

**Instruction**  
**for**  
**Operation and Maintenance**



## **Preface**

Thanks for your trust and interested in our products.

In this specification, we introduce the specialty, workinarea , technical specification as well as operation and maintenance of PDwater well drilling rig. Besides, we also introduce the normal troubles and disposal for customers to deal with. If there are some abnormal problems such as instruction, capability and quality. Please contact us in time for better A/S service.

Please learning all contains of this instruction before operating.

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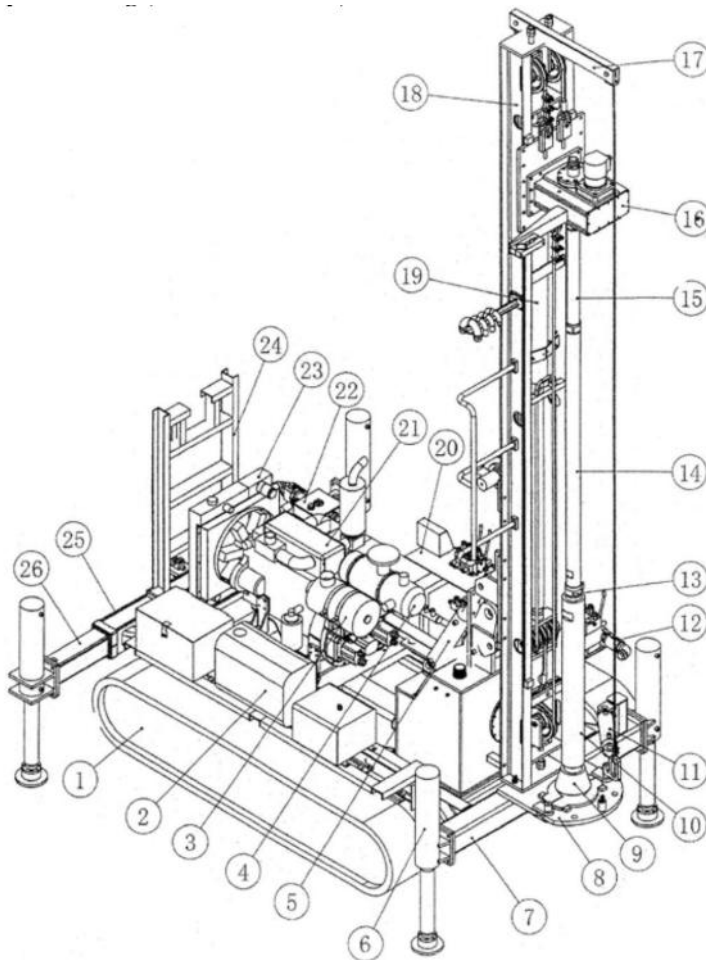
## Section I Drilling Machine Use

### 1. The use of drilling rigs

The PDseries water well drilling rig is a light, efficient and versatile drilling and drilling equipment. It is mainly used for drilling wells, agricultural irrigation wells and other wells. It is especially suitable for water intake projects in mountainous and rock formations. This series of rigs adopts new hydraulic technology, with high torque hydraulic motor rotation and large bore hydraulic oil Cylinder advancement.

## Section 2 The rig shape and working principle

### 1. The shape of the rig (remove the cover)



Picture 2-1 PDseries water well drilling rig

**2. Drill rig spare part name and part number (Picture 2-1)**

No.	Name	Part No.	No.	Name	Part No.
1	Walking part	FY10.6	14	Drill pipe	FY10F.1
2	Diesel tank	60L	15	Arbors	FY10-4
3	Secondary air filter		16	Gyrator	FY10.3.6
4	Desert air filter	KGG-2-1815A	17	Hoisting equipment	FY10.8
5	Pitch cylinder	FY10KW.0	18	guide	FY10.3.2
6	Outrigger cylinder	FY10ZT.0	19	Propulsion cylinder	FY10TI.0
7	Frame	FY10.5.1	20	Console	FY10.2.3
8	Pole holder	FY10.5.3	21	diesel engine	YC4D80
9	drill	Φ115-254	22	Oil injector	FY8-KW10
10	Impactor	HD 系列	23	Oil water cooler	B2928
11	Unloading cylinder	FY10XQ.0	24	Transport bracket	FY10.5.5
12	Shock ball valve	CJQF	25	Outrigger cylinder	FY10SS.0
13	Transition joint	FY10-5	26	Telescopic beam	FY10.5.1.1.2

**3. Working principle**

The PDseries water well drilling rig is a full hydraulic open-hole drilling equipment. It is powered by a diesel engine (21). By driving a hydraulic oil pump to form a high-pressure oil circuit, the hydraulic pressure is driven by manipulating various relevant hydraulic control valves on the console (20). The motor and hydraulic cylinder perform various predetermined actions. The power is activated during operation, pushing the handle of the rotary control valve on the console (20), and the pressure oil is driven by the rotary motor on the rotary motor (16).

Push the handle on the walking control valve to realize the forward, backward, and turn movement of the whole machine.

Push the handle on the console to control the movement of each relevant cylinder and hoisting motor, and complete the telescopic

movement of the guide rail (18) and the unloading cylinder (11), the leg cylinder (6), the telescopic cylinder (25), and the coil. The forward and reverse movement of the Yang motor.

Pushing the handle on the soil of the control valve to realize the telescopic movement of the propulsion cylinder (19), driving the wire rope to feed and lift. When the propulsion cylinder (19) contracts and the gyrotor (16) rotates forward, the ball valve (12) on the intake line is simultaneously opened to supply the pressurized air supplied from the air compressor to the drill pipe (14), the impactor (10), and the impactor. (10) Work and blow the broken rock out of the ground, so as to achieve continuous feeding of the crusher rock and form a rock drilling.

The handles on the confluence control valve are used in combination with the propulsion and swivel handles to achieve fast action of the gyrotor (16) and the propulsion cylinder (19).

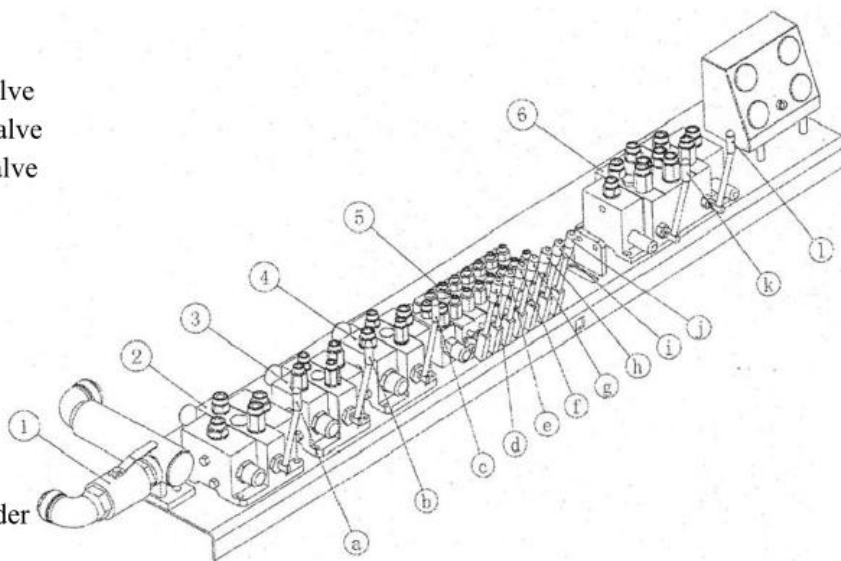
## **Section 3 Drill Handle Operation**

### **1. The impact control valve**

The impact control valve (1) is mounted on the control table on the left side of the drill (Fig. 3-1), and the impact rocker is operated by operating the impact valve handle. When the ball valve handle is placed in the open position, the high pressure line is opened and the impactor starts to operate; otherwise, the high pressure line is disconnected and the impactor stops working.

Note: At the beginning of the rock drilling work, the ball valve handle should be rotated and placed at an appropriate angle. When the rock hole is formed, the ball valve handle can be placed in the limit position.

1. Impact control valve
  2. Rotary control valve
  3. Propulsion control valve
  4. Confluence control valve
  5. Seven-way control valve
  6. Travel control valve
- a. turn around
  - b. Advance
  - c. Confluence
  - d. Unloading brazing
  - e. Hoist
  - f. Front leg
  - g. Carriage pitch
  - h. Rear telescopic cylinder
  - i. Rear left leg
  - j. Rear right leg
  - k. Walking left



**Picture 3-1**

## 2, The rotary control valve

The forward and reverse rotation of the gyrator is achieved by manipulating the handle (a) on the rotary control valve (2). When the handle (a) is pushed toward the rig, the gyrator rotates forward; when the handle (a) is pulled away from the rig, the gyrator reverses; when the handle (a) is at the neutral position, the gyrator stops rotating.

## 3, The propulsion valve

The telescopic movement of the propulsion cylinder is achieved by manipulating the handle (b) on the propulsion control valve (3). When the handle (b) is pushed toward the rig, the gyrator moves downward; when the handle (b) is pulled away from the rig, it moves upwards; when the handle (b) is placed at the neutral position, the gyrator stops moving.

## 4, The combined flow control valve

The handle on the confluence control valve (4) is used in conjunction with the rotary control valve (2) and the handle on the propulsion control

valve (3) for fast operation of the gyrator and propulsion cylinder. When the confluence control valve (c) is pushed toward the drill, the handle (a) on the rotary operation valve (2) is operated, and when the handle (a) is pushed toward the drill, the gyrator rotates rapidly; when the handle is pulled away from the drill, the gyrator Quick reversal. When the confluence control valve (c) is pulled away from the drill, the handle (b) on the propulsion operation valve (3) is operated to realize the rapid expansion and contraction of the propulsion cylinder. When the handle is pushed toward the rig, the gyrator moves down quickly; when the handle (b) is pulled away from the rig, the gyrator moves up quickly.

Note:

1. When impact rock drilling work, only the propulsion handle (b) can be used separately, and the confluence handle (c) must not be used for rapid propulsion.
2. The quick action of the gyrator and the propulsion cylinder can only be achieved by manipulating the confluence handle (c) after the rotary handle (a) or the propulsion handle (b) is used.

The rapid rotation generally uses a relatively soft geology drilling work in the soil layer or the ground.

## **5, Seven joint valve control valve**

By operating the handle on the seven-way valve (5) to control the movement of each relevant cylinder and hoisting motor, complete the pitch and unloading cylinder (11) of the guide rail (18), the leg cylinder (6), and the telescopic cylinder (25) The telescopic movement and the forward and reverse movement of the hoisting motor.

a. Unloading the brazing cylinder: push the handle of the unloading brazing cylinder (d) toward the direction of the drilling machine, and the unloading of the brazing cylinder is contracted; pulling away from the direction of the drilling machine, the unloading brazing cylinder is elongated.



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- b. hoisting motor: push the hoisting handle (e) to the direction of the rig, the hoisting machine drives the wire rope to move upwards; pulling away from the rig, the hoisting machine drives the wire rope to move downward;
- c. Front leg cylinder expansion and contraction: push the front leg handle (f) to the direction of the drill, the front leg cylinders are synchronously extended; pull away from the drilling machine, and the front leg cylinders are synchronously telescoped;
- d. The vertical tilting of the carriage: pushing the tilting handle (g) of the carriage toward the direction of the drilling machine, the sliding frame swinging downward; pulling away from the direction of the drilling machine, the sliding frame swings upward;
- e. Rear telescopic cylinder expansion and contraction: push the rear telescopic cylinder handle (h) toward the drilling machine direction, two telescopic cylinders drive the telescopic beam to extend outwards synchronously; the handle is pulled away from the drilling machine direction, and two telescopic cylinders drive the telescopic beam to expand and contract inward. ;
- f. Rear left leg cylinder expansion: push the rear left leg cylinder handle (i) toward the rig, and the rear left leg cylinder is extended; the handle is pulled away from the rig and the rear left leg cylinder is retracted.
- g. Rear right leg cylinder expansion and contraction: push the rear right leg cylinder handle (j) toward the rig, and the rear right leg cylinder is extended; the handle is pulled away from the rig, and the right leg cylinder is retracted.

Note:

When the four leg cylinders support the rig as a whole, it is strictly forbidden to operate the rear telescopic cylinder handle (h).

When the rig needs to be displaced, the four leg cylinders should be fully retracted to prevent collision with foreign objects while moving.

## 6, Walking control valve

The forward, backward and turning movements of the return rig are realized by manipulating the handles (k), (l) on the travel control valve (6).

- a. When the left and right walking handles (k), (l) are pushed toward the drilling machine at the same time, the drilling machine advances;
- b. Left and right walking handles (k), (l) When the rig is pulled away at the same time, the rig is retracted;
- c. Left travel handle (l) Push to the rig, right travel handle (k) When pulling away from the rig, the rig turns sharply to the right;
- d. Right travel handle (l) Push to the rig, left travel handle (k) When the rig is pulled away, the rig turns sharply to the left;
- e. Left travel handle (k) Pull away from the rig, right travel handle (l) When placed in the neutral position, the rig turns slowly to the right;
- f. Right travel handle (l) Pull away from the rig, and when the left travel handle (k) is in the neutral position, the rig turns slowly to the right;
- g. The left and right walking handles (k) and (l) are placed in the neutral position and the rig does not move.

## Section 4 Drill Rig Operation

### 1, The preparation work before drilling

1. Check all ducts and tubing for damage and ensure that all hose connections are safe and reliable.
2. Check if the tank hydraulic oil is sufficient and the oiler has oil;
3. Check that the lubrication of the lubricated parts is appropriate;
4. Check the carriage to remove debris
5. Check the fixing of the gyrator on the mounting plate, and whether the connection between the mounting plate and the carriage is in good

condition;

6. Check the air compressor air pressure value, the minimum pressure should not be less than 0.10Mpa;
7. After blowing the debris in the main air duct, it is reliably connected to the intake pipe joint of the drilling rig;
8. Before opening the balloon valve, check that the hose is fully engaged with the safety valve;
9. Check that all hoses are in good condition and that the connections are tight and reliable;
10. Adjust the oiler.

## **2,The drilling program**

1. Move the rig to the position where you need to work, and operate the telescopic cylinder handle and the leg cylinder handle to adjust the rig parallel to the ground.
2. Operate the tilt cylinder handle to tilt the carriage to the stop position, tighten the two fixing bolts with a wrench, and insert the retaining pin.
3. Install the first drill pipe (2 m) and the impactor and the drill bit, and fix the impactor with the impactor positioning sleeve.
4. By manipulating the leg cylinder handle micro-adjustment machine, the drill pipe is guaranteed to be vertically downward.
5. Open the balloon valve;
6. Adjust the oiler needle valve until oil droplets are seen at the bit;
7. Slowly move the gyrator downward to make the impactor bit touch the ground surface, and push the impact ball valve handle to the appropriate angle position to drill;
8. After the rock hole is formed, the impactor stable sleeve should be replaced with a drill rod stabilization sleeve, and then the impact ball

valve handle is pushed to the limit position for the formal rock drilling work.

Note:

1. When drilling the soil, replace it with a special earth-boring drill bit. When drilling the soil, the impactor should be removed for direct drilling.
2. When drilling into the rock formation, the drill should be replaced and the impactor installed. The sleeper or block should be placed under the four leg cylinders to increase the stability of the ring.

### **3, The drill pipe**

1. When the gyrator is lowered to the lowest point, the gyrator is lifted, so that the flat side of the wrench on the drill pipe is inserted into the position of the ejector lever, the rotation and the feed are stopped, and the impact pressure is closed;
2. Insert the connecting rod wrench into the flat side of the drill rod and lower the gyrator so that the connecting rod wrench is placed on the rod holder;
3. Reverse rotation, the connecting rod wrench hits the stop pin on the positioner; loosens the upper and lower drill pipe joints;
4. Slowly raise the swivel side of the turret until the joint and the drill rod are completely loose. At this time, the drill rod is hung near the ejector lever wrench to the positioner;
5. Grease the drill pipe thread and cover the drill pipe with a threaded protective cap;
6. Apply grease to the next drill pipe thread;
7. By manipulating the hoisting motor handle, the drill pipe is placed in the appropriate position in front of the gyrator, the drill pipe pre-alignment is aligned with the gyrator axis, and the hoisting motor is slowly lifted, and the gyrator is rotated forward, and the drill pipe is loaded into the

gyrator.

On the pole

8. Operate the hoist motor handle to withdraw the locating sleeve and the hook from the drill rod.
9. Push the impact handle and blow the drill pipe clean with a compressed air;
10. Remove the previous drill pipe thread protection cap and slowly lower the gyrator. At the same time, rotate slowly at a slow speed and make the cobalt rod concentric until the drill rod is tightened;
11. Gently lift the gyrator and remove the ejector lever;
12. At this point, the drill pipe is installed.

#### **4, The unloading rod**

1. Raise the gyrator until the flat end of the wrench at the upper end of the first drill rod falls in the proper position and insert the ejector lever wrench;
2. Lowering the gyrator, causing the docking rod wrench to fall on the rod holder;
3. Reverse rotation, so that the retaining pin on the rod holder blocks the connecting rod wrench, so that the first drill rod and the gyrator transition drill rod are loosened by about 5 mm, and the unloading rod wrench is taken out;
4. Raise the gyrator until the flat end of the wrench at the upper end of the second drill rod falls in the proper position and insert the ejector lever wrench;
5. Lowering the gyrator, causing the connecting rod wrench to fall on the positioner; inserting another connecting rod wrench into the flat side of the wrench at the lower end of the first drill rod; inserting the steel wire rope

on the unloading oil cylinder into the second loading and unloading .In the groove of the rod wrench, the handle of the unloading cylinder is operated to loosen the upper and lower drill rods.

6. Lifting the gyrator to drive the first drill rod up to the appropriate position, operating the hoisting motor handle to fit the positioning sleeve and the hook into the first drill rod, holding the first drill rod in the hand, and rotating the reverse one The upper end of the drill pipe is completely loose, and the hoisting motor handle is operated to lift the drill pipe to the ground.

7. Lower the gyrator and rotate forward. Repeat the above actions (4)(5)(6) to lift all the drill pipes in the hole.

Note:

When the four leg cylinders support the rig as a whole, it is strictly prohibited to operate the rear telescopic cylinder handle (h).

When the rig needs to be displaced, the four leg cylinder rods should be fully retracted to prevent.

## Section 5 Drilling rig use and maintenance

In order to give full play to the maximum efficiency of the rig and extend the life of the rig, the rig should be managed and operated by a person.

Work and maintenance. The operator should understand the main structure, principle, performance and maintenance methods of the rig.

### 1, the inspection and debugging before the operation:

1. Check whether the hydraulic oil in the diesel engine, the oil in the oil tank, and the lubricating oil

in the oil tank meet the requirements.

2. Check if the connecting screws are loose and the air hose is installed

securely.

## **2, the operation steps of the rig:**

1. Start the diesel engine. Wait for the diesel engine to run for 10 to 20 minutes before proceeding further.
2. Push the travel control valve to move the drill to the perforation position; push each handle on the cylinder control valve to adjust the carriage to the position of the stopper. Fine-tune the 4 leg cylinders to ensure that the drill pipe is vertically down.
3. Open the ball valve switch and the impact control valve on the intake line to supply air to the impactor, and at the same time push the rotary control valve to make the gyrator drive the drill pipe and the impactor to rotate forward, and then slowly push the propulsion control valve to make the drill head gradually close to the ground and contact The ground rear impactor begins to work.
4. It is strictly forbidden to use the impactor for soil drilling.

## **3, the operation and maintenance should pay attention to:**

1. It is strictly forbidden to operate illegally under the carriage.
2. Before each use, it is necessary to blow the air supply pipe and iron scraps and debris in the drill pipe to avoid damage or jamming of the impactor parts.
3. The working pressure must be greater than 0.10 MPa. If the air pressure is too low, it will directly affect the rock drilling efficiency and even fail to work.
4. Do not reverse the hole during drilling to prevent the drill pipe and impactor from falling into the hole.

5. If the hole position is found during drilling, it should be adjusted in time to avoid sticking.

6. When changing the bit, pay attention to the diameter change. If the bit wear hole has not been drilled, do not replace the new bit to prevent the drill.

7. In order to ensure that the rig is always in a good and efficient working state and reach the normal rig life, it must be regularly, quantitatively and regularly lubricated and maintained according to the requirements. Fill the parts with the oil cups (it must be checked once every 24 hours). The diesel engine should be checked for replenishment of diesel engine oil every week. For details, please refer to the “Diesel Engine Instruction Manual”.

#### **4, the use and maintenance of the hydraulic system**

1. If the rig is not used for a long time, it should not be used immediately after starting the operation.

It should be operated at a small load of not less than 10 minutes.

2. The hydraulic oil level in the tank must be checked before each work (generally not less than 1/3 of the level gauge).

3. After a certain period of work (usually about 500 hours), the hydraulic oil must be changed immediately (normally N46# anti-wear hydraulic oil) when the hydraulic oil is discolored, deteriorated, or the viscosity is lowered.

4. When replacing, first discharge all hydraulic oil in the tank (including hydraulic components).

For debris in the fuel tank. It can be glued out with plasticine.

5. After the oil absorption and return filter is used for the first time, 100 hours or two weeks, the filter element should be replaced. After every 100



hours of operation, check and clean or replace the oil absorption and return oil filter.

**5, the use and maintenance of the impactor**

1. The impactor must be well lubricated during operation in order to achieve optimum performance and long service life. Lubrication of the impactor is achieved by the oiler. Lubricate the oil before starting work and ensure that the oil mist is not less than 50 drops per minute. No lubrication is allowed! Always pay attention to whether the oil mister works normally and has no lubricating oil during work. If it is found that there is no oil or no oil, it should be stopped and repaired immediately, otherwise the impactor will be damaged.

The oil output of the oil mister is adjusted by the oil regulating valve needle, and the oil is increased by screwing the oil drop screw counterclockwise with a screwdriver.

Turning clockwise turns the oil output down.

2. lubricating oil

The principle of lubricating oil is selected: when the temperature is high, the viscosity of the oil is larger, and when the temperature is lower, the viscosity of the lubricating oil is smaller. It is recommended to select the lubricant as shown below.

Name	Model#	Kinematic viscosity (mm <sup>2</sup> /s)	Solidifying point (°C)	Temperature selection (°C)
lubricating oil	20#	17-23	-15	-10—10
lubricating oil	30#	27-33	-10	5—20
lubricating oil	40#	37-43	-10	15—35

**Section 7 Drilling machine common faults and troubleshooting methods**

Malfunction	Reason	Method of exclusion
No impact on gas	Check valve stuck	Remove the check valve overhaul
	The viscosity of the lubricating oil is too high to stick the piston	Open the check valve and add a small amount of kerosene
	After the drill bit is extended, it is dead with the front joint and cannot be reset.	Or flush with gasoline and then replace the leaner lubricant
	Poor lubrication, piston and cylinder killed	Remove the drill to overhaul
	Valve stroke is too large or too small	Disassembly and repair, replace parts and replace lubricant if necessary
	Poor contact between the valve plate and the bonnet and seat ring	Replace or thin the valve to a stroke of $2.0 \pm 0.2\text{mm}$
	Valve movement is blocked	Check the valve plate plane and bonnet, the seat ring air ring surface is bumped and scratched and then repaired or replaced with new parts
	Misplaced or missing parts	Due to the influence of debris, debris should be removed
Impulsive weakness	Outer casing flip	Installation and reloading
	Cylinder or missing parts	Installation and reloading
	The valve plate is seriously small	Installation and reloading
Broken drill pipe	The drill pipe is rubbed against the hole wall to reduce the wall thickness of the drill pipe and weaken the strength.	Replace the valve
Hydraulic oil temperature rises sharply	There are too many bends in the tubing, causing pressure loss.	When connecting the drill pipe, pay attention to check that the excessively worn drill pipe should be stopped; the available male and female cones that have been broken in the hole are salvaged.
	heat	Reduce the bending of each tubing, straight
	Leakage at each joint, causing volume loss	Replace the joint seal
	Oil return filter blocked	Cleaning or replacement
Card drill	System pressure is too high	Adjust pressure
	Drill bit	
	The new drill bit is larger than the original diameter	When the bit is broken, it can be used as a seamless pipe with the same diameter as the hole diameter, and then filled with yellow mud or asphalt and connected with the drill pipe to the bottom of the hole, and the bottom bottom of the hole is removed.
	The machine is displaced during rock drilling or the drill is deflected in the hole	In the next five cases, the drill can't be lifted or can't fit, the motor doesn't turn, the impactor doesn't ring, etc. At this time, only the external torque or auxiliary tools help to lift, so that the drill rotates, and then the air edge is raised.
	Rock holes or holes in rock holes when drilling or encounter large cracks or caves. In the case of a yellow mud crushed stone belt, the rock powder can not be discharged, the operation is negligent, the drilling is stopped for a long time, the rock powder is not blown off, or the impactor is buried by the rock powder.	

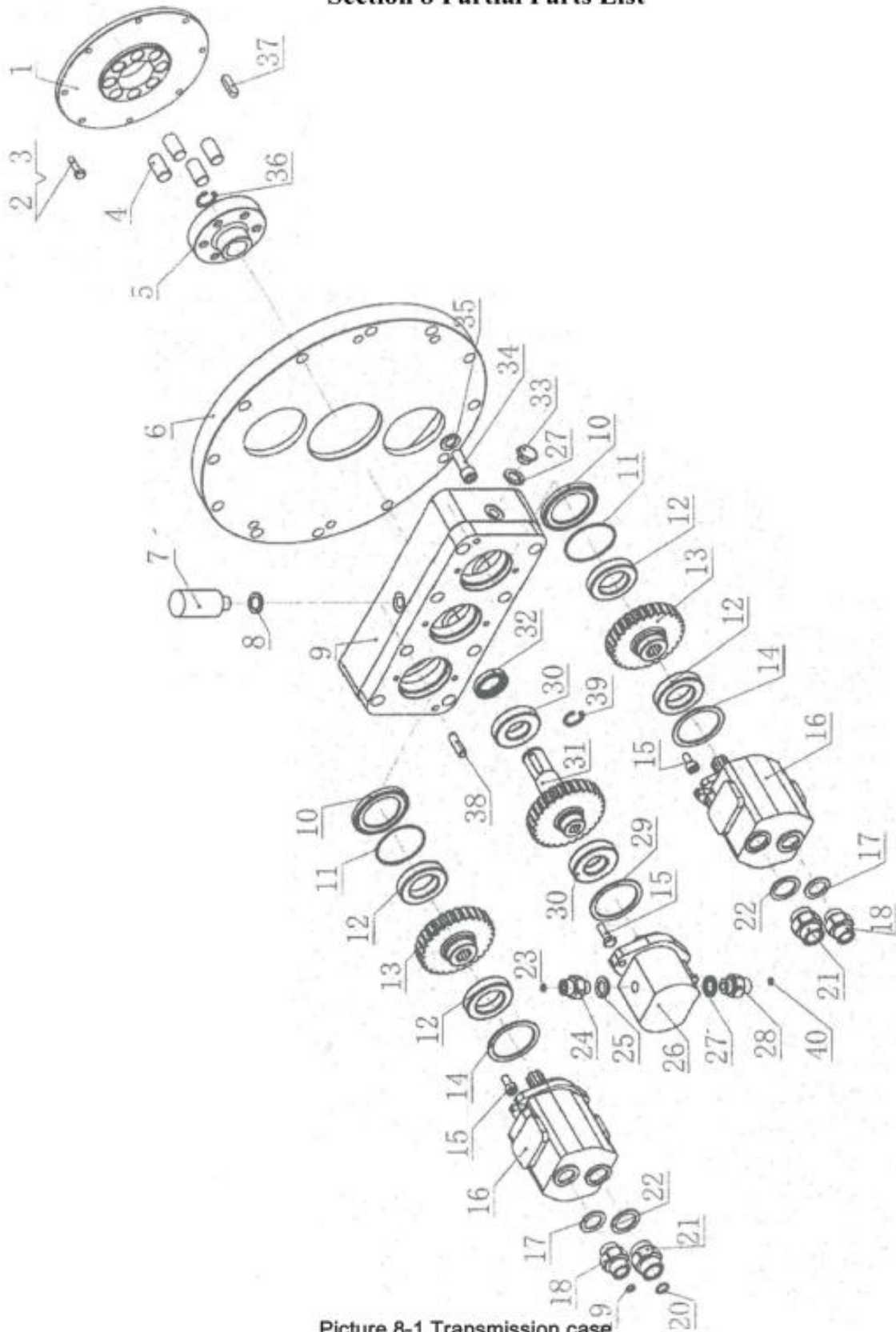
Hydraulic motor does not rotate or the speed is slow and the walking is not synchronized	The oil pump does not produce oil and the system is pressureless.	The oil level of the fuel tank is lower than the suction port, and the hydraulic oil should be added.
	Low pressure	Repair or replace the relief valve, the suction pipe does not intake air, remove the air
	Hydraulic motor internal parts are damaged	Repair or replace the hydraulic motor
	Left and right travel motor pressure difference	Adjust pressure
	Left and right track belts have poor tightness	Adjust the tightness
	Guide wheel and roller inner sleeve, wear	Overhaul or replace
Hydraulic motor oil leakage	Hydraulic motor end face seal wear	Replace the seal
Drilling speed is too slow	Insufficient gas volume, low air pressure	Increase the air supply and check the connector for air leakage.
	Gas supply line is small or too long	Replace the large air duct to shorten the air circuit
	Insufficient thrust	Improve propulsion
	The drilling impactor and the drill pipe have excessive resistance to running on the edge	Immediately shut down and adjust the machine to reduce propulsion and trim the hole wall
	The drill bit has been blunt	Repair the drill bit or replace the drill bit
	Impactor internal parts wear	Replace the internal parts of the impactor
	Excessive moisture in the gas storage bag or icing in the winter pipeline	Gas storage bag, clear water
Diesel engine failure	See the diesel engine manual for details.	Repair or replace parts

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## **Section 7 Safety precautions for drilling rigs**

1. All operators and maintenance personnel who are ready to operate and repair the rig must read and understand the precautions and be able to identify the situation.
2. When the operator approaches the rig, he must wear a helmet, protective glasses, a mask, ear protectors, safety shoes and dust-proof overalls.
3. Before the rig is repaired, first close the main intake pipe and the main damper.
4. Check and keep all nuts and screws, do not loosen, all hoses are connected reliably, and pay attention to protect the hose to prevent breakage.
5. Keep the workplace clean and prevent collapse. Keep your hands, arms and eyes away from moving parts to avoid accidental injury.
6. When starting the travel motor, pay attention to the speed at which the rig advances and retreats. When towing and being towed, do not stand between the two machines.
7. Ensure that the drilling machine is well lubricated, timely repaired, and pay attention to the position of the oil mark during work. Before opening the oil mister, the main air valve must be shut off and the compressed air in the drilling machine pipeline should be released.
8. When there is damage to the parts, the rig should not be used forcibly.
9. Carefully adjust the drilling rig during work. Before supplying the wind, the main air duct and the drilling rig must be bundled together with a safety rope.
10. When the rig is displaced, adjust the carriage to the transport bracket.
11. When the drilling rig is deactivated, blow the surface powder clean and place it in a safe place to prevent damage to the parts.

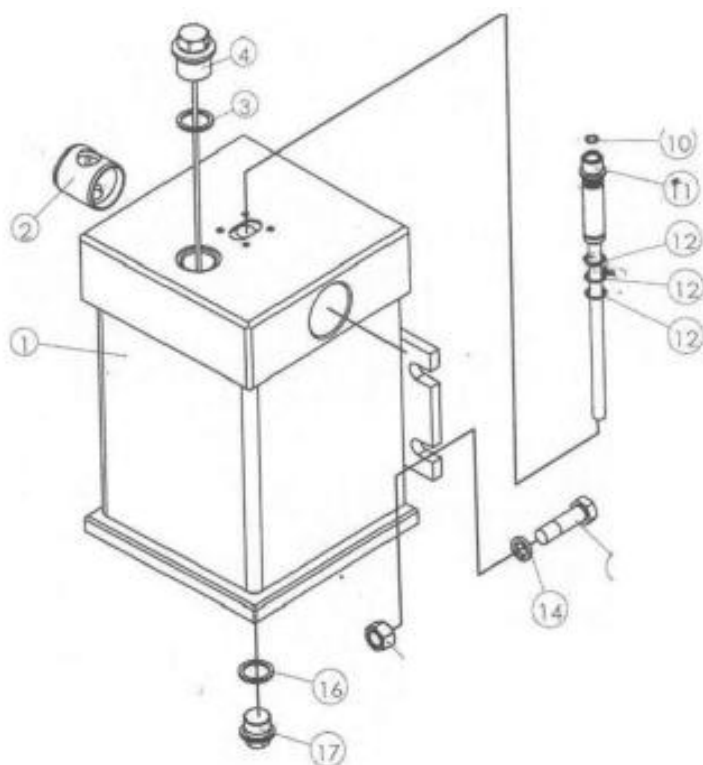
**Section 8 Partial Parts List**



Picture 8-1 Transmission case

**Transmission case ( 8-1 )**

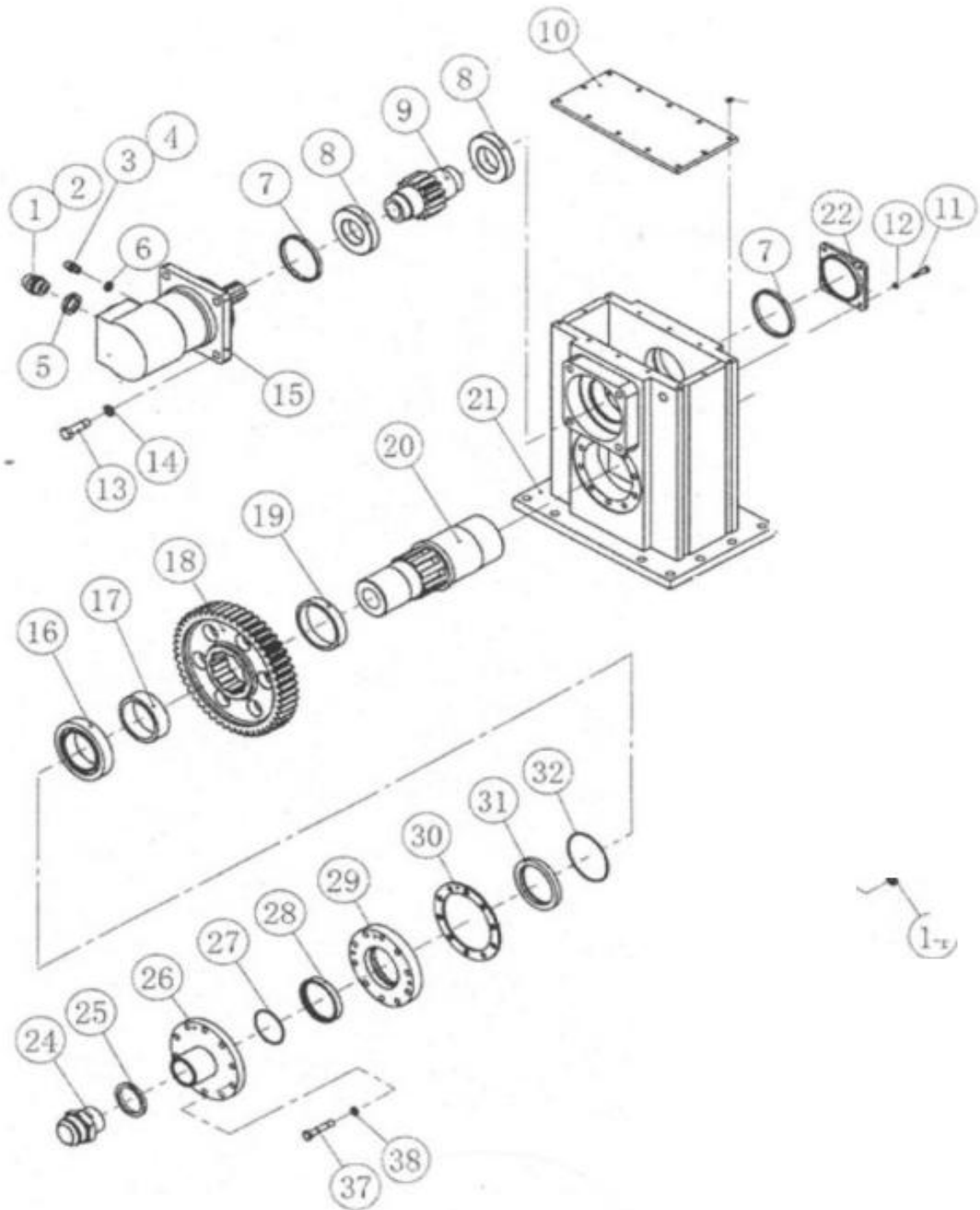
No.	Part No.	Name	Qtys	Suggest Qtyts		
				Grage		
				Min.	Average	Max.
1	FY140A.7.1-2	Drive plate	1			
2	GB70-85	Screw 8M*×30	8			
3	GB93-87	washer	8			
4	FY100.7.4-3	Nylon pin	8			
5	FY140A.7.4-1	Semi-coupling	1			
6	FY140A.7.4-1	Installation disk	1			
7		Respirator	1			
8	JB982-77	Combination washer 20	1			
9	FY140.7.1.1	Box	1			
10	FY100.7.4-5	Sealing plate	2			
11	GB3452.1-92	O-ring 80×2.65	2			
12	GB276-82	Inheritance 207	4			
13	FY140D.7.4-5	Driven gear	2			
14	FY100.7.4-7	Spacer	2			
15	GB70-85	Screw M10×30	6			
16	CBHZ-F36-ALH4L	Gear pump	2			
17	GB1235.1-86	O-ring 22×2.4	2			
18		Oil pump connector M27-1/2	2			
19	GB3452.1-92	O-ring 16×2.65	2			
20	GB3452.1-92	O-ring 28×2.65	2			
21	FY140.7.1-5	Oil pump connector M39-1	2			
22	GB3452.1-92	O-ring 28×3.55	2			
23	GB3452.1-92	O-ring 19×2.65	1			
24	FY140.7.1-5	Connector M30-22	1			
25	JB982-77	Combination washer 22	2			
26	GBT-F410-ALH4	Gear pump	1			
27	JB982-77	Combination washer 18	2			
28	FY140.7.1-6	Oil pump connector M22-18	1			
29	FY140.7.1-7	Spacer	1			
30	GB276-82	Bearing 109	2			
31	FY140.7.4-2	Drive axle	1			
32	GB9877.1-88	Oil seal FB35×52×8	1			
33	JB1000-77	Screw plug M18×1.5	1			
34	GB70-85	Screw M14×40	4			
35	GB93-87	Elastic washers 14	4			
36	GB894.1-86	Shaft retaining ring 32	2			
37	GB1096-79	Key 10×40	2			
38	GB119-86	Pin 10×40	1			
39	GB894.1-86	Shaft retaining ring 52	1			
40	GB3452.1-92	O-ring 12.5×2.65	1			



**Picture 8-2 FY8 Oil injector**

**FY 8- FY 10 Oil injector (8-2)**

No.	Part No.	Name	Qty	Suggest Qty		
				Grade		
				Min.	Average	Max.
1	FY8.1	Oil filler housing	1			
2	FY8-4	bushing	1			
3	JB982-77	Combination washer 33	1			
4	FY8.2	Fuel plug weldment	1			
5	GB93-87	Elastic washer 6	4			
6	GB65-85	Screw M6×16	4			
7	FY8-2	Dust cover	1			
8	FY8-1	Press plate	1			
9	FY8-3	Oil adjustment valve needle	1			
10	GB3452.1-92	O-ring 8.75×1.8	2			
11	FY8.3	Valve body assembly	1			
12	GB3452.1-92	O-ring 1.7×1.8	3			
13	GB5781-86	Hex bolt M16	4			
14	GB93-87	Elastic washers M16	4			
15	GB6170-86	Hex nut M16	4			
16	JG982-77	Combination washer 27	1			
17	FY8-5	Oil drain plug	1			



Picture 8-3 FY10.3.6 Rotary



## FY10.3.6 Rotary (8-3)

No.	Part No.	Name	Qtys	Suggest Qtyts		
				Grage		
				Min.	Average	Max.
1	FY 140.3.2-9	Motor connector 30-33	2			
2	GB3452.1-86	O-ring 19×2.65	2			
3	FY 10.6-1	Connector 1.4-1.6	1			
4	GB3452.1-86	O-ring 7.5×1.8	1			
5	JG982-77	Combination washer 33	2			
6	JG982-77	Combination washer 14	1			
7	GB8831-86	Hole retaining ring 110	1			
8	GB276-82	Bearing 212	2			
9	FY 10.3.6-11	Gear shaft	1			
10	FY 10.3.6-4	Cover	1			
11	GB5782-86	Hex bolt M8×25	14			
12	GB93-87	Elastomeric washer M16	14			
13	GB5782-86	Hex Bolts	14			
14	GB93-87	Elastomeric washer M16	14			
15	BM-E500-H5AY2	Cycloidal motor	1			
16	GB297-84	Bearing 2007118	1			
17	FY 10.3.6-3	Spacer II	1			
18	FY 10.3.6-5	Cycloid	1			
19	FY 10.3.6-6	Spacer I	1			
20	FY 10.3.6-8	Spindle	1			
21	FY 10.3.6.1	Box	1			
22	FY 10.3.6-10	Bearing gland	1			
23	GB297-84	Bearing 2007118	1			
24	2JN-32	Right angle joint	1			
25	JG982-77	Combination washer 64	1			
26	FY 10.3.6.2	Intake seat	1			
27	GB3452.1-86	O-ring 115×2.65	1			
28	JB/ZQ4265-86	Shaft YX seal D90	1			
29	FY 10.3.6-1	Rear end cover	1			
30	FY 10.3.6-2	Adjustment mats	1			
31	GB/T13871-92	Oil seal 90×120×12	1			
32	GB3452.1-86	O-ring 135×2.65	1			
33	GB3452.1-86	O-ring 170×2.65	1			
34	GB/T13871-92	Oil seal 110×140×12	1			
35	FY 10.3.6-7	Front end cover	1			
36	G10708.3-2000	Dust ring FC110×140×8.5	1			
37	GB5782-86	Hex bolts M12×60	12			
38	GB93-87	Elastomeric washer M12	12			

**Picture 8-4 FY10.2 Hydraulic System**

