



WARRANTY

THIS PUMP IS GUARANTEED AGAINST DEFECTS IN MATERIAL AND WORKMANSHIP UNDER NORMAL USE AND SERVICE FOR A PERIOD OF 12 MONTHS FROM THE DATE OF DEALER'S/SUB-DEALER'S INVOICE (PURCHASE BILL OF THE END-USER).



SPECIAL INSTRUCTION

"Purchasers are cautioned to go through carefully the detailed instructions given for proper installation, use and servicing of the product and genuine spare parts as detailed in company's published literature, manuals, pamphlets or other official publications. Any deviation, if made by the customers, will void the warranty obligations and/or manufacturer's liability, if any, for any compensation consequential or otherwise. Use of trained mechanics will get you better results."

SPECIAL NOTE

Our products are meant for pumping water and they do not have any significant effect on environment during their use, if properly selected and used as per instructions given in this manual.



Enriching Lives

Customers are advised to dispose off unusable components through appropriate disposal agencies to avoid the harmful impact (if any) on environment.

"CONGRATULATIONS...." on your acquiring one of the finest pumps in the country. The KIRLOSKAR pump in your possession is the result of over half a century of progressive hydraulic engineering. It is scientifically designed and built to give you long and dependable service. Careful selection of materials and manufacturing assures you a satisfactory performance as per the pump rating. This pump will give you years of trouble free performance if it is handled with due care. This booklet is a step in that direction. It covers general instructions on installation, operation and maintenance of KIRLOSKAR pumps. Read this booklet, comply with the instructions and your pump is bound to serve you well. While reporting the damages or missing part/parts always quote name plate details including its Sr.No. FEATURES: • Withstands wide voltage fluctuations. Voltage range from : 200 V to 440 V • Long life : due to replaceable wearing parts. • Dynamically balanced rotating parts. • Easy maintenance and spares availability. • "Top flat efficiency curve"; minimum variation in efficiency over the entire operating range. • Water lubricated bearings are designed for longer life and vibration free performance. • Pump has a built in non return valve (NRV) designed for minimum friction losses. • Pump set is designed for minimum outside diameter including cable guard which ensures smooth entry in borewell. • Nitrile rubber / bronze bushes are provided to ensure long life with sandy water. • Specially designed thrust bearing in motor portion to withstand axial thrust with minimum wear and tear. • Interior of motor portion are coated with antirust coating.

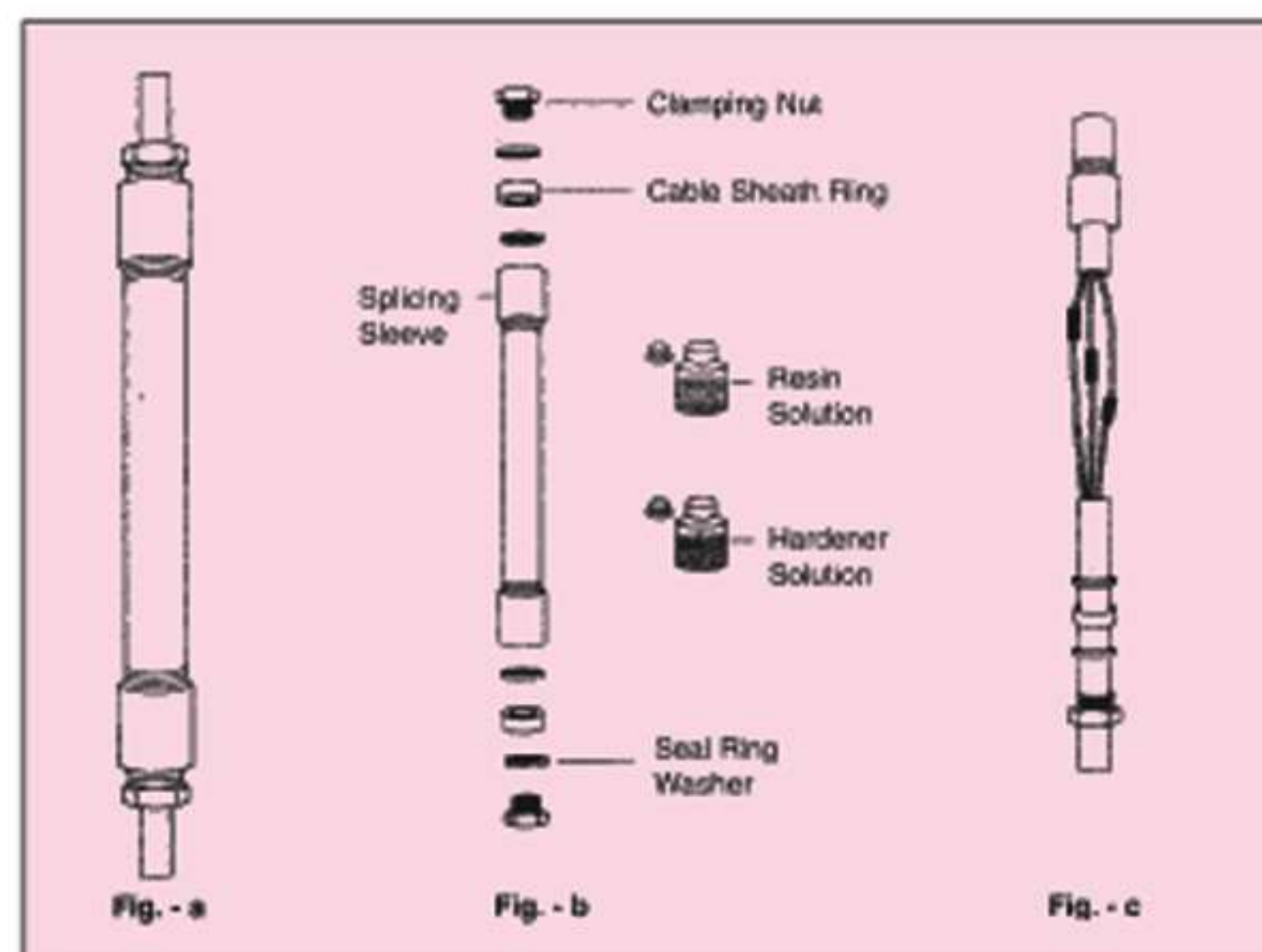
● INSTALLATION AND PIPING

A. UNPACKING AND COUPLING PUMP WITH MOTOR

1. Unpack wooden crate carefully so that the motor cable is not damaged by nails and tools. Check all accessories in the pump crate.
2. Match the serial numbers of the pump and motor. They should be same.
3. Check cable for visible signs of damage. Make repairs if any. Check motor/pump bodies for cracks or other defects.
4. Check float and free rotation of motor and pump separately.
5. Place the motor in a vertical position. Remove both the filling plugs from the upper bearing housing and start filling clean water by a tube; till water emerges from the other filling plug. This ensures that motor has been completely filled with the cooling water.
6. Gently rock the motor to and fro to release the air bubbles trapped in it. Tighten both the filling plugs.
7. Check Megger Value by Megger (Insulation Resistance Meter). It should exceed 50 Mega Ohms.
8. Tighten shortest pipe length available to N.R.V. Tighten two clamps on this pipe length.
9. Raise the pump by a hoist and mount on motor such that motor shaft smoothly enters the coupling.
10. To ensure correct alignment, check for proper face-to-face contact and free rotation of pump and motor simultaneously.
11. Remove cable guard and attach cable. Refix the cable guard.
12. Check for overall float of pump/motor shafts.
13. The pumpset is now ready for installation.

B. CABLE CONNECTION AND MEGGER TEST

1. Cable connection kit (fig. a) of any reputed make should be used to connect additional length of cable.



2. A cable connection kit consists of (fig. b)
 - 2.1 1 no. splicing sleeve with screwed on socket at each end.
 - 2.2 2 nos. cable sheath rings.
 - 2.3 4 nos. seal ring washers.
 - 2.4 2 nos. clamping nuts.
 - 2.5 Resin solution.
 - 2.6 Hardener solution.
3. Follow the instructions given with the cable jointing kit.
4. Ensure that joint of the cable core are staggered (fig.c).
5. check the insulation resistance and continuity of cable by megger (insulation resistance meter) after dipping joint into the water for 10 minutes.
6. Conduct megger test by Megger (Insulation Resistance Meter) to check the insulation and continuity of cable.
7. For earthing of the pumpset, the earthing wire shall be connected to the delivery pipe.

C. DELIVERY PIPE CONNECTION AND PUMPSET INSTALLATION

1. Lower the pumpset by using a chain block and mounting clamps. Full care should be taken while connecting successive pipes, to avoid any leakage. While lowering the pumpset, the cable should not be pulled, stretched or damaged. In case of any damage in the cable during installation, make repairs before continuing the installation. Secure the cable by means of a cable clip just above and below each jointing flange of sleeve to provide proper protection.
2. Put cable clamp at every six meters length and tighten these. To avoid motor burning through injury to cable /puncture of cable, do not distort or pull cable.
3. Lower the pumpset to a depth by at least six to seven meters below the lowest draw-down level. Do not rest it on the bottom of the well, to prevent any build up of sand, silt or sludge covering the bottom of the motor.
4. Connect the delivery bend to the last pipe length at the top.
5. Tighten supporting clamps (one pair) on the tubewell face and rest on the borewell casing.
6. Cover open space of well casing by a plastic sheet or metal sheet to avoid foreign matter like trash, pebbles etc. from falling into well and damaging/clogging into the pump.

D. CONNECTING CABLE TO CONTROL PANEL

1. Use a reputed make starter and control panel.
2. Use automatic starter, Voltmeter, Ammeter, single Phasing preventor and water level guard in control panel. Keep control panel in a water-proof shelter.
3. Connect cable to automatic relay switch of starter. Check the flow of water. If adequate quantity of water is not being discharged, interchange any two of the wire connections to get correct direction of rotation and hence the correct discharge.

ELECTRICAL DETAILS

MOTOR RATING KW/HP	RATED VOLTAGE (VOLTS)	No. OF PHASES	FULL-LOAD CURRENT (AMP.)	FULL-LOAD RPM	MAXIMUM CURRENT IN ENTIRE OPERATING RANGE(AMP.)	CURRENT FOR RELAY SELECTION (AMP.)	TYPE OF STARTING	VOLTAGE RANGE (VOLTS)
2.2/3.0	415	3	6.3	2830	10.0	10.0	DOL	200-440
3.7/5.0	415	3	9.3	2820	13.5	13.5	DOL	200-440
4.5/6.0	415	3	11.8	2865	16.5	16.5	DOL	200-440
5.5/7.5	415	3	13.5	2875	20.5	20.5	DOL	200-440
7.5/10.0	415	3	18.0	2900	28.5	16.5	STAR-DELTA	200-440
9.3/12.5	415	3	22.5	2910	32.0	18.5	STAR-DELTA	200-440
11.0/15.0	415	3	26.0	2920	38.0	21.9	STAR-DELTA	200-440
13.0/17.5	415	3	32.5	2910	43.0	24.8	STAR-DELTA	200-440
15.0/20.0	415	3	36.5	2910	50.0	28.9	STAR-DELTA	200-440

OPERATION

1. Switch on the supply and check for the incoming voltage. It should be normal voltage. Also check whether supply voltages of all three phases are same or not. If not, do not start the pump.
2. **Direction of rotation :**
The direction of rotation can be changed by interchanging the connections of any two of the three phases. Higher discharge shows the correct direction of rotation.
3. **Sand test :**
Examine the water pumped up initially for sand content. Allow it to flow till clear water comes. High sand content will cause premature failure of pump parts.
4. **Supervision :**
Generally, KIRLOSKAR SUBMERSIBLE PUMPS do not require day-to-day maintenance if properly selected and installed. However, it is necessary to check that -
- Current consumed by the motor, and
- The total head; are same as during the start of the operation.

A. DISMANTLING PROCEDURE FOR MOTOR

- a) Loosen and remove drain plug (1216). Remove water.
- b) Remove four nos. nuts (1212) and brass washers (1204) from motor base and remove it by gentle hammering with nylon hammer.
- c) Remove the diaphragm (919). Remove rocker housing (1268) with rocker screw (1269) and H.H. Nut (1270).

- k) Remove suction housing (2003).

- l) To dismantle the diffuser / diffuser casing subassembly, if essentially required, loosen two nos. counter sunk screw (2033) from the diffuser casing (2008) and press it outwards from the bore.

- m) In order to remove the assembly locator (3024), if required, loosen the grub screw (1271) provided on the surface of assembly locator and remove it from the shaft.

B. BOWL TYPE PUMP :

- a) Loosen four nos. cheese head screws (2067) on cable guard (2029) and remove cable guard.
- b) Loosen two nos. screws (1081) and remove the strainer (971).
- c) Loosen six nos. nuts (2028) on N.R.V. body (1099). Gently hammer N.R.V. and remove. At the same time, remove the stem-rod assembly.
- d) Loosen six nos. S. S. nuts between end bowl and next bowl. Remove end bowl (120.1).
- e) Loosen H.H. bolt (3053) and remove washer (3054).
- f) Remove bearing sleeve (2030) and key from the shaft.
- g) Remove first impeller (154) and key from the shaft.
- h) Remove the bearing sleeve (2004.1).

- d) Remove thrust bearing housing (1125) and circlip from rotor shaft. Remove thrust plate (1234) and fibre plate (1199).
- e) Remove the lower bearing housing (1177) by hammering slowly.
- f) Remove four nos. special studs (1181) from stator body (130).
- g) Remove sand guard (1077) and key by screw driver from shaft.
- h) Loosen two nos. H.H. nuts and remove the clamping plate (3021) from the upper bearing housing (1178). Remove the rubber grommet (1008) and brass washers (1205) from the cable hole provided in the upper bearing housing (1178).
- i) Loosen and remove four nos. nuts (1212.1) and washers (1204.1) from upper bearing housing.
- j) Lightly hammer shaft and gradually pull out shaft. Replace the oil seals (500.2).
- k) Gently hammer upper bearing housing and remove from stator.
- l) Remove four nos. special studs (1180) from upper bearing housing-end of stator body.

B. ASSEMBLY PROCEDURE FOR MOTOR

- a) Check megger value - It should be more than 50 Mohms.
- b) Introduce rotor assembly into stator assembly carefully.
- c) Introduce cable through upper bearing housing (1178).
- d) Applying retaining adhesive compound on upper bearing housing end face and mating end.
- e) Attach "T" ends of special studs (1180) on stator tube (130) and mate upper bearing housing by light hammering with nylon hammer.
- i) Loosen six nos. S.S. nuts and remove the next bowl (120).
- j) Remove the impeller (154) and key (321).
- k) Remove the bearing sleeve (2004.1).
- l) Repeat the step till all the stages are removed.
- m) Removed the distance sleeve (2034).
- n) In order to remove the assembly locator (3024), if required, loosen the grub screw (1271) provided on the surface of assembly locator and remove it from the shaft.

ASSEMBLY PROCEDURE FOR PUMP

During assembly, care should be taken to use the same sequence of sleeves as during dismantling. Before assembly, remove the burrs and dust from the surfaces of all parts. Clean them with kerosene. Care should be taken that spanner is applied at the hexagon of NRV only during the tightening of delivery pipe.

A. DIFFUSER TYPE PUMP :

- a) Introduce assembly locator (3024) on shaft and tighten by grub screw (1271).
- b) Introduce the coupling-key on first keyway on N.D.E. side. Introduce coupling (2007).
- c) Place above assembly on motor shaft. Introduce suction housing (2003). Check for free rotation.

- f) Repeat step (c), (d) and (e) for lower bearing housing (1177).
- g) Introduce thrust plate subassembly locating into pin on N.D.E. of rotor shaft. Fit circlip.
- h) Fit rocker screw (1269) in the rocker housing (1268), if removed during dismantling. (Not required in case of mitchell thrust bearing). Tighten the rocker screw with the H.H. nut (1270).
- i) Introduce thrust bearing housing subassembly (1125) on rocker housing such that it takes guide in rocker screw (1269). (Not required in mitchell type thrust bearing).
- j) Mate sub-assembly in step (h) with sub-assembly in step (i) with special studs as guide.
- k) Rotate the rocker screw by 180°, so that it loosens by half of it's pitch.
- l) Now check float (axial play) of the shaft. The float should be 0.75 to 1.25 mm.
- m) Introduce the diaphragm (919) and motor base (1186) resting on rocker housing. Tighten the motor base and rocker housing with four nos. brass washers (1204) and H.H. nuts (1212).
- n) Press brass washer (1204.1) into upper bearing housing cable hole. Press rubber grommet (1008) on above washer in cable hole.
- o) Introduce key into shaft keyway and fit sandguard (1077). Check by depth-vernier for 4.7 mm depth from upper bearing housing-face to sand guard. If limit is exceeded, use shims. If less than 4.7 mm, use packings below upper bearing housing.
- p) Mount the drain plugs (1216) and (1216.1).
- q) Introduce coupling (2007) at the end of the shaft and fit it with the keyway.

- d) Introduce first impeller (151). (No separate key is required to be inserted for locking the impeller).
- e) Apply gasketing compound on suction housing spigot.
- f) Fit diffuser sub-assembly by light hammering.
- g) Introduce next impeller.
- h) Apply gasketing compound on diffuser spigot.
- i) Continue the process till diffuser casings of all the stages are assembled.
- j) While introducing the intermediate bearing housing (2009), if any, first insert the rotating parts i.e. distance sleeve (2034), washer (3034) and bearing sleeve (2004). Then place the intermediate bearing housing on the spigot of the previous diffuser casing (2008). Place the adaptor plate (2040) over intermediate bearing housing.
- k) Introduce final impeller, distance sleeve (2034.1), key, thrust washer (3034) and bearing sleeve (2004.1).
- l) Introduce washer (1273) and tighten H.H. bolt (1272) fully.
- m) Apply gasketing compound on spigot of last diffuser casing (2008) and mate with discharge outlet (2006).
- n) Clamp assembly to suction housing (2003) with five nos. clamping strips (2020) by tightening five nos. hexagonal nuts (1055).

DISMANTLING PROCEDURE FOR PUMP

During dismantling, it is a good practice to mark all sleeves in sequence as they are not interchangeable. This will help in subsequent correct re-assembly.

A. DIFFUSER TYPE PUMP :

- a) Loosen four nos. cheese head screw (2067) on cable guard (2029) and remove cable guard.
- b) Loosen two nos. screw (1081) and remove the strainer (971).
- c) Loosen five nos. nuts (2028) on N.R.V. body (1099). Gently hammer N.R.V. and remove. At the same time remove the stem-rod assembly.
- d) Remove clamping strips (2020) by removing nuts (1055) on each strip. Remove discharge outlet (2006).
- e) Loosen H.H.bolt (1272) and remove washer (1273).
- f) Remove bearing sleeve (2004.1) thrust washer (3034) and key from the shaft.
- g) Remove distance sleeve (2034.1).
- h) Lightly hammer first casing (2008) and remove it. Remove the impeller (151).
- i) Repeat the process till all casings (2008) and impellers (151) are removed.
- j) To remove the intermediate bearing housings (2009), if required, first remove the adaptor plate (2040) and then housing (2009). Now remove bearing sleeve (2004), washer (3034) and distance sleeve (2034).

- o) Insert the stem-rod assembly into the NRV body (1099) and tighten five nos. H.H. nuts (2028).
- p) Fix cap on discharge outlet for protection of the shaft (2100). (If removed during dismantling).
- q) Fit strainer (971) and tighten the two nos. screws (1081). Fit the cable guards (2029) with the four nos. cheese head screws (2067).

B. BOWL TYPE PUMP

- a) Introduce assembly locator on the shaft and tighten by grub screw.
- b) Insert the distance sleeve (2034) on the shaft.
- c) Insert the key in the keyway and fix the impeller (154).
- d) Introduce the first bowl (120) to rest on the suction housing - spigot and tighten with the help of six nuts.
- e) Insert the bearing sleeve (2004.1) to rest on the hub of the impeller.
- f) Repeat the process till all the stages are assembled.
- g) Now rest the end bowl (120.1) on the spigot of last bowl and tighten with the H.H. nuts.
- h) Insert the bearing sleeve (2004.2).
- i) Insert the bearing sleeve (2030) in the shaft (180).
- j) Place the end washer (3054) and tighten it with the help of two H.H. bolt (3053) fully.
- k) Insert the stem-rod assembly into the NRV body (1099).
- l) Mate NRV body with the end bowl (120.1) and tighten with the six nos. H.H. nuts (2028).
- m) Fit strainer (971) and tighten the two nos. screws (1081). Fit the cable guards (2029) with the four nos. cheese head screws (2067).

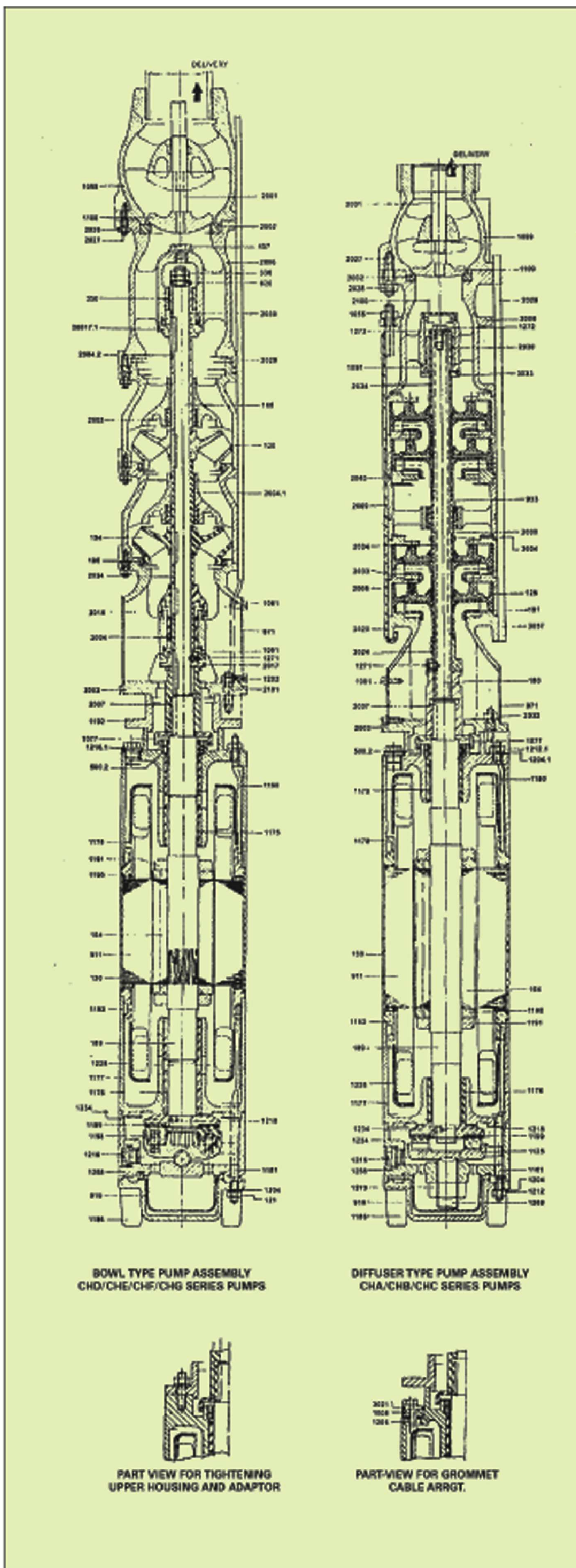
TROUBLE - SHOOTING CHART

TYPE OF FAILURE	Failure to deliver water	Pump does not deliver rated discharge	Pump does not deliver rated head	Pump loses water after start	Pump overloads primemover	Bearings wear rapidly	Seized pump	Irregular delivery
REASON FOR FAILURE								
Wrong direction of rotation	✓		✓					
Suction line not filled with liquid	✓		✓					
Pump not upto rated speed	✓	✓	✓					
Viscosity greater than rated		✓	✓					
Impeller damaged		✓	✓		✓			
Internal leakage (gasket)		✓	✓		✓			✓
Gas or vapour in liquid			✓	✓				
Speed too high						✓		
Total head lower than recommended						✓		
Viscosity and / or specific gravity higher than rated					✓			

TYPE OF FAILURE	Failure to deliver water	Pump does not deliver rated discharge	Pump does not deliver rated head	Pump loses water after start	Pump overloads primemover	Bearings wear rapidly	Seized pump	Irregular delivery
REASON FOR FAILURE								
Impeller blocked or damaged		✓	✓					
Bent shaft						✓		
Thrust bearings too tight					✓			
Excessive thrust						✓		
Lack of lubrication						✓		
Thrust bearings badly installed						✓		
Foreign matter in pump							✓	
Viscosity lower than rated	✓	✓						
Speed too low	✓	✓	✓					
Motor / pump bolts loose							✓	
Leak in delivery pipe-work	✓	✓			✓			

PART - LIST (PUMP)			
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
120	BOWL	2005	BUSH FOR BOWL
120.1	END BOWL	2006	DISCHARGE OUTLET
128	DIFFUSER	2007	COUPLING
151	IMPELLER (RADIAL FLOW)	2008	DIFFUSER CASING
154	IMPELLER (MIXED FLOW)	2009	INTERMEDIATE BEARING HOUSING
180	PUMP SHAFT	2017	SAND-GUARD
190	WEARING RING	2017.1	SAND-GUARD
321	KEY	2018	SAND-GUARD
350	BUSH FOR DISCHARGE OUTLET	2020	CLAMPING STRIP
933	BUSH - I.B.H.	2027	S.S. STUD
971	STRAINER	2029	CABLE GUARD
1055	SS. NUT	2030	BGR.SLEEVE (DIS.-OUTLET)
1081	SCREW CHEESE HEAD	2032	H.H. NUT SUC. HSG./U.B.H
1091	COLLARED BUSH	2033	COUNTER-SUNK SCREWS
1099	N.R.V. BODY	2034	SPACER SLEEVE (I.B.H.)
1100	STEM-ROD	2034.1	SPACER SLEEVE
1192	ADAPTER	2040	ADAPTOR-PLATE (I.B.H.)
1271	GRUB SCREW	2067	CHEESEHEAD SCREW (CABLE GUARD)
1273	WASHER FOR LOCKING	2100	CAP FOR DISCHARGE OUTLET
2001	STEM-ROD	3024	ASSEMBLY LOCATOR
2002	RUBBER RING	3021	CLAMPING PLATE
2003	SUCTION HSG.	3034	THRUST WASHER
2004	BGR.SLEEVE-I.B.H./SANDGUARDS	3051	CLAMP FOR CABLE GUARD
2004.1	BGR.SLEEVE (IMP-IMP)	3053	H.H.BOLT FOR LOCKING
2004.2	BGR.SLEEVE (IMP-SANGUARDS)	3054	WASHER FOR LOCKING

PART - LIST (MOTOR)			
PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
130	STATOR TUBE	1191	BALANCING RING
164	ROTOR	1198	MITCHELL TYPE THRUST BEARING
500.2	OIL-SEAL	1199	FIBRE-PLATE
911	STATOR	1204	WASHER FOR SPECIAL STUD (LOW)
919	DIAPHRAGM	1204.1	WASHER FOR SPECIAL STUD (UP)
1008	GROMMET	1205	WASHER FOR GROMMET
1077	SANDGUARD	1212	NUT UBH FOR SPECIAL STUD (LOW)
1125	THRUST BEARING HOUSING	1212.1	NUT UBH FOR SPECIAL STUD (UP)
1175	BUSH FOR U.B.H.	1216	PLUG
1176	BUSH FOR L.B.H.	1216.1	PLUG
1177	LOWER BEARING HOUSING (I.B.H.)	1218	DOWEL-PIN
1178	UPPER BEARING HOUSING (U.B.H.)	1224	FIXED-TYPE THRUST BEARING
1180	SPECIAL STUD (UPPER)	1228	CAP FOR WINDING OVERHUNG
1181	SPECIAL STUD (LOWER)	1234	THRUST PLATE
1182	END-RING	1268	ROCKER-HOUSING
1185	MOTOR-BASE	1269	ROCKER SCREW
1190	COPPER END RING	1270	H.H. NUT FOR ROCKER SCREW



CROSS-SECTIONAL DRAWINGS OF PUMPSET



Enriching Lives

INSTALLATION, OPERATION & MAINTENANCE MANUAL FOR KIRLOSKAR "CHAMPION" SERIES 150 MM (6") BOREWELL SUBMERSIBLE PUMP

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