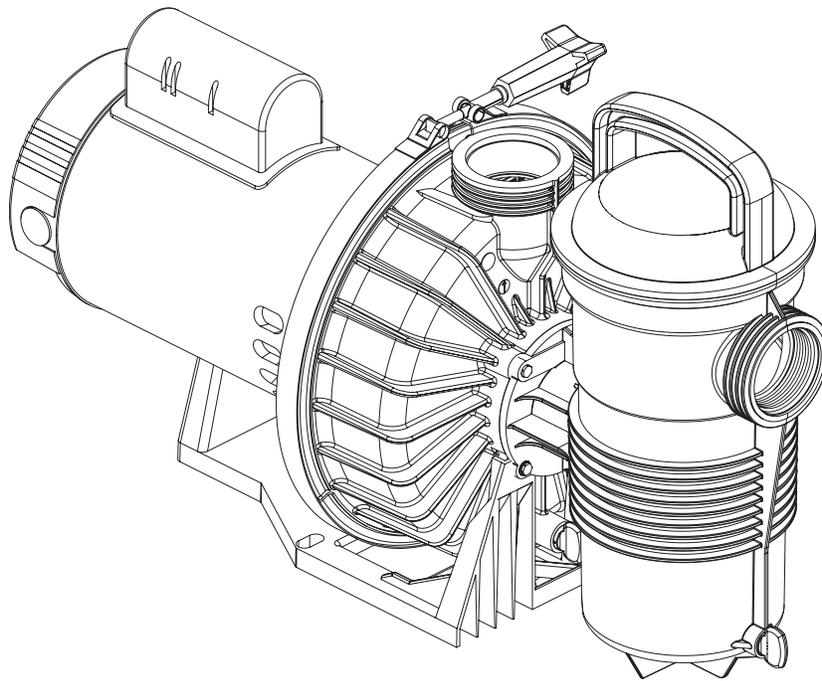




# CHALLENGER® CENTRIFUGAL PUMP



## INSTALLATION AND USER'S GUIDE

IMPORTANT SAFETY INSTRUCTIONS  
*READ AND FOLLOW ALL INSTRUCTIONS*  
SAVE THESE INSTRUCTIONS

## CUSTOMER SERVICE / TECHNICAL SUPPORT

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\* Translated versions of this manual are available online at / La versión en español de este manual del producto, se puede encontrar en línea a / Versiones en francés de este manual está disponible en línea en: <http://www.pentairpool.com/products/pumps-inground-challenger-high-pressure-pumps-24.html>.

# IMPORTANT PUMP WARNING AND SAFETY INSTRUCTIONS



## IMPORTANT NOTICE

This guide provides installation and operation instructions for this pump. Consult Pentair with any questions regarding this equipment.

**Attention Installer:** This guide contains important information about the installation, operation and safe use of this product. This information should be given to the owner and/or operator of this equipment after installation or left on or near the pump.

**Attention User:** This manual contains important information that will help you in operating and maintaining this product. Please retain it for future reference.

## READ AND FOLLOW ALL INSTRUCTIONS SAVE THESE INSTRUCTIONS



This is the safety alert symbol. When you see this symbol on your system or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

### **⚠ DANGER**

Warns about hazards that can cause death, serious personal injury, or major property damage if ignored.

### **⚠ WARNING**

Warns about hazards that may cause death, serious personal injury, or major property damage if ignored.

### **⚠ CAUTION**

Warns about hazards that may or can cause minor personal injury or property damage if ignored.

### **NOTE**

Indicates special instructions not related to hazards.

Carefully read and follow all safety instructions in this manual and on equipment. Keep safety labels in good condition; replace if missing or damaged.

When installing and using this electrical equipment, basic safety precautions should always be followed, include the following:

### **⚠ WARNING**

Do not permit children to use this product.

### **⚠ WARNING**

**RISK OF ELECTRICAL SHOCK.** Connect only to a branch circuit protected by a ground-fault circuit-interrupter (GFCI). Contact a qualified electrician if you cannot verify that the circuit is protected by a GFCI.

### **⚠ WARNING**

This unit must be connected only to a supply circuit that is protected by a ground-fault circuit-interrupter (GFCI). Such a GFCI should be provided by the installer and should be tested on a routine basis. To test the GFCI, push the test button. The GFCI should interrupt power. Push the reset button. Power should be restored. If the GFCI fails to operate in this manner, the GFCI is defective. If the GFCI interrupts power to the pump without the test button being pushed, a ground current is flowing, indicating the possibility of an electric shock. Do not use this pump. Disconnect the pump and have the problem corrected by a qualified service representative before using.

### **⚠ CAUTION**

This pump is for use with permanent swimming pools and may also be used with hot tubs and spas if so marked. Do not use with storable pools. A permanently-installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it is capable of being readily disassembled for storage and reassembled to its original integrity.

## General Warnings

- Never open the inside of the drive motor enclosure. There is a capacitor bank that holds a 230 VAC charge even when there is no power to the unit.
- The pump is not submersible.
- The pump is capable of high flow rates; use caution when installing and programming to limit pumps performance potential with old or questionable equipment.
- Code requirements for electrical connection differ from country to country, state to state, as well as local municipalities. Install equipment in accordance with the National Electrical Code and all applicable local codes and ordinances.
- Before servicing the pump; switch OFF power to the pump by disconnecting the main circuit to the pump.
- This appliance is not intended for use by persons (including children) of reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

### **⚠ DANGER**

FAILURE TO FOLLOW ALL INSTRUCTIONS AND WARNINGS CAN RESULT IN SERIOUS BODILY INJURY OR DEATH. **THIS PUMP SHOULD BE INSTALLED AND SERVICED ONLY BY A QUALIFIED POOL SERVICE PROFESSIONAL. INSTALLERS, POOL OPERATORS AND OWNERS MUST READ THESE WARNINGS AND ALL INSTRUCTIONS IN THE OWNER'S MANUAL BEFORE USING THIS PUMP. THESE WARNINGS AND THE OWNER'S MANUAL MUST BE LEFT WITH THE POOL OWNER.**

### **⚠ DANGER**

SUCTION ENTRAPMENT HAZARD: STAY OFF THE MAIN DRAIN AND AWAY FROM ALL SUCTION OUTLETS!



THIS PUMP PRODUCES HIGH LEVELS OF SUCTION AND CREATES A STRONG VACUUM AT THE MAIN DRAIN AT THE BOTTOM OF THE BODY OF WATER. THIS SUCTION IS SO STRONG THAT IT CAN TRAP ADULTS OR CHILDREN UNDER WATER IF THEY COME IN CLOSE PROXIMITY TO A DRAIN OR A LOOSE OR BROKEN DRAIN COVER OR GRATE.

THE USE OF UNAPPROVED COVERS OR ALLOWING USE OF THE POOL OR SPA WHEN COVERS ARE MISSING, CRACKED OR BROKEN CAN RESULT IN BODY OR LIMB ENTRAPMENT, HAIR ENTANGLEMENT, BODY ENTRAPMENT, EVISCERATION AND/OR DEATH.

The suction at a drain or outlet can cause:

**Limb Entrapment:** When a limb is sucked or inserted into an opening resulting in a mechanical bind or swelling. This hazard is present when a drain cover is missing, broken, loose, cracked or not properly secured.

**Hair Entanglement:** When the hair tangles or knots in the drain cover, trapping the swimmer underwater. This hazard is present when the flow rating of the cover is too small for the pump or pumps.

**Body Entrapment:** When a portion of the body is held against the drain cover trapping the swimmer underwater. This hazard is present when the drain cover is missing, broken or the cover flow rating is not high enough for the pump or pumps.

**Evisceration/Disembowelment:** When a person sits on an open pool (particularly a child wading pool) or spa outlet and suction is applied directly to the intestines, causing severe intestinal damage. This hazard is present when the drain cover is missing, loose, cracked, or not properly secured.

# IMPORTANT PUMP WARNING AND SAFETY INSTRUCTIONS

**Mechanical Entrapment:** When jewelry, swimsuit, hair decorations, finger, toe or knuckle is caught in an opening of an outlet or drain cover. This hazard is present when the drain cover is missing, broken, loose, cracked, or not properly secured.

**NOTE: ALL SUCTION PLUMBING MUST BE INSTALLED IN ACCORDANCE WITH THE LATEST NATIONAL AND LOCAL CODES, STANDARDS AND GUIDELINES.**

**WARNING** TO MINIMIZE THE RISK OF INJURY DUE TO SUCTION ENTRAPMENT HAZARD:

- A properly installed and secured ANSI/ASME A112.19.8 approved anti-entrapment suction cover must be used for each drain.
- Each suction cover must be installed at least three (3') feet apart, as measured from the nearest point to nearest point.
- Regularly inspect all covers for cracks, damage and advanced weathering.
- If a cover becomes loose, cracked, damaged, broken or is missing, replace with an appropriate certified cover.
- Replace drain covers as necessary. Drain covers deteriorate over time due to exposure to sunlight and weather.
- Avoid getting hair, limbs or body in close proximity to any suction cover, pool drain or outlet.
- Disable suction outlets or reconfigure into return inlets.

**WARNING** A clearly labeled emergency shut-off switch for the pump must be in an easily accessible, obvious place.

Make sure users know where it is and how to use it in case of emergency.

**The Virginia Graeme Baker (VGB) Pool and Spa Safety Act** creates new requirements for owners and operators of commercial swimming pools and spas.

Commercial pools or spas constructed on or after December 19, 2008, shall utilize:

(A) A multiple main drain system without isolation capability with suction outlet covers that meet ASME/ANSI A112.19.8a Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, and Hot Tubs and either:

- (i) A safety vacuum release system (SVRS) meeting ASME/ANSI A112.19.17 Manufactured Safety Vacuum Release systems (SVRS) for Residential and Commercial Swimming Pool, Spa, Hot Tub, and Wading Pool Suction Systems and/or ASTM F2387 Standard Specification for Manufactured Safety Vacuum Release Systems (SVRS) for Swimming pools, Spas and Hot Tubs or
- (ii) A properly designed and tested suction-limiting vent system or
- (iii) An automatic pump shut-off system.

Commercial pools and spas constructed prior to December 19, 2008, with a single submerged suction outlet shall use a suction outlet cover that meets ASME/ANSI A112.19.8a and either:

- (A) A SVRS meeting ASME/ANSI A112.19.17 and/or ASTM F2387, or
- (B) A properly designed and tested suction-limiting vent system, or
- (C) An automatic pump shut-off system, or
- (D) Disabled submerged outlets, or
- (E) Suction outlets shall be reconfigured into return inlets.

**For Installation of Electrical Controls at Equipment Pad (ON/OFF Switches, Timers and Automation Load Center)**

**CAUTION** Install all electrical controls at equipment pad, such as on/off switches, timers, and control systems, etc. to allow the operation (startup, shut-down, or servicing) of any pump or filter so the user does not place any portion of his/her body over or near the pump strainer lid, filter lid or valve closures. This installation should allow the user enough space to stand clear of the filter and pump during system start-up, shut down or servicing of the system filter.



**DANGER**



**HAZARDOUS PRESSURE: STAND CLEAR OF PUMP AND FILTER DURING START UP**

Circulation systems operate under high pressure. When any part of the circulating system (i.e. locking ring, pump, filter, valves, etc.) is serviced, air can enter the system and become pressurized.

Pressurized air can cause the pump housing cover, filter lid, and valves to violently separate which can result in severe personal injury or death. Filter tank lid and strainer cover must be properly secured to prevent violent separation. Stand clear of all circulation system equipment when turning on or starting up pump.

Before servicing equipment, make note of the filter pressure. Be sure that all controls are set to ensure the system cannot inadvertently start during service. Turn off all power to the pump. **IMPORTANT: Place filter manual air relief valve in the open position and wait for all pressure in the system to be relieved.**

Before starting the system, fully open the manual air relief valve and place all system valves in the "open" position to allow water to flow freely from the tank and back to the tank. Stand clear of all equipment and start the pump.

**IMPORTANT: Do not close filter manual air relief valve until all pressure has been discharged from the valve and a steady stream of water appears.** Observe filter pressure gauge and be sure it is not higher than the pre-service condition.

## General Installation Information

- All work must be performed by a qualified service professional, and must conform to all national, state, and local codes.
- Install to provide drainage of compartment for electrical components.
- These instructions contain information for a variety of pump models and therefore some instructions may not apply to a specific model. All models are intended for use in swimming pool applications. The pump will function correctly only if it is properly sized to the specific application and properly installed.

**WARNING** Pumps improperly sized or installed or used in applications other than for which the pump was intended can result in severe personal injury or death. These risks may include but not be limited to electric shock, fire, flooding, suction entrapment or severe injury or property damage caused by a structural failure of the pump or other system component.

**WARNING** The pump can produce high levels of suction within the suction side of the plumbing system. These high levels of suction can pose a risk if a person comes within the close proximity of the suction openings. A person can be seriously injured by this high level of vacuum or may become trapped and drown. It is absolutely critical that the suction plumbing be installed in accordance with the latest national and local codes for swimming pools.

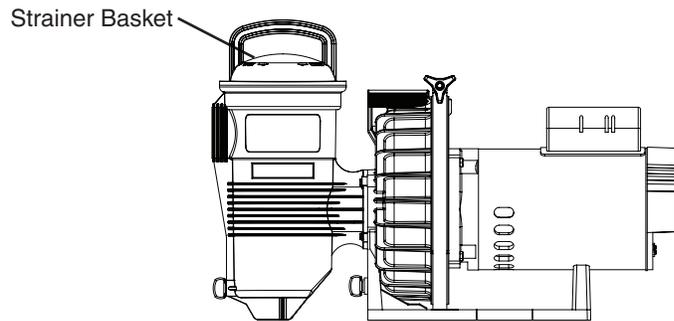
Warnings and safety instructions for Pentair Aquatic Systems pumps and other related products are available at: <http://www.pentairpool.com/pool-owner/safety-warnings/> or call (800) 831-7133 for additional free copies of these instructions.

Please refer to <http://www.pentairpool.com/pool-owner/safety-warnings/> for warning and safety instructions related to the this product.

## SAVE THESE INSTRUCTIONS

## Pump Overview

The Challenger® Centrifugal Pump is designed to operate for years with proper maintenance. The pump housing, seal plate, diffuser, hair and lint pot and impeller are made from high quality thermoplastic materials. These materials have been selected for their corrosion-resistant nature. When installed, operated and maintained in accordance with these instructions, your pump will provide years of service.



Challenger Centrifugal Pump

Your centrifugal pump is driven by an electric motor. The motor is directly attached to the pump impeller. As the electric motor turns, it causes the impeller to turn and this causes the water to flow. The water flows into the hair and lint pot inlet and through the basket assembly to pre-strain large particles. The flow then enters the center of the pump housing. If the pump does not contain the hair and lint pot assembly, the flow simply enters the center of the pump housing. The flow goes through the impeller and out the pump discharge port.

### Two Speed Pump Models

The performance of this pump will be the same at high speed as the same model single speed pump, both hydraulically and prime wise. At low speed, the pump will produce one half the flow and 1/4 the pressure of high speed. However, the pressure required by the filter and pool plumbing at half flow will also be greatly reduced due to much lower system friction. These lower friction losses result in great energy savings. At one half flow (low speed) the electrical energy savings are 60% for equal amounts of circulated water.

Turn motor to low speed for quiet operation and electrical cost savings. Since the pump should be operated mostly at low speed for cost saving, minor adjustments may be required in the automatic chlorine dispenser, the skimmers and the heater due to the lower flow. (See the equipment manufacturer's operation manuals.)

Pool owners should use high speed for vacuuming the pool, quick filtering action, priming the system, and to keep up with heavy bathing loads.

Spa and Tub owners will want to use high speed for good jet action.

## Pump Strainer Basket

The strainer basket, sometimes referred to as the 'Hair and Lint Pot', is located in front of the pump housing. Inside the chamber is the basket which must be kept clean of leaves and debris at all times.

Regardless of the length of time between filter cleaning, it is important to visually inspect the hair and lint pot basket at least once a week. A dirty basket will reduce the efficiency of the filter and heater and also put an abnormal stress on the pump motor.

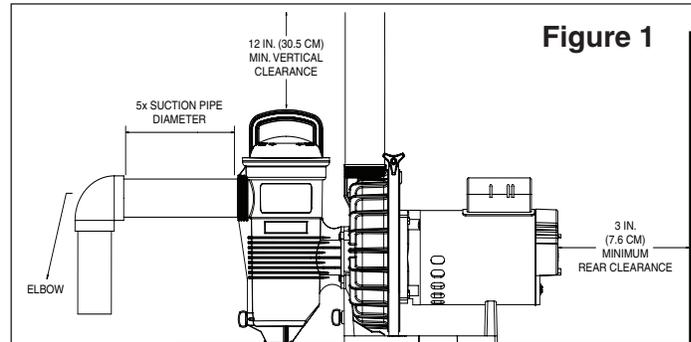
# INSTALLATION

## Location

Be sure the Challenger® Centrifugal Pump location meets the following requirements:

**Note:** Do not install this pump within an outer enclosure or beneath the skirt of a hot tub or spa unless marked accordingly.

1. Install the pump as close to the pool or spa as possible. To reduce friction loss and improve efficiency use short, direct suction piping returns.
2. Install a minimum of 5 feet (1.5 meters) from the inside wall of the pool or spa. Canadian installations require a minimum of 9.8 feet (3 meters) from pool water.
3. Install the pump a minimum of 3 feet (0.9 meters) from the heater outlet.
4. Do not install the pump more than 10 feet (3 m) above the water level.
5. Install the pump in a well ventilated location protected from excessive moisture (i.e., rain gutter downspouts, sprinklers, etc.).
6. Install the pump with a rear clearance of at least 3 inches (7.6 cm) so that the motor can be removed easily for maintenance and repair. A vertical clearance of 12 inches (30.5 cm) is required for strainer basket removal. See **Figure 1**.



## Piping, Fittings and Valves

1. Use thread seal tape or pipe sealants on all male connections of pipes and fittings. Use only pipe sealant compounds suited for plastic pipe. **DO NOT USE PETROLEUM BASED PRODUCTS.**
2. Support pipe to prevent strains on the systems filter, pump and valves.
3. When connecting fitting to the pump, apply a pipe sealant to the threads and then hand tighten plus 1½ turns. **DO NOT OVERTIGHTEN.**
4. Long piping runs and elbows restrict flow. For best efficiency, use the fewest possible fittings, large diameter pipe (at least 1.5 inches) and locate equipment as close to the pool as possible. The pump suction line should not be smaller than the pipe size on the inlet of the pump.
5. Suction fittings must conform to ASME/ANSI A 112.19.8 M Standards. Use double suction fittings.
6. For most installations Pentair recommends installing a valve on both the pump suction and return lines so that the pump can be isolated during routine maintenance. We also recommend a valve, elbow or tee installed in the suction line should be no closer to the front of the pump than five (5) times the suction line pipe diameter. See **Figure 1**.

**Example:** A 1.5 inch pipe requires a 7.5 inch (19 cm) straight run in front of the suction inlet of the pump. This will help the pump prime faster and last longer.

**Note:** DO NOT install 90° elbows directly into the pump inlet and outlet.

## Wiring Installation

### ⚠ WARNING



#### RISK OF ELECTRICAL SHOCK OR ELECTROCUTION.

This pool pump must be installed by a licensed or certified electrician or a qualified pool serviceman in accordance with the all National Electrical Code and all applicable local codes and ordinances. Improper installation will create an electrical hazard which could result in death or serious injury to pool users, installers, or others due to electrical shock, and may also cause damage to property.

Always disconnect power to the pool pump at the circuit breaker before servicing the pump. Failure to do so could result in death or serious injury to serviceman, pool users or others due to electric shock.

1. Make sure all electrical breakers and switches are turned off before wiring motor.
2. Make sure that the wiring voltage matches the motor voltage. If they do not match permanent damage to the motor will occur.

## Wiring Installation, (continued)

3. For wiring sizes and general guidelines for proper electrical installation, please follow the specifications defined in the National Electric Code and any local codes as required.
4. Make sure all electrical connections are clean and tight.
5. Cut wires to the appropriate length so they don't overlap or touch when connected to the terminal board.

### WARNING

Never work on pump while it is running or power is still connected; hazardous voltage can cause severe or fatal injury. A suitable ground fault interrupter should always be installed at the power supply source of the unit.

### WARNING

Ground motor before connecting to electrical power supply. Failure to ground motor can cause severe or fatal electrical shock hazard. Do not ground to a gas supply line.

6. The Challenger® Centrifugal Pump motor must be wired for the proper voltage in accordance with the wiring diagram supplied with the motor.

### CAUTION

Wiring the motor with the incorrect supply voltage will cause damage to the motor and void the warranty.

7. The wiring to the motor should be kept as short as possible and large enough NOT to cause an excessive voltage drop.
8. Install, ground and bond wire according to local or National Electrical Code requirements.
9. Bond the motor to the pool structure in accordance with the National Electrical Code. Use a solid No. 8 AWG or larger copper conductor (No. 6 AWG for Canadian installations). Run a wire from the external bonding screw on the motor to the pool bonding structure.

## Grounding

Permanently ground motor. Use green terminal provided under motor canopy or access plate; use size and type wire required by code. Connect motor ground terminal to electrical service ground. On cord connected circuits, check for proper grounding.

## Bonding

The National Electrical Code Article 680-22 requires that the motor be electrically bonded to appropriate permanently installed pool or spa/hot tub structure by a solid copper conductor no smaller than No. 8 AWG (no smaller than No. 6 AWG for Canadian installations). Bonding wire should be connected from the accessible wire connector on the motor shell to all metal parts of the swimming pool spa or hot tub structure and to all electrical equipment, metal conduit and metal piping within five (5) feet of the inside walls of a swimming pool spa or hot tub. A grounding lug is provided on the exterior of the motor shell for this purpose.

### FOR CORD AND PLUG-CONNECTED UNITS

#### WARNING

Do not bury cord. Locate cord to minimize abuse from lawn mowers, hedge trimmers, and other equipment.

#### WARNING

To reduce the risk of electric shock, replace damaged cord immediately.

#### WARNING

To reduce the risk of electric shock, do not use extension cord to connect unit to electric supply; provide a properly located outlet.

#### WARNING

**RISK OF ELECTRIC SHOCK.** Connect only to a grounding type receptacle protected by a ground-fault circuit-interrupter (GFCI). Contact a qualified electrician if you cannot verify that the receptacle is protected by a GFCI.

### CAUTION

This pump is for use with permanently installed pools and may also be used with hot tubs and spas. Do not use with storable pools unless pump is protected by a factory installed double insulated enclosure. A permanently installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it may be readily disassembled for storage and reassembled to its original integrity and has a maximum dimension of 18 feet and a maximum wall height of 42 inches.  
Do not install within an outer enclosure or beneath the skirt of a hot tub or spa unless so marked.

# OPERATING THE PUMP

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## Initial Start-Up

1. Relieve all system pressure and open all air bleeders on entire hydraulic system prior to starting the Challenger® Centrifugal Pump. See filter owner's manual.
2. Ensure that all fittings, clamps, closures and couplings are tight and in accordance with equipment manufacturer's recommendations.
3. Open suction and discharge valve to allow free flow of water. On flooded suction pumps with strainer pot, the water source is higher than the pump. The water will flow into the pump strainer pot and the pot will fill with water. On pumps without strainer pot, the water will fill the pump housing.
4. On non-flooded suction systems, the pump lid will have to be removed by rotating the lid counter-clockwise and lifting.
5. The pump strainer pot should be filled with water up to suction/inlet port on the pump.
6. It is good practice to lubricate the lid o-ring with silicone lubricant each time the lid is removed. The o-ring should be cleaned and inspected every time the strainer pot is opened.
7. The lid should be replaced by pressing the lid down and twisting the lid clockwise.
8. The pump is now ready to prime. Energize the motor and the pump will prime. The time to prime will depend on the suction lift and the distance and size of suction piping. Turn off power if the pump does not prime within thirty (30) minutes and refer to "Troubleshooting" on page 11.



**DO NOT run the pump dry. If the pump is run dry, the mechanical seal will be damaged and the pump will start leaking. If this occurs, the damaged seal must be replaced. ALWAYS maintain proper water level in your pool (half way up skimmer opening). If the water level falls below the skimmer opening, the pump will draw air through the skimmer, losing the prime and causing the pump to run dry, resulting in a damaged seal. Continued operation in this matter could cause a loss of pressure, resulting in damage to the pump case, impeller, and seal and may cause property damage and personal injury.**

This section describes how to maintain the Challenger® Centrifugal Pump.

## Cleaning the Pump Strainer Basket

The strainer basket in the pump should be visually inspected at least once a week. Remove the clear lid and the basket and clean debris from basket. Inspect the lid o-ring; if damaged replace. The pump seal requires no lubrication.

### ⚠ WARNING

**DO NOT** open the strainer pot if pump fails to prime or if pump has been operating without water in the strainer pot. Pumps operated in these circumstances may experience a build up of vapor pressure and may contain scalding hot water. Opening the pump may cause serious personal injury. In order to avoid the possibility of personal injury, make sure the suction and discharge valves are open and strainer pot temperature is cool to touch, then open with extreme caution.

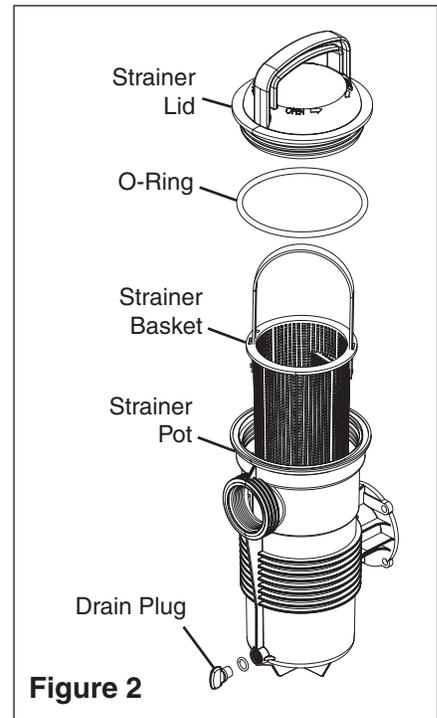
### ⚠ CAUTION

To prevent damage to the pump and filter and for proper operation of the system, clean pump strainer and skimmer baskets regularly.

1. Turn off the pump at the breaker.
2. Close the inlet and discharge valves.
3. Relieve pressure in the system.
4. Turn the strainer lid in a counter-clockwise direction to remove the lid and remove the basket from the pump.
5. Remove the debris from the strainer basket and rinse out the basket. Replace the basket if it is cracked.
6. Replace the basket.
7. Fill the pump strainer pot and volute up to the suction/inlet port with water.
 

**Note:** It is important that the O-Ring be kept clean and well lubricated.
8. Clean the lid, O-ring, and sealing surface of the strainer pot.
9. Reinstall the lid by placing the lid back onto the strainer pot and turning the lid clockwise.
 

**Note:** Be sure the lid O-ring is properly placed around the entire sealing surface of the strainer pot.
10. Open the inlet and discharge valves.
11. Turn the power "ON" at the circuit breaker.



**Figure 2**

### ⚠ WARNING



### **THIS SYSTEM OPERATES UNDER HIGH PRESSURE.**

When any part of the circulating system (e.g., Lock Ring, Pump, Filter, Valves, etc.) is serviced, air can enter the system and become pressurized. Pressurized air can cause the lid to separate off which can result in serious injury, death, or property damage. To avoid this potential hazard, follow these instructions.

12. Open the manual air relief valve on top of the filter.
13. Stand clear of the filter. Start the pump.
14. Bleed air from the filter until a steady stream of water comes out. Close the manual air relief valve.

## Winterizing

You are responsible for determining when freezing conditions may occur. If freezing conditions are expected, take the following steps to reduce the risk of freeze damage. **Freeze damage is not covered under warranty.**

In mild climates, when temporary freezing conditions may occur, run your filtering equipment all night to prevent freezing.

To prevent freeze damage, follow the procedures below:

1. Shut off electrical power for the pump at the circuit breaker.
2. Drain the water out of the pump housing by removing the two thumb-twist drain plugs from the housing. Store the plugs in the pump basket.
3. Cover the motor to protect it from severe rain, snow and ice.

**Note:** DO NOT wrap the motor with plastic or other air tight materials during winter storage. The motor may be covered during a storm, winter storage, etc., but never when operating or expecting operation.

## Electric Motor Care

### Protect from heat

1. Shade the motor from the sun.
2. Any enclosure must be well ventilated to prevent overheating.
3. Provide ample cross ventilation.

### Protect against dirt

1. Protect from any foreign matter.
2. Do not store (or spill) chemicals on or near the motor.
3. Avoid sweeping or stirring up dust near the motor while it is operating.
4. If a motor has been damaged by dirt it may void the motor warranty.
5. Clean the lid and clamp, O-ring, and sealing surface of the pump pot.

### Protect against moisture

1. Protect from continuous splashing or continuous sprayed water.
2. Protect from extreme weather such as flooding.
3. If motor internals have become wet - let it dry before operating. Do not allow the pump to operate if it has been flooded.
4. If a motor has been damaged by water it may void the motor warranty.

### Note:

- DO NOT wrap motor with plastic or other air tight materials. The motor may be covered during a storm, for winter storage, etc., but never when operating, or expecting operation.
- When replacing the motor, be certain that the motor support is correctly positioned to support the size of motor being installed.

This section describes how to service the Challenger® Centrifugal Pump.

### RISK OF ELECTRICAL AND ELECTROCUTION



This pool pump must be installed by a licensed or certified electrician or a qualified pool serviceman in accordance with the National Electrical Code and all applicable local codes and ordinances. Improper installation will create an electrical hazard which could result in death or serious injury to pool users, installers, or others due to electrical shock, and may also cause damage to property.

**Always disconnect power to the pool pump at the circuit breaker before servicing the pump. Failure to do so could result in death or serious injury to serviceman, pool users or others due to electric shock.**

Read all servicing instructions before working on the pump.



**DO NOT** open the strainer pot if pump fails to prime or if pump has been operating without water in the strainer pot. Pumps operated in these circumstances may experience a build up of vapor pressure and may contain scalding hot water. Opening the pump may cause serious personal injury. In order to avoid the possibility of personal injury, make sure the suction and discharge valves are open and strainer pot temperature is cool to touch, then open with extreme caution.



Be sure not to scratch or mar the polished shaft seal faces; seal will leak if faces are damaged.

## Pump Disassembly

All moving parts are located in the rear sub-assembly of this pump. Refer to **Figure 4** on page 9 for an illustrated parts view.

### Tools required:

- Adjustable wrench.
- 1/4 inch flat-blade screwdriver.
- 9/16 inch open end wrench.
- Rubber Mallet

### To remove and repair the motor sub-assembly perform the following procedures:

1. Turn off the pump circuit breaker at the main panel. Close suction and discharge valves to relieve system pressure.
2. Drain the pump by removing the drain plugs. The drain plugs can be removed by hand. No tools are needed.
3. Loosen the band clamp by turning the band clamp knob counter-clockwise. The band clamp holds the rear-subassembly to the housing (strainer pot/volute).
4. Remove the rear sub-assembly from the housing (strainer pot/volute) and place the band clamp to the side.  
**Note:** If the band clamp does not separate from the pump housing and seal plate when loose, lightly tap the top of the band clamp with a rubber mallet. This will free the clamp from the housing.
5. Place the rear sub-assembly upright and on a flat surface. Use a 1/4 inch flat blade screwdriver to remove the three (3) holding screws located on the diffuser.
6. Remove the diffuser and diffuser spacer from the rear sub-assembly.
7. Use the 1/4 inch flat blade screwdriver to remove the impeller screw located in the center of the pump's impeller.  
**Note:** The impeller screw is a left-handed thread and loosens in a clockwise direction.

## Pump Disassembly (continued)

- Use the 1/4 inch flat blade screwdriver to hold the motor shaft in place. The motor shaft is accessible through the back of the motor.

**Note:** If the torque is too high to hold the screwdriver by hand then an adjustable wrench may be used to hold the screwdriver shaft in place. Use locking pliers instead if your screwdriver has a round shaft.

- Unscrew the impeller from the motor shaft by twisting the impeller counter-clockwise.
- Remove the rotating portion of the spring seal by hand.

**Note:** When placing the rotating seal to the side, ALWAYS place flat side down. The portion of the rotating spring seal that contacts the white ceramic seal must be kept as free from contaminants (dust, dirt, debris, etc.) as possible.

- Use the 9/16 inch wrench to remove the four (4) bolts that hold the motor to the seal plate.

## The Shaft Seal

The mechanical seal can be changed without disconnecting piping by removing the band clamp and pulling the motor with pump bracket diffuser and impeller assembly away from front pump housing body.

The Shaft Seal consists primarily of two parts, a rotating spring seal and a ceramic seal. See **Figure 3**.

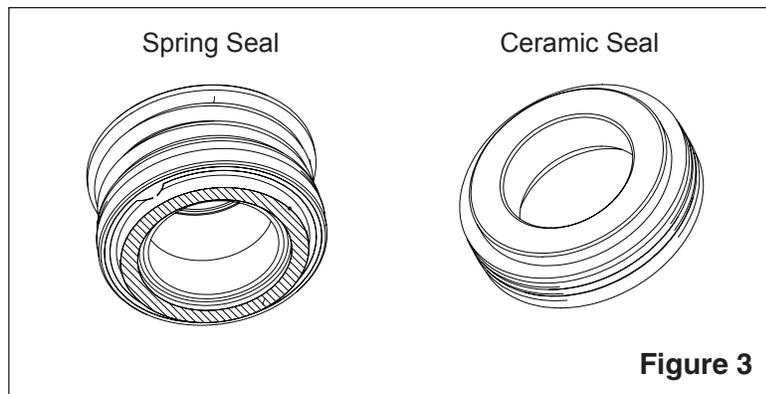
The Challenger® Centrifugal Pump requires little or no service other than reasonable care, however, a Shaft Seal may occasionally become damaged and must be replaced.

**CAUTION** The polished and lapped faces of the seal could be easily damaged if not handled with care.

**CAUTION** In mild climate area, when temporary freezing conditions may occur, run your filtering equipment all night to prevent freezing.

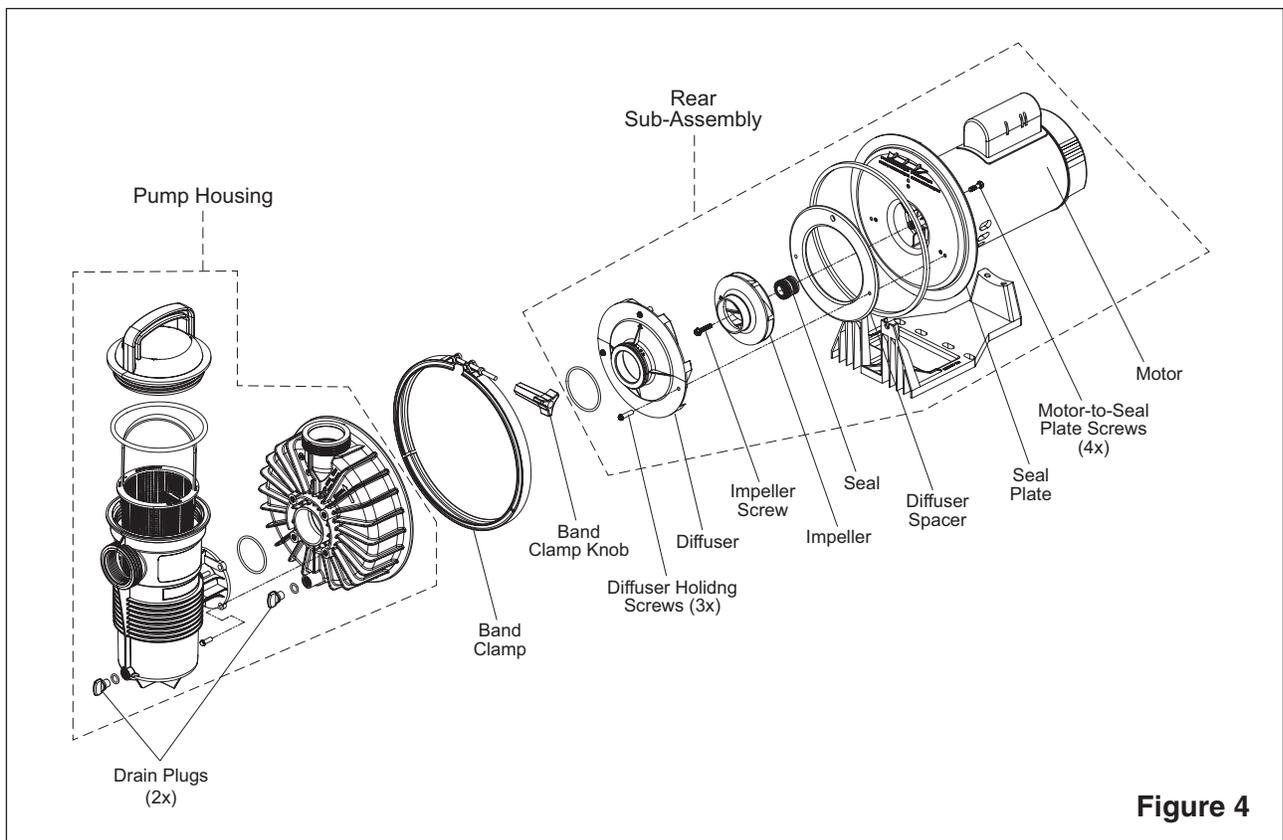
### To replace the pump seal:

- Follow steps 1-11 in the “Pump Disassembly” section.
- Place the seal plate face down on a flat surface and tap out the old ceramic seal.
- Press the new ceramic seal into the seal plate with your thumbs and wipe off the white ceramic with a clean cloth.
- Using a 9/16 inch wrench, remount the seal plate to the motor via the four (4) bolts that hold the motor to the seal plate.
- Grease the motor shaft thread and continue with steps 2-10 from the “Pump Reassembly” section to reassemble the pump.



## Pump Reassembly

1. Use the 9/16 inch wrench to remount the seal plate to the motor via the four (4) bolts that hold the motor to the seal plate.
2. Reseat the spring seal on the white ceramic seal. Ensure that the carbon face of the spring seal contacts the ceramic face of the stationary seat.
3. Grease the motor shaft thread and screw the impeller onto the motor shaft.  
**Note:** Use the 1/4 inch flat blade screwdriver to hold the motor shaft in place when screwing down the impeller. The motor shaft is accessible through the back of the motor.
4. Using a 1/4 inch flat blade screwdriver, screw in the impeller lock screw.  
**Note:** The impeller screw is a left-handed thread and tightens in a counter-clockwise direction.
5. Remount the diffuser spacer and diffuser using a 1/4 inch flat blade screwdriver and the three (3) diffuser screws.
6. Reseat the pump housing (strainer pot/volute) onto the rear sub-assembly.
7. Place the band clamp around the pump housing and rear sub-assembly. Tighten with the band clamp knob.  
**Note:** The band clamp knob should be parallel to the floor of the equipment pad when the clamp is installed properly.
8. Reinstall the drain plugs. Hand tighten only!
9. Fill the pump strainer pot with water.
10. Refer to page 4 “Initial Start-Up” procedures to restart the pump.



**Figure 4**

## RESTART INSTRUCTIONS

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If the Challenger® Centrifugal Pump is installed below the water level of the pool, close return and suction lines prior to opening hair and lint pot on pump. Make sure to reopen valves prior to operating.

**⚠ CAUTION** DO NOT run the pump dry. If the pump is run dry, the mechanical seal will be damaged and the pump will start leaking. If this occurs, the damaged seal must be replaced. ALWAYS maintain proper water level in your pool (half way up skimmer opening). If the water level falls below the skimmer opening, the pump will draw air through the skimmer, losing the prime and causing the pump to run dry, resulting in a damaged seal. Continued operation in this matter could cause a loss of pressure, resulting in damage to the pump case, impeller, and seal and may cause property damage and personal injury.

### Priming the Pump

The pump strainer pot must be filled with water before the pump is initially started. Follow these steps to prime the pump:

1. Remove the pump lid.
2. Fill the pump strainer pot with water.
3. Reassemble the pump lid onto the strainer pot. The pump is now ready to prime.
4. Open the air release valve on the filter, and stand clear of the filter.
5. Turn on the switch or time clock.
6. When water comes out of the air release valve, close the valve. The system should now be free of air and recirculating water to and from the pool.
7. This pump will prime within thirty (30) minutes. Do not allow your pump to run longer than this time without developing full flow. If the pump does not prime, see “Troubleshooting” on page 11.
8. Two speed pumps should run on high speed for priming.

# TROUBLESHOOTING

Use the following troubleshooting information to resolve possible Challenger® Centrifugal Pump problems.



**WARNING**

**RISK OF ELECTRICAL SHOCK OR ELECTROCUTION.**

Improper installation will create an electrical hazard which could result in death or serious injury to pool users, installers, or others due to electrical shock, and may also cause damage to property.

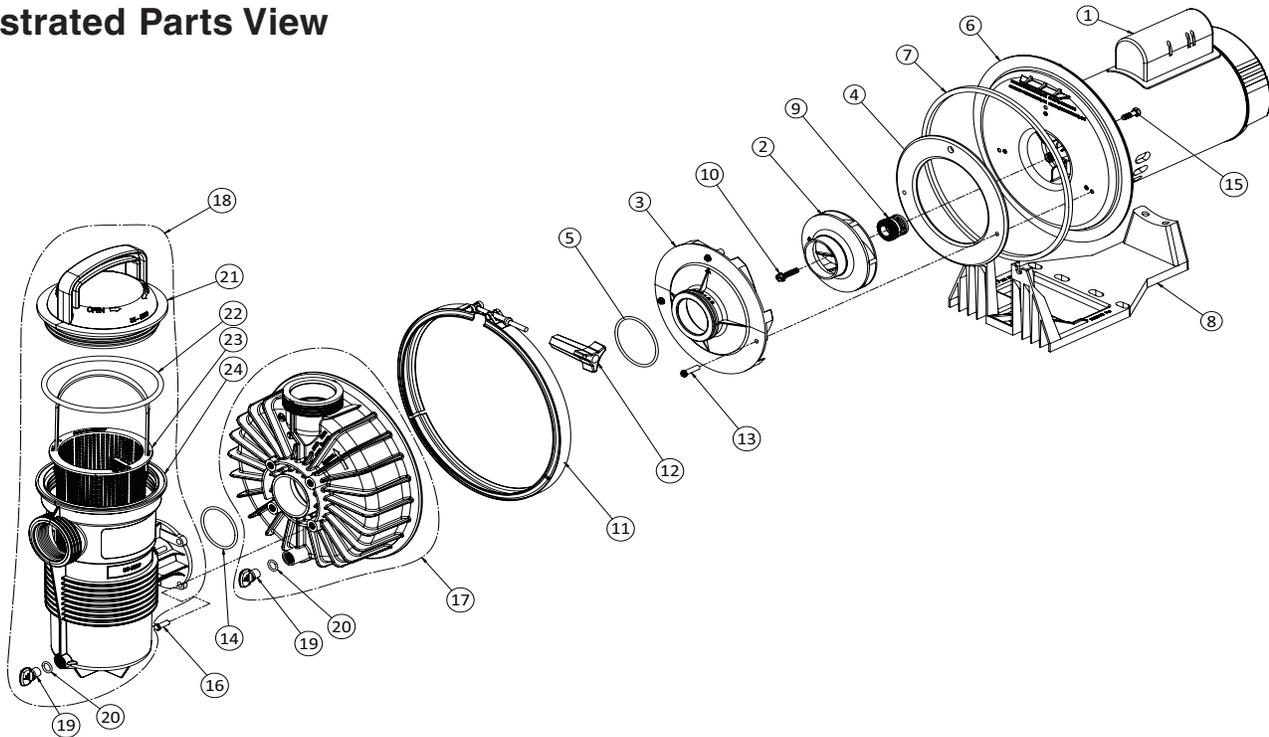
1. If you are not familiar with your pool filtering system and/or heater:
  - a. **DO NOT** attempt to adjust or service without consulting your dealer, or a qualified pool professional.
  - b. Read the entire Installation & User's Guide before attempting to use, service or adjust the pool filtering system or heater.
2. **SWITCH OFF power to the pump at the breaker before attempting service or repair.**

## Problems and Corrective Actions

Problem	Cause	Remedy
<b>Pump will not prime</b>	<ol style="list-style-type: none"> <li>1. No water in strainer pot.</li> <li>2. Strainer pot lid is not tight.</li> <li>3. Damaged lid o-ring.</li> <li>4. Water level is below skimmer.</li> <li>5. Strainer basket or skimmer basket is clogged.</li> <li>6. Closed valve in piping system.</li> <li>7. Pump is on low speed (two speed units only).</li> <li>8. Air leak in suction line.</li> </ol>	<p>Add water to pot. Tighten lid. Replace o-ring. Adjust pool water level. Clear basket. Check all valves and open all necessary valves. Adjust to high speed. Find &amp; fix leak.</p>
<b>Low Flow-High Filter Pressure</b>	<ol style="list-style-type: none"> <li>1. Filter is dirty.</li> <li>2. Restriction in return line.</li> </ol>	<p>Clean filter. Open return line restriction.</p>
<b>Low Flow-Low Filter Pressure</b>	<ol style="list-style-type: none"> <li>1. Strainer basket or skimmer basket is clogged.</li> <li>2. Clogged impeller.</li> <li>3. Air leak in suction line.</li> <li>4. Restriction in suction line.</li> </ol>	<p>Clean basket. Clean obstruction. Find &amp; fix leak. Find and open restriction.</p>
<b>Motor does not turn</b>	<ol style="list-style-type: none"> <li>1. Power switch is off.</li> <li>2. Circuit breaker has tripped.</li> <li>3. Pump is in "Off-mode" on a timer controlled circuit.</li> <li>4. Motor terminal connections are incorrect.</li> <li>5. Motor shaft is locked by bad bearing.</li> <li>6. Impeller is locked by debris.</li> </ol>	<p>Check power switch &amp; reset. Check circuit breaker &amp; reset, if re-trips, contact electrician. Check timer mode. Have terminal connections checked by electrician. Have motor bearings replaced or replace pump. Clean impeller.</p>
<b>Motor Over-Heating</b>	<ol style="list-style-type: none"> <li>1. Electrical supply connections are incorrect.</li> <li>2. Wiring to pump is undersized.</li> <li>3. Power Company supply voltage is low.</li> <li>4. Ventilation is inadequate for motor.</li> </ol>	<p>Have terminal connections checked by electrician. Consult electrician to rewire pump. Notify Power Company. Remove any restrictions to air flow.</p>

# REPLACEMENT PARTS

## Illustrated Parts View



## High Pressure Pump Parts List

Item #	P/N	Description
1	See Motor Table	Motor
2	See Impeller/Diffuser Table	Impeller
3	See Impeller/Diffuser Table	Diffuser
4	See Impeller/Diffuser Table	Diffuser Spacer
5	355331	Diffuser O-Ring
6	355004	Seal Plate
7	355329	Seal Plate Square Ring
8	355305	Base
9	354545S	Seal
10	355389	Impeller Screw
11	354629	Band Clamp
12	175025	Band Clamp Knob
13	355334	Diffuser Screw (3x)
14	355330	Front Housing O-Ring
15	U30-74SS	Motor Bolt (4x)
16	354265	Strainer Pot Bolt (4x)
17	355468	Housing
18	359507 / 357391 (3HP)	Pot Assembly
19	357161	Drain Plug (2x)
20	192115	Drain Plug O-Ring (2x)
21	355301	Lid
22	350013	Lid O-Ring
23	355318 / 355441 (3HP)	Strainer Basket
24	355300	Strainer Pot

## Motor Table

Motor	Model		
	Single Speed	Two Speed	3-Phase TEFC
1/2F, 3/4A	355019S	—	—
3/4F, 1A	355021S	355375S	—
1F, 1-1/2A	355023S	355376S	—
1-1/2F, 2A	355025S	355377S	—
2F, 2-1/2A	355027S	355378S	—
3F	355034S	—	—
1/2FE, 3/4FE	355009S	—	—
1FE	355011S	—	354806S
1-1/2FE	355013S	—	354808S
2FE, 2-1/2AE	355015S	—	354810S
3FE	355017S	—	354812S

## Impeller/Diffuser Table

Motor	Impeller P/N	Diffuser P/N	Diffuser Spacer P/N
<b>HIGH PRESSURE MODELS</b>			
1/2F, 3/4A, 1/2FE	355147	355148	355384
3/4F, 1A, 3/4FE	355187	355188	355317
1F, 1-1/2A, 1FE	355369	355188	355317
1-1/2F, 2A, 1-1/2FE	355315	355270	355317
2F, 2-1/2A, 2FE, 2-1/2AE	355604	355545	355317
3F, 3FE	355544	355545	355317

## High Flow Pump Parts List

Item #	P/N	Description
1	See Motor Table	Motor
2	See Impeller/Diffuser Table	Impeller
3	See Impeller/Diffuser Table	Diffuser
4	See Impeller/Diffuser Table	Diffuser Spacer
5	355030	Diffuser O-Ring
6	355004	Seal Plate
7	355329	Seal Plate Square Ring
8	355305	Base
9	354545S	Seal
10	355389	Impeller Screw
11	354629	Band Clamp
12	175025	Band Clamp Knob
13	355334	Diffuser Screw (3x)
14	355330	Front Housing O-Ring
15	U30-74SS	Motor Bolt (4x)
16	354265	Strainer Pot Bolt (4x)
17	355468	Housing
18	359507	Pot Assembly
19	357161	Drain Plug (2x)
20	192115	Drain Plug O-Ring (2x)
21	355301	Lid
22	350013	Lid O-Ring
23	355318	Strainer Basket
24	355300	Strainer Pot

## Motor Table

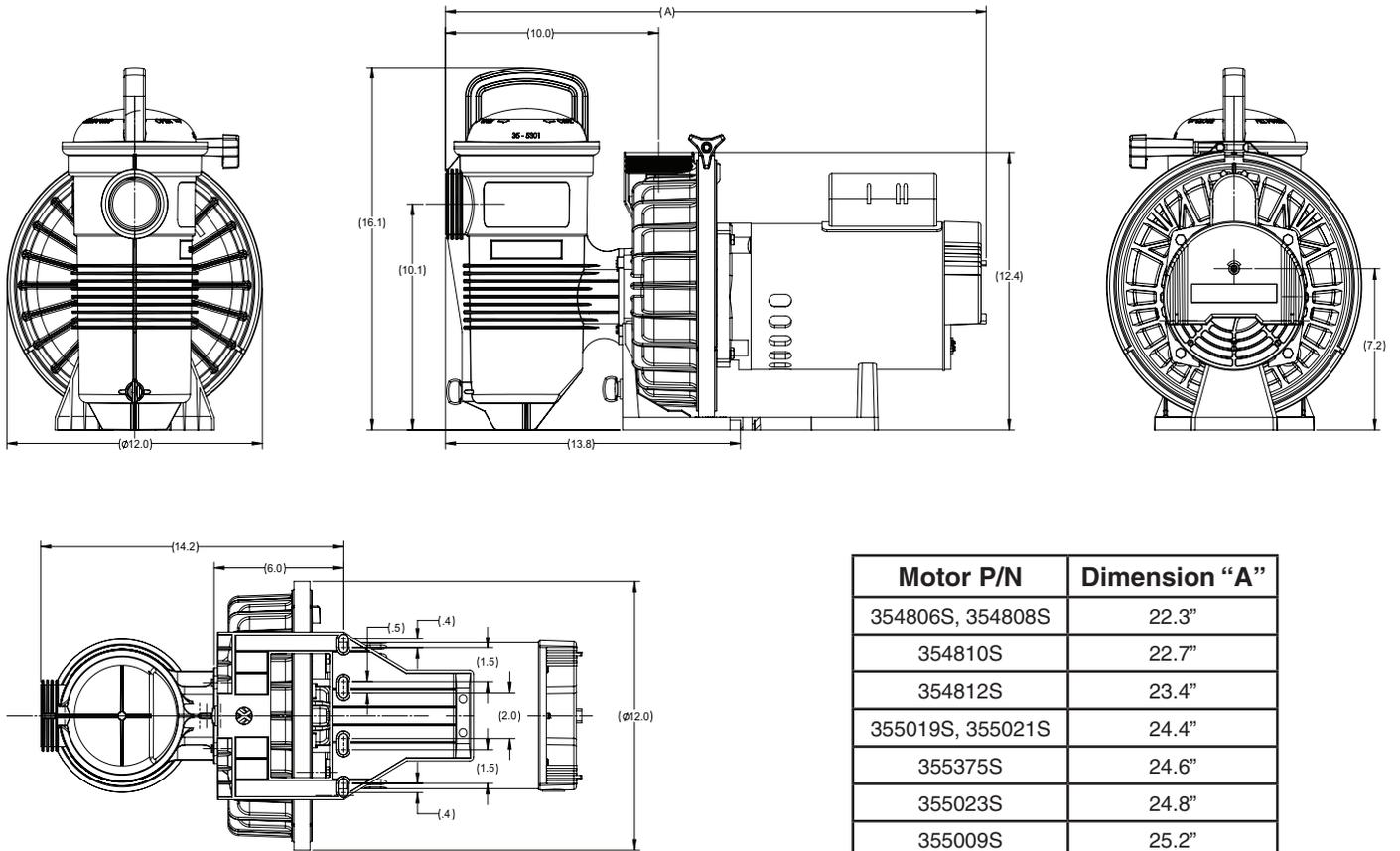
Motor	Motor P/N
1/2F, 3/4A	355019S
3/4F, 1A	355021S
1F, 1-1/2A	355023S
1-1/2F, 2A	355025S
2F, 2-1/2A	355027S
1FE	355011S
1-1/2FE	355013S
2FE, 2-1/2AE	355015S

## Impeller/Diffuser Table

Motor	Impeller P/N	Diffuser P/N	Diffuser Spacer P/N
<b>HIGH FLOW MODELS</b>			
1/2F, 3/4A	355043	355029	355028
3/4F, 1A	355067	355029	355028
1F, 1-1/2A, 1FE	355074	355077	355078
1-1/2F, 2A, 1-1/2FE	355086	355077	355078
2F, 2-1/2A, 2FE	355093	355094	355095

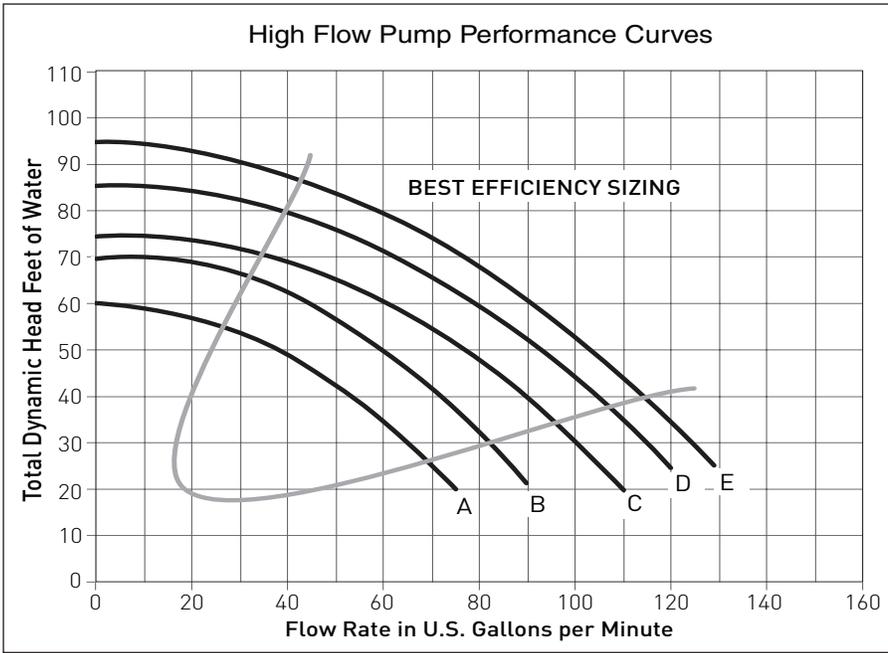
# TECHNICAL DATA

## Dimensional Drawings

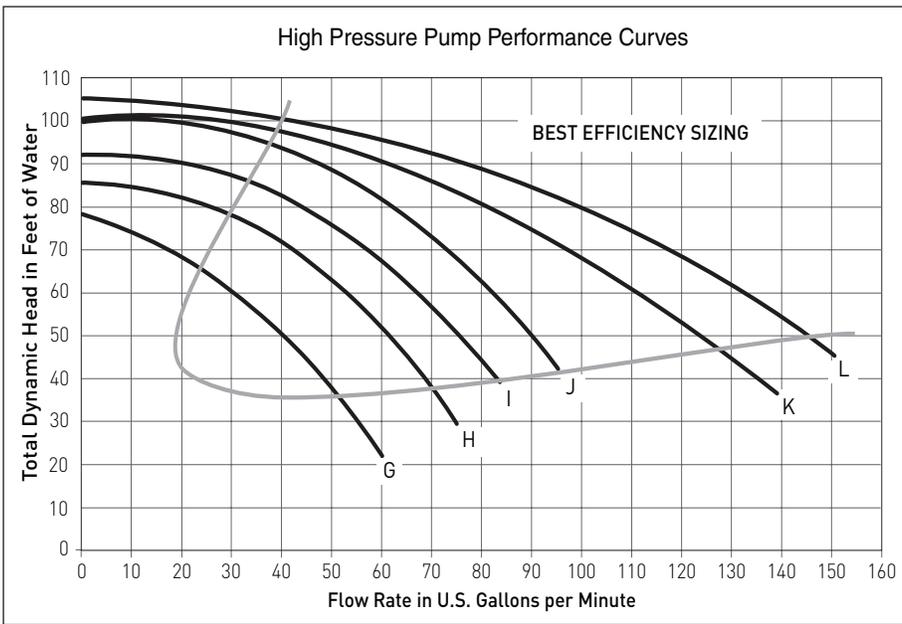


Motor P/N	Dimension "A"
354806S, 354808S	22.3"
354810S	22.7"
354812S	23.4"
355019S, 355021S	24.4"
355375S	24.6"
355023S	24.8"
355009S	25.2"
355376S	25.3"
355011S, 355027S	25.4"
355377S	25.8"
355013S	25.9"
355378S	26.3"
355025S, 355034S, 355015S, 355017S	26.4"

# Pump Performance Curves



High Flow Curve Key	
	MOTOR
A	1/2F and 3/4A
B	3/4F and 1A
C	1FE, 1F and 1-1/2A
D	1-1/2FE, 1-1/2F and 2A
E	2FE, 2F and 2-1/2A



High Pressure Curve Key	
	MOTOR
G	1/2FE, 1/2F and 3/4A
H	3/4FE, 3/4F and 1A
I	1FE, 1F, 1-1/2A and 1FE 3PH
J	1-1/2FE, 1-1/2F, 2A and 1-1/2FE 3PH
K	2FE, 2-1/2AE, 2F, 2-1/2A and 2FE 3PH
L	3FE, 3F and 3FE 3PH



1620 HAWKINS AVE., SANFORD, NC 27330 • (919) 566-8000  
10951 WEST LOS ANGELES AVE., MOORPARK, CA 93021 • (805) 553-5000

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