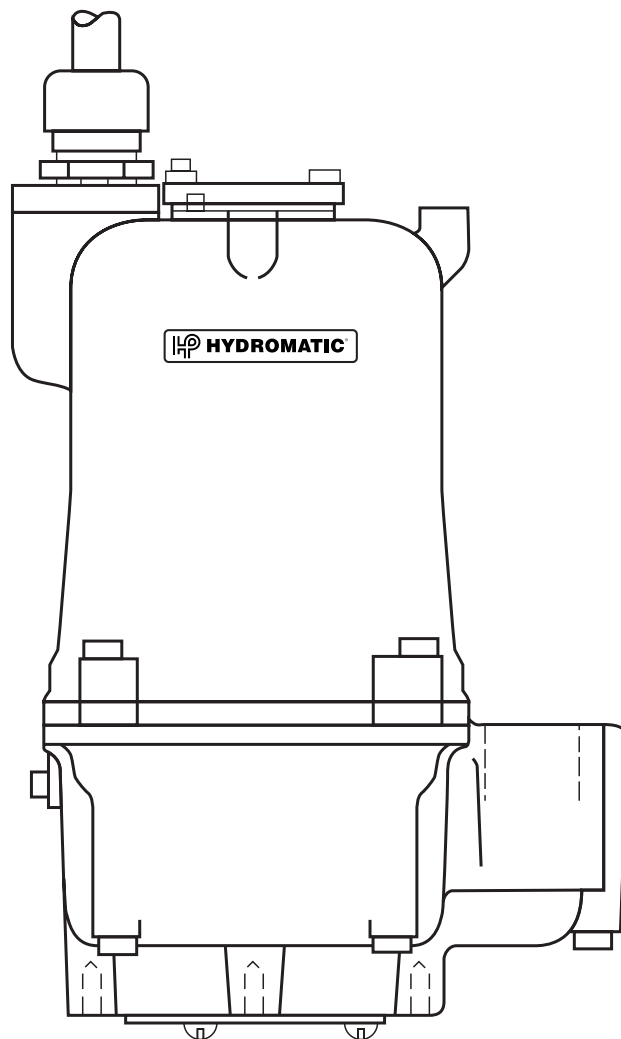




**HYDROMATIC®**



# MODEL NSPG 200 **SUBMERSIBLE GRINDER PUMP**

## **INSTALLATION AND SERVICE MANUAL**



NOTE! To the installer: Please make sure you provide this manual to the owner of the equipment or to the responsible party who maintains the system.

# General Information

## Attention:

This manual contains important information for the safe use of this product. Read this manual completely before using this product and refer to it often for continued safe product use. Reasonable care and safe methods should be practiced. Check local codes and requirements before installation.

## Unpacking Pump:

Remove pump from carton. When unpacking unit, check for concealed damage. Claims for damage must be made at the receiving end through the delivery carrier. Damage cannot be processed from the factory.

**WARNING:** Before handling these pumps and controls, always disconnect the power first. Do not smoke or use sparkable electrical devices or flames in a septic (gaseous) or possible septic sump.

## CALIFORNIA PROPOSITION 65 WARNING:

**▲ WARNING** This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

# Pump Information

## Pump Description:

The Hydromatic® pumps covered by these instructions are submersible grinder pumps.

The cutter blades are on the suction side of the centrifugal pump impeller and discharge directly into the inlet of the impeller. The integral stainless steel pump-motor shaft is sealed

by two mechanical seals with an oil chamber between the seals to provide lubrication for both seal faces.

A radial sleeve bearing, lubricated by the oil in the seal chamber, is located between the seals and takes the radial load from the pump impeller and cutter blades.

The motor winding, rotor and ball thrust bearing are mounted in a housing sealed and filled with oil to lubricate the bearing and transmit the heat from motor winding to outer shell. The ball thrust bearing is held in a movable cap so that the axial cutter and cutter ring clearance can be adjusted from the outside without the use of shims.

The power cord is sealed into the motor housing with a cord grip, and the individual conductors are sealed into the cord cap with epoxy sealing compound.

## Application:

These pumps are designed for either home or industrial sewage discharge applications with a pH ranging from 6 to 9, specific gravities from 0.9 to 1.1, viscosities ranging from 28 to 35 S.S.U., and temperatures up to 140°F.

## Codes:

All local wiring codes must be observed. Consult the local inspector before installation to avoid costly delays that can occur due to rejection after job is finished.

# Installation Instructions

## Location:

If pumps are installed in an existing basin or concrete sump, the piping can either be connected permanently or rails and brackets

can be furnished for mounting to walls of basin. In either case, be sure that the Hydromatic solids handling check valve is used and that the pumps are submerged in a vertical position. The complete factory built packaged system is recommended for the most satisfactory installation and generally for the lowest cost where expensive installation labor is involved.

## Electrical Connections:

Make all connections from motor to control panel to comply with local codes.

**CAUTION:** Be sure ground wire is connected to a good ground such as a water pipe. This is important for safety.

# Pump Operations

## Starting the Pump:

To start the pump, perform the following steps in order:

1. If pump is three phase, the rotation of the impeller must first be checked. Lift pump from sump, lay it down and quickly turn pump on and then off. The impeller should turn counterclockwise when viewed from the suction. If rotation is wrong, turn off main breaker and interchange any two line leads to motor to correct rotation. If the pump is piped-in permanently and inlet cannot be observed, rotation will have to be checked by pump operation described later. If pump is single phase, no rotation check is necessary.
2. Run water into sump until motor is covered.

3. Open gate valve in discharge line.
4. Turn pump on. If pump runs and sump liquid does not pump down, stop pump and close discharge gate valve. Then lift pump until sealing flange is open to vent off trapped air. Lower pump, open discharge valve and start the pump again. If the pump is piped in permanently, it may be necessary to break union at pump discharge to clear air.
5. If pump is three phase, piped-in permanently, and still does not operate properly after venting, rotation is wrong and can be reversed by interchanging any two line leads.
6. Level controls should be set so that pump turns off when level is about 2 inches above inlet and turns on when level is about 2 inches above motor.

## Pump Maintenance

### Axial Cutter Adjustment:

To maintain the proper face clearance between the axial cutter and the cutter ring, follow this procedure:

1. Close gate valve at pump discharge.
2. Turn off circuit breaker.

**CAUTION:** Never work on pump unless power has been turned off.

3. Remove pump from sump.
4. Loosen jam nuts on set screws located on top of bearing housing.

5. Loosen set screws.
6. Tighten hex head capscrews until axial cutter just drags on cutter ring when radial cutter is turned by hand.
7. Back off on hex screws 1/8 turn.
8. Tighten setscrews to lift axial cutter for proper face clearance.
9. Tighten jam nuts on setscrews.
10. Again, turn radial cutter by hand to determine if shaft has any drag.
11. If there is still some drag, repeat above steps and back off hex screws further.

**IMPORTANT:** Be sure that both hex screws are tightened or loosened the same amount and that the setscrews are tight against the motor housing. Also, remember that the setscrews increase the clearance while the hex screws decrease the clearance.

### Replacing Grinder Parts:

1. Close gate valve at pump discharge.
2. Turn off circuit breaker.
3. Remove pump from sump.
4. Unscrew capscrews and remove cutter ring retainer.
5. Unscrew hex head capscrews and remove volute case. Cutter ring can now be removed from volute. Keep both shims for reassembly as necessary.
6. Radial cutter and axial cutter are now exposed. If checking for clogging, these parts can now be cleaned without removing them from the shaft.

7. If necessary to replace cutters, remove capscrew, washer and radial cutter from shaft. Radial cutter and impeller are screwed onto shaft. The thread is right-hand. Tap radial cutter with plastic hammer if necessary to loosen. Axial cutter lifts off impeller and is held from rotating by pin. Unscrew impeller from shaft in the same manner as radial cutter, and remove washer.
8. Clean all parts thoroughly before proceeding with the assembly. Make sure spring pin is inserted into impeller. Replace case but do not replace grinder ring at this point.
9. Loosen hex head capscrews 1/2 turn. Replace shims and cutter ring and cutter retainer ring. Now repeat steps 4 through 11 under Axial Cutter Adjustment. It may be necessary to loosen hex head capscrews in pump case and tap with a hammer to get proper clearance on O.D. of radial cutter.
10. Plug pump into power and operate for a few seconds only to be sure parts are not rubbing.

### Replacing Seals:

1. Remove pipe plug from top of motor and from seal chamber and drain out all oil. The lower pipe plug drains the seal housing while the other drains the motor housing. Check for water in the oil drained from motor chamber. If there is some water in this oil, the

pump must be completely dismantled and the stator dried out or replaced if the resistance to ground is less than 500,000 ohms after drying. A hypot check of 1500 volts for 230 volt motors and 2000 volts for 460 volt motors should be performed.

2. Remove cutters, impeller and pump parts as described above under Replacing Grinder Parts.
3. Remove socket head capscrew in seal plate and screw two of the screws into the tapped back-off holes to force seal plate from seal housing. Pulling this plate off will also force lower seal from shaft. Remove lower seal from seal plate.
4. Remove snap ring and pull upper seal from shaft. It may be necessary to use packing hooks to remove seal. Use a screwdriver to break the upper stationary ceramic seal ring so that it can be removed easily.

**CAUTION:** Do not use any old seal parts. Replace all parts with new pieces. Mixing old parts with new parts will cause immediate seal failure.

5. When cleaning all parts before replacement, check to be sure sleeve bearing or shaft is not worn. Be sure all O-rings are in excellent condition without cuts or nicks, and replace them if not in excellent condition. Use O-ring lube to prevent cutting at assembly.

6. Refill seal chamber and motor chamber with oil. Lay pump on side to fill seal chamber. Do not fill completely; allow about 1/2 inch below fill plug so that there will be an air space for expansion. Set pump upright and replace the upper drain plug in the side before filling motor chamber. Again fill so that oil level is just over the top of winding to allow air space for expansion.
7. Use only Hydromatic submersible oil in motor chamber and seal chamber. In an emergency, a high grade transformer oil can be used.

#### **Replacing Motor Stator:**

1. If necessary to replace stator, completely dismantle pump as described above.
2. Remove bearing housing and shaft rotor assembly. When cap and rotor are removed, motor leads can be disconnected through the bearing cap bore. The leads are connected with twist-on wire nuts. Do not tape leads when replacing stator as oil will deteriorate the tape and cause motor failure. Use only twist on wire nuts.
3. If cord leads are burned, it may be necessary to replace power cord and cord grip assembly.
4. Remove motor housing bolts and lift off housing.
5. Remove stator screws and set housing on hardwood blocks. Bump housing up and down

on hardwood block to loosen stator which should drop out.

6. Thoroughly clean housing and other parts and install new stator.
7. Connect leads through housing bore and tuck leads back behind the stator windings to prevent rubbing on rotor. Use only twist-on wire nuts to connect wires.
8. If the ball bearing is rusted or feels rough when turned, it should be replaced. Remove hex head capscrews, lockwashers, retainer plate and pull the bearing and rotor assembly from the bearing cap. Remove hex head capscrew and washer and press the bearing off the shaft. Install the new bearing by pressing on inner face only. Pressing on the outer face will ruin the bearing.
9. In reassembly replace any O-rings that are defective. Use Parker O-ring Lube on all O-rings for easy assembly and to prevent cutting.
10. Completely reassemble and fill with oil.
11. Always run pump for a few seconds after assembly work to be sure all parts run smoothly and are correctly adjusted before replacing in sump. Check again for correct rotation. Pump should rotate counterclockwise when viewed from the suction.

NOTE: When applying power, be sure the pump is restrained from turning by holding the pump at the motor housing, or by clamping it in a holding fixture.

CAUTION: Always keep hands away from the pump cutter area after the circuit breaker is reconnected.

## Pump Troubleshooting

Below is a list of troubles and their probable causes.

### No liquid delivered.

1. Pump air bound
2. Discharge head too high
3. Pump or piping plugged
4. Wrong rotation
5. Speed too low

### Insufficient liquid delivered.

1. Discharge head too high
2. Impeller or cutters partially plugged or damaged
3. Wrong rotation
4. Incorrect diameter impeller
5. Speed too low

### Insufficient discharge pressure.

1. Wrong rotation
2. Air or gases in liquid
3. Impeller damages
4. Incorrect impeller diameter
5. Speed too low

### Pump overloads motor.

1. Wrong rotation
2. Specific gravity or viscosity of liquid too high
3. Speed too high
4. Head lower than rating, pumping too much liquid

5. Pump clogged
6. Defective bearings
7. Defective impeller

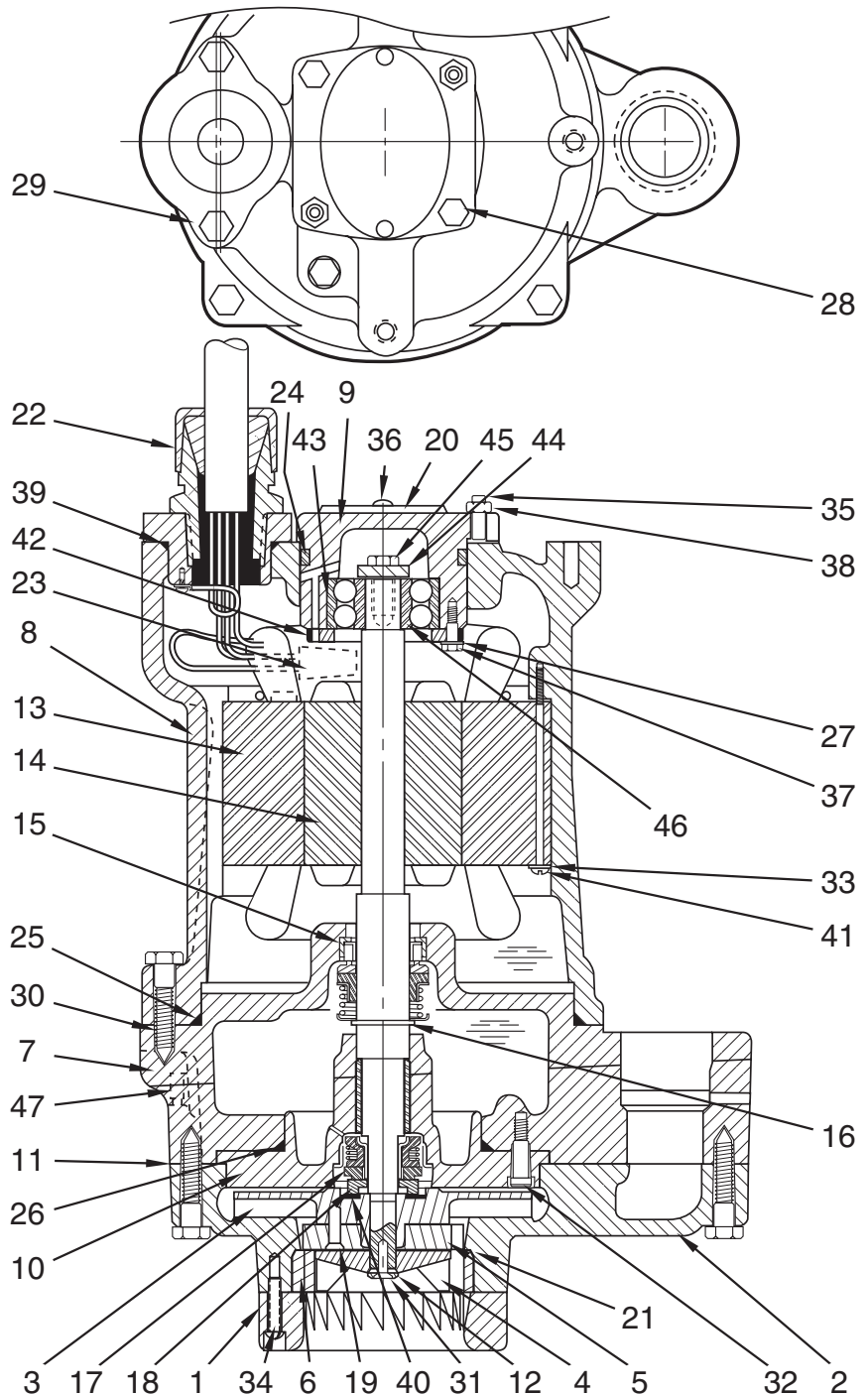
### Pump is noisy.

1. Defective bearings
2. No axial clearance between impeller and volute
3. No axial clearance between cutter ring and axial cutter
4. No diametral clearance between radial cutter and cutter ring

If the cause of the trouble cannot be determined and corrected as outlined above, contact your nearest factory representative.

# NSPG 200 Parts List

Item No.	Eng. No.	Part Description	Qty.
1	054010102	Head -- Suction	1
2	054020112	Volute	1
3	070330122	Impeller	1
4	054050025	Cutter, Lower Radial	1
5	055060012	Cutter, Upper Axial	1
6	054070012	Cutter Ring, Stationary	1
7	054080102	Seal Housing	1
8	054090122	Motor Housing, GE Motor	1
	054090142	Motor Housing, Emerson Motor	1
9	054100112	Bearing Cap, GE Motor	1
	054100132	Bearing Cap, Emerson Motor	1
10	054040105	Seal Plate and Lower Bearing	1
11	054130011	Gasket	1
12	055700031	Impeller Washer	1
13	21573C104	Stator 1/200 Volt GE	1
	21573C100	Stator 1/230 Volt GE	1
	21573C101	Stator 3/200 Volt GE	1
	21573C102	Stator 3/230/460 Volt GE	1
	21573C103	Stator 3/575 Volt GE	1
14		Rotor and Shaft w/Bearing	
	108320175	1-Phase GE	1
	108230225	3-Phase GE	1
15	003000001	Upper Shaft Seal	1
16	009750021	Snap Ring	1
17	049170011	Lower Seal, Rotating	1
18	049180011	Lower Seal Seat	1
19	064200001	Pin	1
20	134250741	Nameplate	1
21	131880001	Shim .005"	AR
22	064210065	Cord Cap Assy, 25' Single	1
23	000730011	Wire Connector, All 1-Phase and 200/575 Volt 3-Phase	3
	000730011	230 Volt 3-Phase	4
	000730011	460 Volt 3-Phase	6
24	001500081	O-ring, GE Motor	1
	001500461	O-ring, Emerson Motor	1
25	05876A120	O-ring	1
26	001500291	O-ring	1
27	000190011	Screw	4
28	005170111	Capscrew	2
29	001010201	Capscrew	2
30	001010191	Capscrew	9
31	011300081	Impeller Screw	1
32	005170091	Socket Head Screw	3
33	000250091	Stator Screw, GE Motor	4
	000250081	Stator Screw, Emerson Motor	4
34	000300131	Machine Screw	3
35	001140061	Hex Nut	2
36	045800011	Drive Screw	2
37	001770021	Lockwasher	4
38	000130071	Adjustment Screw	2
39	008340151	O-ring	1
40	001560291	Flat Washer	1
41	05454A009	Lock Washer	4
42	054140003	Brg Retainer Plate	1
43	071670011	Bearing	1
44	001560221	Flat Washer	1
45	19100A004	Capscrew	1
46	001560121	Flat Washer	1
47	001190081	Pipe Plug	2
	517000597	Seal Kit	1
	24709110000	Paraffinic Oil	



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## STANDARD LIMITED WARRANTY

Pentair Hydromatic® warrants its products against defects in material and workmanship for a period of 12 months from the date of shipment from Pentair Hydromatic or 18 months from the manufacturing date, whichever occurs first – provided that such products are used in compliance with the requirements of the Pentair Hydromatic catalog and technical manuals for use in pumping raw sewage, municipal wastewater or similar, abrasive-free, noncorrosive liquids.

During the warranty period and subject to the conditions set forth, Pentair Hydromatic, at its discretion, will repair or replace to the original user, the parts that prove defective in materials and workmanship. Pentair Hydromatic reserves the right to change or improve its products or any portions thereof without being obligated to provide such a change or improvement for prior sold and/or shipped units.

Start-up reports and electrical schematics may be required to support warranty claims. Submit at the time of start up through the Pentair Hydromatic website: <http://forms.pentairliterature.com/startupform/startupform.asp?type=h>. Warranty is effective only if Pentair Hydromatic authorized control panels are used. All seal fail and heat sensing devices must be hooked up, functional and monitored or this warranty will be void. Pentair Hydromatic will cover only the lower seal and labor thereof for all dual seal pumps. Under no circumstance will Pentair Hydromatic be responsible for the cost of field labor, travel expenses, rented equipment, removal/reinstallation costs or freight expenses to and from the factory or an authorized Pentair Hydromatic service facility.

This limited warranty will not apply: (a) to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with the printed instructions provided; (b) to failures resulting from abuse, accident or negligence; (c) to normal maintenance services and parts used in connection with such service; (d) to units that are not installed in accordance with applicable local codes, ordinances and good trade practices; (e) if the unit is moved from its original installation location; (f) if unit is used for purposes other than for what it is designed and manufactured; (g) to any unit that has been repaired or altered by anyone other than Pentair Hydromatic or an authorized Pentair Hydromatic service provider; (h) to any unit that has been repaired using non factory specified/OEM parts.

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