NOTICE TO INSTALLER: Instructions must remain with installation.

FM2102
1207
Supersedes
1107

"Quality Pumps Since 1939"

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

MAIL TO: *P.O. BOX 16347 • Louisville, KY 40256-0347*
SHIP TO: *3649 Cane Run Road • Louisville, KY 40211-1961*
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

visit our web site:
www.zoeller.com

ZOELLER ON-SITE WASTEWATER PRODUCTS

OWNER'S MANUAL

Effluent Turbine Submersible Pumps

Congratulations on the purchase of the Zoeller Effluent Turbine Submersible Pump. For over sixty years the name Zoeller has represented the standard for submersible sump and sewage pumps. The same high quality workmanship and easy maintenance design has been incorporated into this line of on-site wastewater products. This Zoeller system will provide years of trouble-free service when installed according to the manufacturer recommendations.

This manual incorporates the installation, operation, maintenance, and service instructions into one document to aid in the ownership of a Zoeller on-site wastewater product. Please read and review this manual before installing the product. Many items contained within, when followed correctly, will not only ensure a long and problem-free life for the system, but also save time and money during installation. Should further assistance be necessary please call our Technical Service department at 1-800-928-PUMP.

Table of Contents

Safety Instructions 1
Limited Warranty 2
Preinstallation Information 2
Pump Performance Data 3-4
Electrical Data 5
Major Components 5
Pump Installation and Wiring Diagram 6
System Wiring Instructions 6
Splicing Underground Wires 7
Start-up and Maintenance 7
Troubleshooting & Service Checklist 7
Typical Installations 8

Owner's Information

Model Number: _____ **Date Code:** _____

Job Name: _____

Dealer: _____

Date of Purchase: _____

Contractor: _____

Date of Installation: _____

System Readings During Operation: Voltage _____ **Amps** _____

Safety Instructions

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.



This is a **SAFETY ALERT SYMBOL.**
When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

⚠ DANGER — Warns of hazards that **WILL** cause serious personal injury, death or major property damage.

⚠ WARNING — Warns of hazards that **CAN** cause serious personal injury, death or major property damage.

⚠ CAUTION — Warns of hazards that **CAN** cause personal injury or property damage.

⚠ NOTICE — Indicates special instructions which are very important and must be followed.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

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Limited Warranty

Manufacturer warrants, to the purchaser and subsequent owner during the warranty period, every new product to be free from defects in material and workmanship under normal use and service, when properly used and maintained, for a period of one year from date of purchase by the end user, or 18 months from date of original manufacture of the product, whichever comes first. Parts that fail within the warranty period, one year from date of purchase by the end user, or 18 months from the date of original manufacture of the product, whichever comes first, that inspections determine to be defective in material or workmanship, will be repaired, replaced or remanufactured at Manufacturer's option, provided however, that by so doing we will not be obligated to replace an entire assembly, the entire mechanism or the complete unit. 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 applications other than in raw sewage 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, 3649 Cane Run Road, Louisville, Kentucky 40211, 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.

Preinstallation Information

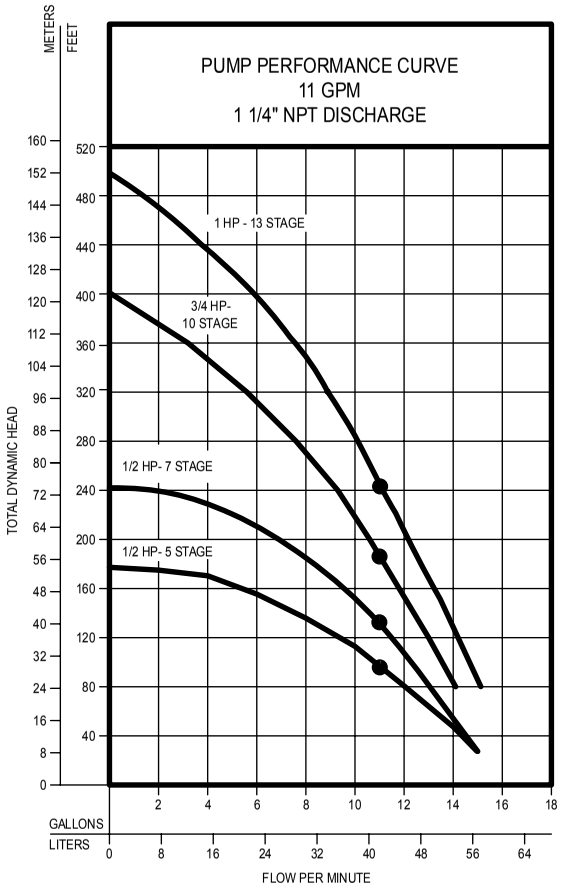
1. **Inspect your unit.** Occasionally, products are damaged during shipment. If the unit is damaged, contact your dealer before using.
2. **Carefully read the literature** provided to familiarize yourself with specific details regarding installation and use. These materials should be retained for future reference.
3.  ⚠ WARNING **"Risk of electrical shock"** Do not remove power supply cord and strain relief or connect conduit directly to the pump. Installation and checking of electrical circuits and hardware should be performed by a qualified and licensed electrician.
4.  ⚠ WARNING Do not lift, carry, or hang pump by the electrical cables. Damage to the electrical cables can cause shock, burns or death.
5.  ⚠ WARNING **For your protection, make certain the pump ground wire is properly connected to the ground wire with the incoming power line.** Test for ground at the junction box using an Underwriters Laboratory listed circuit analyzer which will indicate if the power, neutral and ground wires are correctly connected. If in doubt, call a qualified licensed electrician.
6.  ⚠ WARNING Make certain that the receptacle is within the reach of the pump's power supply cord. **DO NOT USE AN EXTENSION CORD.** Extension cords that are too long or too light do not deliver sufficient voltage to the pump motor. But, more important, they could present a safety hazard if the insulation were to become damaged or the connection end were to get wet.
7.  ⚠ WARNING **Make sure the pump electrical supply circuit is equipped with fuses or circuit breakers of proper capacity.** A separate branch circuit is recommended, and sized according to the "National Electrical Code" for the current shown on the pump nameplate.
8. ⚠ WARNING **DO NOT** run the pump dry. **DO NOT** run the pump with a completely closed discharge. **DO NOT** pump chemical or corrosive liquids. Failure to follow above warnings could result in damage to the pump, voiding the warranty and causing personal injury.
9. ⚠ CAUTION Check to be sure your power source is capable of handling the voltage requirements of the motor, as indicated on the pump nameplate.
10. The installation of pumps using auxiliary variable level float switches is the responsibility of the installing party. Care should be taken such that the tethered float switch will not hang up and are secured so that the pump will turn on and off properly.
11. ⚠ CAUTION Water hammer creates momentary high pressure surges. These surges can cause severe damage to check valves and the piping system. Consideration for water hammer must be included in the piping system design. Reference ASPE Data Book, Chapter 2.33. Some systems may require external spring or lever weighted check valves or other engineered solutions.
12. ⚠ CAUTION In cold climates the discharge pipe may be subject to freezing. If the riser on the septic tank is above the frost line, it will be necessary to protect the system from freeze up. The discharge pipe can be insulated or the check valve can be removed. If the check valve is removed, the "on-off" cycle must be adjusted for any back-flow from the discharge line.
13. ⚠ WARNING According to the state of California (Prop 65), this product contains chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

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Pump Performance Data

TOTAL DYNAMIC HEAD/FLOW
PER MINUTE EFFLUENT

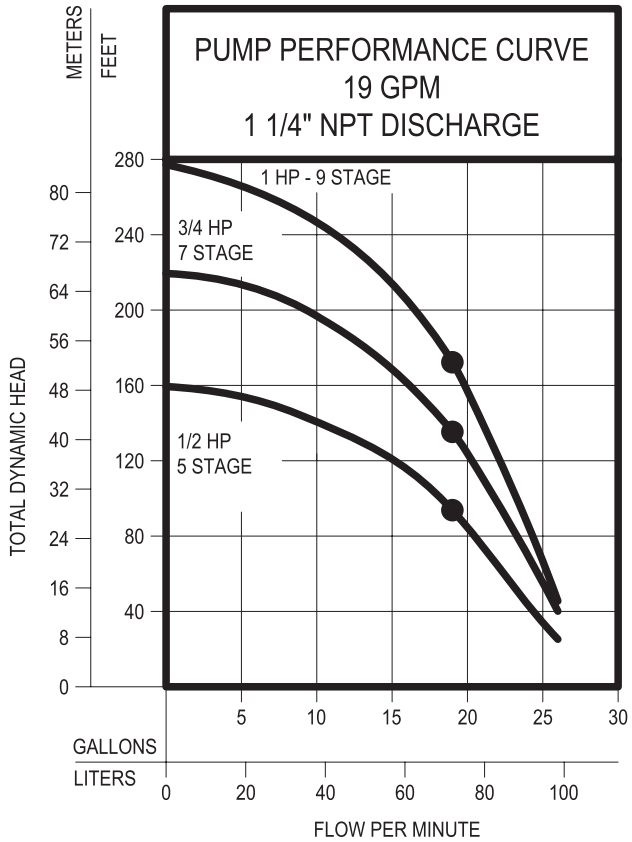
MODEL		1/2 HP 5 STAGE		1/2 HP 7 STAGE		3/4 HP 10 STAGE		1 HP 13 STAGE	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters	Gal.	Liters
40	12.2	14.4	54.5	14.5	54.9	-	-	-	-
80	24.4	12.1	45.8	13.1	49.6	14.1	53.4	14.6	55.3
120	36.6	9.4	35.6	11.6	43.9	13.0	49.2	13.7	51.9
160	48.8	5.5	20.8	9.6	36.3	11.8	44.7	12.8	48.5
200	61	--	--	7.1	26.9	10.6	40.1	12.0	45.4
240	73.2	--	--	2.0	7.6	9.3	35.2	11.0	41.6
280	85.3	--	--	--	--	7.6	28.8	9.9	37.5
320	97.5	--	--	--	--	5.6	21.2	8.7	32.9
360	109.7	--	--	--	--	3.2	12.1	7.3	27.6
400	121.9	--	--	--	--	–	–	5.6	21.2
440	134.1	--	--	--	--	–	–	3.7	14.0
480	146.3	--	--	--	--	–	–	1.8	6.8
Shut-off Head:		177 ft. (54.0m)		241 ft. (73.6m)		401 ft. (122.2m)		504 ft. (153.6m)	



015413

TOTAL DYNAMIC HEAD/FLOW
PER MINUTE EFFLUENT

MODEL		1/2 HP 5 STAGE		3/4 HP 7 STAGE		1 HP 9 STAGE	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters
40	12.2	24.4	92.4	26	98.4	26.2	99.2
80	24.4	20.5	77.6	23.3	88.2	24.3	92
120	36.6	15.2	57.5	20.3	76.8	22.2	84
160	48.8	--	--	16.1	60.9	19.8	74.9
200	61	--	--	9.2	34.8	16.5	62.5
240	73.2	--	--	--	--	11.3	42.8
Shut-off Head:		159 ft. (48.5m)		219 ft. (66.8m)		277 ft. (84.4m)	



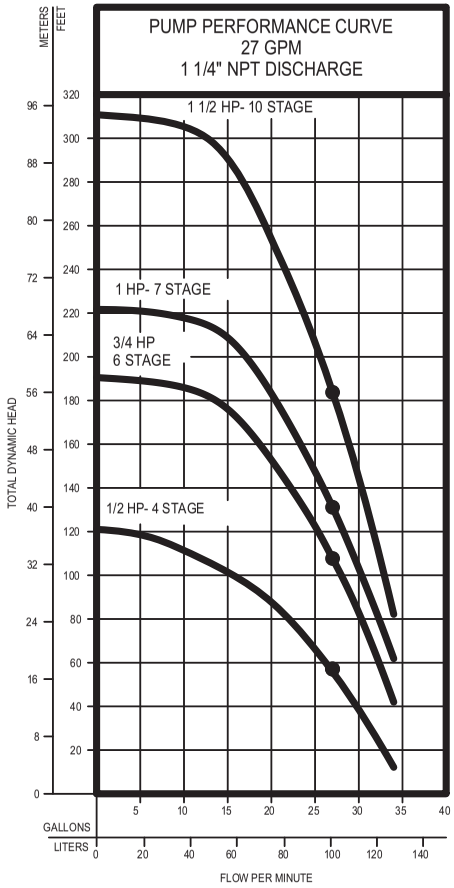
015414

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Pump Performance Data

TOTAL DYNAMIC HEAD / FLOW
PER MINUTE EFFLUENT

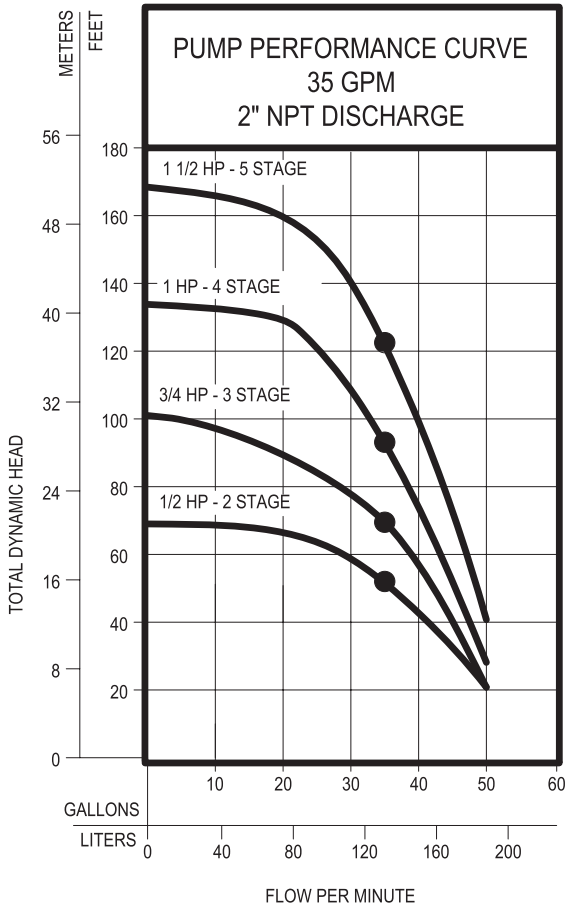
MODEL		1/2 HP 4 STAGE		3/4 HP 6 STAGE		1 HP 7 STAGE		1 1/2 HP 10 STAGE	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters	Gal.	Liters
20	6.1	32.9	124.5	35.9	135.9	37.5	141.9	37.4	141.6
40	12.2	30.1	113.9	34.2	129.5	35.8	135.5	36.3	137.4
60	18.3	26.4	99.9	32.3	122.3	34.1	129	35.2	133.3
80	24.4	22.3	84.4	30.4	115	32.3	122.3	34.3	129.8
100	30.5	16.1	60.9	28	106	30.4	115.1	32.9	124.5
120	36.6	5	18.9	25.4	96.1	28.3	107.1	31.8	120.4
140	42.7	--	--	22.3	84.4	26	98.4	30.3	114.7
160	48.8	--	--	18.7	70.8	23.4	88.6	28.9	109.4
180	54.9	--	--	13.7	51.9	20.5	77.6	27.3	103.3
200	61	--	--	--	--	17.2	65.1	25.8	97.7
220	67.1	--	--	--	--	7.1	26.9	24.1	91.2
240	73.2	--	--	--	--	--	--	22.0	83.3
260	79.3	--	--	--	--	--	--	19.5	73.8
280	85.3	--	--	--	--	--	--	16.5	62.5
300	91.4	--	--	--	--	--	--	12.4	46.9
Shut-off Head:		122 Ft. (37.2m)		190 Ft. (57.9m)		222 Ft. (67.7m)		311 Ft. (94.8m)	



015045

TOTAL DYNAMIC HEAD / FLOW
PER MINUTE EFFLUENT

MODEL		1/2 HP 2 STAGE		3/4 HP 3 STAGE		1 HP 4 STAGE		1 1/2 HP 5 STAGE	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters	Gal.	Liters
20	6.1	50.7	196.5	50.7	191.9	51.6	195.3	52.8	199.8
40	12.2	41.9	158.6	45.3	171.5	47.8	180.9	49.9	188.9
60	18.3	30.4	115.1	39.5	149.5	43.4	164.3	46.8	177.1
80	24.4	--	--	31.0	117.3	38.6	146.1	42.5	160.9
100	30.5	--	--	9.5	36.0	32.8	124.2	39.9	151.0
120	36.6	--	--	--	--	25.4	96.1	35.5	134.4
140	42.7	--	--	--	--	--	--	30.5	115.4
Shut-off Head:		69 Ft. (21.0m)		101 Ft. (30.7m)		134 Ft. (40.8m)		168 Ft. (51.2m)	



015044

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Electrical Data for Zoeller Effluent Turbine Pumps

HP	Volts	Phase	Hz	S.F.	Maximum Amps	Maximum Watts	Locked Rotor Amps	KVA Code	Fuse/Circuit Breaker Amps Std.	Fuse/Circuit Breaker Amps Delay	Winding Resistance Line to Line
1/2	115	1	60	1.6	12	970	64.4	R	30	15	1.0 - 1.3
1/2	230	1	60	1.6	6	970	32.2	R	15	8	4.2 - 5.2
3/4	230	1	60	1.5	8	1325	40.7	N	20	10	3.0 - 3.6
1	230	1	60	1.4	9.8	1600	48.7	N	25	11	2.2 - 2.7
1 1/2	230	1	60	1.3	13.1	2250	56.8	L	35	15	1.5 - 1.9
2	230	1	60	1.25	Y 13.2 B 11.9 R 2.6	2650	51.0	G	30	15	1.6 - 2.3 M 5.2 - 7.15 S
3	230	1	60	1.15	Y 14.0 B 14.5 R 4.5	3650	82.0	G	45	20	.9 - 1.5 M 3.0 - 4.9 S

Major Components

1. **Submersible Effluent Turbine Pump -** A submersible effluent turbine pump is a multistage centrifugal design pump. Each stage consists of an impeller and diffuser. Water pressure increases in equal amounts as it passes from stage to stage. The more stages, the higher the pressure the pump will develop.

   To correctly select a pump for a specific application, the following information must be known:
   - The amount of discharge required in GPM or LPM
   - The total dynamic head required in feet or meters

   Use this information along with the performance data found on the previous page to make your selection.

2. **Control Panel -** Submersible effluent turbine pumps require the use of an above ground control panel or junction box with a pump control switch for proper operation. Operation of these pumps without a control panel or junction box with a pump control switch can result in failure of the pump and void the warranty.

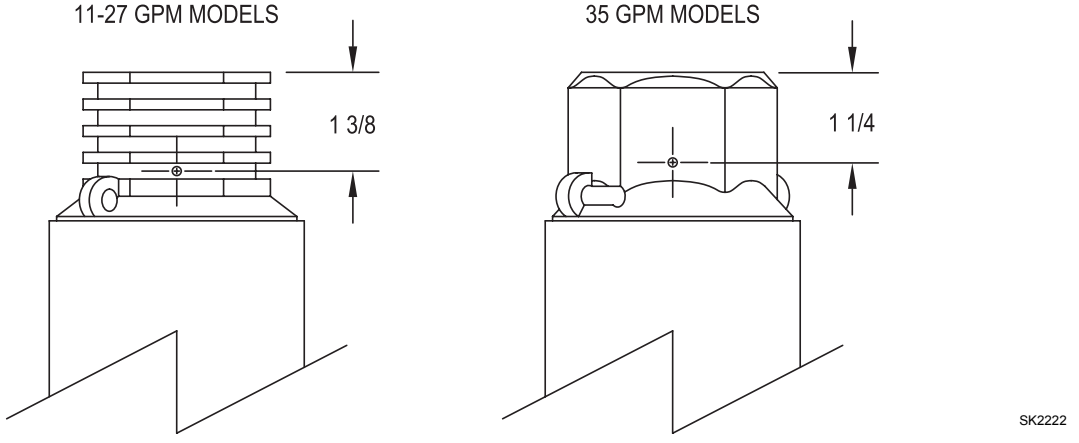
3. **Float Switches -** All submersible effluent turbine pumps are nonautomatic. The use of float switches are required for the proper operation of the pump. Operation of these pumps without float switches can result in failure of the pump and void the warranty. A minimum of two float switches should be used in each application:
   - A pump control float switch
   - A high water alarm float switch

4. **Piping -** The submersible effluent turbine pump can be installed with schedule 40 PVC pipe. The pipe size should be 1¼" diameter for the 11 GPM to 27 GPM pump series and 2" diameter for the 35 GPM pump series.

   General piping from the pump to a splitter, distribution box, drain field etc., should be the same diameter as stated above. For long pipe runs consult friction loss tables for correct pipe sizing.

5. **Check Valve -** A check valve is required in all duplex systems. It is also required when a large amount of effluent can backflush into the system causing rapid cycling of the pump.

   A 1/8" weep hole must be drilled in the side of the discharge head when using a check valve (see drawing below for drill location).



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Pump Installation and Wiring Diagram

1. Submersible effluent turbine pumps may be installed in any application where relatively clear effluent, such as from a dosing tank or high head STEP system etc., is being pumped.

2. Pumps should always be installed vertically. Pumps should never be installed horizontally.

3. Because of their low temperature rise, pumps under 2 HP do not require a flow inducer sleeve.

4. Mount the junction box in its permanent position.

5. Run prewired conduit, or equivalent submersible cable from the junction box to a fused disconnect or, if applicable, the control panel.

6. Feed the pump power cord and float switch cords into the junction box.

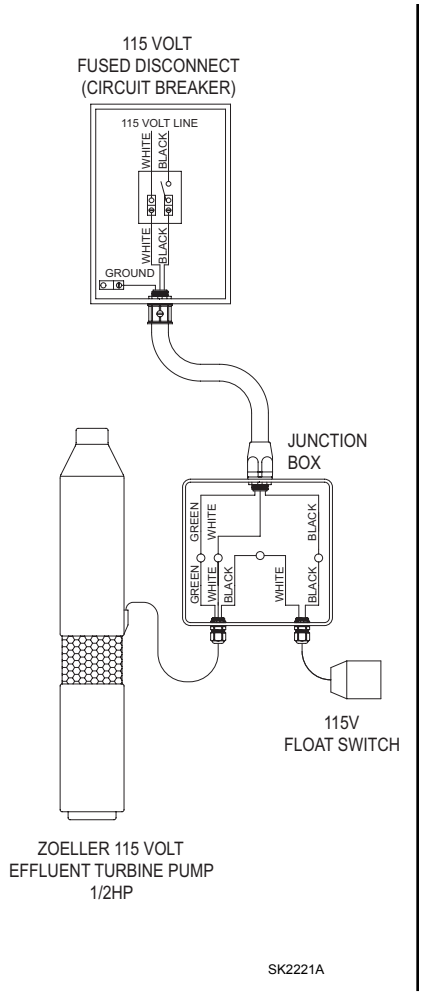
7. Make the connections in the junction box using the wiring diagrams below. If you are using a control panel or a filtered STEP system, follow the wiring diagrams and instructions included with them.

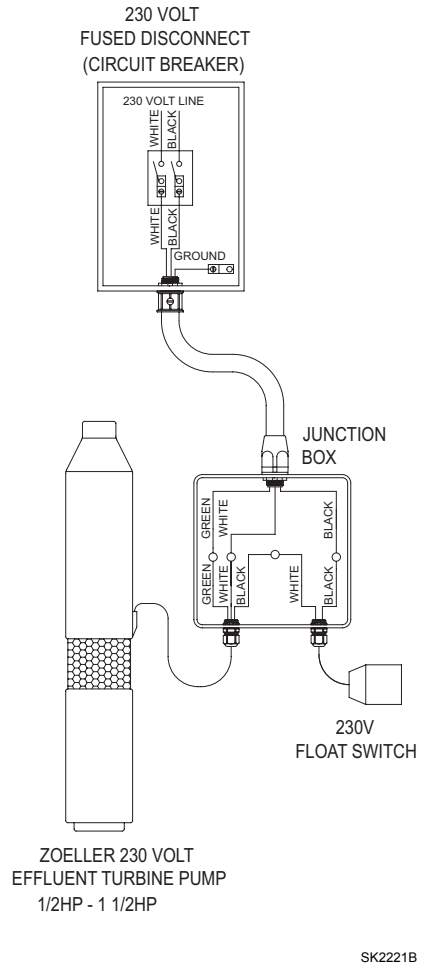
8. An alarm should be used with any system using a pump. Follow the wiring diagram with the alarm for installation and check your local codes.

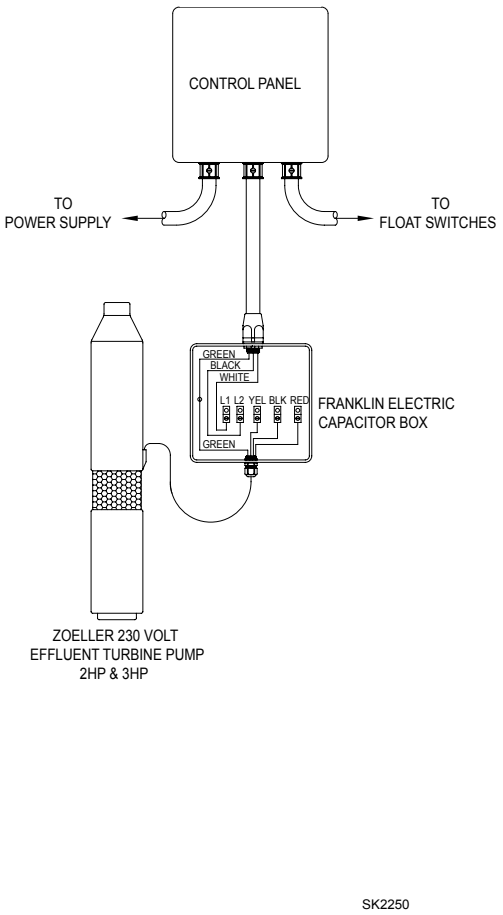
9. Run the appropriate power to the control panel from a fused (circuit breaker) disconnect. The appropriate power supply information may be found on the pump nameplate.

10. To provide a suitable ground, a separate ground wire (green or bare) at least as large as the line conductors is required. It is connected from the electrical disconnect box to the control panel, to the junction box and to the green ground wire of the submersible motor lead.

11. Always disconnect all power when installing or servicing the pump.







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Splicing Underground Wires

Splicing of wires to be buried must be done according to the National Electrical Code. Wire connectors or splicing means installed on conductors for direct burial shall be listed for such use.

Start-up and Maintenance

Before placing the equipment into operation the following must be checked:

- Septic tank and/or pump chamber should be pumped and cleaned prior to installation in existing system.
- Septic tank and/or pump chamber must be watertight.
- Installation needs to be according to instructions.
- Installation should include an easy access riser and tamper resistant lid.
- Filter assembly needs to be in place and secure.
- Float tree needs to be in place, secure and adjusted for proper cycling.
- Make sure float switches are free to move within the basin.
- Be sure electrical connections are watertight and conform to the Uniform Building Code and the National Electrical Code (NEC).
- Fill the septic tank and/or pump chamber with water and check the system for operation.

After installing the pump into the containment area with adequate submergence, open the discharge valve fully. Start the unit using manual controls. If flow is appreciably less than rated performance, pump may be air locked. To expel trapped air, jog the unit several times, using the manual controls.

Have a qualified electrician take voltage and current measurements on the black wire of single phase. Record these readings in the space provided in the "Owner's Information" section on the front this manual for future reference.

Be sure to complete all items such as installing the lid on the riser, securely closing the control panel, and checking the system operation have been completed before placing the system into service.

Routine maintenance should include:

- Service filter in STEP system and/or septic tank.
- Clean pump screen.
- Make sure the check valve is functioning properly.
- Check wire connections.
- Make sure the weep hole is clear.
- Make sure the float switches are free to move within the basin.
- Make sure there are no leaks in the plumbing.
- Make sure there is no excessive noise while the pump is running.

Troubleshooting and Service Checklist



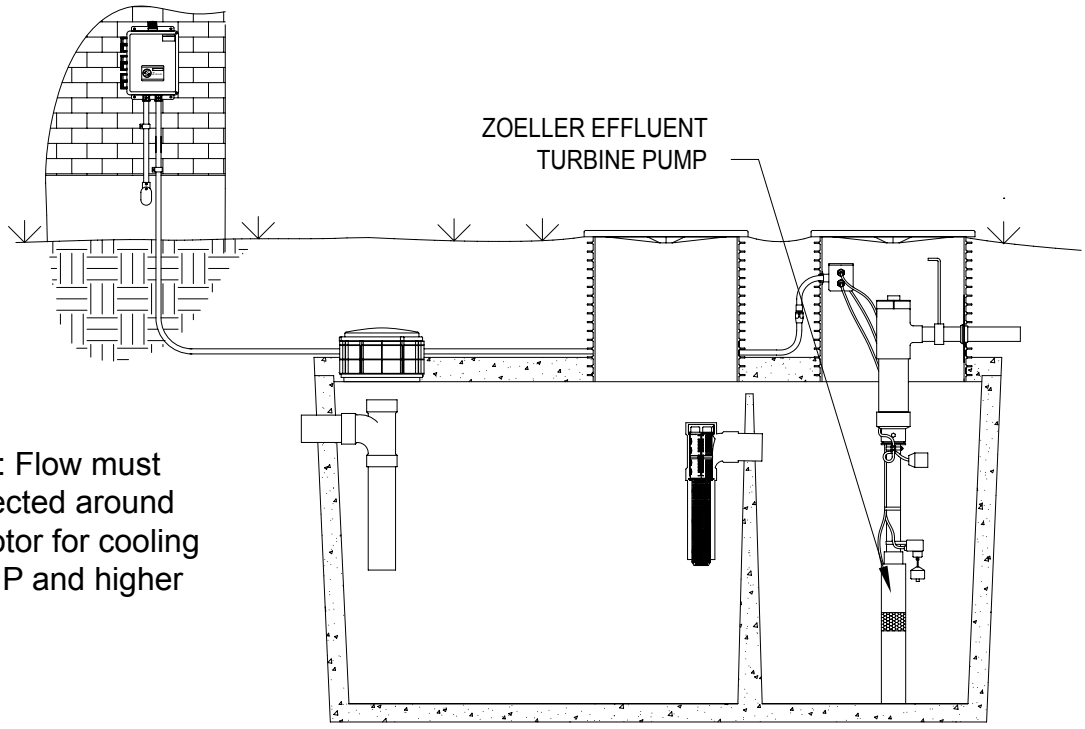
⚠ WARNING **ELECTRICAL PRECAUTIONS-** Before servicing a pump, always shut off the main power breaker and then unplug the pump - making sure you are not standing in water and wearing insulated protective sole shoes. Under flooded conditions, contact your local electric company or a qualified licensed electrician for disconnecting electrical service prior to pump removal.

CONDITION	COMMON CAUSES
A. Pump will not start or run.	Check fuse, low voltage, overload open, open or incorrect wiring, open switch, impeller or seal bound mechanically, defective capacitor or relay when used, motor or wiring shorted. Float assembly held down. Switch defective, damaged, or out of adjustment.
B. Motor overheats and trips overload or blows fuse.	Incorrect voltage, negative head (discharge open lower than normal), impeller or seal bound mechanically, or relay, motor shorted.
C. Pump starts and stops too often.	Check valve stuck or none installed in long distance line, overload open, level switch(es) defective, sump pit too small, leak in the system.
D. Pump will not shut off.	Debris under float assembly bound by pit sides or other, switch defective, damaged or out of adjustment, leak in the system.
E. Pump operates but delivers little or no water.	Check strainer housing, discharge pipe, or if check valve is used vent hole must be clear. Discharge head exceeds pump capacity. Low or incorrect voltage. Incorrect motor rotation. Capacitor defective. Incoming water containing air or causing air to enter pumping chamber.
F. Drop in head and/or capacity after a period of use.	Increased pipe friction, clogged line or check valve. Abrasive material and adverse chemicals could possibly deteriorate impeller and pump housing. Check line. Remove unit and inspect.

If the above checklist does not uncover the problem, consult the factory - Do not attempt to service or otherwise disassemble pump. Service must be by Zoeller Authorized Service Stations.

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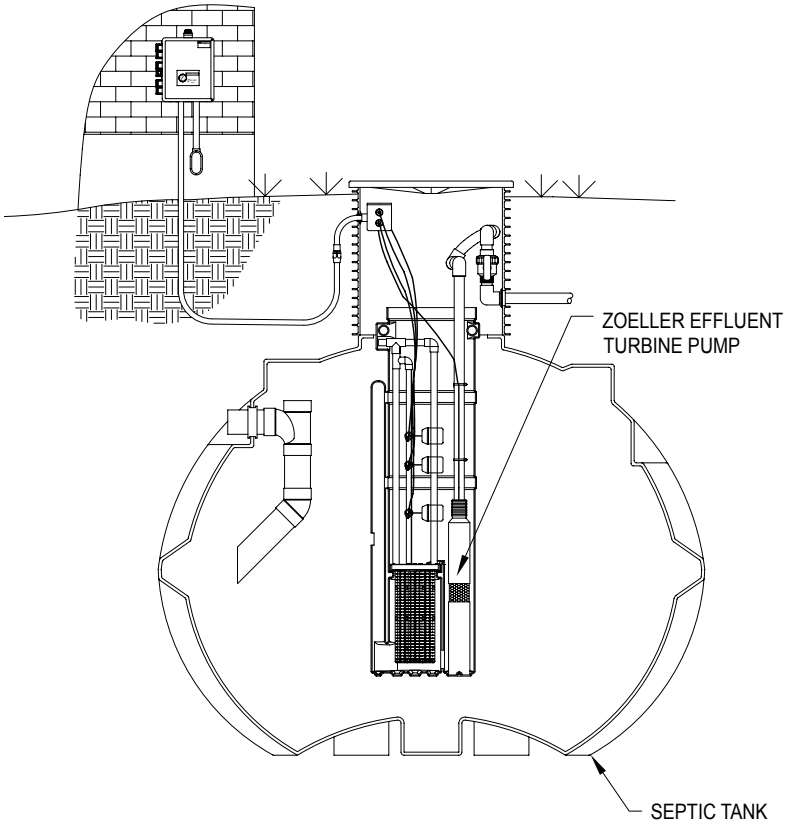
Typical Installations
ALL INSTALLATIONS REQUIRE A FILTER BEFORE THE PUMP.



NOTE: Flow must be directed around the motor for cooling on 2 HP and higher units.

SK2220

SEPTIC TANK



SK2219

www.zoeller.com

ZOELLER PUMP CO.

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Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP
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Manufacturers of..

"Quality Pumps Since 1939"

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