



# SL450 SWIVEL WITH SPINNER

## OPERATION MANUAL

SL450-SM

STANDARD : SY/T5530-1992



8A-0063

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## ATTACHED FIGURES

Figure 1: SL 450 Swivel

Figure 2: SL450 Swivel

Figure 3: Packing

Figure 4: Inspecting and debugging for assemble

Figure 5: Inspecting and debugging for assemble

Figure 6: Inspecting and debugging for assemble

Figure 7: Overview of XSL450 Swivel with Spinner

## 1. Technical Specifications

Model:	SL450
Max. static load:	4500 kN
Max. speed:	300 rpm
Max. work pressure:	35 MPa
Stem ID:	75 mm
Coupling thread:	
With stem:	7 5/8 REG LH
With kelly:	6 5/8 REG LH
Line pipe thread of gooseneck with hose:	4"-8teeth/in (API std 5B)
Overall Dimensions	830×1096×3015mm
Weight	2700kg

## 2. Primary Purposes and Applicable Scope

### 2.1 Primary Purposes

2.1.1 To hang drill string

2.1.2 To connect lift-unit (not rotary) with rotary drilling tool.

2.1.3 To act as the channel of high-pressure mud into drilling tool.

Note: Fit with special spinner to conduct spinning works and to connect single or break out kelly.

### 2.2 Applicable Scope

SL450 is suitable for petroleum rig with drilling depth of 4500meters and 6000meters.

## 3. Main Structure

The Swivel with Spinner consists of rotary part, fixed part, supporting part and sealing part. The rotary part is composed of stem and joints. The fixed part includes six parts such as housing(12), upper cover(4), lower cover(15), gooseneck(31), bail(33) and bail pin(34). The supporting part comprises main bearing(13), anti-bouncing (guide) bearing(9), and lower guide bearing(16). The sealing part covers packing device(30) and upper and

lower spring seal rings.

Stem(11) bears all the weight of drill string and the pressure of inner mud. The coupling threads of stem with joint and joint with kelly are both up to the size and measure method of API spec7 (Specification for Rotary Drilling Equipment).

Stem is a part with hollow center. The upper end is linked with packing device (Figure 3), and the lower end is connected with joint. And the middle part sits on the main bearing with two bearings in two ends guiding it. The upper guide bearing also acts to avoid the moving of stem. The upper side of it is fixed with rubber umbrella(5) to prevent mud from entering the swivel body. O-ring(21) between stem and joint can prevent high-pressure mud from washing thread and acts as seal.

Bail is attached to housing through two bail pins, which makes swivel hang on big hook. The housing is a carrying part and an oil tank for lubricating and cooling main bearing and guide bearing. The upper and lower parts of it are connected with upper cover and lower cover respectively. The outside of it is fixed with buffer(10) to avoid the impact of suspension ring on housing in the course of drilling. Within the upper cover there are anti-bouncing bearing and two spring seal rings(7). The two rings are installed oppositely to avoid the leakage of oil and the entry of mud and dirty from outside. There is a screwed hole in the upper cover for the oiling to the housing and fixing of dipstick. On the flange face of upper cover there fixed a gooseneck, and of the top of the gooseneck there is a taper threaded hole, which is set for measuring well. Tighten screw plug(1) to avoid overflowing of high-pressure mud in the course of well sinking. The other side of gooseneck is connected with packing device(30). Lower guide bearing is in the lower cover. Also in the lower side there are three spring seal rings(19) to seal the oil in the swivel body.

Packing device(3) connects gooseneck and stem. They form the mud passageway. Packing device is the main part to seal high-pressure mud, which has self-sealing style and quick dismantle structure. When the mud pipe and packing is needed to change because of wears, rotate out the upper and lower covers and take out the whole device from one side. There is no need to

uninstall gooseneck and hose.

#### **4. Operation of SL450 Swivel**

Load and dynamic pressure tests of SL450 Swivel have been taken before delivery. And there is no oil in the Swivel. Before use the following must be done.

4.1 Unscrew and remove the dipstick, fill with lubricate SAE90, be sure that the oil is not contaminated and the oil should be clean.

4.2 Inspect stem. A proper pipe can evenly rotated by a person with a one meter long Chain Tong.

4.3 Lubricate all oil cups with oil gun.

4.4 Inspect upper and lower packing press covers(Figure3-1, 10) to ensure the nuts(Figure1-35) and joint(Figure1-22) are tight. In order to assure connections, unscrew the joints and lubricate them and then tighten them by Tongs.

According to experience, new swivel should undergo shallow well(less than 1200 meters), then for deep well.

#### **5. Lubrication**

5.1 Inspect oil level for one times every shift. The oil level should not be below the lowest scale of dipstick. Replace oil every two months. For a new or new repaired swivel replacement is necessary after use of 200 hours. Drain the dirty off when replacing oil. Inject clean SAE90 after wash out all dregs.

5.2 Use No.2 SY1412-75 to grease bail pin, packing device, and upper and lower spring seal ring. Once every shift. It should be under the no pump pressure status when grease mud packing, so the lubricant can go through all the parts of packing assembly and have a good lubrication.

#### **6. Replacing Packing Device**

6.1 Uninstall (refer to figure 3)

Hammer the press covers of upper and lower packing boxes(LH)(1,10) to loosen them until to be even with mud pipe(6), then the packing device will be

push out from one side.

## 6.2 Inspection

6.2.1 Separate the lower packing box(12) from mud pipe(6) and remove oil cup(7). Then take out the press cover of lower packing(10). Reverse the screw(8) for two or three revolutions. Then take out O seal press sleeve(11), spacers(13,14), lower liner ring(15) and mud packing(4) from the lower packing box.

6.2.2 Remove spring ring(2) from the top of mud pipe. Take away mud pipe(6) and the lower cover of upper packing box(1). Then take out upper sealing press sleeve(3), mud packing(4) and upper liner ring(16) for the upper packing box.

6.2.3 Take out O seal ring(9,17) and clean all parts.

6.2.4 Replace worn parts.

## 6.3 Installation

Install the qualified parts.

6.3.1 Lubricate the lip part of mud packing(4), and the slots of upper liner ring(16) and upper seal press sleeve(3). Install orderly upper liner ring, mud packing and upper sealing press sleeve into the upper packing box(5) as per Figure 3, and then enclose the press cover. Install them wholly on the mud pipe from mud pipe's end with spline. And imbed the spring ring(2) into the slot of mud pipe.

6.3.2 Smear grease on the lip of mud packing(4), lower liner ring(15), spacers(13,14) and V-slot of lower O-sealing press sleeve(11). Install orderly the lower liner ring, spacer, mud packing and lower sealing press sleeve into the lower packing box(12). Caution: the oil hole of spacer(14) should point at the oil cup hole of lower packing box. Screw into the screw(8), tighten it and reverse it 1/4 revolution. Install the lower packing box assemble and the press cover from the other end of the mud pipe.

6.3.3 Fix O-seal rings(9,17) into the upper and lower seal press covers(3,11) respectively. Install oil cup(7) into the lower packing box(12). Then put the packing device into the swivel and enclose the upper and lower packing press cover.

## **7. Maintenance**

7.1 Dismantle according to the following steps when repair.

7.1.1 Loosen the joint under the stem before dismantle the swivel from rig.

7.1.2 Set the swivel upright.

7.1.3 Screw out screw plug(26) and screw stopper(24) to drain oil.

7.1.4 Dismantle packing device according to “replacing packing device”.

7.1.5 Install the rubber umbrella(5) above the stem.

7.1.6 Install gooseneck(31)and upper cover(4)[include spring seal ring(7) and out-ring of upper guide bearing(9)].

7.1.7 Install the adjusting gasket(8).

7.1.8 Dismantle the stem assembly[include stem, upper ring of main bearing, inner ring of upper and lower guide bearing, and upper and lower liner(28,25)].

7.1.9 Take out the holder of main bearing, roller and lower ring.

7.1.10 Uninstall the lower cover(15) and knock slightly the out-ring of lower guide bearing and take it out. Then uninstall the press cover(20), and take out three spring seal rings(19) and spacer(17). Last uninstall the oil cup(18) and take out O seal ring(14).

7.2 Inspect and replace parts.

7.2.1 Replace spring seal rings and O seal rings.

7.2.2 Inspect all the bearing rollers and rings against break, corrosion and crack. If any flaw of main bearing appears replace the new one. Upper and lower roller rings can't be exchanged. When uninstall the roller ring from stem, knock it. If necessary, heat them to 65-100° C; That will make the ring easy to uninstall.

7.2.3 In the course of moving, all the openings of parts and lines should be sealed against the entry of mud, dust and water.

7.3 Reinstallation

7.3.1 Grease the lip of spring seal ring(7) and enclose the upper cover. Pay attention to install the two seal rings oppositely. And fix the spacer(27) to make the grease of seal ring ease. Use retainer ring to fix and then knock the guide bearing(15) into the upper cover.

7.3.2 Knock the out-ring of lower guide bearing(16) into the lower cover(15) and enclose the lower cover to the housing.

7.3.3 Set assembled housing upright on the supporter and put the lower ring of main bearing, roller and holder into the housing.

7.3.4 Put stem assembly into the housing.

7.3.5 Turn stem assembly slightly to ensure the firm of main bearing.

7.3.6 Enclose the installed upper cover to the housing.

7.3.7 Turn the stem assemble again to see if all the bearings is set firmly.

7.3.8 Check the clearance between the under face of upper cover flange and upper face of housing. Remove the lower cover and put enough adjusting gaskets(8) to ensure the axial clearance within 0.05mm~0.25mm.

7.3.9 Enclose the upper cover to the housing. And tighten the screw bolt(6).

7.3.10 Install rubber umbrella, gooseneck, packing device and joint.

7.3.11 Fix up the oil cup and screw in bolt. Then fill with oil and that will be ok.

## **8. Inspection and Debugging**

Inspection and debugging is important in the course of assembly. Inspect and debug as per the following procedure.

8.1 The clearance between upper seat ring of main bearing and end face must not be more than 0.03mm.

8.2 Adjusting gasket(8) between upper cover and housing is used to adjust the axial clearance of upper guide bearing(9); the clearance should be within 0.15~0.25mm.

8.3 Inspect with dial indicator.

8.3.1 Inspect upper cover hole as per figure 4. Radial run out: 0.20mm.

8.3.2 Inspect gooseneck as per figure 5. Radial run out: 0.30mm.

8.3.3 Inspect mud pipe as per figure 6. Radial run out: 0.30mm.

If the radial run out measured is not within the above scope. You may loosen the press covers of upper and lower packing boxes, and knock the mud pipe slightly to change the tightening degree of bolt to adjust the radial run out of upper cover and gooseneck.

## 9. Packing and Shipping

Fix the swivel evenly on the supporter. Inner joint in the gooseneck and all pipelines should be wrapped with plastic cloth, or blocked by stoppers. The lower joint of the stem should be installed with guard nut.

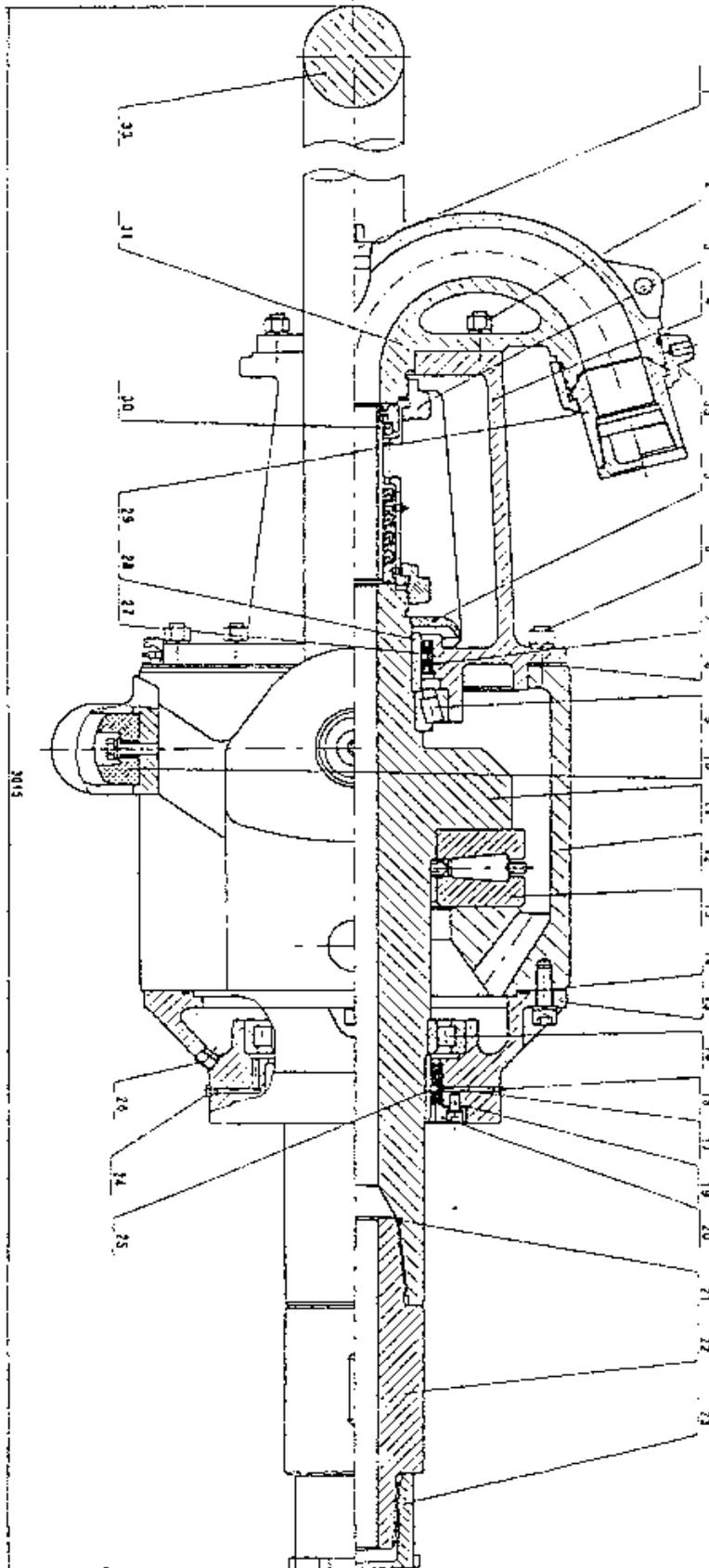
## 10. Spare Parts List

Figure No.	Name	Qty	Note
78.120.00	Packing Device	1	
78.120-04	Mud Packing	10	
78.120-07	Spring Ring	1	
78.120-06	Mud Pipe	1	
78.120-05	Upper Liner Ring	1	
78.120-08	Lower Liner Ring	1	
JB/ZQ4224-97	O Seal Ring 120×5.7	5	
JB/ZQ4224-97	O Seal Ring 135×5.7	3	
78.100-22	Seal Ring 155×10	1	
JB/ZQ4224-97	O Seal Ring 165×8.6	3	
JB/ZQ4224-97	O Seal Ring 560×8.6	1	
HG4-692-67	Spring Seal Ring 220×260×18	2	
HG4-692-67	Spring Seal Ring 250×290×18	3	

## Bearing Table

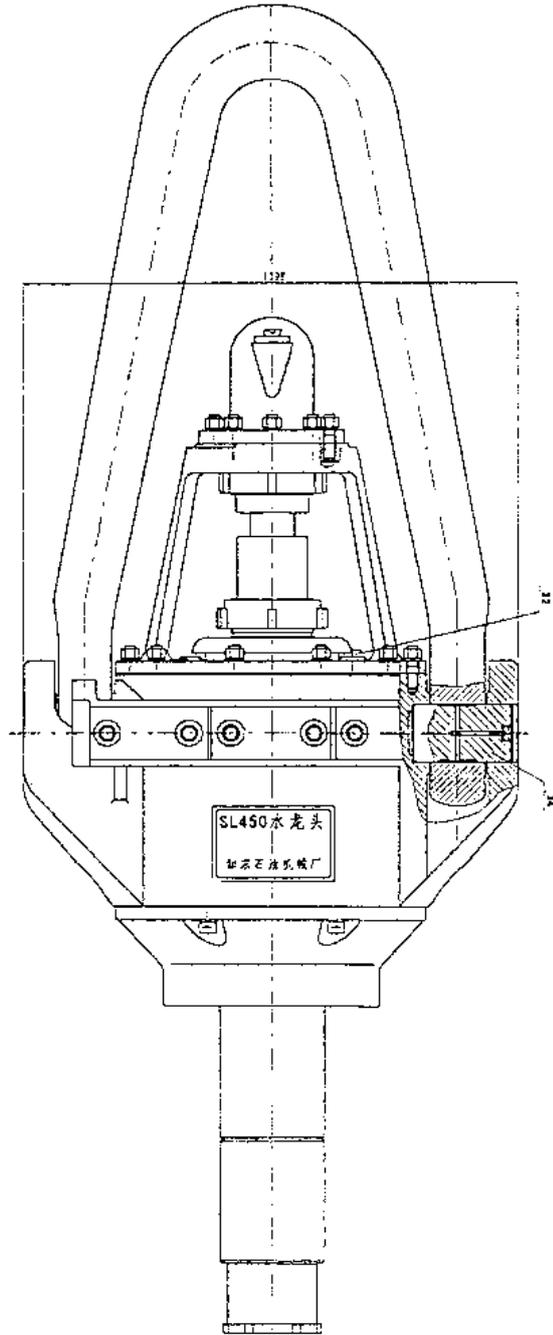
Code Name	Specification	Qty.	Note
19954EQ	270×550×130	1	
2007140	200×310×70	1	
32148	240×360×56	1	

**Caution:** The swivel can't be used below -18° C when bearing the Max. Load. If must be used, should confirm the low temperature properties of the material and take necessary measures to shield.

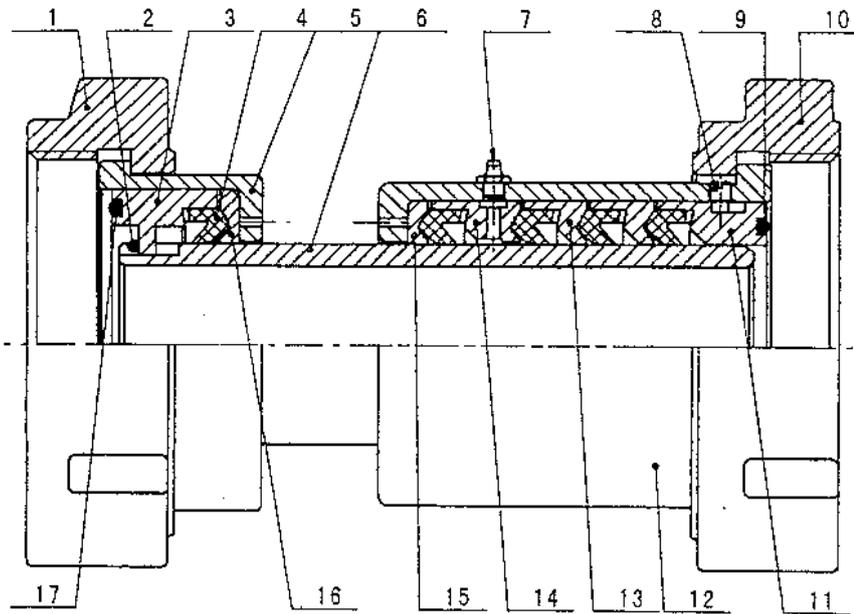


1. Plug
2. Screw
3. Packing Box
4. Upper Cover
5. Rubber Umbrella
6. Screw Bolt
7. Spring Seal Ring
8. Adjust Gasket
9. Anti-bouncing Bearing
10. Buffer
11. Stem
12. Housing
13. Main Bearing
14. O Seal Ring
15. Lower Cover
16. Lower Guide Bearing
17. Lower Spacer
18. Oil Cup
19. Spring Seal Ring
20. Press Cover
21. O Seal Ring
22. Joint
23. Guard Nut
24. Screw Plug
25. Lower Liner Sleeve
26. Screw Plug
27. Upper Spacer
28. Upper Liner Sleeve
29. Inner Joint
30. Packing Device
31. Gooseneck
32. Dipstick
33. Bail
34. Bail Pin
35. Nut

**Figure 1 SL450 Swivel**



**Figure 2 SL450 Swivel**



**Figure 3:Packing**

- |                                     |                                      |                      |
|-------------------------------------|--------------------------------------|----------------------|
| 1. Press Cover of Upper Packing Box | 7. Oil Cup                           | 13. Spacer           |
| 2. Spring Ring                      | 8. Screw                             | 14. Spacer           |
| 3. Upper Seal Press Sleeve          | 9. O Seal Ring                       | 15. Lower Liner Ring |
| 4. Mud Packing                      | 10. Press Cover of Lower Packing Box | 16. Upper Liner Ring |
| 5. Upper Packing Box                | 11. Lower Seal Press Sleeve          | 17. O Seal Ring      |
| 6. Mud Pipe                         | 12. Lower Packing Box                |                      |

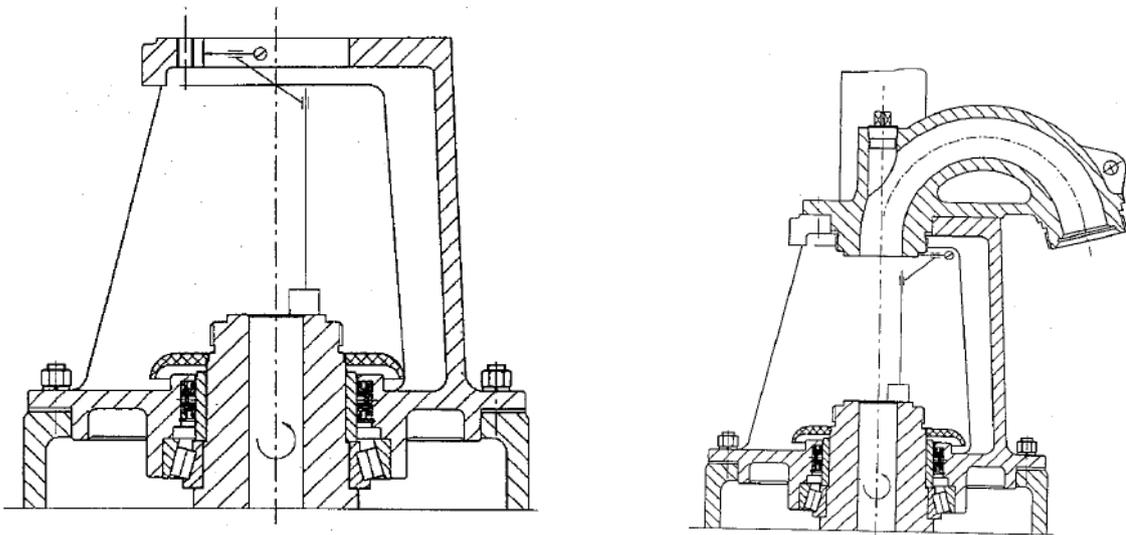


Figure 4: Inspecting and debugging for assemble

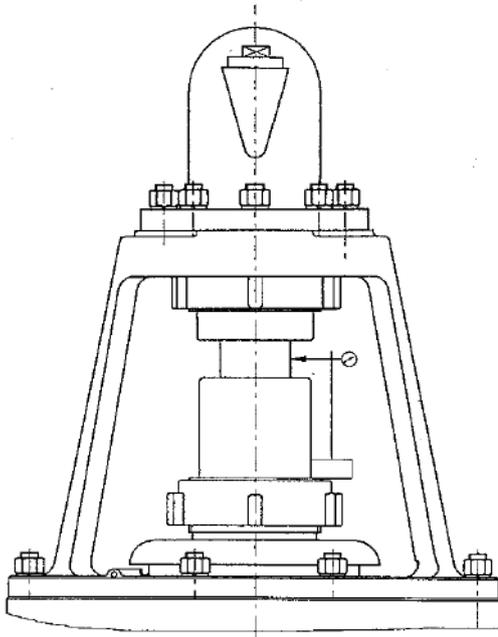


Figure 6: Inspecting and debugging for assemble

Figure 5: Inspecting and debugging for assemble

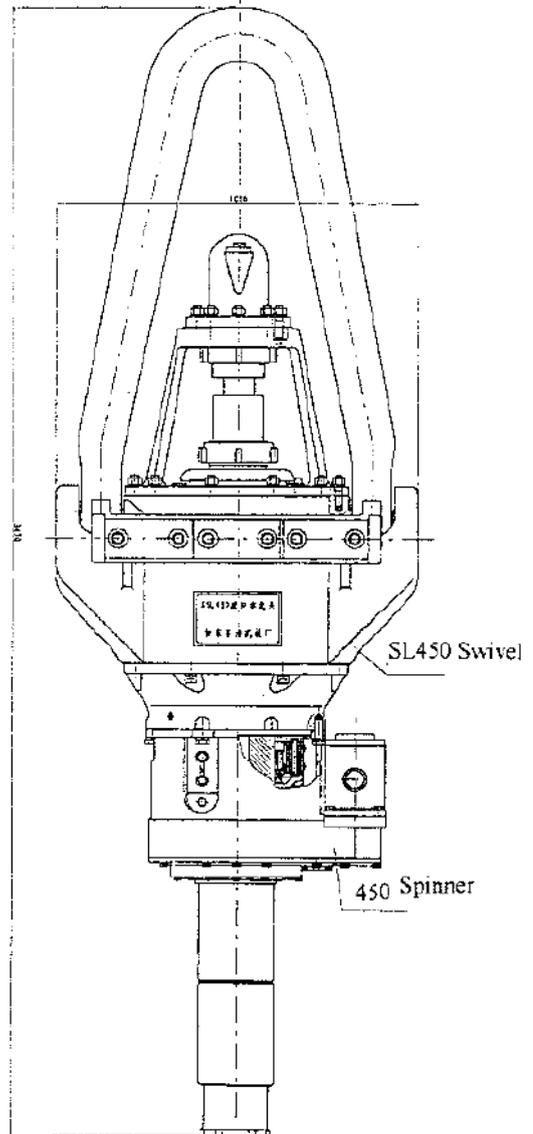


Figure 7: Overview of XSL450 Swivel with Spinner