# INSTALLATION ,OPERATION AND MAINTENANCE MANUALWITH FOR KIRLOSKAR MAKE

# **DWSS-SUBMERSIBLE DEWATERING PUMPS**



# KIRLOSKAR BROTHERS LIMITED.

# **IMPORTANT INSTRUCTIONS:-**

- 1. USE CONTROL PANEL WITH STARTER, SINGLE PHASE PREVENTOR (For 3 Phase Pumps) AND DRY RUNNING PROTECTION.
- 2. FOR SINGLE PHASE PUMPS USE RUN CAPACITOR AS FOLLOWS
  - A) FOR 1 HP 36 mfd.
  - B) FOR 2 HP -40 mfd.
- 3. NEVER RUN THE PUMP DRY TO AVOID BURNING OF MOTOR.
- 4. FULL LOAD CURRENT -

HP / PH / VOLTAGE	FULL LOAD CURRENT
1 HP / 1 PH / 230 V	10 Amps
2 HP / 1 PH / 230 V	14 Amps
1 HP / 3 PH / 415 V	2.8 Amps
2 HP / 3 PH / 415 V	4.6 Amps
3 HP / 3 PH / 415 V	6.5 Amps
5 HP / 3 PH / 415 V	9.5 Amps

**CAUTION** 

### 1. DO NOT LOWER OR LIFT THE PUMP WITH THE HELP OF CABLE

2. DO NOT FILL ANY LIQUID INSIDE THE MOTOR, AS REQUIRED QUANTITY OF OIL IS FILLED AT FACTORY.

**3. DO NOT RUN THE PUMP DRY.** 

4. DO NOT RUN PUMP IN REVERSE DIRECTION, CORRECT DIRECTION WILL GIVE MAXIMUM HEAD & DISCHARGE

5. DO NOT RUN THE PUMP WITHOUT CONTROL PANEL HAVING SINGLE PHASING, DRY RUN & OVERLOAD PROTECTION.

6. DO NOT RUN THE PUMP WITH CONTROL UNIT IN BYPASSED CONDITION.

7. ENSURE THAT PUMP IS USED FOR RIGHT APPLICATION.

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### 1.0 GENERAL

- 1.1 DWSS-Series Submersible Dewatering pumps are having bottom suction with motor on top type construction pumps. They are available in single phase upto 2HP / 1.5KW & in three phase beyond 2HP / 1.5KW.
- **1.2** The pump comprises of three units:
- i) Pump Unit: Consist of Impeller and diffuser at the bottom. Motor is at the top. Suction is from the bottom most part. Pumped out water passes through outer shell which forms the cooling jacket around the motor. Discharge of the pump set is from the top most part.

## ii) Stuffing Box Unit

It comprises two numbers mechanical seals and oil chamber filled with oil for lubricating the seals. The seal behind the impeller is having seat ring of silicon carbide *v/s* silicon carbide and second seal comprises of carbon ring *v/s* ceramic ring.

# iii) Electrical Motor Unit

These pumps are provided with submersible three or single phase squirrel cage induction motors in watertight housing. The entire motor unit is tested to ensure the leak tightness of the joints.

- 1.3 DWSS- series pump is to be used with control panel. These control panels should consist of either with DIRECT ON LINE type starter or STAR DELTA type starters. These panels are designed for smooth running of pump set. The pump gets switched off automatically and is protected against the following.
  - a) Dry running of pump
  - **b**) Single phasing.
  - c) overload
- 1.4 As a standard supply, DWSS Series pumps are supplied with 10Mtrs. long cable. This cable consists of power cable suitably designed for the voltage and current. The extension cable if used must be of same size rating etc. as that supplied with pump. Cable connection should be done carefully and cable joint (if any) must be above the maximum water level and sealed to prevent any water ingress.

# 1.5 FOR 1 HP-SINGLE PHASE PUMS PANEL SHOULD CONSISIT OF 36 MFD START CAPACITOR AND FOR 2HP SINGLE PHASE PUMP 40 MFD START CAPACITOR.

- 2.0 INSTALLATION
- 2.1 The DWSS Series pumps require no foundation. Only ensure that the delivery pipe line is well supported and weight of it is not acting on pump directly.
- 2.2 When the pump has been lowered along with the pipes into the sump, check that the cable is sagging and is not under tension.
- 2.3 Avoid resting pump on the bottom or surface with soft or loose soil and with unsettled slurry / mud etc.
- 2.4 DO NOT LIFT THE PUMP WITH THE HELP OF CABLE.
- 2.5 Use chain for lowering or lifting of the pump. While selecting size of the chain, weight of the pump should be taken in to consideration. We recommend use of non-return valve in delivery pipe line located before sluice valve.

Start pump provided there is enough water to be pumped is available.

### 3.0 OPERATION

Prior to the commissioning of pump, please check the following list:

- **3.1.1** Check that the pump rotates freely. This can be done by giving momentaril0y electric supply.
- **3.1.2** Do not fill any liquid or oil inside the oil chamber. The oil chamber of the pump is duly filled with proper grade of oil in appropriate quantity before dispatch from factory.
- **3.1.3** Check the insulation resistance of winding by using 500 V megger. The insulation resistance of winding should not be less than 100 megohm at phase to phase and phase to Earth. This test should be carried out at free end of the cable. If the insulation resistance is found less than 100 megohm then please consult our service personnel.
- **3.1.4** For continuity test, connect the two wires of megger between the two ends of the same phase of motor. It should show zero resistance. This test should be carried out for all the phases.
- 3.1.5 The megger test for phase to phase and phase to earth should be conducted serially. The megger test should show insulation resistance above 100 M Q
- **3.1.6** Never by pass the panel as this will nullify the warrantee claims. Use panel having protection against Dry running, Single Phasing and Overload.
- 3.1.7 When pump runs dry, panel would trip .To restart the pump Hoist up the pump and momentarily switch on the power. If the connections are correctly made the pump should jerk in clockwise direction when viewed from top. If the pump jerks in opposite direction, change two phases of the incoming leads to the control panel. In no case the direction of rotation should be changed by changing the leads of motor terminals. Do not run the pump dry. Just check in which direction the pump jerks.
- **3.2** While putting the pump in operation, follow the procedure outlined below:
- **3.2.1** Start the pump. Let the motor pick up full speed.
- 3.2.2 Open discharge valve slowly.
- **3.3** Check during running that:
- **3.3.1** The pump is running smooth.
- **3.3.2** Power consumption is within limit.
- **3.3.3** Head and capacity developed by the pump is as specified.
- **3.3.4** Stop the pump immediately if any defects are detected and must not be started unless they are rectified. Report immediately to the supplier if it is not possible to rectify the defects at site.
- **3.4** Stopping the pump: Pump should be switched off only after closing delivery sluice valve.
- **3.5** Make sure that the strainer does not get clogged by leaves or other suspended materials.

### 4.0 MAINTENANCE:

Preventing maintenance schedule is the periodical checks and precautions by which possibilities of failures and breakdowns are minimized.

- 4.1 Daily checks:
- **4.1.1** An hourly record of the delivery pressure and power input to the pump should be maintained.
- **4.1.2** Vibrations are the first sign of impending troubles like bearing failure, choking of impeller or casing and such other operating troubles. The pump performance should be checked for noise and vibration.
- 4.2 Periodical checks:
- 4.2.1 Clean the sump if there are chances of deposition of content of liquid handled.
- 4.3 Annual checks: (After one year minimum)
- **4.3.1** The pump portion of the motor pump set should be overhauled completely to check the clearance and to replace the worn out parts. Clearance between impeller and casing ring and casing cover are very important
- **4.3.2** The effect of liquid handled on pump components should be checked. If abnormal corrosion, erosion is observed then the components should be replaced with that of suitable material.
- 4.3.3 If pump is to be stored for long period, flush it with clean water properly.
- **4.3.4** Protect the cable from damage during storage and transportation. Wrap the cable around the pump properly during storage.
- 5.0 TECHNICAL DATA:
- 5.1 DWSS Series pumps are supplied at maximum speed of 2850 rpm having 2 pole single phase or three phase motors.

The direction of rotation is clockwise when viewed from the motor top.

5.2 Specification of bearings:

The shaft is supplied with antifriction' ball bearings at both ends. The bearing specifications are given below. The designations of bearings are as per SKF catalogue. However, equivalent bearing in type, capacity and dimensions can also be used.

Motor rating in HP	Lower bearing	Upper bearing
up to 2.0	6204	6204
3.0 to 5.0	6206	6205
7.5 to 10	6305	6206
12.5 to 20	3308	6308
25 to 30	3308	6308
35 to 50	3310	6308

# 5.3 Mechanical Seals:

Motor ratings	MECHANICAL S	SEAL DETAILS
In HP	(Motor Side)	(Pump Side)
up to 2.0	Carbon Vs Ceramic	Carbon Vs Ceramic
3.0 to 5.0 7.5 to 10 12.5 to 20 25 to 30 35 to 50	Carbon Vs Ceramic	SIC Vs SIC

Pumps are supplied with double mechanical seals of following type:

5.4 Oil Specification: Use "Transformer Oil" of good quality confirming to SAE 40 or equivalent.

[Please furnish complete name plate details, name of parts, part numbers and material of construction while ordering spare parts for the pump.]

# **TROUBLE DIAGNOSIS CHART**

# SUBMERSIBLE DEWATERING PUMP

Type of Trouble: Pumpset does not deliver water / delivers insufficient quantity of water

Likely Reason	Suggested Solution
Water level might have gone below or	1. Stop the Pumpset until water level
yield to sump / well is not sufficient.	rises
	2. Operate the Pumpset with valve
	throttled.
	3. Replace the Pumpset with lower
	discharge capacity.
Pumpset working near shut-off head.	Replace the Pumpset with higher head
	capacity.
Direction of Rotation of the motor is	Correct the direction by changing any
reverse.	of the two phases of supply.
Motor running at speed lower than	Check the supply voltage and
rated.	frequency.
Strainer / Impeller may be clogged or	Clean the strainer and the flow passage
chocked	of Impeller.

# Type of Trouble: Pumpset Consumes excessive power.

Likely Reason	Suggested Solution
Motor may be running at speed higher than	Check the supply voltage and
the rated one.	frequency.
Low voltage across motor terminals.	If necessary replace the supply
	cable with higher size.
Rotating parts rubbing with stationary parts	Replace defective parts and
/ pump shaft bent.	ensure proper clearance.
Pumpset is being operated in the range not	Ensure that Pumpset is
recommended by the manufacturer	operating at recommended head
	suggested by the manufacturer.

# Type of Trouble: Excessive noise & the vibration in the system.

Likely Reason	Suggested Solution
Excessive air or gas intrusions in the water	Increase the submergence by
being pumped	lowering the pump further
	down if possible.
Worn out / defective bearing and other parts.	Replace the defective parts

# Type of Trouble: Motor burn out.

Likely Reason	Suggested Solution
Defective motor protection devices / Faulty backup protection system.	Consult control panel expert
Surrounding water temperature is higher than the normal water temperature.	Consult manufacturer for cooling jacket arrangement if available with them.
Continuous operation of motor at low voltage / unbalance voltage.	Take steps for getting correct voltage supply.
Too frequent starts & stops of Pumpset.	Ensure that starts and stops don't exceed the guidelines given by the manufacturer.

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