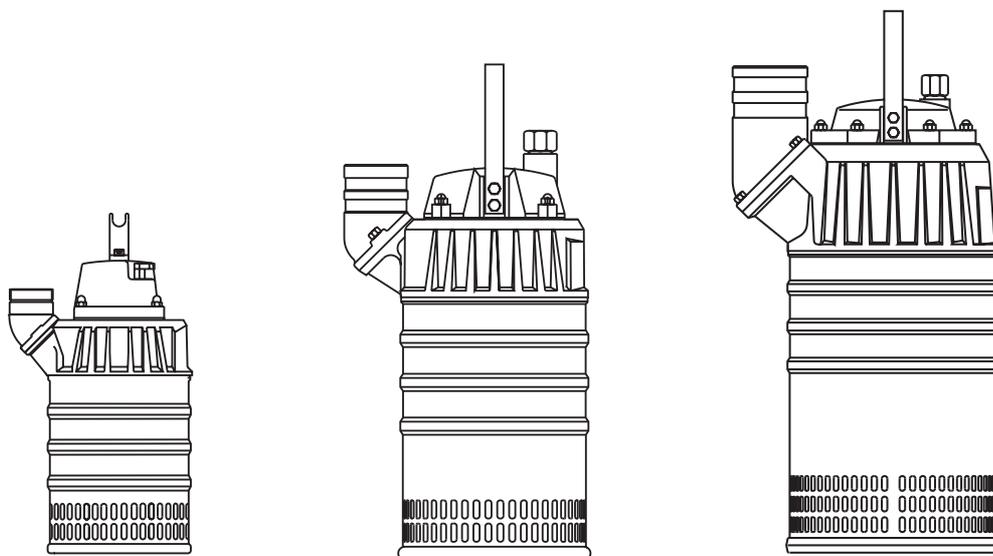


## JUMBO<sup>®</sup> 12 to 84

### Workshop manual



## Index

1.0	<u>General</u>	Page 3
1.1	Scope of manual	3
1.2	Complete overhaul	3
2.0	<u>Dismantling</u>	3
2.1	Base plate	3
2.2	Diffusor, cooling jacket	3
2.3	Oil draining	3
2.4	Impeller	3
2.5	Shaft seal	3
2.6	Rotor unit	4
2.7	Ball bearing	4
2.8	Cover and cable gland	4
2.9	Stator with contactor	4
3.0	<u>Insulation test</u>	5
3.1	Thermal contacts	5
4.0	Exchange of stator	6
4.1	Removal of stator	6
4.2	Mounting of stator	6
4.3	Thermal contacts	6
5.0	<u>Assembly</u>	7
5.1	General	7
5.2	Stator unit, Contactor, Main cover	7
5.3	Cable and gland cover	7
5.4	Ball bearings and rotor unit	7
5.5	Secondary seal	8
5.6	Primary seal and wear plate	8
5.7	Impeller	8
5.8	Refilling of oil	9
5.9	Diffusor and outer casing	9
6.0	<u>JUMBO 84 HD - 50Hz</u>	10
7.0	<u>Testing</u>	10
8.0	<u>Electrical connections</u>	11
8.1	Single phase JUMBO 12W, JUMBO 14W and JUMBO 24W	11
8.2	Three phase direct start	11
8.3	The coil of the contactor	11
8.4	Three phase star delta starting	11
8.5	Fuses	11
9.0	<u>Sectional drawing</u>	12

## 1.0 General

### 1.1 Scope of manual

This manual is to be used only by the authorised ABS service workshops. For the installation and the operation of the pump please use appropriate instructions.

### 1.2 Complete overhaul

A complete overhaul of the pump should be carried out if there has been water or oil in the motor housing or if the pump has been in daily operation for more than a year. At low utilization of the pump the overhaul intervals can be extended. Dismantle the pump completely, replace damaged and worn parts. Clean all sealing surfaces and check that they are not damaged. If water or oil has leaked into the motor housing, inspect and replace ball bearings and shaft seals as required.

Use only ABS spare parts.

### **Warning**

Always check that the pump is disconnected from the electric power supply, and cannot be energized, prior to any work being carried out.

## 2.0 Dismantling

### 2.1 Base plate

Loosen the bottom nuts/screws and remove the base plate.

### 2.2 Diffuser, Cooling jacket

Unscrew the nuts for the diffuser. Press out the cooling jacket and diffuser with a crow bar applied between diffuser and impeller nut. Pull out the diffuser from the cooling jacket.

### 2.3 Oil draining

Unscrew the oil plug and drain off the oil in a clean can and inspect it.

### 2.4 Impeller

Remove the rubber covers from the stud bolts. Hold the impeller with a large screwdriver or similar between the vanes and unscrew the impeller nut with an 8 mm Allen key. Prise the impeller loose with two screwdrivers under the impeller hub. Remove the key from the shaft.

### 2.5 Shaft Seals

Pull out the rotating ring of the primary seal with sleeve and spring and remove the O-ring from the shaft.

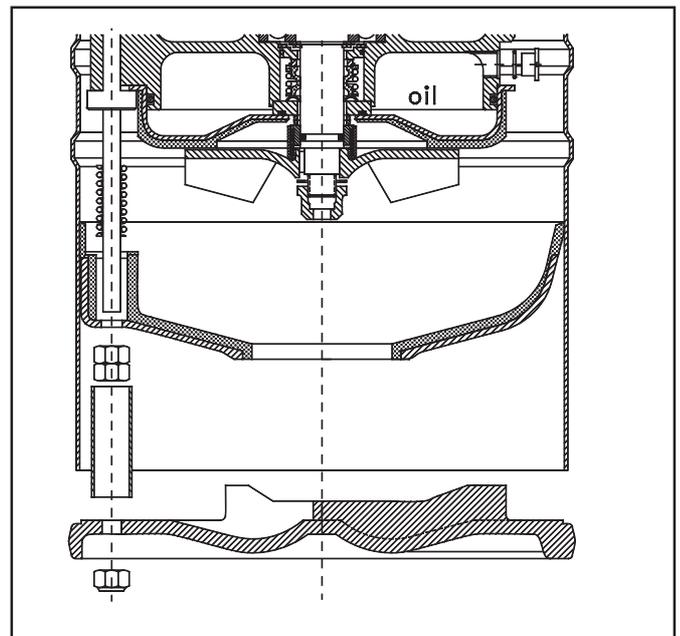


Figure 1 Removing base plate, diffuser and cooling jacket, oil draining.

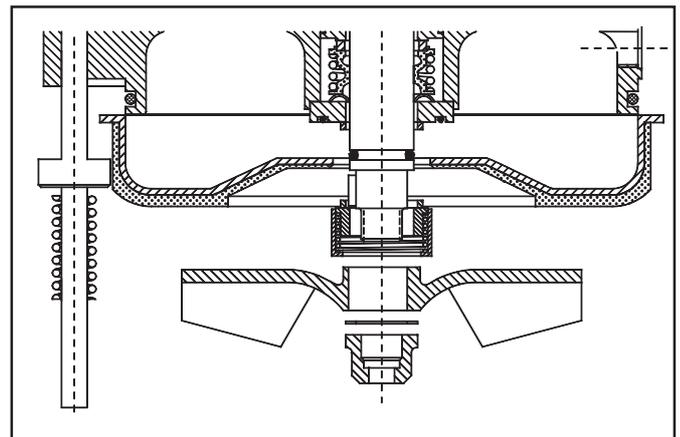


Figure 2 Removing impeller and primary seal.

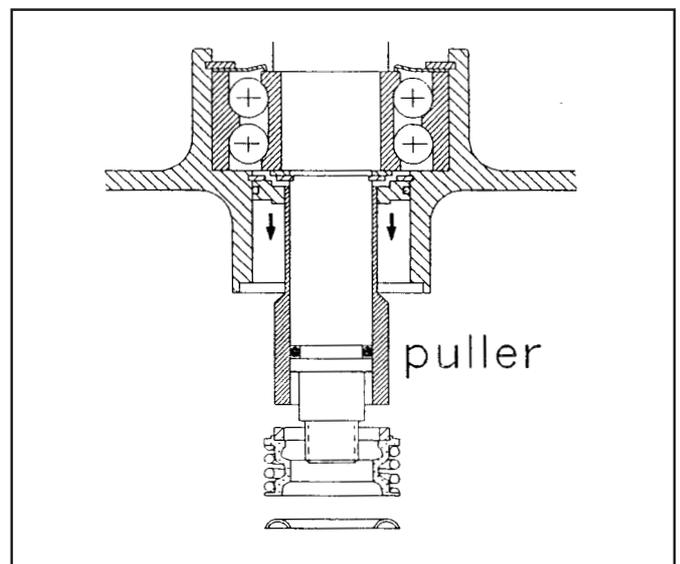


Figure 3 Removing secondary seal.

Unscrew the stud bolts. Withdraw the wear plate and remove the stationary ring of the primary seal.

Cut the lock washer part No. 11060085 with a pair of nippers. Pull out the lock washer carefully in order to avoid scratching the shaft. Remove any possible scratches before pulling out the rotating part of the secondary shaft seal. Screw puller part No. 96990371 into the stationary ring of secondary seal and pull out the ring.

## **2.6 Rotor unit**

Unscrew the screws which hold stator housing and oil casing together. Turn the housing about 15° and prise it loose from the casing with a screwdriver. Lift out the stator unit.

Remove the external circlip on the shaft (inside secondary seal) with a pair of circlip pliers for dia 25 mm.

The rotor shaft has to be pressed out of the ball bearing. Introduce the rotor into a tube of the same length as the rotor shaft and with an inner diameter slightly larger than the outer diameter of the bearing seat. Press against the end of the shaft until the rotor comes loose. If a high pressure is needed, screw the impeller nut fully on the shaft end in order to protect it.

## **2.7 Ball bearings**

Remove the internal circlip and Nilos ring for the ball bearing and press out the bearing. Eventually the bearing seat can be heated quickly with LP-gas to facilitate the removal.

Remove the washer in the bottom of the bearing seat (JUMBO 24 , JUMBO 44) or the circlip (JUMBO 12 - 15, JUMBO 54 - 84). Pull out the upper ball bearing with a puller.

## **2.8 Cover and Cable Gland**

Unscrew the cap nuts for the cover. Lift out the cover and disconnect the cable from the contactor.

If the water has penetrated through the cable gland, the cable bushing should be replaced. Remove strain relief clamp prior to unscrewing cable gland body. Pull out cable, rubber bushing and washers.

## **2.9 Stator Unit with Contactor**

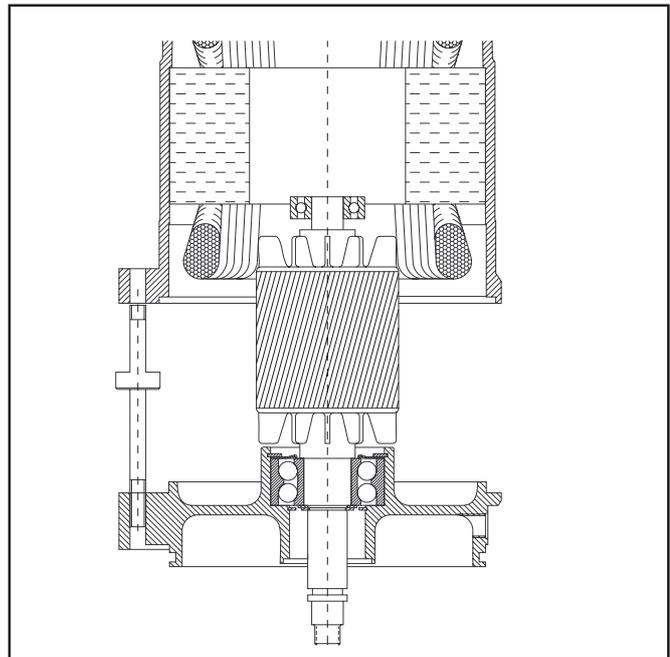


Figure 4 Removing rotor unit.

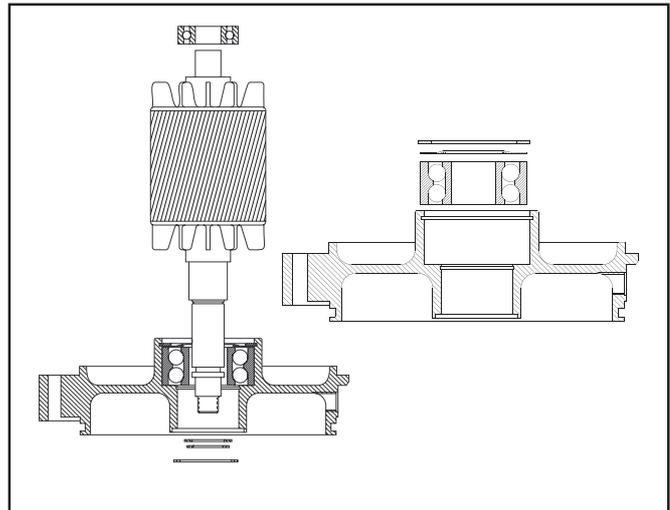


Figure 5 Removing rotor and bearing.

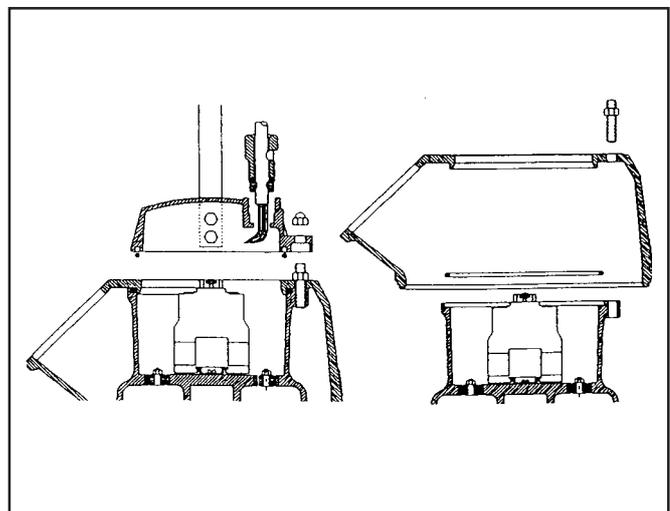


Figure 6 Removing cover and cable gland.

### 3.0 Insulation test

The motor insulation should be tested in connection with service or repair. Measure insulation resistance between the different phase windings, between windings and earth and between windings and thermal switch circuit. The insulation resistance should be measured with 500v megohmmeter and the reading should be at least 1 megohm.

If insulation resistance is lower the stator unit should be dried in an oven.

If stator insulation reading after drying is still low, the stator unit should be replaced.

The insulation between the separate turns in the winding should also be checked. This can be done by measuring the resistance of the phase windings, which should give the same reading for all three windings for 3-phase motors. For single-phase motors the resistance in the auxiliary field is roughly double that in the main field.

### 3.1 Thermo contacts

The circuit with the three built-in thermal contacts should be checked for continuity, using an ohmmeter or buzzer.

If circuit is open the defective contact should be identified by checking each individual thermal contact. The faulty thermal contact can be bypassed in accordance with the adjacent wiring diagram.

Disconnect all stator leads from the contactor and remove the contactor. Check that the contactor coil is free from defects and that the contact points are not burned.

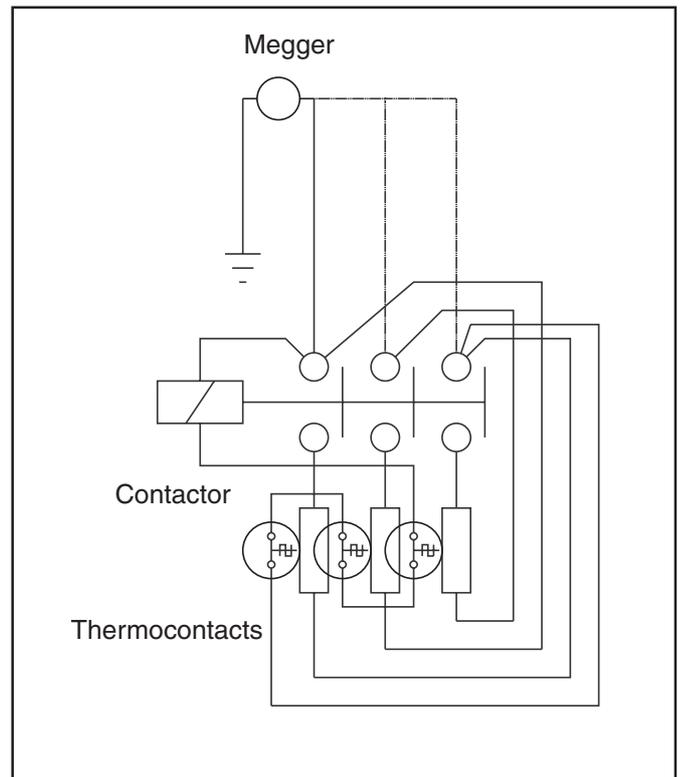


Figure 7 Meggering of windings.

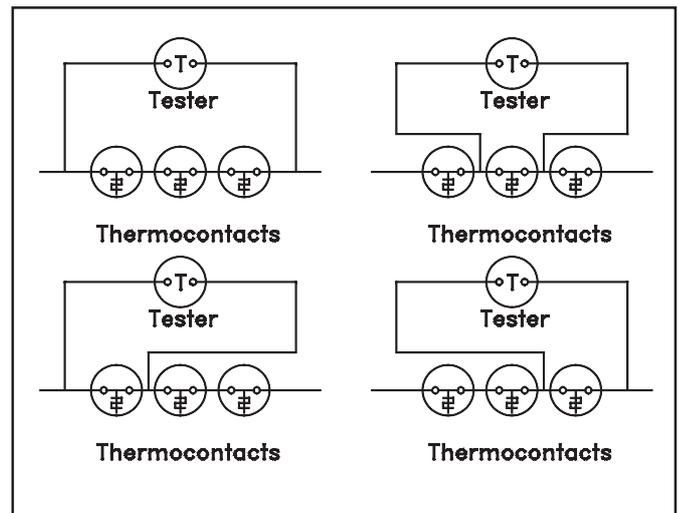


Figure 8 Testing of thermocontacts.

## 4.0 Exchange of Stator

### 4.1 Removal of stator

Loosen nuts for the wire seal and pull out the seals. Pull out the cables and arrange them so as to avoid jamming when the stator is falling out of the housing.

Remove the O-ring in the upper bearing seat.

Block up the housing so that the stator can drop freely out of the housing. It is important that the sealing surfaces of the housing will not be damaged.

Heat the housing quickly with two LP-gas flames at the stator laminations and downwards until the stator drops out at a temperature of about 250°C.

Clean the housing and check it for damages, particularly on sealing surfaces and in ball bearing seat. If damages cannot be corrected, the housing must be rejected.

### 4.2 Mounting of stator

Block up the new stator and make sure that the housing can be fully pushed down onto the stator. Protect the stator insulation for damages and put down the terminal wires (free from insulation resin and smooth) into the stator to avoid contact with the hot housing during assembly.

Heat the housing with two LP-gas flames to about 250°C. With two 25 mm nozzles this will take about one minute. Take the hot housing with heat-resistant gloves and push it down to its stop over the housing.

**Note!** Locate the holes for the terminal cables in the housing about 10 mm from the exit of the cable groups on the winding head.

When the housing has been mounted it may be cooled by compressed air.

When the housing has cooled down the terminal cables can be pulled up through the holes in the housing with a hook made of steel wire. Mount the cable bushings (6-hole seals) on the two groups of cables.

### 4.3 Thermal contacts

The thermal switches are connected in series and the joints should be well insulated.

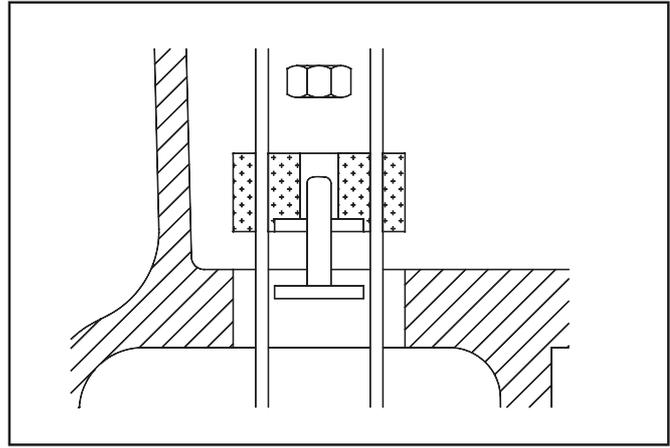


Figure 9 Removing wire seal.

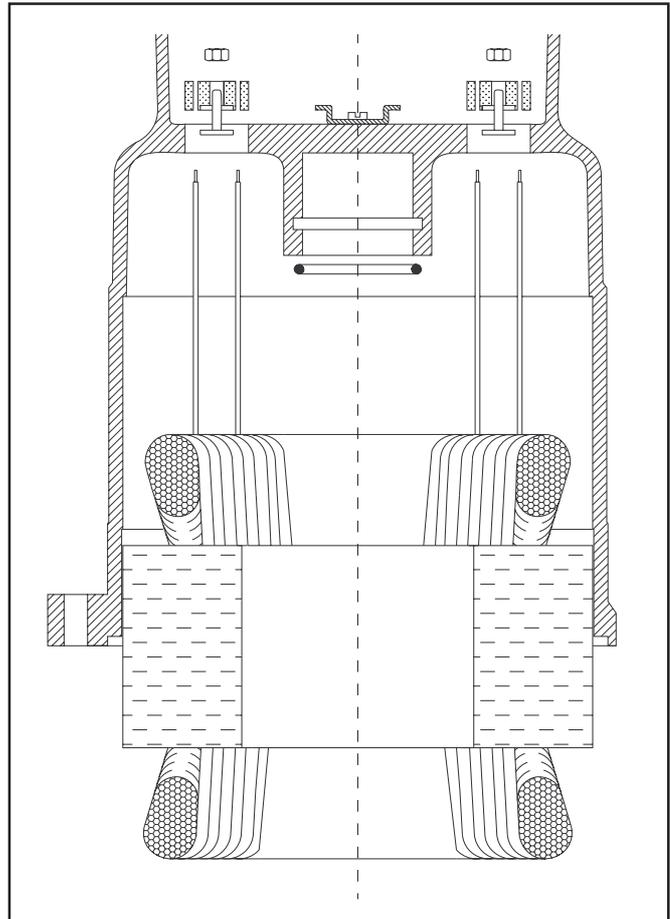


Figure 10 Removing stator from housing.

## 5.0 Assembly

### 5.1 General

Prior to assembly, clean all parts carefully, especially O-ring grooves and mating surfaces. Grease or oil O-rings to eliminate damage during assembly. Put some grease or oil on screw threads to simplify disassembly during future overhaul.

### 5.2 Stator Unit, Contactor, Main Cover

Grease and mount the O-ring in the upper bearing seat. Connect all stator leads to the contactor according to wiring diagram and mount the contactor at the bottom of the contactor chamber.

Grease and mount the O-ring between stator unit and main cover. Mount the main cover on the housing and tighten it against the stator housing with the nuts. Check that the O-ring or stator leads have not been jammed.

### 5.3 Cable Gland and Cover

Measure inner diameter of cable rubber bushing to see that it corresponds to cable diameter. Place rubber bushing and washers (one on each side of the bushing) on the cable.

Pull cable through the junction box cover, far enough to let the rubber bushing seat on a non-deformed portion of cable. Tighten the cable gland body and the strain relief clamp.

Grease and mount the O-ring in the cover. Connect the phase leads to the contactor according to wiring diagram and screw the yellow/green earth lead in the main cover. Mount the cover on the main cover and arrange the leads so that they may not be jammed or block the functioning of the contactor. Tighten the cover with the cap nuts.

### 5.4 Ball bearings and Rotor Unit

Clean the oil casing and all sealing surfaces thoroughly. Remove burrs and scratches. Pack the ball bearing up to 2/3 of its volume with a ball bearing grease e.g. Shell Alvania Grease 3 or SKF Alfalub LGMT 3/1.

Mount the washer in the bottom of the bearing seat (JUMBO 24, JUMBO 44) or the circlip (JUMBO 12 -14, JUMBO 54 - 84).

Heat the bearing seat with LP-gas to about 150°C and mount the bearing in the seat. Mount the Nilos ring and circlip on top of the bearing.

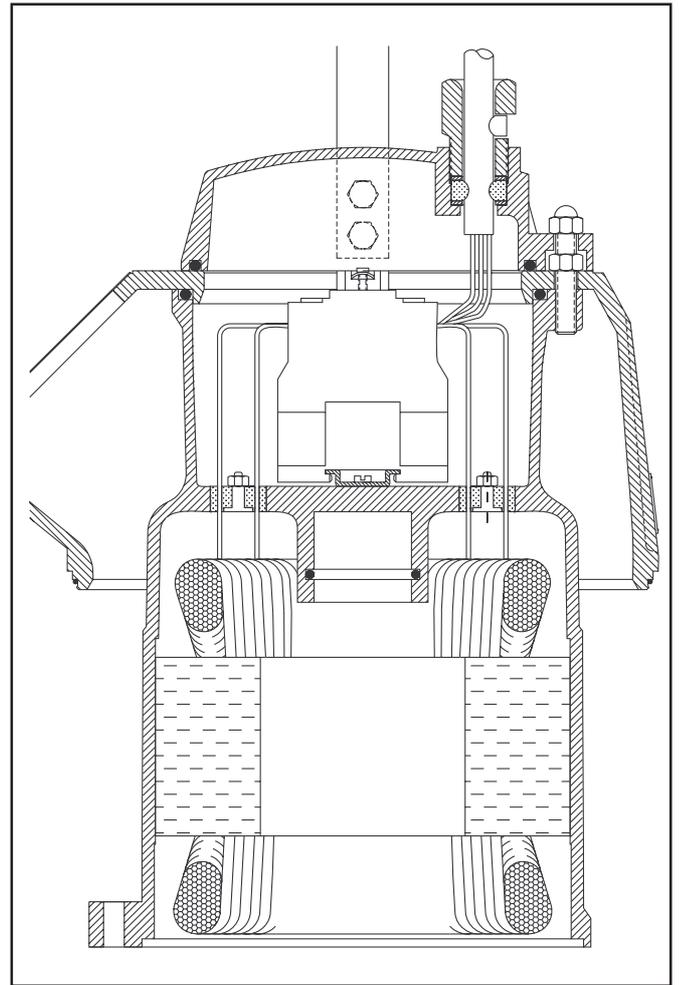


Figure 11 Assembling stator unit, contactor, main cover, cable gland and cover.

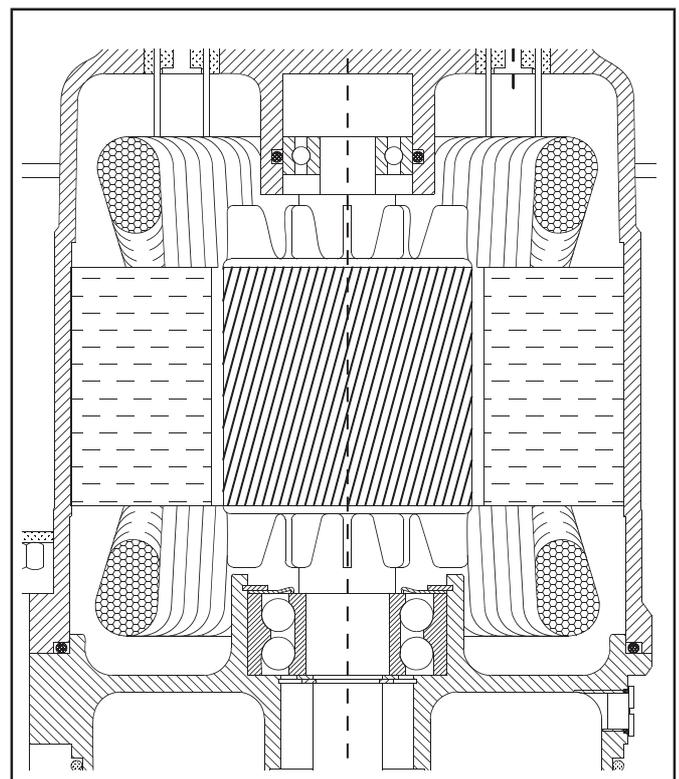


Figure 12 Mounting of rotor unit.

Place the oil casing on a mandrel with hole for the rotor shaft and resting against the inner ring of the ball bearing.

Place upper bearing on the shaft and press both bearings into position against the shaft shoulders. Mount washer and circlip on the shaft below lower bearing. Turn the rotor by hand and check that it turns freely without seizing.

Grease and mount the O-ring between stator housing and oil casing. Slip the stator unit onto the rotor unit and check that the O-ring is not jammed. Tighten the stator housing to the oil casing with the screws.

## 5.5 Secondary seal

Clean and grease the seal seat in the oil casing and mount the stationary ring with O-ring part No. 11121012. Push it down to the bottom of the seat with mandrel part No. 96990370. Push the rotating part of the secondary seal onto the shaft with mandrel part No. 96990372. Mount lock washer part No. 11060085, using the same mandrel. Push the mandrel down to its stop against the shaft end.

## 5.6 Primary Seal and Wear Plate

Mount stationary ring of primary seal with O-ring part No. 11120236 in its seat in the oil casing. The clearance between the lock washer and the stationary ring of the primary shaft seal should be about 1 mm.

Before the outer O-ring is mounted on the oil casing, check that the wear plate is sealing, efficiently against O-ring part No. 11120236.

Grease and mount O-ring in casing, and assemble wear plate with washers and stud bolts. Mount the rubber covers on the stud bolts and over the knobs on stator housing and oil casing. Grease and mount a new O-ring part No. 11120895 on the shaft. Oil the sealing surfaces of the mechanical seal and push the rotating ring onto the shaft. Assemble the seal spring and spring sleeve.

## 5.7 Impeller

Mount the impeller on the shaft, securing it with key, spring washer and nut. Check that impeller runs free of wear plate with a clearance of 0,5 - 1mm (0.02-0.04"). For Jumbo 12/15 the clearance should be 1-2 mm (0.04"-0.08"). Adjust the clearance with shims between impeller and shaft if necessary.

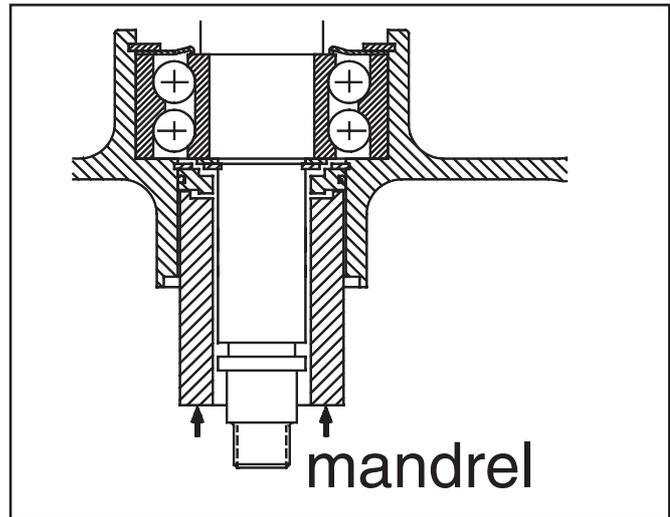


Figure 13 Mounting stationary ring (secondary seal).

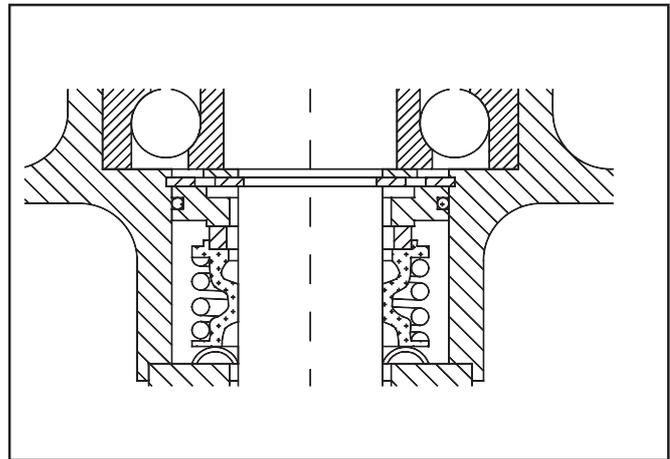


Figure 14 Mounting rotating ring (secondary seal).

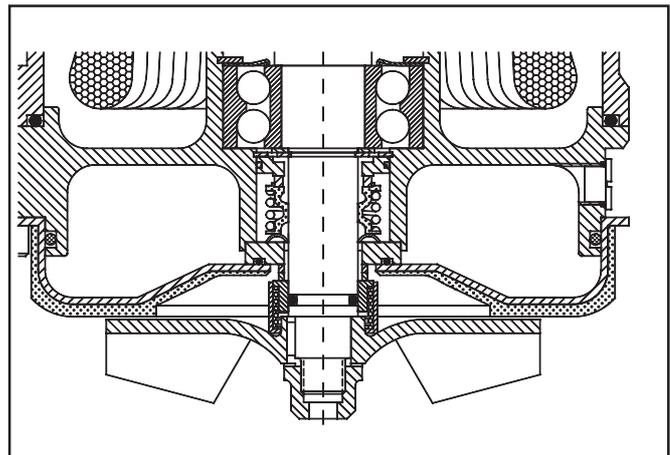


Figure 15 Mounting primary seal, wear plate and impeller.

## 5.8 Refilling of oil

Fill new oil in the oil chamber.

Oil type:

Paraffin oil (white oil) with viscosity  
10-15 cSt, eg BP Enerpar M 002 or equivalent.

### Correct quantities are as follows:

JUMBO 12	0,35 litres
JUMBO 14	0,35 litres
JUMBO 15	0,35 litres
JUMBO 24	0,50 litres
JUMBO 44	0,50 litres
JUMBO 54	0,90 litres
JUMBO 84	0,90 litres

Tighten the oil plug with a new O-ring.

## 5.9 Diffuser and Outer casing

Mount the coil springs on the stud bolts  
(JUMBO 54 - JUMBO 84). Mount the diffuser on  
the stud bolts and screw one nut onto each stud  
bolt.

Grease and mount the O-ring on the main cover.  
Also grease the outer diameter of the diffuser.  
Push the outer casing over the diffuser towards  
the main cover and check that the O-ring is not  
being jammed.

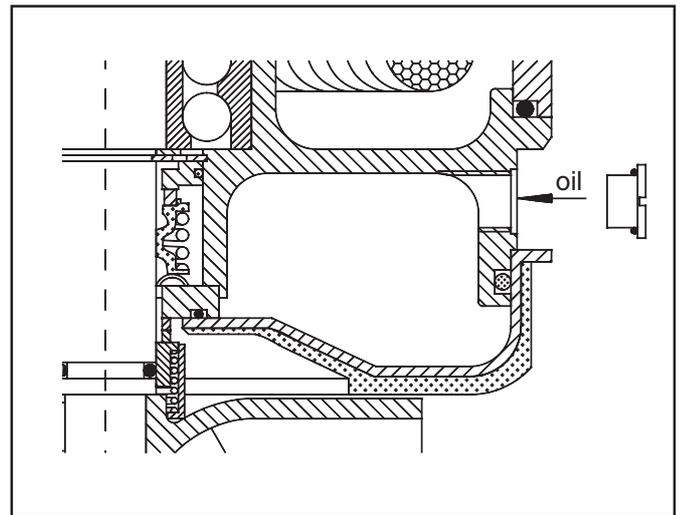


Figure 17 Filling oil.

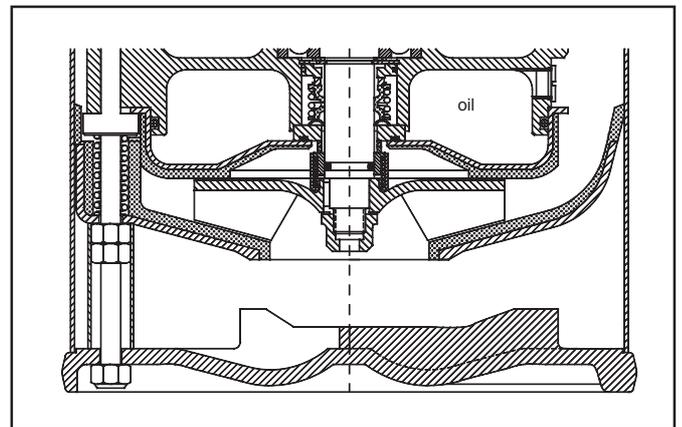


Figure 18 Mounting diffuser, outer casing and  
base plate.

## 6.0 JUMBO 84 HD - 50 Hz

### Assembly and adjusting the diffuser and impellers (two impellers).

Please note that the second impeller, 35070364, is ad-justed by washer 11470106 and locked by a distance sleeve, having the same length as the hub of the first impeller, 35070366.

The guide vane, 31470158, is screwed together with the diffuser, 31470155, by three screws, 11250101, + Loctite in the treads. Distance sleeves (six pcs) 41380102, are placed between the diffusor and the guide vane. Partly mounted details are put down on the stud bolts, 11350170. Then put six pcs of washer 11470058 and six pcs of nuts, 11400085, on the guide vane.

Adjust the diffuser, 31470155, against the impeller. After this the nuts are slacked loosen (opened) a quarter of one turn. It is important that the impeller is close to the diffuser in order for the pump to give the promised high head.

That the diffuser is correct installed (parallell) can be checked by measuring the distance from the guide vane up to the motor. The distance between the upper side of the impeller and the guide vane is ad-justed by shims, 11470071, to about 1 to 1,5 mm. Please note that the shaft key, 14040051, should be fitted after the shims.

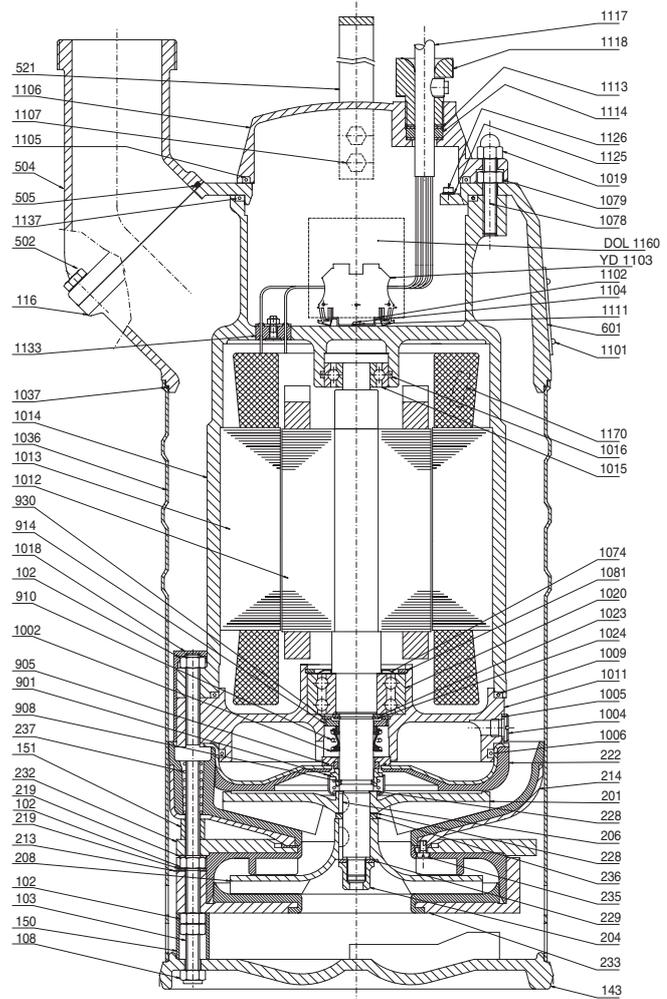
The washers, 11470058 (six pcs), are placed on the stud bolts and thereafter the diffuser, 31470156. The distance between the impeller and the diffuser are adjusted by one or several adjusting shims, 11470107. It has to be the same amount on each stud bolt. The distance should be about 0,1 to 0,2 mm. Two nuts on eachother are then locking it all.

After this there are only the rubber sleeves, 13400183, on the nuts, the outer casing and the bottomplate left to mount and the pump is ready to use again.

It is advisable, to save time, that the pump is always started for a few seconds to check that the impellers are rotating while still in the workshop. If the nuts are screwed on too tight the impellers are too close thto the diffusers.

### 7.0 Testing

Connect motor cable to power supply and start the pump. Check the direction of rotation. Seen from above the pump should make an anti-clockwise jerk. If possible, operate the pump in water and measure the head against closed valve.



## 8.0 Electrical Connections

### 8.1 Single phase JUMBO 12W, JUMBO14W and JUMBO 24W

The winding and capacitor of JUMBO 12W are connected according to the figure 19A.

The windings, capacitor and contactor of JUMBO 14W and JUMBO 24W are connected according to the figure 19B.

### 8.2 Three phase direct start

The stators which are wound for dual voltage can be easily changed from one voltage to the other by changing the windings from delta connection (e.g.230V) to star connection (e.g. 400V)

### 8.3 The coil of the contactor

The coil of the contactor is activated by the same voltage as the supply voltage therefore when changing from one voltage to the other the coil of the contactor must also be changed.

### 8.4 Three phase star delta starting.

The star delta starting is obtained by using a separate starter e.g. JP54SD or JP84SD. The power wires and the control wires are in one cable connected as shown in figure 22.

### 8.5 Fuses

Fuses are to be installed in the power circuits as a short circuit protection. Fuses with a time lag are to be used. The table below shows the recommended sizes.

Pump	Three-phase			Single-phase	
	230V	400V	500V	110V	220V
JUMBO 12	4,0A	2,3A	1,9A	10,4A	5,2A
JUMBO 14	4,8A	2,8A	2,2A	14,8A	7,3A
JUMBO 15	5,0A	2,9A	2,3A		
JUMBO 24	9,5A	5,5A	4,2A		10,5A
JUMBO 44	15A	8,7A	6,6A		
JUMBO 54	21A	12A	9,2A		
JUMBO 84	31A	18A	14A		

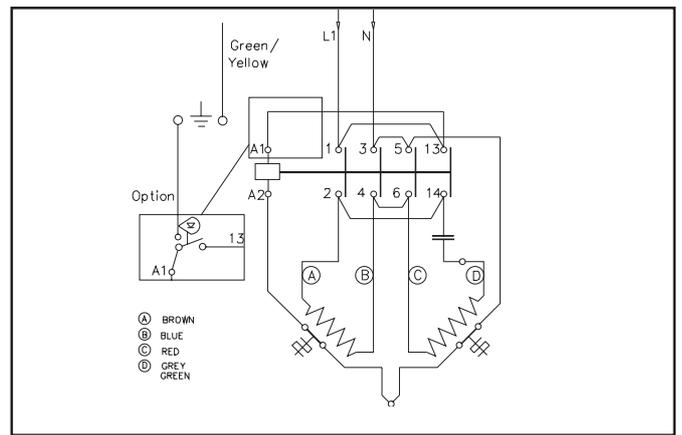


Figure 19B Single phase connection.

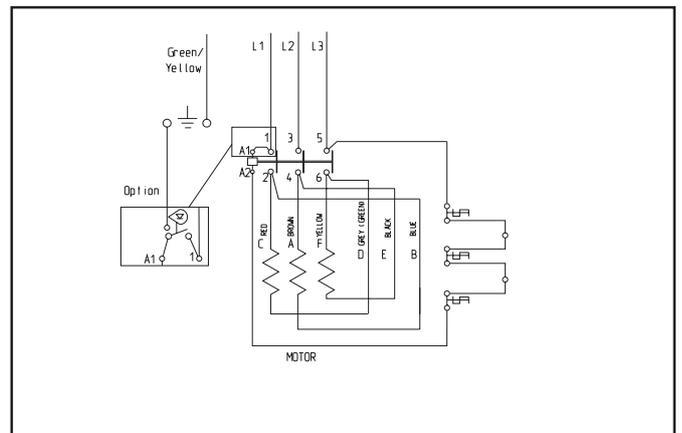


Figure 20 Delta connected windings direct start.

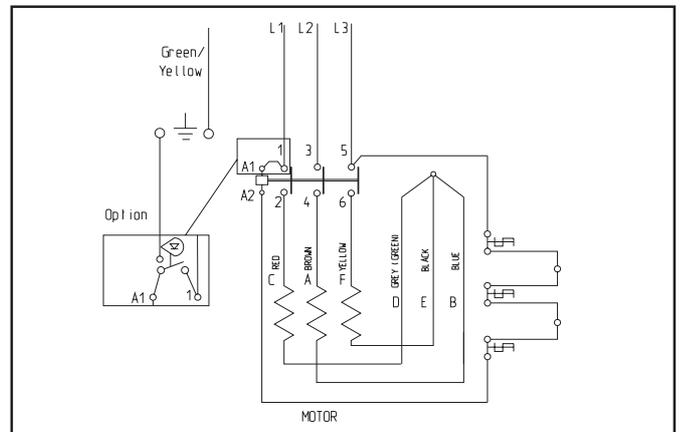


Figure 21 Star connected windings direct start.

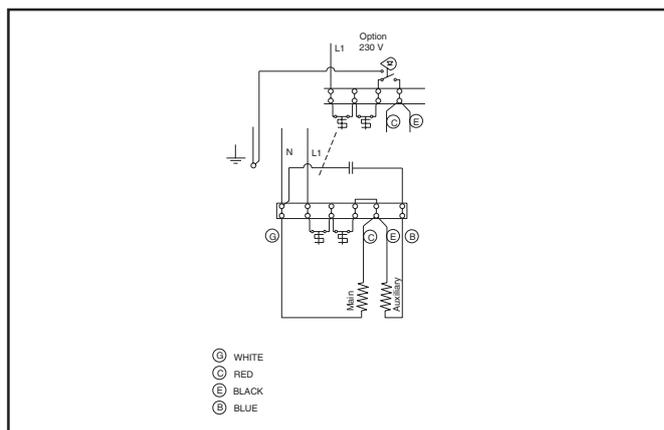


Figure 19A Single phase connection

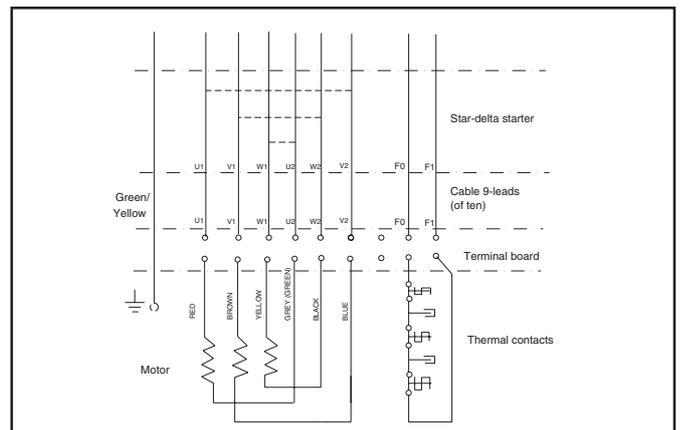


Figure 22 Connecting for star / delta start.

## 9.0 Sectional drawing

