bar, 75 Bar)

Pump spec. : Rexroth A10V28(24cc/rev)

2. Max. pressure setting: 190Bar



Fig. 20 Accumulator pump

\*\* The max. capacity of this pump is 28cc/rev. JUNJIN's specification is 24cc/rev using the spacer ring which limits the stroke of cylinders.  $(28cc/rev \rightarrow 24cc/rev)$ 

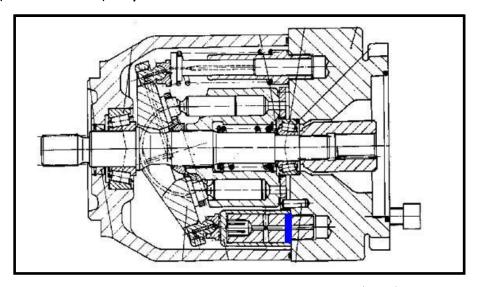


Fig. 20-1 Stroke limit using the spacer ring(2.2T)

### O Suction filter: component (4)

This filter is installed in the suction line to the pump for filtering. It should be replaced every 3 months or 100 working hours.

## O Line check valve : component (10)

This check valve is installed between the pump and accumulator to prevent the hyd. oil from flowing back to the pump.

\* Chattering noise might be caused by the check valve failure.



Fig. 21 Line check valve

O Pressure gauge for accumulator pump: component # (5)

190 Bar is built up as soon as the radio remote transmitter is turned on if
the dump valve is equipped with. 190 Bar is built up as soon as the
S-valve is changed over after 30-40 Bar down.



Fig. 22 Pressure gauge for accumulator pump

- Accumulator: component # (18)
   The nitrogen pressure inside the bladder is charged at 90 Bar at factory.
   The max. pressure is accumulated up to 190 Bar for fast S-valve change-over.
  - \* Nitrogen gas has to be charged when the pressure is below 90 Bar.



Fig. 23 Bladder replacement



Fig. 24 Accumulator

Shut-off valve for accumulator pressure drain: component # (9)
 The accumulator pressure can be drained manually using this shut-off valve.



Fig. 25 Shut-off valve for accumulator pressure drain

- Reducing valve for volume control: component
  - 0~30Bar control for output volume is performed with this reducing valve.
  - 0-30Bar pressure controls the angle of main pump swash plate.
  - Manual volume control

To establish desired pump speed, using wrench and remove cap and set allen screw with key provided.

When the shut-off valve drain the pressure to the tank, the main pump keeps max. output volume.

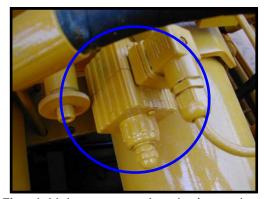




Fig. 1 Volume control reducing valve and manual volume control with allen wrench



Fig. 2 Shut-off v/v for max. output(Rexroth A11V260, A20V190)

- 75Bar Reducing valve : component # (16)
  - 75 Bar pressure goes to the Mst line of main pump. 0-45 Bar control can not be achieved unless this 75 Bar is built up.
  - \* Both reducing valve have to be checked to test the output volume control.



Fig. 29 75Bar reducing valve

O Solenoid valve for dump: component # (36)

As a safety device it drains the accumulator pressure automatically when the radio remote transmitter is turned off.

- \* Restore accumulator and pilot pressure by loosening the jam nut with wrench, then fully turn in allen bolt and secure jam nut.
- \* This valve has been removed since September, 2004.



Fig. 30 Dump valve

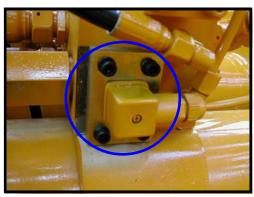


Fig. 31 Removed dump valve (Since September, 2004)

\* 2A fuse has to be removed for sure.(fuse for dump valve)

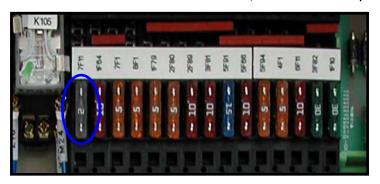


Fig. 31-1 Fuse removal

○ 250Bar Relief valve : component (19)

This 250Bar is installed to protect the system from the explosive pressure of accumulator pump even though the accumulator pump has its own 190 Bar relief valve.

#### \* How to set 250Bar relief valve

DR control of accumulator pump is set at 190Bar with the adjustment screw(Fig. 33). DR control adjustment should be higher than 250 Bar to set the 250Bar relief valve pressure. Remove the cap of accumulator pump regulator and turn the screw inward using a allen wrench to the max. pressure. Finally set the 250Bar relief valve(Fig. 32).

The 190Bar relief valve of accumulator pump should be set at 190Bar again after setting the 250Bar.

\* Remark: The improper setting or higher setting than 250Bar might cause the problem with hyd. hose failure of plunger cylinder.



Fig. 32 250Bar Relief valve



Fig. 33 190Bar relief valve(accm. pump)

- 4-way valve for S-valve change-over: component # (23)
  - 1. This valve controls the direction to plunger cylinders by the sensing signal of main cylinder.
  - 2. S-valve can be changed over manually by the knob on the each side of valve.

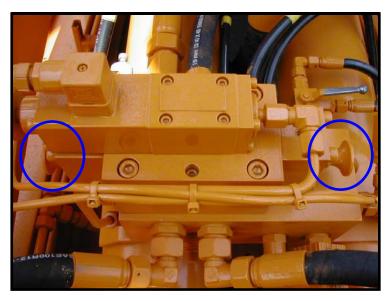


Fig. 34 4-way valve(accumulator pump)

O Plunger cylinder: component # (24)

As a actuator of the accumulator pump it's shifted explosively whenever the stroke of main cylinder changes.

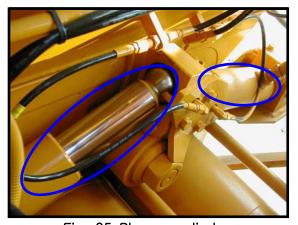


Fig. 35 Plunger cylinder

### ■ Function of solenoid valve for dump

The function of solenoid valve for dump is the relief of the accumulator pump pressure(not to be able to change the S-valve by the pressure) as a safety valve when the remote-control transmitter's power is turned off. The other function is the warming-up of pump without pressure before pumping work especially in cold area.

## Removal of solenoid valve for dump

The solenoid valve for dump has changed into optional one for customer since September, 2004. (Reinstallment of this valve is possible by customer's request)

Operator should relieve the pressure by using manual valve after pumping work when the dump valve is not equipped.



Fig. 1 Manual shut-off valve for accumulator pressure drain



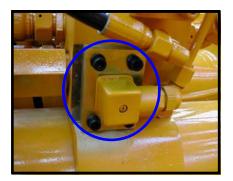


Fig. 2 Dump valve and removal of valve using plug plate



Fig. 3 Removal of fuse(7F11, 2A) for safety

## ■ New type of dump valve

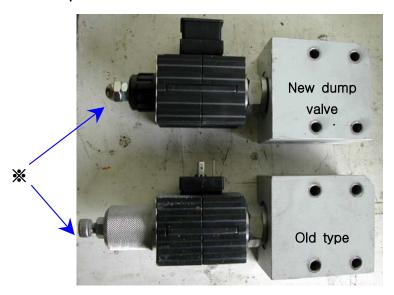


Fig. 4 New type of dump valve

New type of dump valve's manual operating part is different from old one's, but the function is the same.

\* Manual operation of solenoid valve(when accumulator pressure not stored): Restore accumulator pressure by loosening jam nut with wrench, then fully turn in allen bolt and secure jam nut.

## ■ Hydraulic schematic of solenoid valves

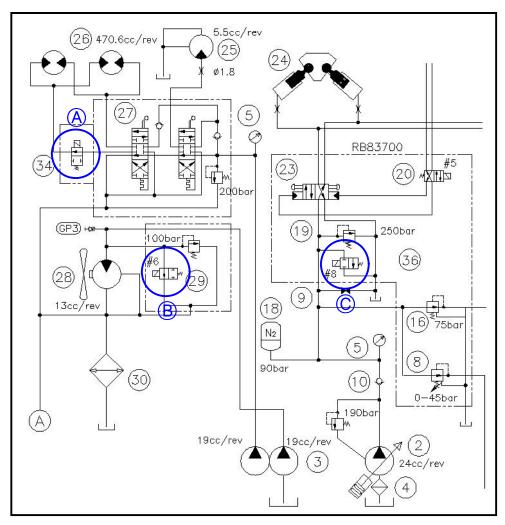


Fig. 1 Hyd. schematic of each solenoid valve

A: Solenoid valve for agitator motor

B: Solenoid valve for oil cooler

© : Solenoid valve for dump

#### Function of each solenoid valve

- Solenoid valve for agitator motor (A)
- When operator opens the screen of hopper(the limit switch next to hopper is activated), then this solenoid valve returns to the original position(block of hyd. flow) and the agitator motor stops turing. The activation of limit switch stops supplying of electric power. Usually, the electric power is supplied to this solenoid valve when the agitator motor works.
- Solenoid valve for oil cooler (B)
- This solenoid valve returns to the original position by the thermo-electric sensor or the oil cooler switch on main panel. Electric power is usually supplied to this sol. and drains the hyd. oil to the reservoir. (Oil cooler does not work)

This sol. blocks the oil flow and introduces the oil flow to the oil cooler motor when the electric power supply is cut off, then the oil cooler motor starts to turn.

- Solenoid valve for dump (©)
- The function of this solenoid valve for dump is the relief of the accumulator pump pressure(not to be able to change the S-valve by the pressure) as a safety valve when the remote-control transmitter's power is turned off. The other function is the warming-up of pump without pressure before pumping work especially in cold area.

Different from (A) and (B), this solenoid valve drains the oil flow to the reservoir when the electric power supply is cut off. (major difference between (A)(B) and (C))

## ■ Part number of each solenoid valve

Part description			Part number			
	Pail description		Old type		New type	Remark
1	1 Colored durable for existence mental (A)		RB999000	24V	RB99900C	
	1   Solenoid valve for agitator motor(A)	12V	RB999700	12V	RB99970C	
2		24V	RB999000	24V	RB99900C	
2	Solenoid valve for oil cooler(®)		RB999700	12V	RB99970C	
3	2 Colonaid valva for dump((a)	24V	RB996000	24V	RB99600C	
J	Solenoid valve for dump(©)	12V	RB996700	12V	RB99670C	

## ■ Installing an orifice on T-line of main 4-way valve

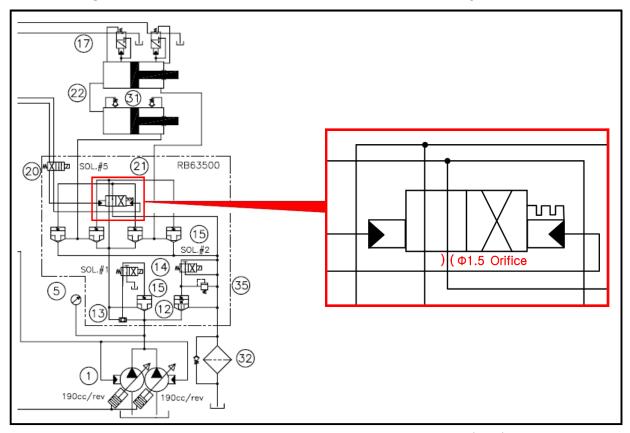


Fig. 1 Hydraulic schematic of main 4-way valve(M55)

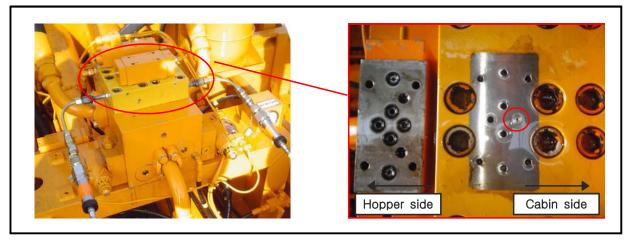


Fig. 2 Installing an orifice on T-line of main 4-way valve

## Procedure to install an orifice(Φ1.5)

The purpose of installing an orifice on main 4-way valve is to build back pressure on the T-line to stabilize S-tube shift. We've found that the 4 logic valves occasionally open simultaneously upon shifting S-valve when the oil temperature reached over  $70^{\circ}$ C, which means the produced oil from main pump returns to the tank. For normal pumping 2 of the logic valves need to be closed and 2 need to be open. The orifice helps the logic valves to operate properly. Installing an orifice( $\Phi$ 1.5) is recommended to prevent this problem.

- ① Disengage PTO and be ready to service the pump. Remember to drain the air pressure in hydraulic tank.
- 2 Take the main 4-way valve off and clean up the surface.
- ③ Insert the orifice( $\Phi$ 1.5) on the manifold block T-line. (Refer to Fig. 2 and T-line is located cabin side.)
- 4 Assemble the 4-way valve back to the block.



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Subject	Reduction gear for swing			

### Reduction gear

JUNJIN uses the reduction gear for swing on M42, M43, M50 and M55. Boom pump supplies hyd. oil to the turning motor through the boom control valve. The oil flow opens the brake valve of reduction gear and the boom starts to slew with the pinion gear and the ring gear.

## Spec. of the reduction gear

	Part #	Pinion gear	Gear body	Shaft(φ)	Ratio	Teeth(Z)	Ring gear
M40	MS023	RB9305	RB37180C	ф85	81.9	19	RB829
10140	MS113	MS11314	MS1138	ф			
M42	RB371	RB37114	RB3718	ф95	81.9	15	RB376
M43	RB371	RB37114	RB3718	ф95	81.9	15	RB376
10143	RB37100C	RB37114C	RB37180C	ф85	81.9	15	RB376
M48	RB475	RB47514	RB3718	ф95	159.1	14	RB474
M50	RB475	RB47514	RB3718	ф95	159.1	14	RB474
M52	MS114	MS11414	MS1148				
	RB795	RB47514	RB3718	ф95	81.9	14	RB474
M55	MS08	MS080014	RB3718	ф95	81.9	17	RB474
	MS143	MS11414	MS1138				

## Hyd. turning motor

Model	M40	M42	M43	M48	M50	M55
Part #	RB566	RB387	RB387	RB481	RB481	RB566

## ■ Brake valve of reduction gear

	Torque	Brake valve	Gear body without brake valve
All models	24KG • M	RB3719	RB37185



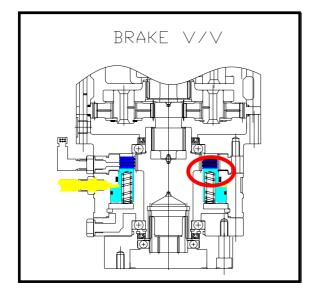
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### ■ Brake valve of reduction gear

The swing brake is just a stack of small disk that bind against each other like a clutch. When the tension from a spring is released, the swing motor turns and sends oil to the hub which releases this tension and the disk will spin against each other. As soon as the swing motor is stopped, the spring should clamp down on the disk and they should grab again. It is the same principle as a multiplate clutch.

## Brake valve operation

- O As the oil flows to the brake valve, yellow area gets bigger. (Brake released)
- O Green piston moves by the oil flow.
- O Blue-black brake disk is released.



BRAKE V/V

Holding brake

O Blue-black = Disc

○ Green = Brake piston

Releasing brake

○ Yellow = Hyd. oil

2 of air breathers for piston and disc move



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### ■ Checking the torque of brake valve

- O Using the torque wrench
  - · Lift the main section vertically for safety after O/R set up.
  - Relief the air pressure in system and take apart the brake valve from the reduction gear.
  - Plug the hyd. line which is connected to the brake valve from the safety valve block.
  - Check the torque using the torque wrench.
     (An adapter which connect the coupling and torque wrench is necessary.)
  - Recommended torque value = 24KG · M (±3KG · M)
- O Visual check of the brake valve
  - · Remove the cover of pinion gear.
  - Check the movement of pinion gear and ring gear when the boom stops right after the swing. If the gear movement keeps to turn even though the operator stop slewing.
  - · It is normal the gear moves within the backlash.



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## ■ Pictures of reduction gear



M40



M42, M43



M48, M50

55M