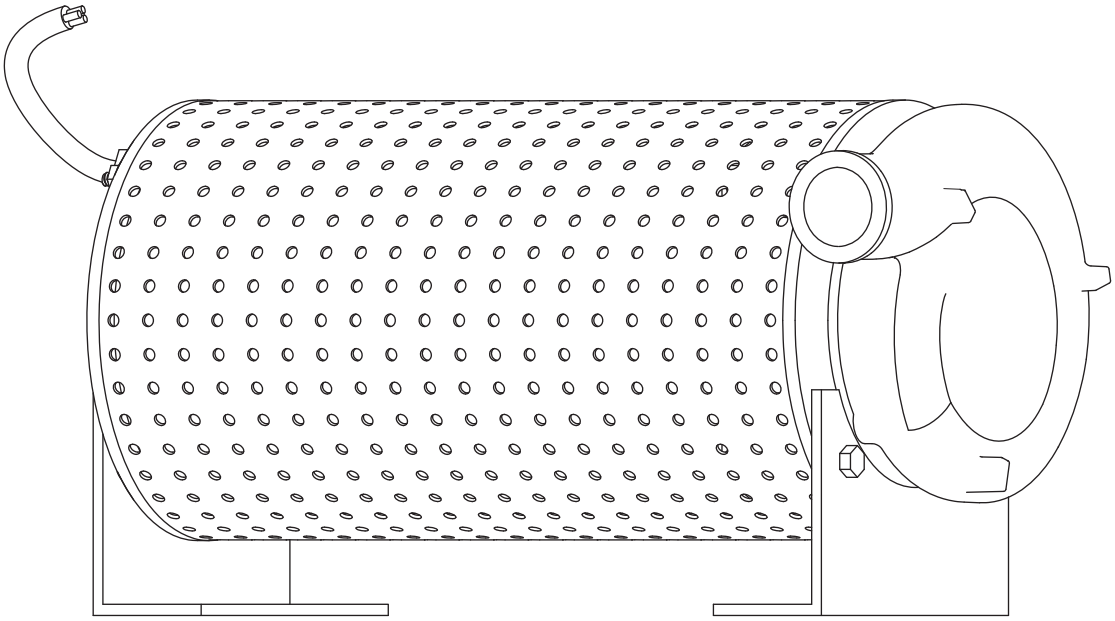
POWER-FLO
Pumps & Systems



Series: PFU31 • PFU51, PFU71 • PFU102

1/3, 1/2, 3/4 & 1HP
3450 RPM • 60 Hz
Submersible Fountain Pumps

General Safety Information

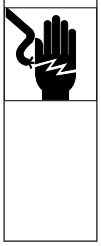
Before installation, read the following instructions carefully. Failure to follow instruction and Safety information could cause serious bodily injury, death and/or property damage. Each Power-Flo pump is individually factory tested to insure proper performance. Closely following these instructions will eliminate potential operating problems, assuring years of trouble-free service.

⚠ WARNING

- Risk of electric shock. To reduce risk of electric shock, always disconnect pump from power source before handling. Lock out power & tag.
- Installation must be in accordance with the National Electric Code and all applicable state and local codes.
- Installation and servicing is to be conducted by qualified personnel.
- These pumps are NOT to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70.
- Keep clear of suction and discharge openings. Do not insert fingers in pump with power connected.
- Always wear eye protection when working on pumps.
- **DO NOT** use power cord to lift pump. Protect cable from cuts and punctures. Do not handle power cable with wet hands.

⚠ CAUTION

- Do not us these pumps in water over 145˚F. Consult Power-Flo for high temperature pump models.
- Pumps build up heat and pressure during operation-allow time for pumps to cool before handling or servicing.



This pump is **NOT** intended for use in swimming pools or any body of water with human contact. Pumps when used as a decorative water fountain pump **MUST** be used in circuit protected by a Ground Fault Interrupter. Installations in Decoritive Fountains or Water Features provided for visual enjoyment MUST be installed per ALL State and Local codes.

- Bronze/brass fitted pumps may contain levels higher than considered safe for potable water systems. Government agencies have determined that leaded copper alloys should not be used in potable water applications.
- For cool operations the suction chamber keeps motor 2/3 submerged at all times.

POWER-FLO *Pumps & Systems*

Model No. ____ Date Code ____ Serial# ____

Voltage ____ Phase ____ Amps ____ HP ____ 60HZ

877-24PUMPS · www.powerflopumps.com

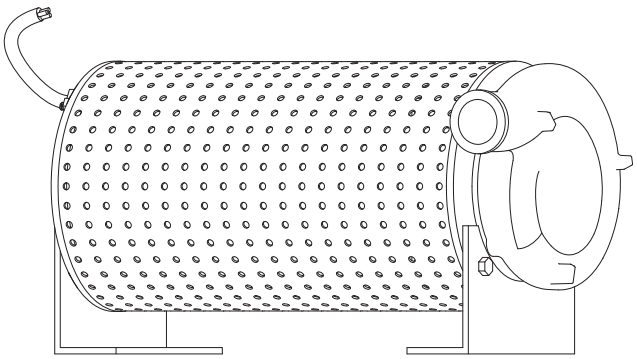
IMPORTANT!
Prior to installation, record Model Number, MFG Date, Amps, Voltage, Phase and HP, from pump name plate for future reference. Also record the Voltage and Current Readings at Startup:

1 Phase Models
Amps:
Volts:

POWER-FLO *Pumps & Systems*

Specifications

DISCHARGE	1-3/4" Hose Connection, 90° Rotation
LIQUID TEMPERATURE	145°F (63°C) Continuous
VOLUTE	Brass
INTERMEDIATE	Brass
HOUSING TUBE	304 Stainless Steel
HOUSING END PIECE	Brass
SCREEN	304 Stainless Steel
PUMP SUPPORTS	304 Stainless Steel
IMPELLER	1/3 & 1/2HP - Four Vane, Open, Brass 3/4 & 1 HP - Six Vane Open, Brass
SHAFT	416 Stainless Steel
O-RINGS	Buna-N
HARDWARE	300 Series Stainless Steel
SEAL	Single Mechanical, Carbon/Ceramic/Buna-N
POWER CORD	12 Ft.
MOTOR END BEARING	Single Row, Ball, Oil Lubricated
PUMP END BEARING	Sleeve, Oil Lubricated
MOTOR	Oil Filled, Squirrel Cage Induction, NEMA B Design, Class A Insulation
SINGLE PHASE	Permanent Split Capacitor (PSC), Includes Overload Protection in Motor



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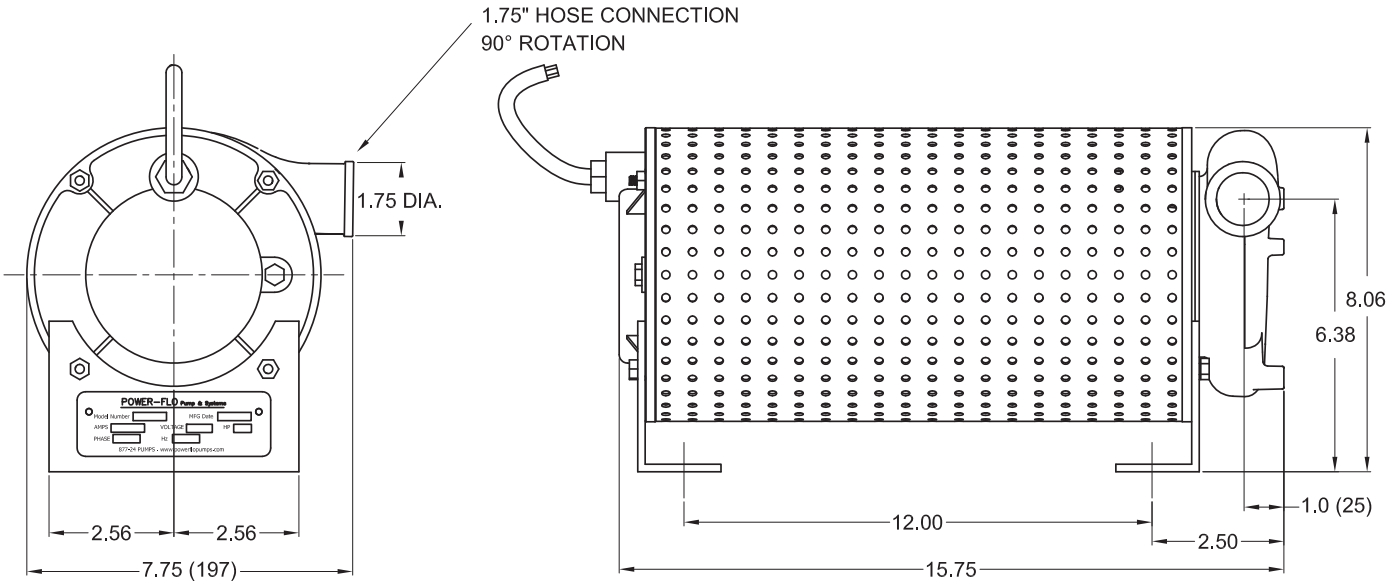
The design of the suction chamber keeps motor 2/3 submerged at all times for cool operation.

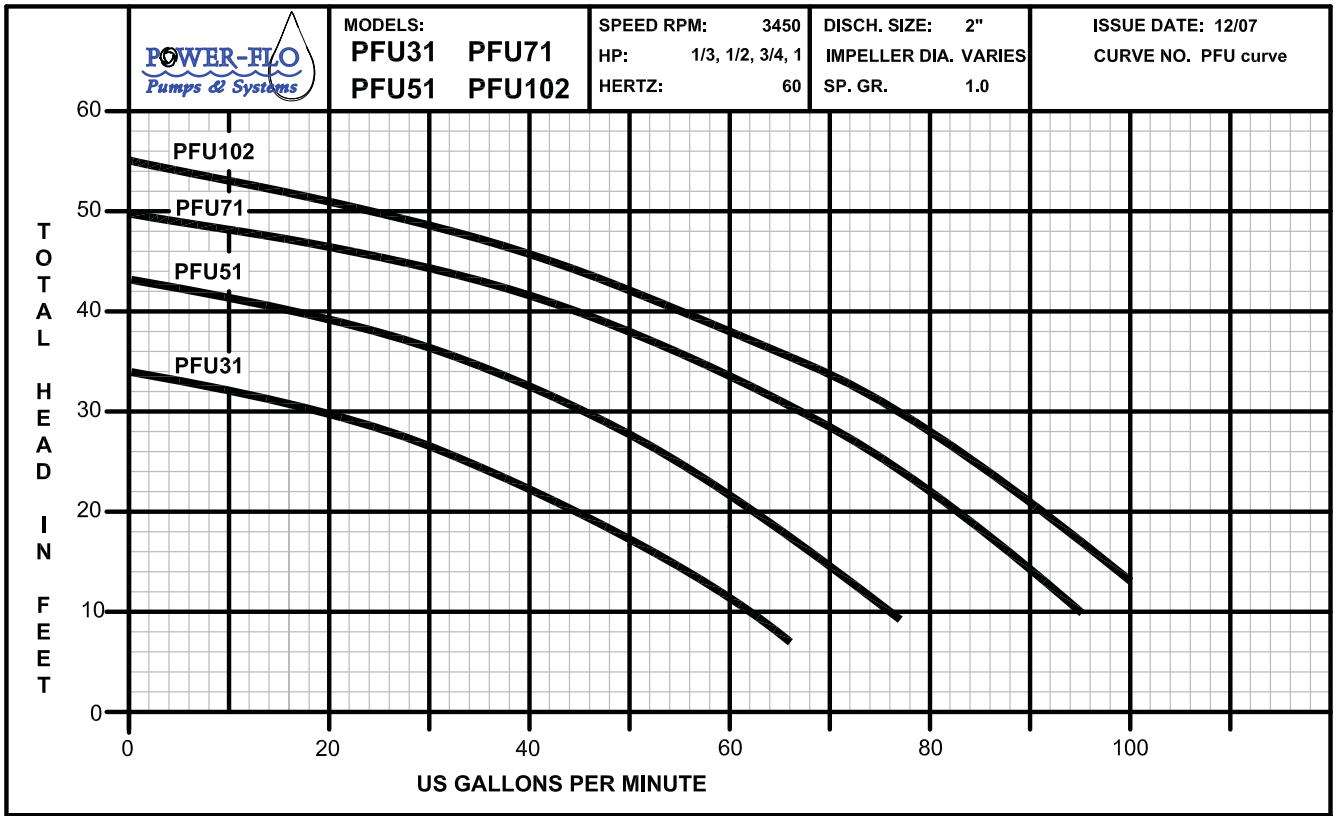
MODEL	HP	Hz	Volts/Ph	RPM	Full Load Amps	Locked Rotor Amps	NEMA Start Code	Cord Type	Cord Size	Cord O.D.
PFU31	1/3	60	115/1	3450	8.0	21.0	J	SOW	16/3	0.395
PFU51	1/2	60	115/1	3450	9.5	21.0	E	SOW	16/3	0.395
PFU71	3/4	60	115/1	3450	12.0	28.0	D	SOW	16/3	0.395
PFU102	1	60	230/1	3450	7.0	21.0	E	SOW	16/3	0.395

Winding resistance ± 5% at terminal block. Rated operation at ± 10% voltage at motor

Dimensions



Performance



Receiving Inspection

Upon receiving the pump, it should be inspected for damage or shortages. If damage has occurred, file a claim immediately with the company that delivered the pump. If the manual is removed from the packaging, do not lose or misplace.

Storage

Any product that is stored for a period longer than six (6) months from the date of purchase should be bench tested prior to installation. A bench test consists of, checking the impeller to assure it is free turning and a run test to assure the motor (and switch if provided) operate properly. Do not pump out of liquid.

Location

The design of these pumps allow for use in decorative water displays. These pumps should be set in the bottom of a pit in the horizontal position to insure submergence at all times. In the horizontal position, the built-in suction trap will prevent the unit from pumping the pit dry, keeping the motor 2/3 submerded, providing adequate cooling.

Pump may be mounted in the vertical position, but could expose motor housing if water level is pumped down. This could cause the motor to overheat and trip the built-in automatic overload protector.

Discharge Piping

This is a high capacity low head pump. It is important to use as few pipe fittings as posible and of adequate size to hold pressure loss due to friction to a minimum. All models have 1-3/4 inch hose connection discharge and can be rotated in 90° increments.

WARNING ! - Disconnect power from pump before handling or servicing Injury, electrical shock or death could result. Pump MUST be grounded in accordance with the NEC or CEC and all state province, local codes and ordinances. This pump is NOT for use in swimming pools.

Electrical Connections

The PFU motor is an oil filled, single phase permanent split capacitor type with built in automatic overload protector and does not require a control box. Connect the white and black wires of the motor lead to the two line leads from the power source fused disconnect switch or breaker box. Connect the green wire to a ground. See table below for, cable sizes to reach from power souce to motor leads, and fuse sizes.

CORD & FUSE SIZES MAXIMUM CORD LENGTH IN FEET				
CORD SIZE	**1/3HP 115V FUSE: 20 AMP**	**1/2HP 115V FUSE: 25 AMP**	**3/4HP 115V FUSE: 30 AMP**	**1HP 230V FUSE: 25 AMP**
14 GA.	70	55	40	100
12 GA.	120	95	55	145
10 GA.	220	145	95	240

Power cable:

The power cable mounted to the pump must not be modified in any way except for shortening to a specific application. Any splice between the pump and the control panel must be made in accordance with the electric codes. It is recommended that a junction box, if used, be mounted outside the sump to prevent flooding. **DO NOT USE THE POWER CABLE TO LIFT PUMP.**

Overload Protection:

Single Phase - The stator in-winding overload protector used is referred to as an inherent overheating protector and operates on the combined effect of temperature and current. This means that the overload protector will trip out and shut the pump off if the windings become too hot, or the load current passing through them becomes too high.

IMPORTANT ! - The overload will then automatically reset and start the pump up after the motor cools to a safe temperature. In the event of an overload, the source of this condition should be determined and corrected immediately.

WARNING! - DO NOT LET THE PUMP CYCLE OR RUN IF AN OVERLOAD CONDITION OCCURS !

If current through the temperature sensor exceeds the values listed, an intermediate control circuit relay must be used to reduce the current or the sensor will not work properly.

TEMPERATURE SENSOR ELECTRICAL RATINGS		
Volts	Continuous Amperes	Inrush Amperes
110-120	3.00	30.0
220-240	1.50	15.0

Wire Size:

If longer power cable is required consult a qualified electrician for proper wire size.

Pre-Operation & Service

Pre-Operation

1. Check Voltage and Phase
   Compare the voltage and phase information stamped on the pump name plate.

2. **Check Pump Rotation** - Improper motor rotation can result in poor pump performance and can damage the motor and/or pump. Check rotation on three phase units by momentarily applying power and observe the "kickback". Kickback should always be in a counter-clockwise direction as viewed from motor end or opposite to impeller rotation. Incorrect rotation for Single-Phase pumps is unlikely. If the rotation is incorrect contact factory.

3. **Name Plate** - Record the information from the pump name plate to drawing in front of manual for future reference.

4. **Insulation Test** - An insulation (megger) test should be performed on the motor. Before the pump is put into service. The resistance values (ohms) as well as the voltage (volts) and current (amps) should be recorded.

Maintenance

No lubrication or maintenance is required. Perform the following checks when pump is removed from operation or when pump performance deteriorates:

a). Inspect motor chamber for oil level and contamination.
b). Inspect impeller and body for excessive build-up or clogging.
c). Inspect and clean screen if required.
d). Inspect seal for wear or leakage.

Servicing

NOTE: Item numbers in ( ) refer to Figures 3 & 4.

WARNING ! - Before any service work is done, disconnect and lock out electrical power to pump.

Cooling Oil - Anytime the pump is removed from operation, the cooling oil in the motor housing should be checked visually for oil level and contamination. To check oil, set unit upright. Remove pipe plug (32). With a flashlight, visually inspect the oil in the housing tube (27) to make sure it is clean and clear, light amber in color and free from suspended particles. Milky white oil indicates the presence of water. Oil level should be above all internal componentry.

Oil Testing

- Drain oil into a clean, dry container by placing pump on it's end, remove pipe plug (32), from housing tube (27).
- Check oil for contamination using an oil tester with a range to 30 Kilovolts breakdown.
- If oil is found to be clean and uncontaminated (measuring above 15 KV. breakdown), refill the housing.
- If oil is found to be dirty or contaminated (or measures below 15 KV. breakdown), the pump must be carefully inspected for leaks at the shaft seal (8), gland nut (17), o-rings (23), and pipe plug (32), before refilling with oil. To locate the leak, perform a pressure test.

After leak is repaired, dispose of old oil properly, and refill with new oil.

Oil Replacement - Set unit upright and (drain oil, if not already done), refill with new cooling oil as per table below.

An air space must remain in the top of the housing tube when pump is placed with volute end on bench, to compensate for oil expansion. Fill until capacitor is covered when viewing through fill plug hole. When refilling with oil after servicing the shaft seal (8), a pressure test should be preformed. If shaft seal (8) was not serviced, then apply pipe sealant and replace the pipe plug (32).

***DO NOT** overfill oil. Overfilling of housing with oil can create excessive and dangerous hydraulic pressure which can destroy the pump and create a hazard. Overfilling oil voids warranty.*

Cooling Oil Recommended Supplier/Grade	
BP	Enerpar SE100
Conoco	Pale Paraffin 22
Mobile	D.T.E. Oil Light
Shell Canada	Transformer-10
Texaco	Diala-Oil-AX

Pressure Test - Oil should be at normal level. Remove pipe plug (32) from housing end (19). Apply pipe sealant to pressure gauge assembly and tighten into hole. Pressurize housing to 6 P.S.I. Use soap solution around the sealed areas and inspect joints for "air bubbles". If, after five minutes, the pressure is still holding constant, and no "bubbles" /oil seepage is observed, slowly bleed the pressure and remove the gauge assembly. Replace pipe plug using sealant. The leek must be located and repaired if pressure does not hold.

Pressure builds up extremely fast, increase pressure by "TAPPING" air nozzle. Too much pressure will damage seal. ***DO NOT exceed 6 P.S.I.***

Disassembly & Assembly

Impeller and Volute:

Disconnect power. Disconnect discharge piping. Remove screen (14) by removing springs (33) and lifting off. Remove cap screws (29) and pull volute (1) and gasket from bearing sleeve (9). Remove set screw (3), unscrew counter-clockwise impeller (2) from motor shaft. Replace impeller if worn or pitted.

Reassemble by placing shims (5) on shaft, to ensure proper clearance between impeller (2) and bearing sleeve (9). The clearance should be approximately .03 inches. Screw impeller (2) clockwise onto shaft and place set screw (3) in place and tighten. Place gasket (30) and volute (1) onto bearing sleeve (9) and insert cap screws in place and tighten. Replace screen (14) with springs (33).

Motor & Shaft Seal:

Remove screen, volute and impeller as previously stated and drain oil from housing. Loosen gland nut (17) and slide it back on cord (18). Remove hex nuts (20) and lockwashers (21) from studs (28) and pull housing end (19) from housing tube (27). Disconnect cord set (18) and check for damage or cracks, replace if required. Remove grommet (15), friction rings (16) from housing end (19), replace if damaged. Pull housing tube (27) from bearing sleeve (9). Remove seal spacer (31) and v-ring (6) from shaft. Loosen motor screws and pull bearing sleeve (9) with shaft seal (8) from motor.

IMPORTANT that you mark location of overload in relation to bearing sleeve (9). Remove retaining ring (7) and press seal assembly (8) out of bearing sleeve. Replace complete seal if seal shows signs of uneven wear on seal faces, chips, or scratches. If replacing seal, remove stationary by prying out with flat screwdrive.

Examine o-rings (23) and replace if damaged. Check motor capacitor (12) with an Ohm meter by first grounding the capacitor by placing a screwdriver across both terminals and then removing screwdriver. Connect Ohm meter (set on high scale) to terminals. If needle moves to infinity (∞) then drifts back, the capacitor is good. If needle does not move or moves to infinity (∞) and does not drift back, replace capacitor (12). Inspect motor winding for shorts and check resistance values. Check rotor for wear. If rotor or the stator windings are defective, the complete motor must be replaced. To test the overload, check the continuity between the black and white wires.

Assemble bearing sleeve (9) onto motor (10), locating overload as noted (or at the 11 o'clock position as viewed from motor end), with the four motor bolts. Place capacitor (12) into bracket (25) if removed and secure with screw. Connect flag terminal from motor and terminal boot (13) to capacitor (12).

Place one o-ring (23) into groove on bearing sleeve (9) being careful not to damage the o-ring. Slide housing tube (27) onto bearing sleeve (9). Place o-ring (23) into groove on housing end piece (19) and place end piece onto housing tube (27). Place pump support (22) onto lower studs (28) and lockwashers (21) and hex nuts (20) onto studs and tighten.

IMPORTANT! - All parts must be clean before reassembly. Handle seal parts with extreme care. DO NOT damage lapped surfaces.

To reassemble, clean seal cavity in bearing sleeve (9) and oil. Insert seal (8) retaining ring along with spring onto motor shaft until seated.

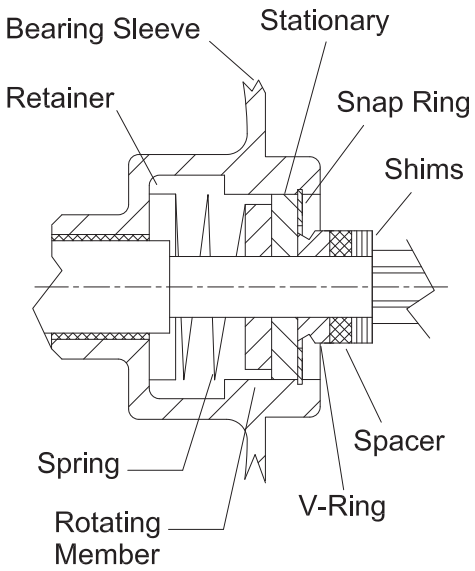


Figure 1

Lightly oil **(Do not use grease)** shaft and inner surface of rotating member and assembly tool bullet. Place the bullet tool over shaft threads and with lapped surface facing out, press rotating member with seal pusher tool onto shaft and into bearing sleeve (9) until it seats against shoulder of shaft.

Lightly oil stationary member of seal, and with lapped surface facing motor, press stationary member with seal pusher tool into bearing sleeve (9) until it seats against rotating member. Replace retaining ring (7), place v-ring (6) and seal spacer (31) onto shaft until seated. Assemble sceen, volute and impeller as described.

Service

Power Cable Connection

Place gland nut (17), one friction ring (12), grommet (15) onto cord and slide cord through housing end piece (19). Make wire connections using terminal connectors (24). Place o-ring (23) into groove on housing end piece (19) and slide end piece onto housing tube (27) being careful not to damage o-ring. Place pump support (22) onto lower studs (28) and place lockwashers (21) and hex nuts (20) onto studs and tighten. Insert grommet and friction ring into housing end piece (19). Apply pipe sealant to gland nut (17), screw into end piece and torque gland nut to 17.5 ft. lbs to prevent water leakage.

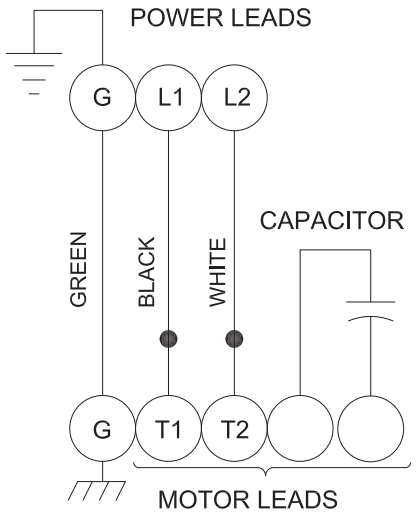


Figure 2 - 115 & 230 Volt, 1Ph	
POWER CABLE	**MOTOR LEAD**
Green (Ground)	Green
T1 - Black	Straight Connector
T2 - White	Straight Connector
Capacitor	Flag Connector
Capacitor	Flag Connector

Repair Parts

For Repair Part Please supply: Model Number and MFG Date as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

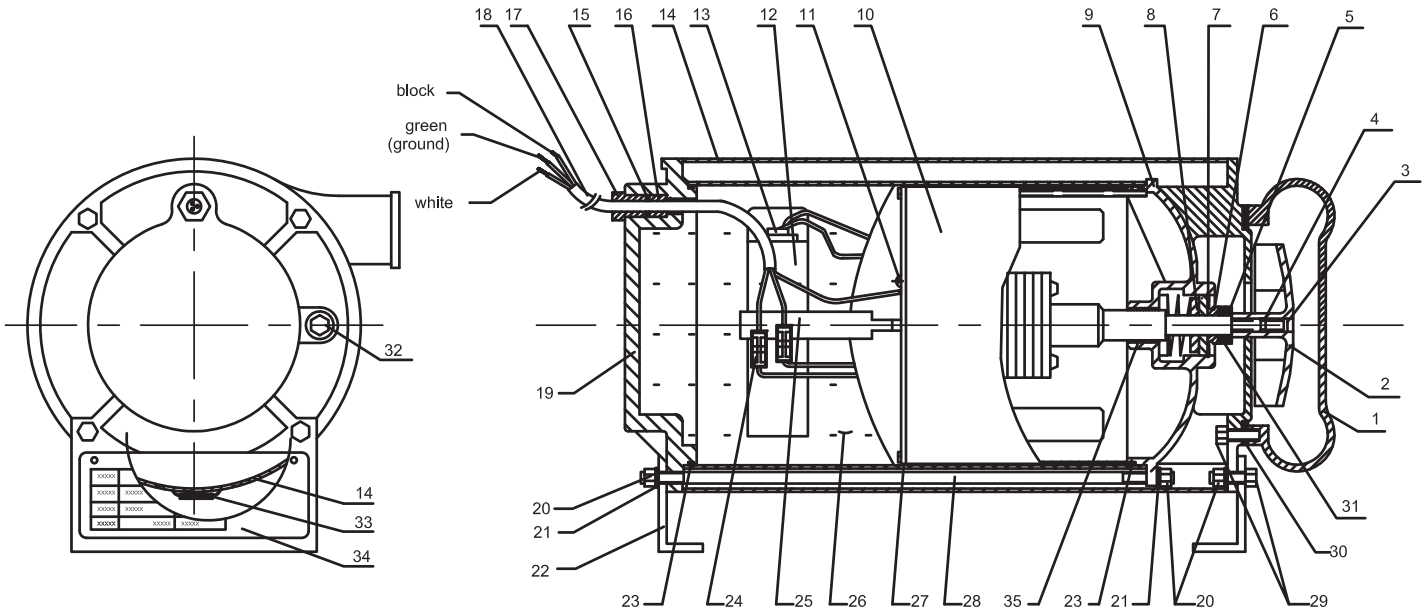


Figure 3

For Repair Part Please supply: Model Number and MFG Date as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Repair Parts

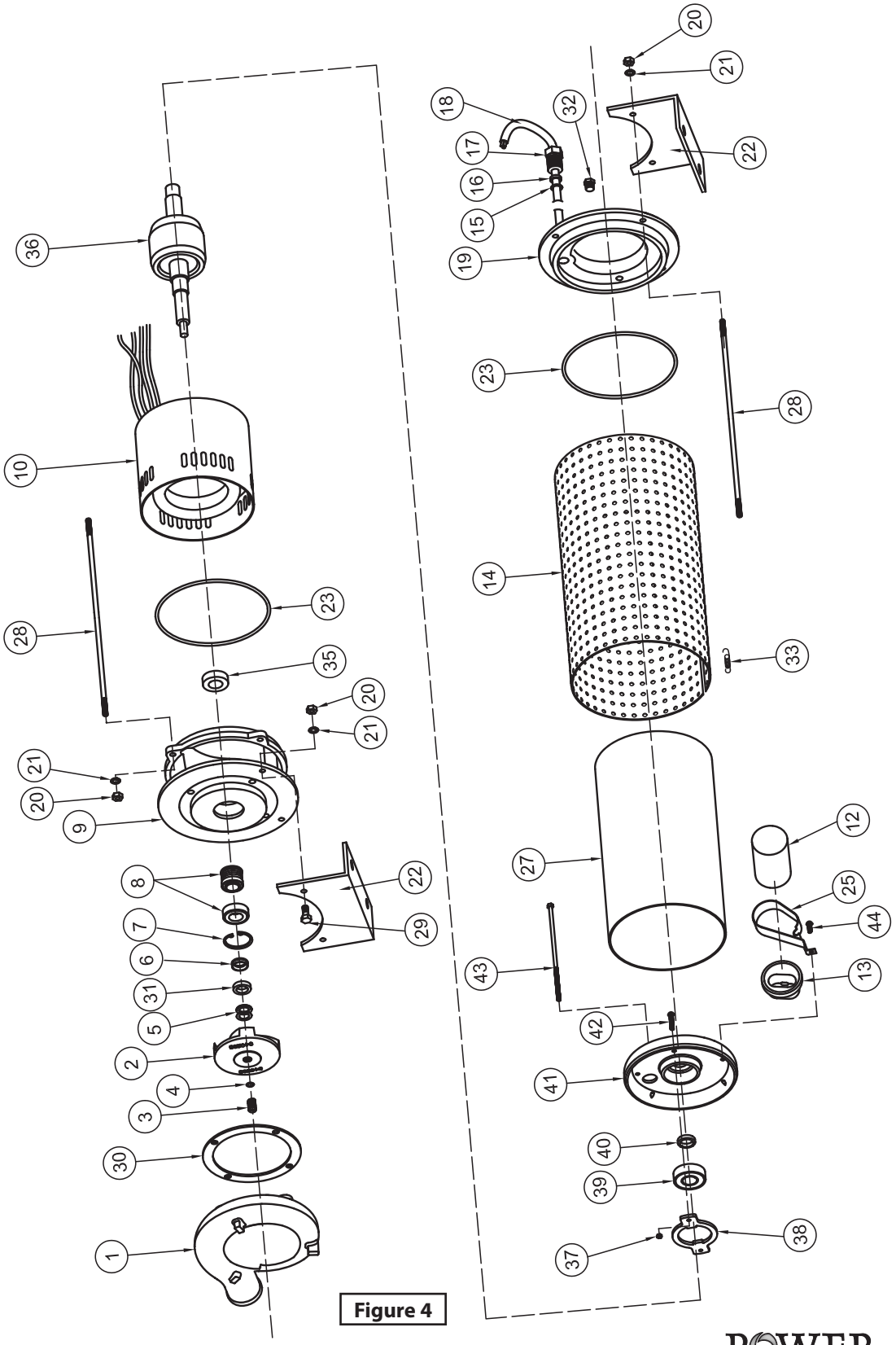


Figure 4

Parts List

For Repair Part Please supply: Model Number and MFG Date as shown on Name Plate, and Part Description and Part Number as shown on Parts List.

Ref. No.	Qty	Name	Part Numbers			
			PFU31	PFU51	PFU71	PFU102
1	1	Volute, Bronze	PF093277	PF093277	PF093277	PF093277
2	1	Impeller, Bronze	PF024331	PF024332	PF024333	PF024334
3	1	Slotted set screw 7/16-20, Stainless	PF026155	PF026155	PF026155	PF026155
4	1	Lockwasher, 7/16 Stainless	♦	♦	♦	♦
5	6	Shims, impeller, Stainless	PF24336	PF24336	PF24336	PF24336
6	1	V-ring, Buna-N	PF056789	PF056789	PF056789	PF056789
7	1	Retaining ring	PF023702	PF023702	PF023702	PF023702
8	1	Shaft Seal, Carbon/Ceramic/Buna-N	PF023701	PF023701	PF023701	PF023701
9	1	Bearing sleeve, Bronze	PF093279	PF093279	PF093279	PF093279
10	1	Motor	PF023254	PF023255	PF024308	PF023257
11	1	Self Tapping Screw, 8-32 x .31" Lg	♦	♦	♦	♦
12	1	Capacitor 20UF ±6%	PF070963	PF070963	PF070963	PF070963
13	1	Terminal Boot, Buna-N	PF034322	PF034322	PF034322	PF034322
14	1	Screen, Stainless	PF023699	PF023699	PF023699	PF023699
15	1	Grommet, Bronze	PF014896	PF014896	PF014896	PF014896
16	2	Friction ring, Plastic	PF085673	PF085673	PF085673	PF085673
17	1	Gland nut, Stainless	PF026857	PF026857	PF026857	PF026857
18	1	Cord set	PF086039	PF086039	PF086039	PF086039
19	1	Housing end, Bronze	PF026850	PF026850	PF026850	PF026850
20	10	Hex nut 1/4-20, Stainless	♦	♦	♦	♦
21	10	Lockwasher 1/4"	♦	♦	♦	♦
22	2	Pump support	PF023316	PF023316	PF023316	PF023316
23	2	O-ring, Buna-N	PF016068	PF016068	PF016068	PF016068
24	2	Terminal Connector, Plastic	PF079318	PF079318	PF079318	PF079318
25	1	Capacitor bracket, Steel	PF039858	PF039858	PF039858	PF039858
26	83.5 oz	Cooling Oil - PFU31, 1/3HP	Refer to Chart, Souce Locally			
	83.5 oz	Cooling Oil - PFU51, 1/2HP				
	79.5 oz	Cooling Oil - PFU71, 3/4HP				
	67.5 oz	Cooling Oil - PFU102, 1HP				
27	1	Housing tube, Bronze	PF088356	PF088356	PF088356	PF088356
28	4	Studs, 1/4-20 x 11.812" Lg, Stainless	PF023695	PF023695	PF023695	PF023695
29	10	Hex Hd Screws 1/4-20 x .625" Lg, SS	♦	♦	♦	♦
30	1	Gasket, Casing, Buna-N	PF024335	PF024335	PF024335	PF024335
31	1	Seal Spacer, Buna-N	PF025756	PF025756	PF025756	PF025756
32	1	Pipe Plug 1/8" NPT, Stainless	♦	♦	♦	♦
33	4	Screen Spring	PF023501	PF023501	PF023501	PF023501
34	1	Name Plate	CF	CF	CF	CF
35	1	Brass Bushing	CF	CF	CF	CF

♦ = Aquire locally
CF = Consult Factory

Trouble Shooting Chart

Risk of electric shock. Always disconnect the pump from the power source before handling inspections or repairs.

Symptom	Possible Cause(s)	Corrective Action
Pump will not run or pump fluid	1. Poor electrical connection, blown fuse, tripped breaker or other interruption of power; improper power supply 2. Defective motor 3. Insufficient liquid level 13. Debris plugging screen and suction intake	1. Check all electrical connections for security. Have electrician measure current in motor leads, if current is within ± 20% of locked rotor Amps, impeller is probably locked. If current is 0, overload may be tripped. Remove power, allow pump to cool, then re-check current. 2. Check winding insulation (Megger Test) and winding resistance. If check is outside of range, dry and re-check. If still defective, replace per service instructions. 3. Make sure liquid level is above the pump 4. Re-check all sizing calculations to determine proper pump size. 5. Check discharge line for restrictions, including ice if line passes through or into cold areas. 6. Remove and examine check valve for proper installation and freedom of operation 7. Open valve 8. Check impeller for freedom of operation, security and condition. Clean impeller cavity and inlet of any obstruction 9. Loosen union slightly to allow trapped air to escape. 10. Repair fixtures as required to eliminate leakage 11. Check pump temperature limits and fluid temperature 12. Replace portion of discharge pipe with flexible connector or tighten existing piping. 13. Check screen and/or suction inlet.
Pump hums but doesn't run	1. Incorrect low voltage 8. Impeller jammed or loose on shaft, or inlet plugged	
Pump delivers insufficient capacity	1. Incorrect low voltage 4. Ecessive inflow or pump not properly sized for application 5. Discharge restricted 6. Check valve partially closed or installed backwards 7. Shut-off valve closed 8. Impeller jammed or loose on shaft, or inlet plugged 9. Pump may be air locked causing pump not to flow 10. Piping fixtures leaking or discharge before the nozzle 13. Suction restricted	
Pump shuts off and turns on independent of switch, (trips thermal overload protector). **CAUTION!** Pump may start unexpectedly. Disconnect power supply.	1. Incorrect low voltage 4. Ecessive inflow or pump not properly sized for application 8. Impeller jammed or loose on shaft, or inlet plugged 11. Excessive water temperature	
Pump operates noisily or vibrates excessively	2. Worn bearings, motor shaft bent 8. Debris in impeller cavity or broken impeller 12. Piping attachments to building structure too loose or rigid	

NOTE: Power-Flo Pumps & Systems assumes no responsibility for damage or injury due to disassembly in the field. Disassembly of the pumps or supplied accessories other than at Power-Flo Pumps & Systems or its authorized service centers, automatically voids warranty.

LIMITED WARRANTY

Manufacturer warrants, to the immediate purchaser and subsequent initial owner during the warranty period, every new pump to be free from defects in material and workmanship under normal use and service, when properly used and maintained, for a period of eighteen (18) months from date of manufacture or twelve (12) months from date of installation (which ever comes first). The initial owner is the purchaser who first uses the pump after its initial installation, or for non-permanent installation, the first owner who uses the pump. The date of installation shall be determined by a dated sales receipt noting the model and serial number of the pump. The dated sales receipt must accompany the returned pump. Product will be repaired, replaced or remanufactured at Manufacturer's option. No allowance will be made for shipping charges, damages, labor or other charges that may occur due to product failure, repair or replacement. This warranty does not apply to and there shall be no warranty for any material or product that has been disassembled without prior approval of Manufacturer, subjected to misuse, misapplication, neglect, alteration, accident or act of God; that has not been installed, operated or maintained in accordance with Manufacturer's installation instructions; that has been exposed to outside substances including but not limited to the following: sand, gravel, cement, mud, tar, hydrocarbons, hydrocarbon derivatives (oil, gasoline, solvents, etc.), or other abrasive or corrosive substances, wash towels or feminine sanitary products, etc. in all pumping applications. The warranty set out in the paragraph above is in lieu of all other warranties expressed or implied; and we do not authorize any representative or other person to assume for us any other liability in connection with our products. Contact Manufacturer at: 1-877-24PUMPS or www.powerflopumps.com, Attention: Customer Service Department, to obtain any needed repair or replacement of part(s) or additional information pertaining to our warranty.

MANUFACTURER EXPRESSLY DISCLAIMS LIABILITY FOR SPECIAL, CONSEQUENTIAL OR INCIDENTAL DAMAGES OR BREACH OF EXPRESSED OR IMPLIED WARRANTY; AND ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND OF MERCHANTABILITY SHALL BE LIMITED TO THE DURATION OF THE EXPRESSED WARRANTY.

Some states do not allow limitations on the duration of an implied warranty, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.