

# INSTRUCTION MANUAL

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## CABLE REEL

◎ TCR - FM TYPE



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## **1. INTRODUCTION & CHARACTERISTICS**

### **1.1 INTRODUCTION**

The Friction Type Cable Reel is a compact automatic type cable reel that is Comprised of slip rings, reel drum and squirrel cage induction motor. Because Of a specially designed friction clutch, slip will be occur when the reel is over-Loaded and unreeling.

### **1.2 CHARACTERISTICS**

- 1) The adjusting knob for the reeling torque is located at the side of the reducer and it is easy to adjust the torque.
- 2) It is suitable for small capacity cranes and vehicles which are not heavily operated.
- 3) A brake system is not required.
- 4) Considering its compact size, the friction type cable reel is appropriate for limited space.

## **2. INSTALLATION**

The friction type cable reel will be packed & delivered with the friction reducer Already assembled with the slip ring box and with a seperate reel drum. After Opening the packing, please, install the cable reel as below.

### **2.1 REDUCER**

- 1) Fix the rope on the reducer shaft and in the eye bolt on the slip ring box, and transport the reducer to required position.
- 2) Place the reducer in position on the top of the base and fasten it with bolts, nuts, and spring washers.
- 3) Unscrew the bolts on the flange in front of the reducer, and wipe clean the rust preventive from the contact surface of the flange and the reel drum.
- 4) Check the oil level through the oil sight gauge on the reducer. If insufficient, refill oil up to the middle level of the oil sight gauge.

## 2.2 REEL DRUM

- 1) Take off the front cover from the reel drum.
- 2) Fix the rope through the rim of the reel drum, transport reel drum by the crane to the flange in front of the reducer, and assemble together. Please, be careful not to loose the "O"-ring out of the groove on the face of the mating flange.
- 3) After aligning the bolt holes which are located inside of the reel drum with the flange tapped holes, fit screws and spring washers, and tighten securely.

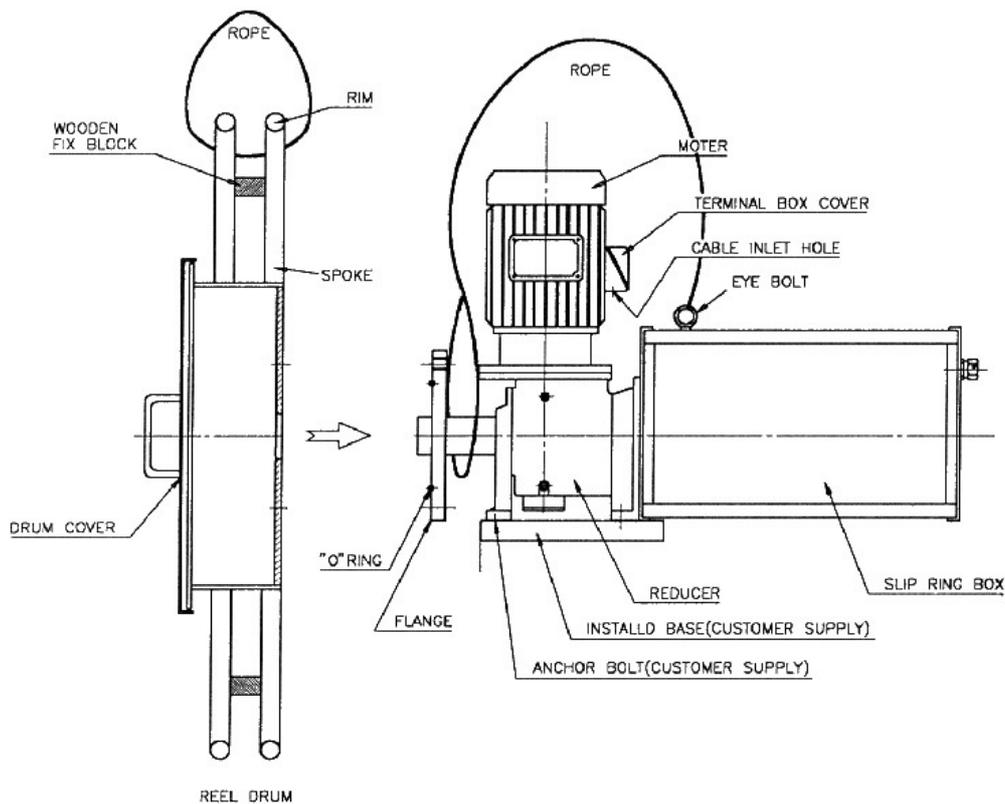


Figure 1. Installation of reel drum

**2.3 WIRING OF MOTOR**

- 1) Check the voltage, current, and frequency of the motor from the name plate with the input power source.
- 2) Take off the motor's terminal box cover
- 3) Connect the cables by using the cable protection tubes through a cable gland (PF 3/4") to the terminal box. Connect cables to motor cables and insulate cable correctly. Replace terminal box cover.
- 4) Turn on the power, and check the direction of travel of the equipment and the direction of rotation of the reel drum. If the direction of rotation of the reel drum is not correct, reverse V & W(white & blue) and recheck the direction of rotation.
- 5) For reverse direction, confirmation of consistence between operational sequence and the direction of reel rotation is required.
- 6) If the direction of rotation is correct, then remove the wooden blocks from the spokes of the reeling drum.

## 2. 4 CONNECTION AND WIRING OF REELING CABLE

### 2. 4. 1 PART OF REELING DRUM

Before you connect the cable reel with the reel drum, check cable specifications (such as square, number of cores, outer diameter and weight), also the cable length that includes dead turns, installation height, winding length and connecting length to the junction box.

- 1) Attach the guide roller to the designated position and remove cable gland from the reel drum.
- 2) Before the connection, take off cable outer cover. Measure length.
- 3) Install the cable through the guide rollers, and insert through the cable gland and install the gland. Be sure to seal with sealing compound at the inlet of the cable to the reel drum.
- 4) Take off the cable clamp which is attached to the drum, and wind rubber protection strip(thickness 2 - 3mm) two or three times around the cable. And then re-position the cable clamp.
- 5) Connect both sets of the cables to the terminal block.
- 6) Install the front cover.

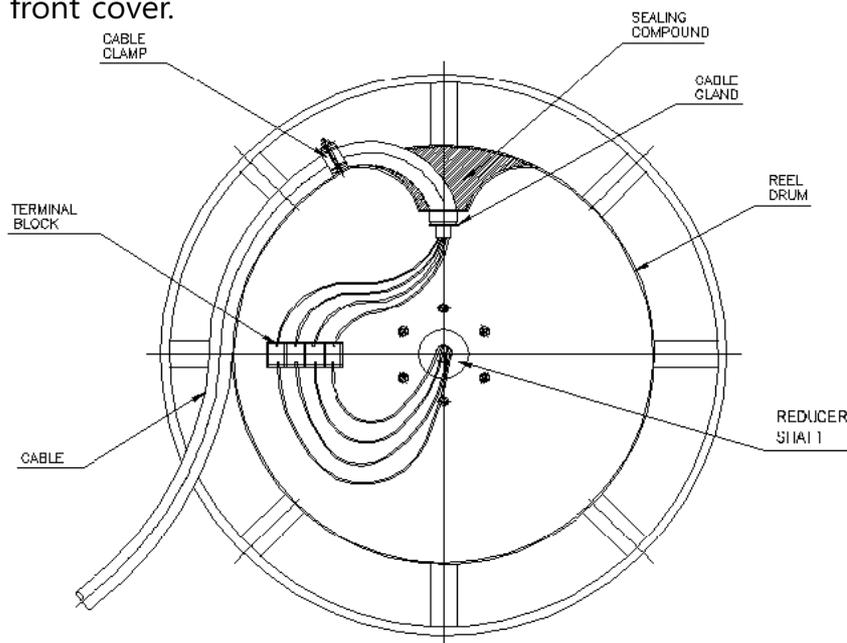


Figure 2. Connection and wiring of reeling cable

**2. 4. 2 FIXED PART OF CABLE**

- 1) In the case of operating in two directions from the center position, wind one turn of the cable around the drum of the center position device when the reel is at the center position. And, clamp the cable same as 2. 4. 1 4).
- 2) Open the cover of the junction box, insert the cables through the cable gland. And fasten the cable gland tight.
- 3) After connecting the cables correctly, close the junction box cover.

**2. 5 WIRING OF SLIP RING**

If the number of slip rings is less than 12 sets, connect the cables to the brush holders directly.

If the number of slip rings is more than 13 sets, connect the cables to the terminal block which is located at the rear side of slip ring box.

**2. 5. 1 IF THE NUMBER OF SLIP RINGS IS LESS THAN 12 SETS**

- 1) Take off the upper cover of the slip ring box.
- 2) Check the contact conditions of brush and slip ring.
- 3) Insert the cable through the cable connector to the inside of the slip ring box.  
At this time, be sure to use cable protection tubes.
- 4) After positioning and cutting suitable lengths of wire to each brush position, connect the cables to corresponding position.
- 5) Close the cover.

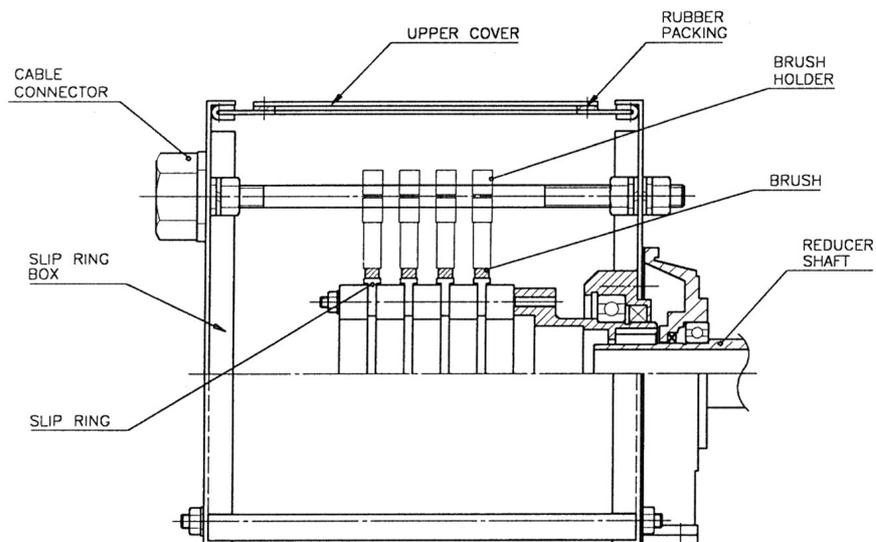


Figure 3. The number of slip ring is less than 12 sets

**2. 5. 2 IF THE NUMBER OF SLIP RINGS IS MORE THAN 13 SETS**

- 1) Remove the rear cover .
- 2) Insert the cable through the cable connector to the inside of the slip ring box.  
At this time, be sure to use cable protection tubes.
- 3) After the connection of cables with the terminal block , refit the rear cover.

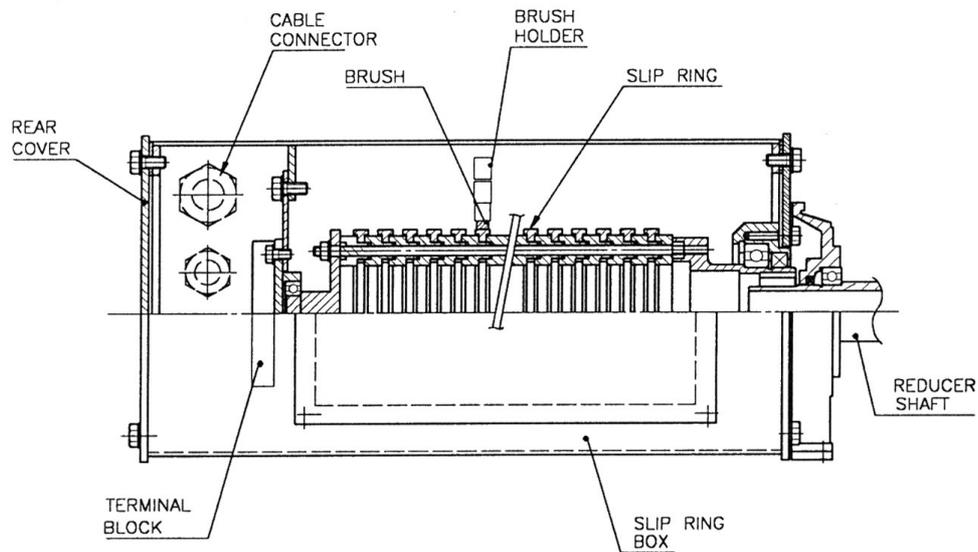


Figure 4. The number of slip ring is more than 13 sets

### **3. OPERATION**

- 1) Switch on the power, and operate as below.
- 2) First, check the direction of travel of the equipment (or hoisting direction) and the direction of rotation of the reel drum by jog operation.
- 3) In case of both side travel of equipment (=central power supplying), a limit switch (manual return type, TL-LA) must be attached to the crane, and install the striker for the limit switch in the center of travelling distance. Check the operation of limit switch.
- 4) If the direction of rotation of the reel drum is correct, test run the cable and check for slack and over-tension of the cable.
- 5) During the test run, slack or over-tension of cable may occur, and this may cause damage to the cable. To prevent damaging the cable, stop operating the cable reel and be sure to adjust the reducer torque accordingly. Please, take a look at "the adjustment table" 5. TORQUE ADJUSTMENT.
- 6) When the equipment stops, cable slack may occur due to inertia. To prevent this problem, the motor must be run for a few seconds. If cable slack is still observed, adjust timer. See item 5. torque adjustment.

## 4. CONSTRUCTION & FUNCTION

### 4.1 CONSTRUCTION OF REDUCER

- 1) The worm wheel is rotated by a worm which is connected to the motor, the rotating force or torque of the worm wheel is transmitted to the disks which are located at both side of the worm wheel. And, subsequently rotating the drum shaft.
- 2) By the spring pressure between the disks and the worm wheel, torque is transmitted. The torque can be adjusted by a nut.
- 3) In case of unwinding, the motor stops, and the cable will be unwound by the slip between disks and worm wheel. As the equipment travels.

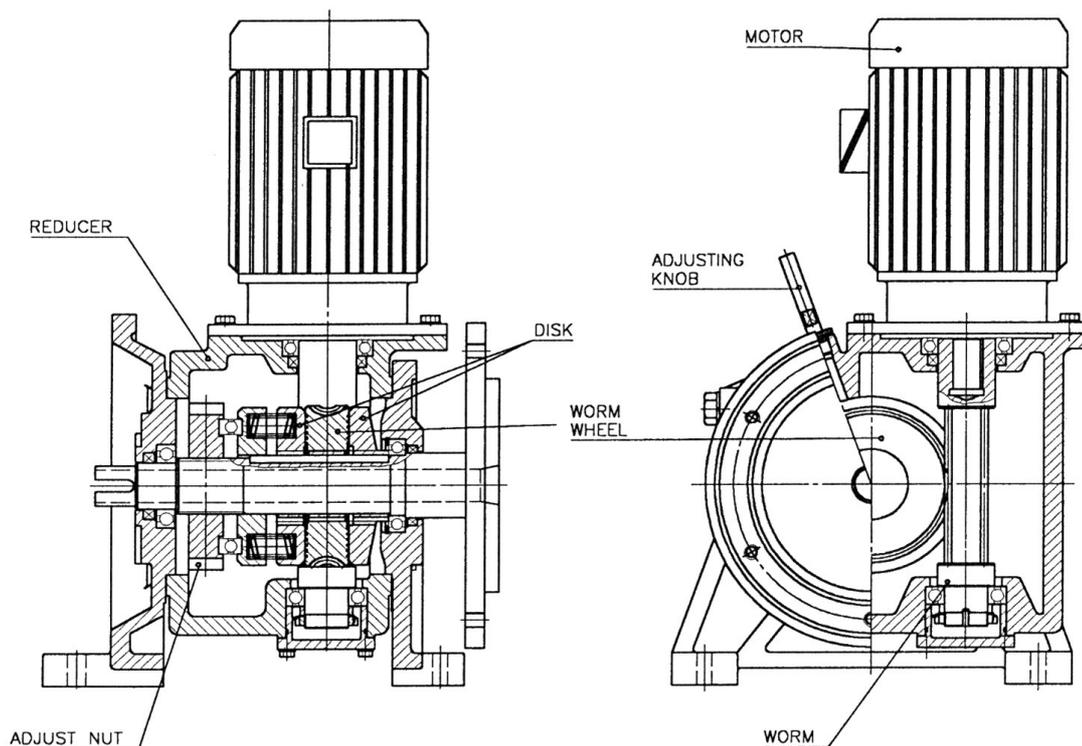


Figure 5. Construction of Reducer

## 4.2 CONSTRUCTION OF SLIP RING

- 1) The cables are passed from the reel drum to the slip ring box through a hollow shaft on the reducer, and is then connected to the slip rings.
- 2) As the slip rings and the reducer shaft are connected by a coupling , the slip rings revolve in the same direction as the reel drum.
- 3) Slip rings and the brushes contact each other, and the brushes are connected to the outgoing cables.

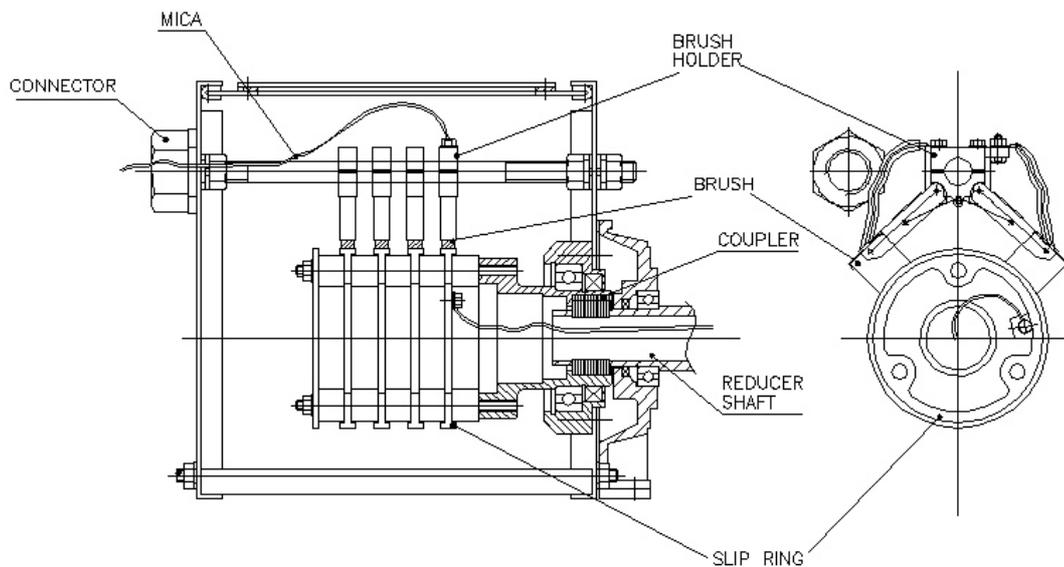


Figure 6. Construction of slip ring

## 5. TORQUE ADJUSTMENT

The reeling torque of the friction reducer is transmitted by a friction clutch. The Friction clutch is operated by a spring compression force that is generated by Tightening the adjusting nut. Be sure to adjust, when the following problems Occur.

NO	PROBLEM	SOLUTION
1	Over tension of cable during winding	Reduce torque
2	Over tension of cable during unwinding	
3	Slack of cable during stop	Increase torque
4	Can not wind	

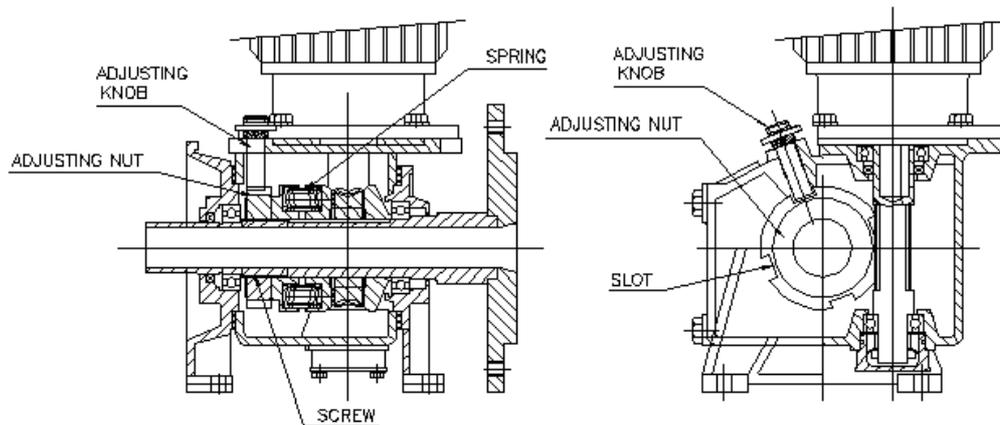


Figure 7. Mechanism of Torque transmission

- 1) Unscrew the knob by a spanner.
- 2) Reverse the knob and insert the knob in the tapped hole and then turn the reel drum back and forth manually to fit the end part of knob into the slot of adjusting nut.
- 3) Seeing from front of reel drum, turn the reel drum clock-wise. The torque will be increased. If reel drum is turned counter clock-wise, the torque will be re-

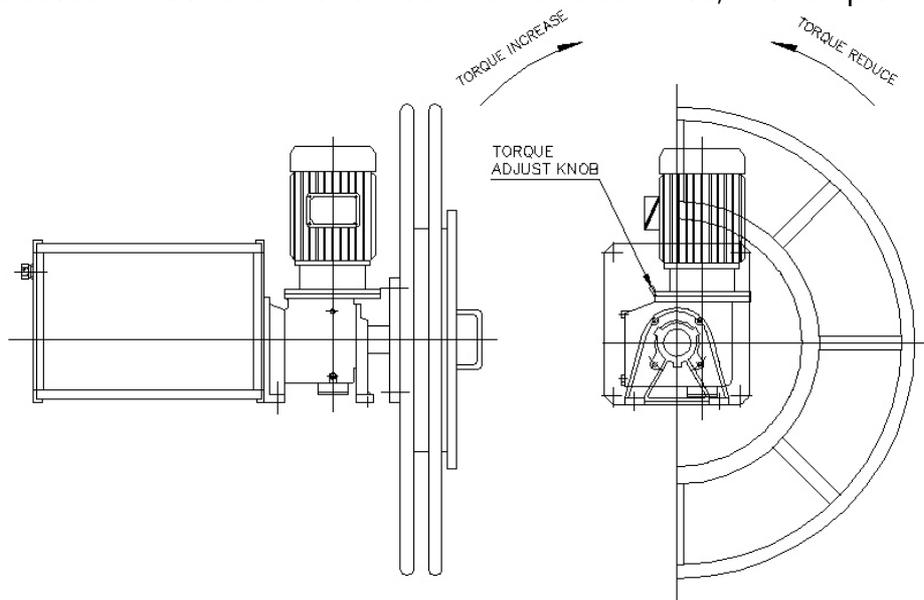


Figure 8. Torque adjustment

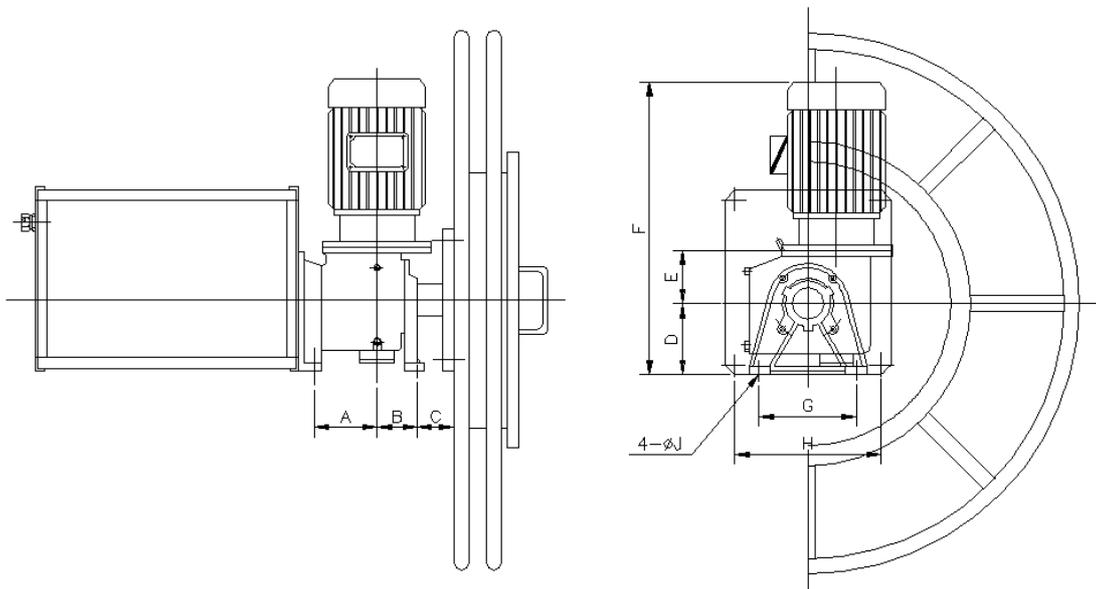
- 4) After torque adjustment, remove the knob, turn over knob, and reposition the knob in the tapped hole.
- 5) Recheck the conditions(over-tension or slack) of cable when winding and un-winding operations are performed.

**6. MAINTENANCE**

- 1) The bearings which support the revolving parts are shield type bearing. Therefore, lubrication is not required.
  - 2) After three months operation, change the oil. Use oil SPIRAX HD 80W/90. And, after this point, change oil once in every year.
  - 3) For draining the oil, there is a drain plug located on the lower part of the reducer box. And, refilling can be done through the torque adjusting knob hole.
  - 4) The correct level of oil is up to the middle level of the oil sight gauge.
  - 5) Check the reducer oil level once in every month, if the oil level is below the middle level of the oil sight gauge, refill to level.
- Check the following at the intervals indicated.

NO	Check point	Check interval	Solution
1	Reducer oil	Every month	Fill up if below level
2	Surface of slip ring	Every 3month	Sand paper, in case of scratch
3	Degree of brush	Every 3month	In case of excessive wear, replace with new one
4	Spring tension of brush holder	Every 3month	In case of lack of tension, replace with new one
5	Disengagement of brush	Every 3month	Put it back to the original position
6	Infiltration of water, and dust inside the slip ring box & reel drum	Every 3month	Replace the cover packing, If damaged check the fastening condition of bolts and cover. Check cable connector tighten securely.

**7. DIMENSION OF REDUCER**



REDUCER	A	B	C	D	E	F	G	H	J
FM-17	110	70	64	125	93	515	170	206	12
FM-30	260	119	79	215	162	716	350	420	19

Figure 9. Dimension of reducer

**8. SEQUENCE DIAGRAM & CONTROL PANEL**

8.1 HORIZONTAL ONE SIDE POWER SUPPLYING (Figure 10)

8.2 HOISTING MOTION (Figure 11)

8.3 HORIZONTAL CENTRAL POWER SUPPLYING (Figure 12)

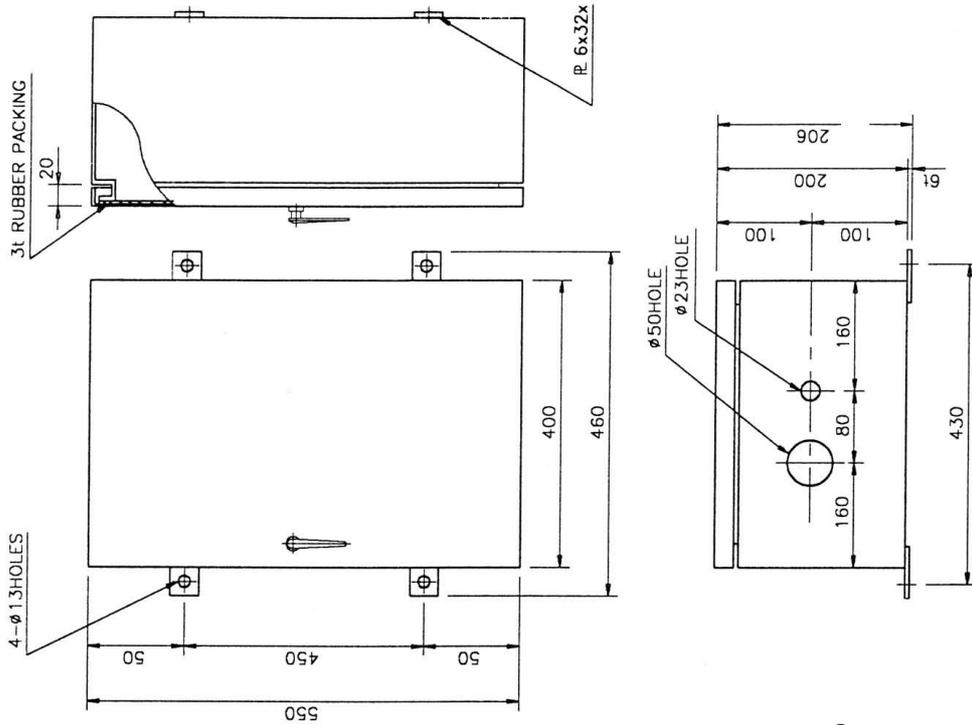
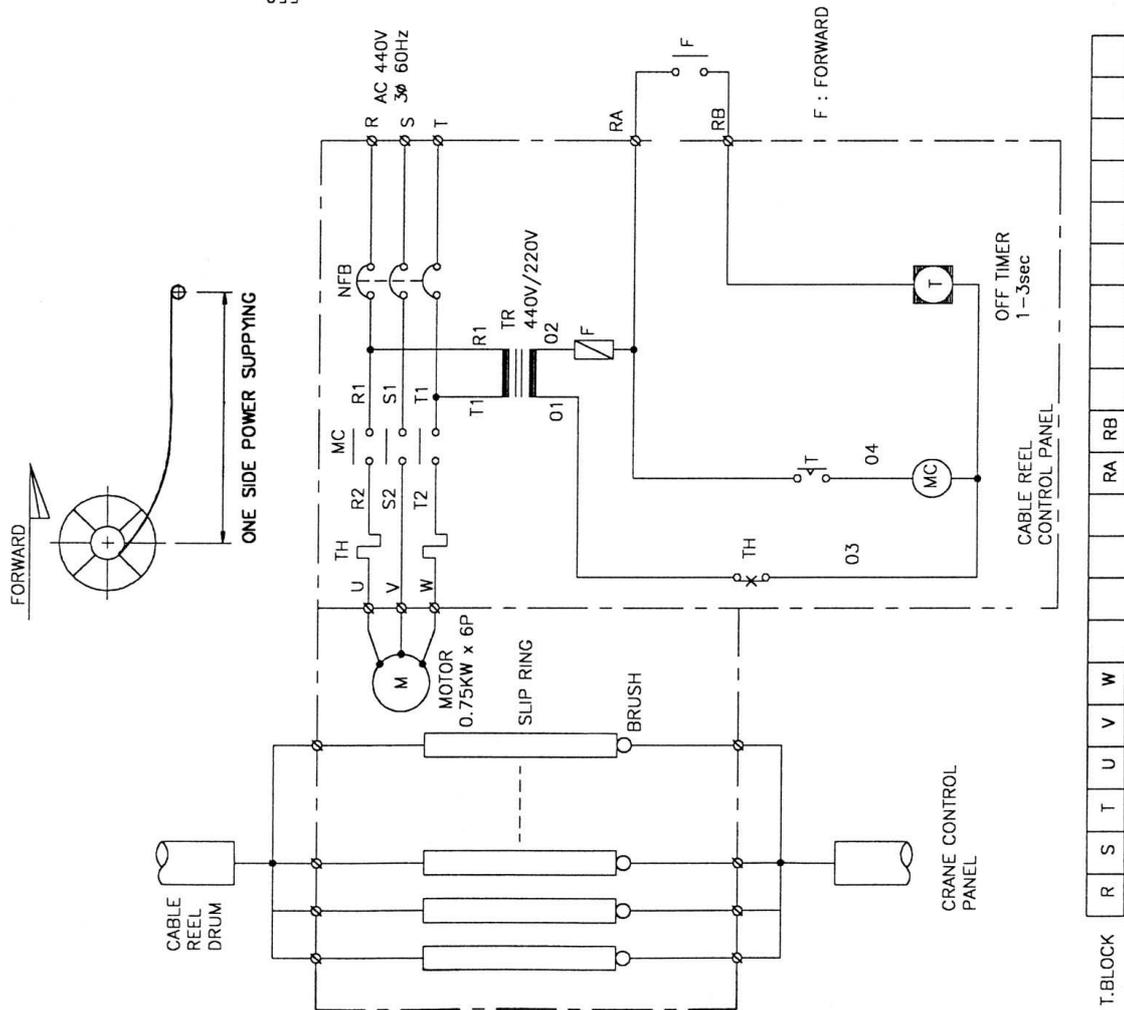


Figure 10. Horizontal one side power supplying



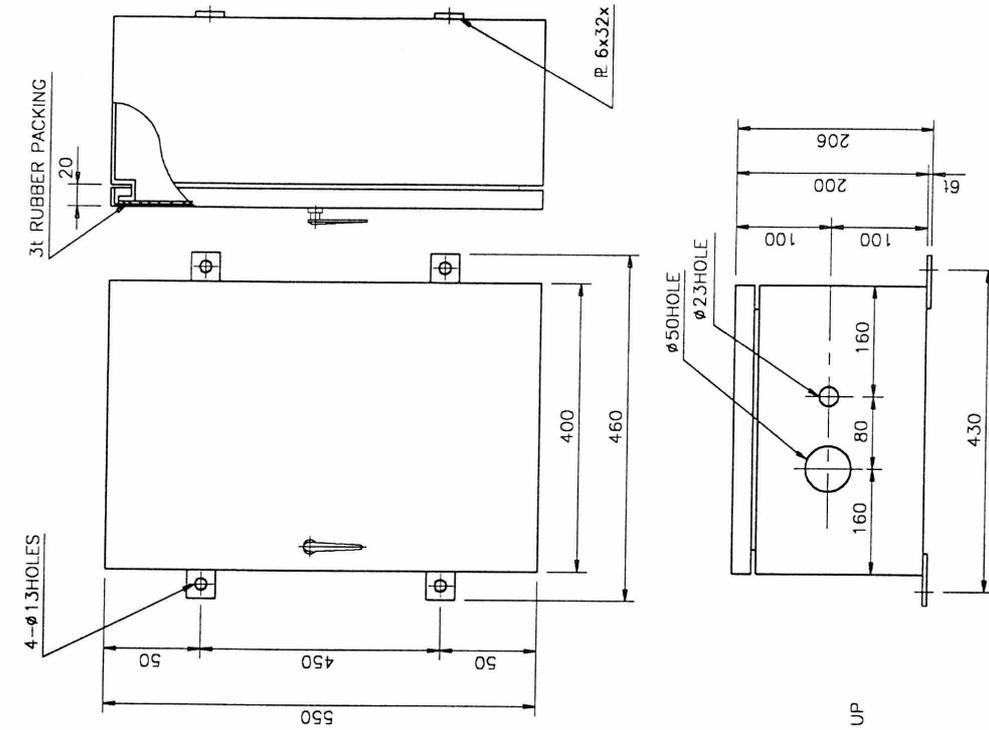
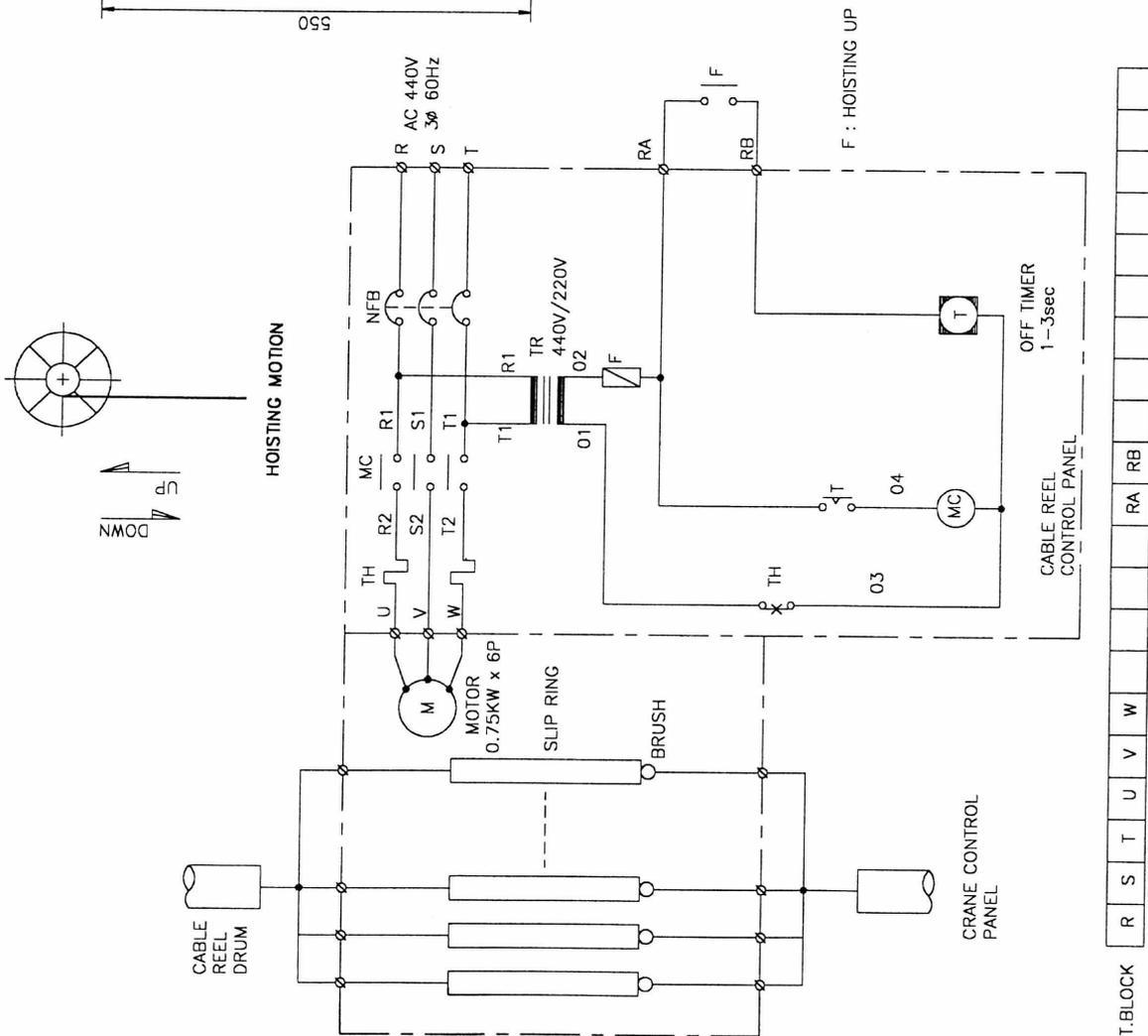


Figure 11. Hoisting motion



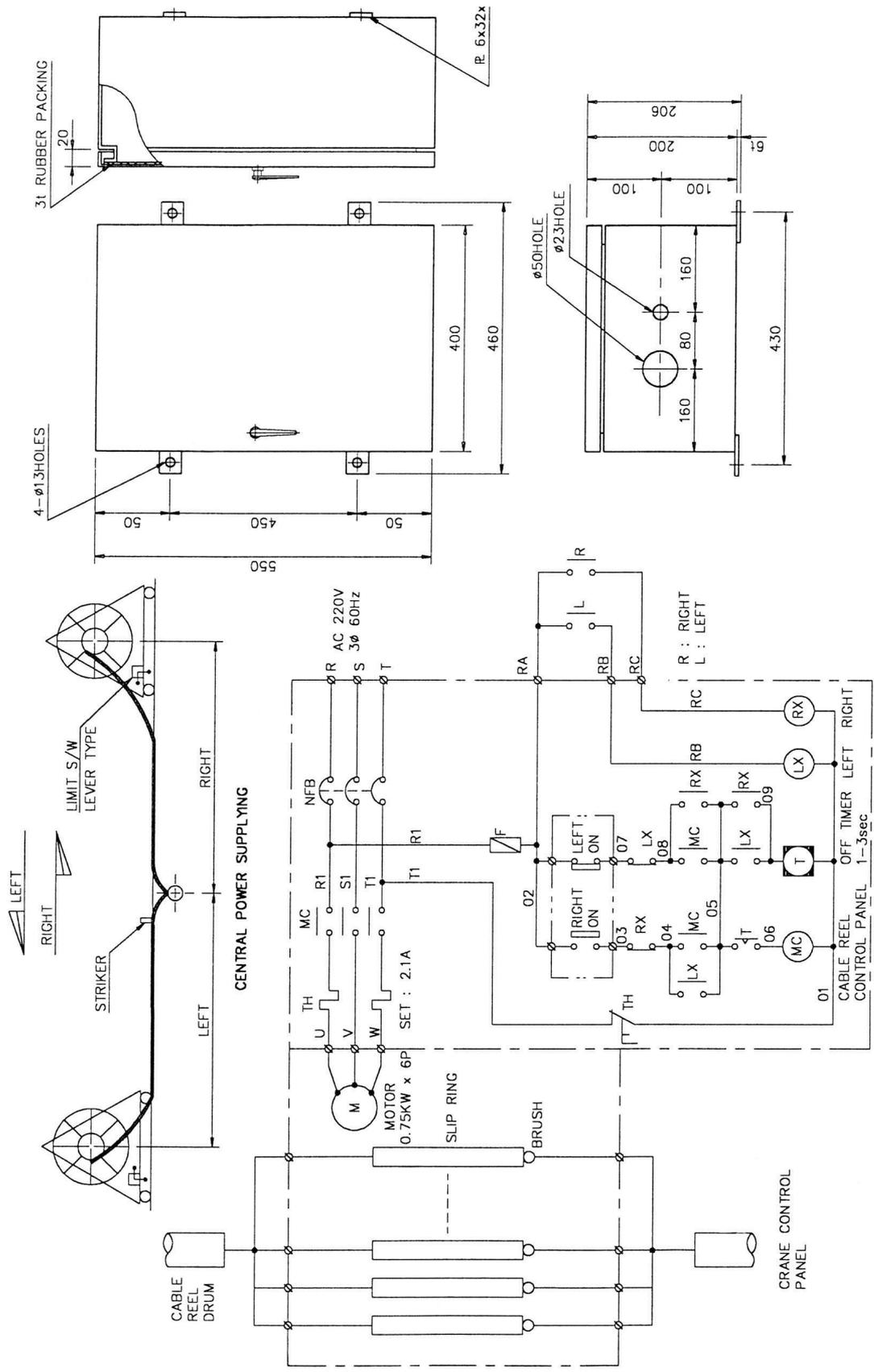


Figure 12. Horizontal central power supplying