

PROPELLER PUMPS

Description

A vertical propeller type pump with the motor drive on the top of the pump is shown in Figure 1. The motor and pump shafts are connected by a rigid coupling. A thrust bearing, located at the top of the motor, carries the thrust developed by the pump and the weight of the entire rotating element.

A propeller "22" is secured to the lower end of the shaft by key "24" and held in place by nut "23". The hand of the threads is such that proper rotation of the pump tends to tighten the nut on the shaft. A renewable liner "2" held in place by screw "3", is provided in the lower casing as shown in Figure 1. Directly above the propeller are stationary guide vanes "4" which direct the flow from the propeller and eliminate undesirable turbulence. The outer rim of the guide vanes and a portion of the pump casing are shaped to form a diffuser which assists in converting the kinetic energy (or velocity) of the water leaving the propeller into potential energy (or pressure) at the discharge.

The guide vanes are held in place by stationary sleeve "18". To prevent possible rotation of the guide vanes, key "8" on the casing and a keyway on the rim of the guide vanes are provided.

Two rubber lined, water lubricated steady bearings "6" and "26" are provided. Approximately 3 GPM of filtered water at 5# gauge pressure must be supplied for these bearings at the 3/4" pipe connection. These bearings are held in place by set screws and can be removed readily when the pump is dismantled. Renewable sleeves on the shaft are provided at the lower and upper bearings, the one at the latter extending up through the gland box. These sleeves are shrunk on and are also held in place by set screws.

Leakage at the upper end of the pump shaft is eliminated by a water sealed packed gland. Approximately 2 GPM of filtered water at 5# gauge pressure must be supplied for this gland at the 3/4" pipe connection.

A non-reversing mechanism, consisting of major items "36" to "40" inclusive, is provided to prevent the water from reversing the direction of rotation of the unit if its motor should trip out. This mechanism includes a band brake which acts on the periphery of the coupling hubs. The ends of brake band "37" are attached to the lever "38" which is fulcrumed with unequal lever arms. When the solenoid mechanism "36" releases the pull on this lever "38" the band grips the hubs due to the action of spring "40" and thus the rotation is stopped and reverse rotation is prevented. For proper adjustment the necessary turnbuckle, bolt and nut are provided. All these should be adjusted so as to give minimum clearance between the band and coupling hubs under operating conditions.

In order to dismantle this unit, the following points should be noted:

1. Remove drain nipple "12" and water supply nipples "29" and "30". All these extend thru the upper casing into cover "17".
2. Attach special clamp to pump shaft a few inches above the gland box and then place blocks between this clamp and gland box.
3. Break the coupling.
4. Remove bolts from both flanges of the motor support and then remove the motor and motor support.
5. Lift out entire rotating element including cover "17". (When re-assembling care should be taken to have the keyway in the rim of the guide vanes engage key "8").

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6. With the rotating element removed from the casing the procedure for further dismantling is evident; the propeller, guide vanes, stationary sleeve, and casing cover being removable from the lower end of the shaft.

The characteristics of a propeller pump are such that the power consumption is at a minimum when the valve in the discharge line is wide open. Throttling the discharge valve increases the power consumption and therefore normally the pump should not be operated with the valve partially closed. Before starting the pump, the discharge valve should be lifted at least $1/5$ from its seat in order to prevent overloading the motor drive.

Positive pressure is required at the inlet. The prevailing water elevations are given on the pump outline drawing.

List of Parts

The following list, covering major parts, has been compiled to facilitate ordering repair parts by item number and name when the serial number of the pump is given:

Item No.	NAME	Item No.	NAME
1	Casing (Lower)	22	Propeller
2	Liner	23	Propeller Nut
3	Liner Screw	24	Propeller Key
4	Guide Vanes	25	Motor Support
5	Bearing Screws	26	Bearing (Upper)
6	Bearing (Lower)	27	Bearing Screw
7	Casing (Middle)	28	Deflector (Water)
8	Key (Guide Vanes)	29	Nipple (Gland Water)
9	Key Screw (Guide Vanes)	30	Nipple (Bearing Water)
10	Casing (Upper)	31	Pipe (Gland Water)
11	Manhole Cover	32	Pipe (Bearing Water)
12	Drain Nipple	33	Unions
13	Drain Nipple Washer	34	Washers
14	Gland	35	Motor
15	Gland Spacer	36	Solenoid (Non-reversing mechanism)
16	Gland Packing	37	Brake Band (Non-reversing mechanism)
17	Casing Cover	38	Lever (Non-reversing mechanism)
18	Stationary Sleeve	39	Bracket (Non-reversing mechanism)
19	Shaft	40	Spring (Non-reversing mechanism)
20	Shaft Sleeve (Lower)	41	Coupling
21	Shaft Sleeve (Upper)	42	Washer (Stationary Sleeve)

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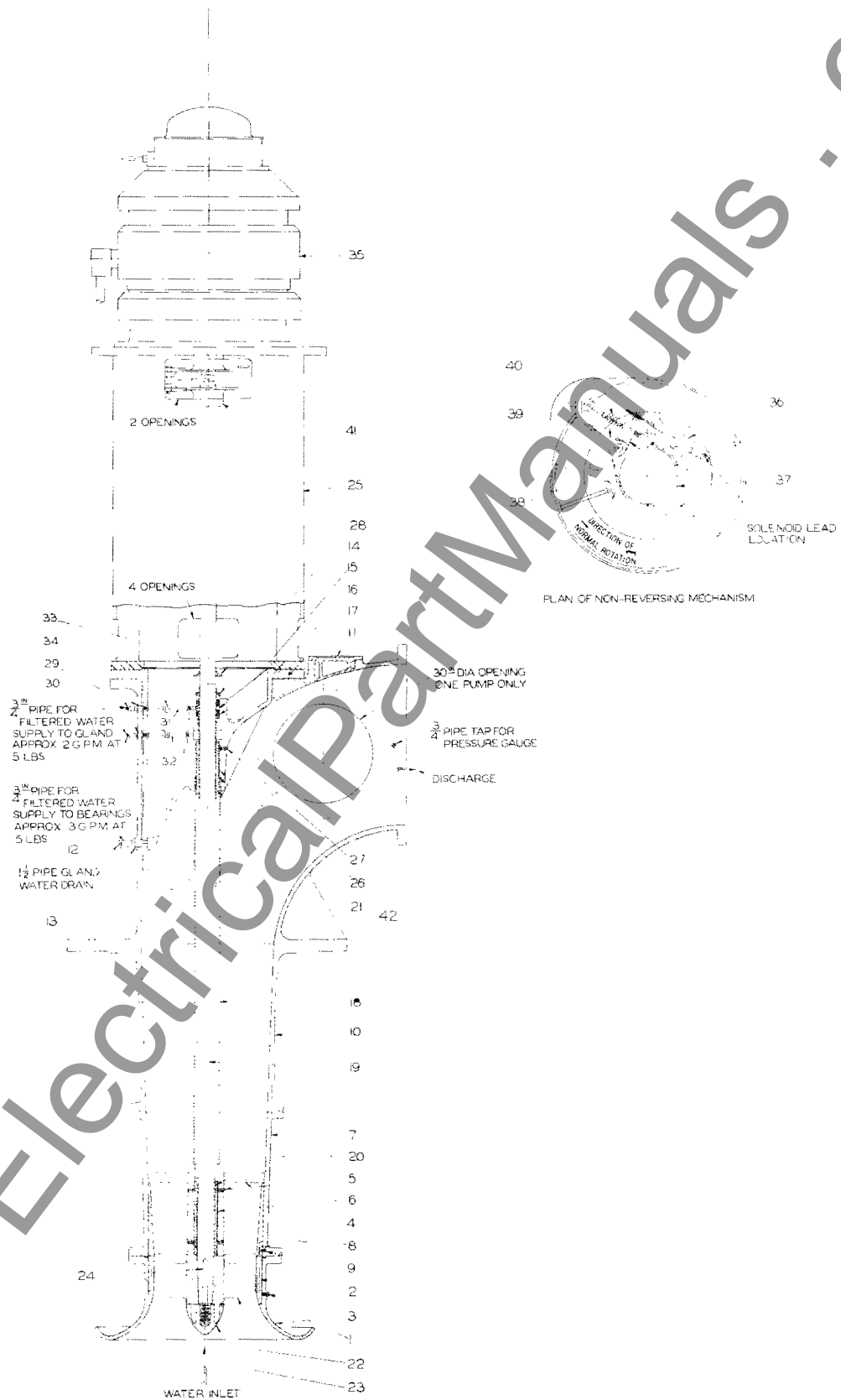


Figure 1