

# PENTAIR Variable Speed Programmable Pump Instruction Manual

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## Variable Speed Programmable Pump

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### Product Information

The Variable Speed Programmable Pump is a highly efficient pool pump designed to save power consumption. It features a variable speed design, a simple and intuitive user interface, and a real-time clock with 24-hour memory retention. The pump also includes a revolutionized removable strainer basket with built-in thermal overload protection and a totally enclosed fan cooled (TEFC) motor.

The pump is available in three models: A, B, and C. Each model has an input of 230 VAC, 50/60 Hz, P1-1500 Watts, P2-1150 Watts, single phase.

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### Product Usage Instructions

#### 1. Installation:

- Before installing or servicing the pump, ensure that the power supply is turned off and the system circulation is stopped.
- Open the air relief valve to release all pressure.
- It is recommended to have the pump installed and serviced by a qualified pool professional.

#### 2. Safety Precautions:

- Read and follow all safety instructions provided in the manual.
- Stay off the main drain and away from all suction outlets.
- Ensure that the strainer cover is properly secured to prevent violent separation due to pressure in the circulation system.
- Before servicing, turn off all circulation system and pump

controls. Make sure the filter manual air relief valve is open and all pressure is relieved.

- Remove plugs of the pool/spa from the suction outlets to avoid potential suction entrapment.
- Do not permit children to use the product without close supervision.
- Before working on any electrical equipment, turn off the power supply.

### 3. **Operation:**

- Ensure that all system valves are in a position that allows pool water to return back to the pool.
- Check that all components of the circulation system are in good condition and assembled properly before operating the pump.
- Do not run the pump dry. Fill the strainer housing with water before running the pump to prevent damage to the mechanical shaft seal and avoid leakage and flooding.

### 4. **Troubleshooting:**

- If you experience any issues with the pump, refer to the troubleshooting section in the user manual or contact a qualified pool professional for assistance.

### 5. **Parts:**

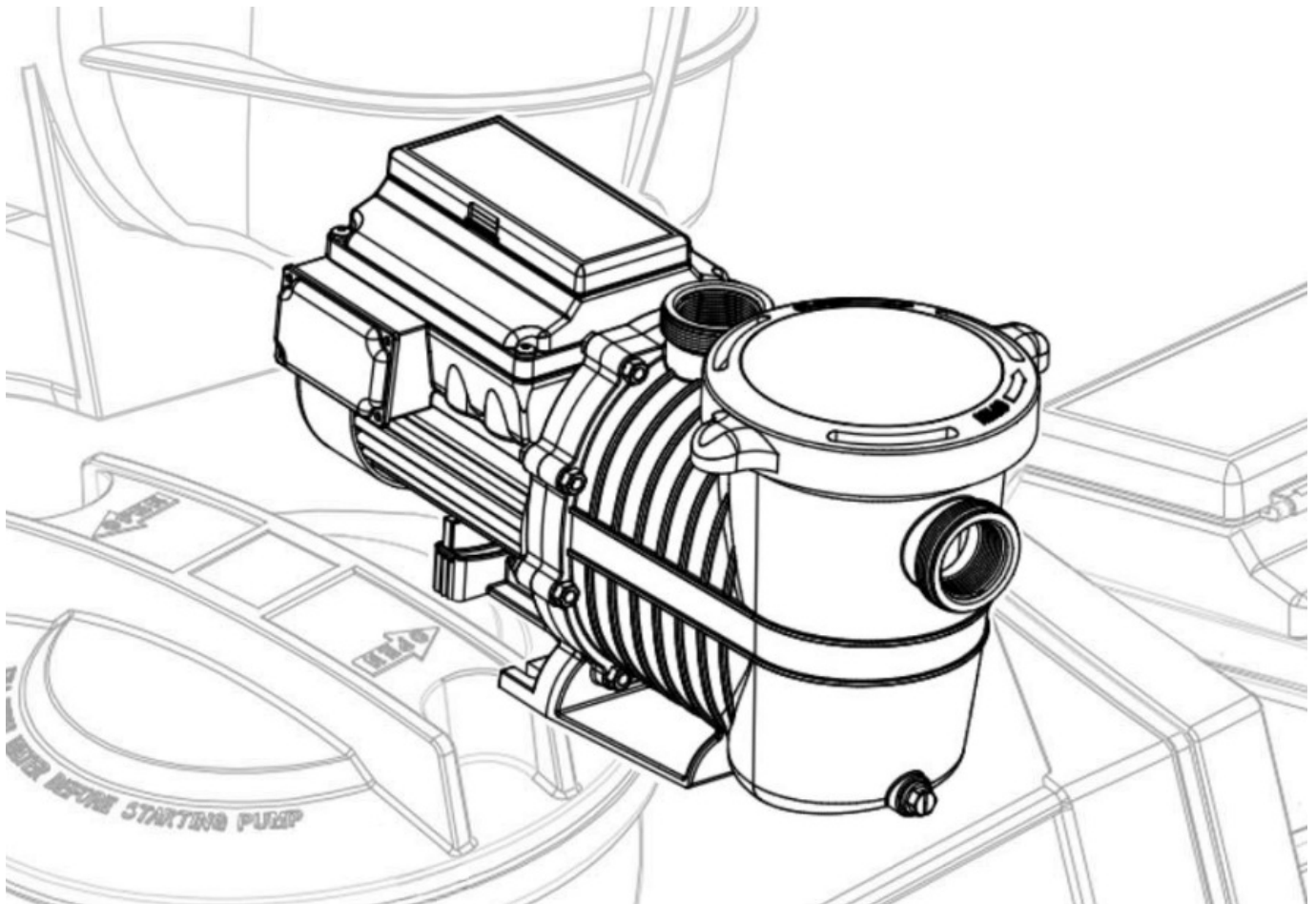
- If any parts need to be replaced, refer to the parts section in the user manual or contact a qualified pool professional for assistance.

Always read the instruction manual carefully before installation and follow all instructions provided for safe and efficient use of the Variable Speed Programmable Pump.

Variable Speed

Programmable Pump

USER'S MANUAL
INSTALLATION   OPERATION   TROUBLE SHOOTING   PARTS



IMPORTANT SAFETY INSTRUCTIONS  
READ AND FOLLOW ALL INSTRUCTIONS  
SAVE THESE INSTRUCTIONS

**READ CAREFULLY AND SAVE THIS INSTRUCTION MANUAL**

TO USER/INSTALLER/OPERATOR – THIS USER MANUAL INCLUDES KEY POINTS AND IMPORTANT SAFETY INSTRUCTIONS ON USING THIS PRODUCT, READ AND FOLLOW ALL INSTRUCTIONS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH. SAVE THESE INSTRUCTIONS.



**SAFETY PRECAUTION**

**Read this “Safety Precautions” before operation.**





Below information should not be neglected for proper use of this product. Follow all instructions can help user avoid potential danger.









**Following information is very important for safety in handling this product.**








**Be sure to observe them.**

<b>DANGER</b>	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
<b>WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
<b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.
<b>IMPORTANT</b>	 <b>PROHIBITED</b>  <b>ALERT</b>

**DANGER**

	Stay off the main drain and away from all suction outlets.
	strainer cover must be properly secured to prevent violent separation due to pressure in the circulation system.
	Before servicing, turn all the circulation system and pump controls off, make sure the filter manual air relief valve is in the open position and all pressure is relieved.
	It is highly recommend that this product be installed and serviced by a qualified pool professional.

<b>WARNING</b>	
	Remove plugs of the pool/spa from the suction outlets so as to void potential for suction entrapment.
	To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.
	Before starting, all system valves must be in a position that will allow pool water to return back to the pool.
	Make sure all components of the circulation system are in good condition and assembled properly before operating the circulation system.
	Before working on any electrical equipment, turn off power supply to the equipment.
	Risk of Electric 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.
	The 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.
	To reduce the risk of electric shock replace damaged cord immediately.

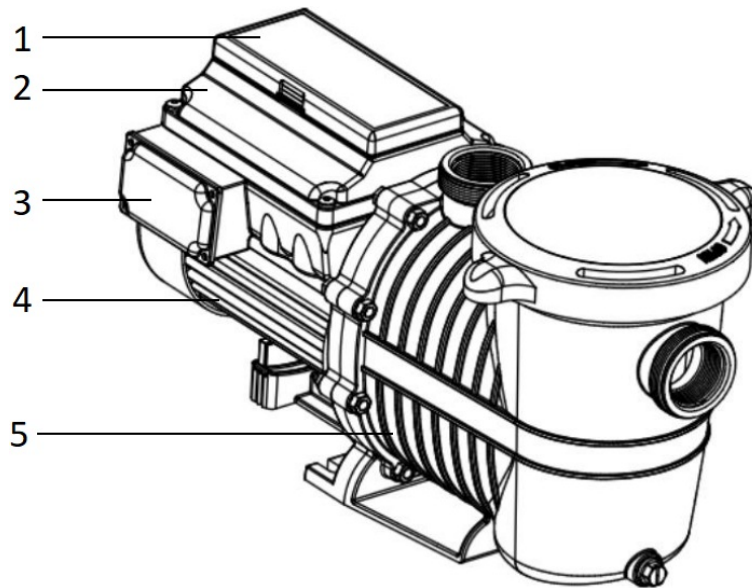
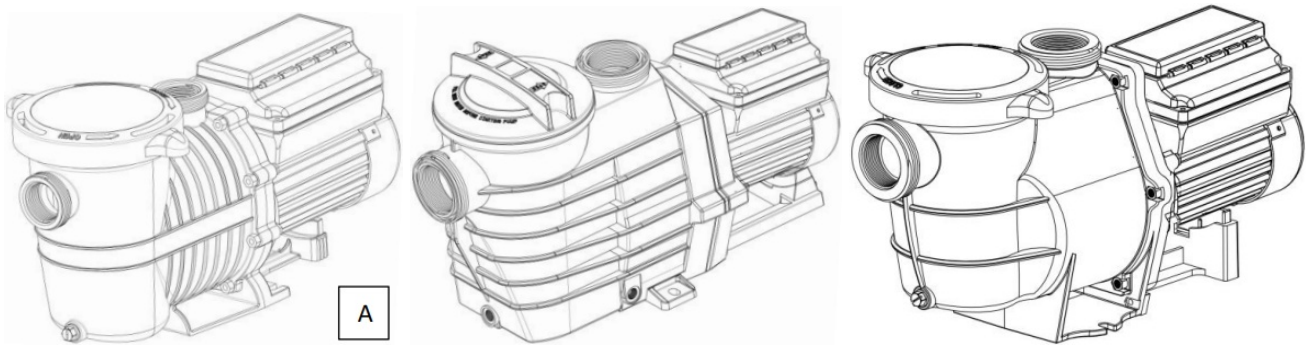
<b>CAUTION</b>	
	All electrical wiring must be in conformance with local code and National Electric Code (NEC).
	Though this pump is designed for outdoor use, it is strongly advised to keep the pump from direct sunlight for a longer lifespan.
	Install this pump in a place with good drainage.
	Make sure the surrounding of the pump is ventilated to reduce the probability of overheating.
	This pump is for use with permanently-installed 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.
	Do not install this pump in a damp location.
	Do not run pump dry. Fail to do so will damage the mechanical shaft seal and result in leakage and flooding. Fill strainer housing with water before running the pump.

## GENERAL VIEW

Variable speed pump is a good choice for your pool which helps to save power consumption significantly.

This manual includes instruction of three models: [A], [B] and [C]. It contains important information on how to operate the pump safely, properly and most efficiently. Read carefully before installation and always follow

instructions.

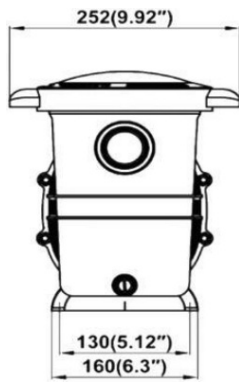


1. Control Panel
2. Variable Frequency Driver
3. AC Power Connection Terminal
4. Pump Motor
5. Pump Body

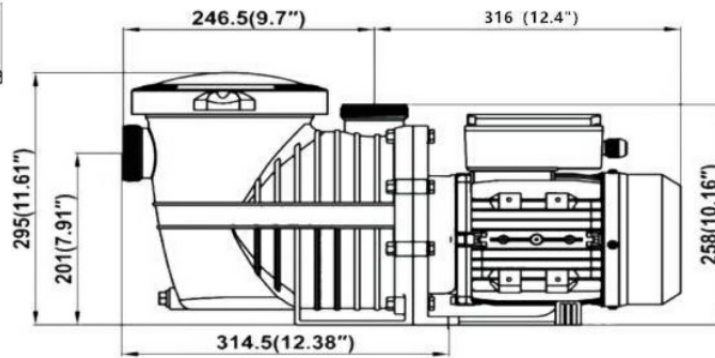
#### Feature

- Variable speed design makes it extremely energy saving.
- Simple, intuitive user interface, easy to program and operate.
- Real-time clock with 24-hour memory retention.
- A revolutionized removable strainer basket with a built-in thermal overload protection.
- Totally enclosed fan cooled (TEFC) motor.

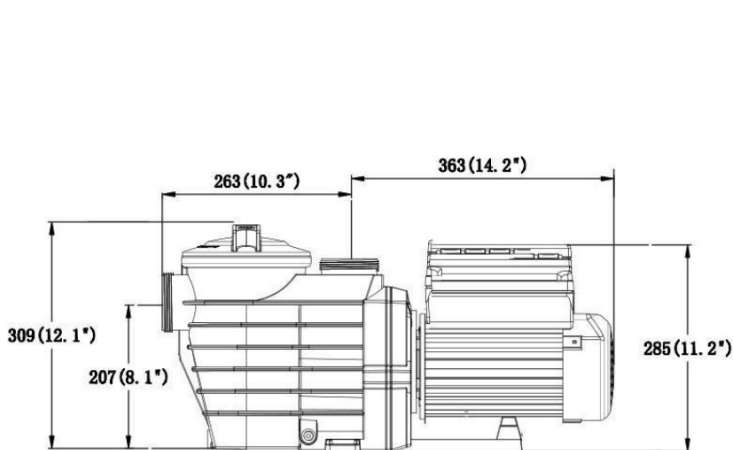
#### Dimension



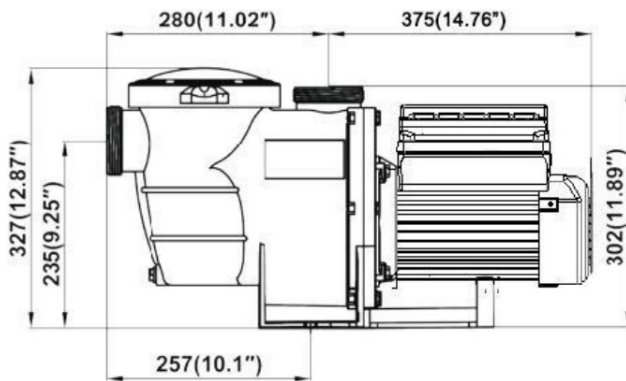
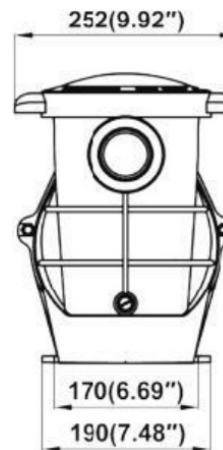
[A]



[B]

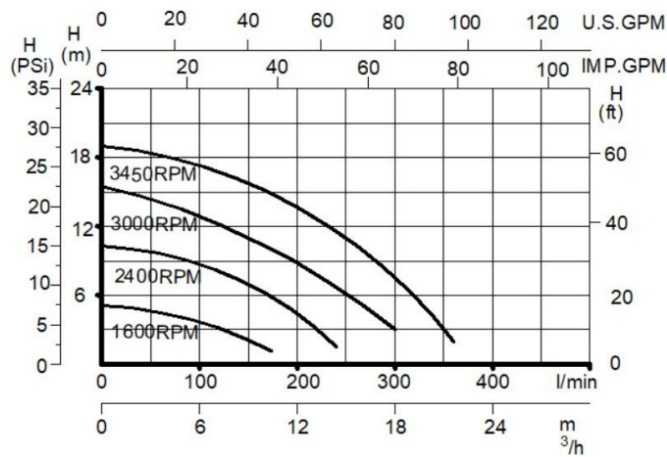


[C]



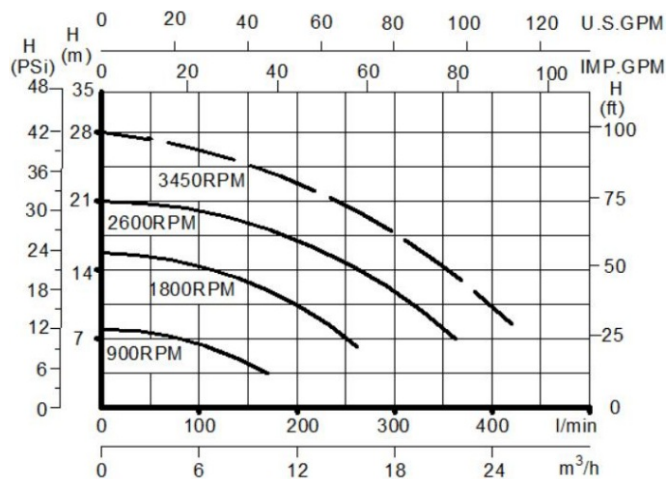
**Input:** 230 VAC, 50/60 Hz, P1-1500 Watts, P2-1150 Watts, single phase.

Performance Curve

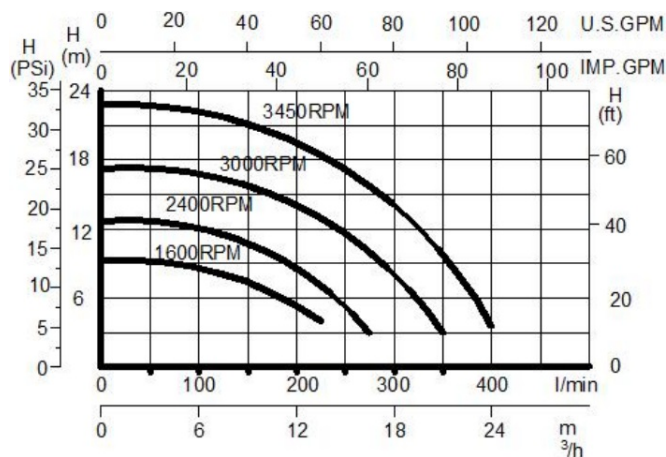


[A]

[B]



[C]



## INSTALLATION GUIDE

**Before servicing, turn the power supply off and stop the system circulation, open the air relief valve and release all the pressure.**

**WARNING:** This product should be installed and serviced by a qualified pool professional.



Try to install this pump as close as possible to the swimming pool. Plumbings with less joint and elbow pipes are better for good suction. It is highly recommended that locate the pump in a cool, dry place without direct sunlight for a longer lifespan. Install pump on a firm level surface to meet all local and national codes. Fix pump on the base with bolts to reduce vibration.

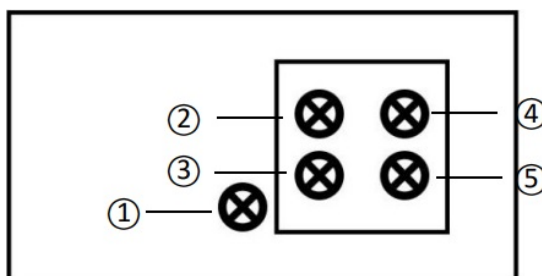
It is also highly recommended to install a check valve on the pipe near the inlet port of the pump, so that no priming is required when pump restarts after that.

**Warning:** Prevent foreign matters from entering the pump through inlet, fail to do so will result in damage to the pump.

**Warning:** Keep product away from Children.

Use Teflon tape on the thread before screw fittings to pump inlet and outlet ports so as to avoid leakage. Do not over-tighten the fittings.

### Wiring



If pump comes with a power cord & plug, no wiring needed. In some areas, power cord is not provided due to the local electrical standards and pump should be wired according to local electrical standards and regulations. For those pumps, follow the instructions below to wire them:

Take off the AC power connection terminal box cover, there are 5 screws inside the terminal box, the screw (1) should be connected to the ground wire, the screw (2) and (3) should be connected to either of the two live wires. The screw (4) and (5) is not used.

Make sure that the electrical supply available is suitable for the motor's voltage, phase, and cycle, and that the wire size is adequate for the HP (kW) rating and distance from the power source.

**Warning:** All electrical wiring must be performed by a licensed electrician,

**Warning:** All electrical wiring must conform to local codes and NEC regulations.

**Warning:** Use copper conductors only.

Electrical Guidance for Single phase motors					
Rated		Volts	Circuit Breaker Amps	Branch Fusetron Amps	Recommended Wire Size 0-50'
KW	HP				
0.37	0.5	115	15	15	No. 14
0.55	0.75	115 230	15 10	15 6.25	No. 14 No. 14
0.75	1	115 230	20 10	20 9	No. 12 No. 14
1.1	1.5	115 230	30 15	30 15	No. 10 No. 14
1.55	2	115 230	30 15	30 12	No. 10 No. 14
1.88	2.5	230	20	20	No. 12

Voltage from the power source must be in the range from 90% to 110% of the motor nameplate rated voltage. Fail to do so will result in overload tripping and reduced component life.

Install, ground, bond, and wire motor in accordance with local or NEC requirements.

Ground the pump by connecting a grounding wire from the electrical service ground terminal to the motor grounding screw.

Bond pump motor to pool structure. The means creating a electrical connection between the pump and the pool system. This helps to prevent any potential hazards that could occur if there was an electrical issue with the pump.

## PRIMING

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Fill strainer housing with water, make sure no air or water leaks from anywhere of the pump, keep the operator at least 10ft away from the pump.

Turn on power and wait for the pump to prime, which may take several minutes until the strainer housing is full of water, the prime time depends on the vertical and horizontal distance of the suction pipe. Make sure all necessary valves are open and the circulation is free when pump is running.

If pump fails to prime within five minutes, stop it and check the problem. See troubleshooting.

## SERVICING

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**Warning:** Stop pump and release all pressure from the circulation system before servicing.

Clean the filter basket regularly to ensure adequate water flow.

Make sure the motor runs in a normal way without any noise or vibration or overheating.

If any problem found on the pump, see troubleshooting to find the problem and contact distributor to get spare parts for replacement. See spare parts.

## STORAGE

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Keep pump from freeze in cold weather, please follow the instructions to drain the pump:

- Make sure the water level is below the suction pipe the pool.
- Remove the drain plug from pump strainer body as well as the pump lid.
- Take off pump from the mounting pad and pour out the remaining water from the pump.
- Assemble the strainer lid and drain plug back to the pump.
- Keep pump in dry and ventilated place.

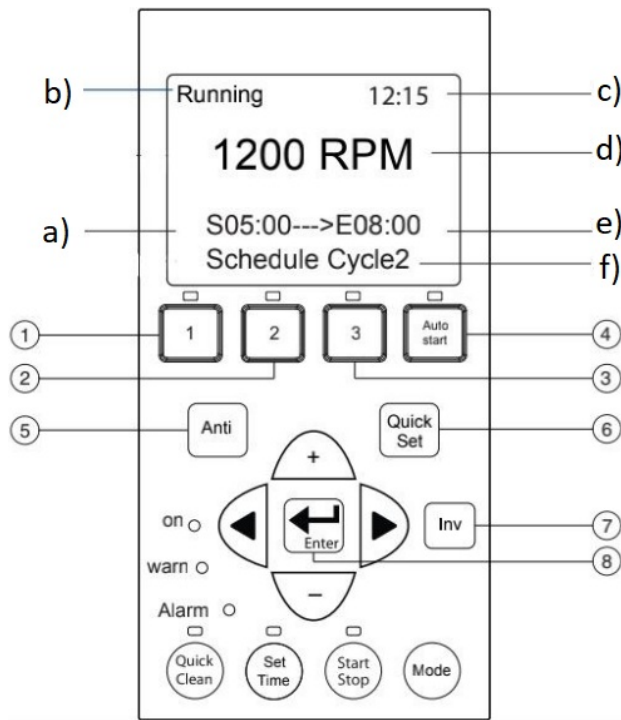
**Warning:** Turn off the power and release all pressure before draining the pump.

**Warning:** Do not pack the pump in a sealed bag to prevent metal components from rusting.

## CONTROLLER OPERATION

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Operator Control Panel



- a) Start/End Time in Schedule Mode
- b) Running/Stop
- c) Current Time
- d) Current Speed
- e) Current Watt in Manual Mode
- f) Current Mode

#### Controls and LEDs

(1) **1 button/LED:** when in manual mode, button 1 means manual speed 1; When in schedule mode, this button means cycle 1. The LED lights on means the pump is running at speed 1 in manual mode or running at cycle 1 in schedule mode.

(2) **2 button/LED:** when in manual mode, button 2 means manual speed 2; When in schedule mode, this button means cycle 2. The LED lights on means the pump is running at speed 2 in manual mode or running at cycle 2 in schedule mode.

(3) **3 button/LED:** when in manual mode, button 3 means manual speed 3; When in schedule mode, this button means cycle 3. The LED lights on means the pump is running at speed 3 in manual mode or running at cycle 3 in schedule mode.

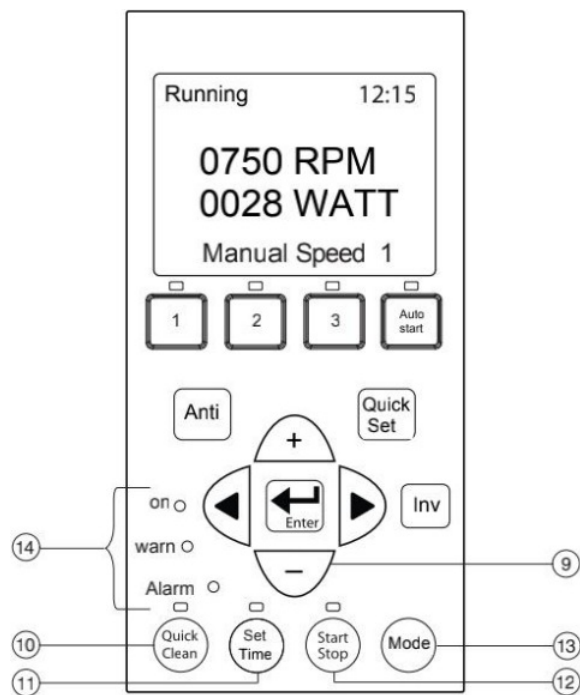
(4) **Auto Start:** if LED is on, pump will start running automatically when power is given. LED off means disable.

(5) **Anti button:** antifreeze function on/off.

(6) **Quick Set:** set up for current mode.

(7) **Inv:** shows basic parameters.

(8) **Enter:** save the current value and come into next set up item in quick edit mode.



**(9) Arrow/+/- buttons:**

Left arrow: move cursor left one digit.

Right arrow: move cursor right one digit.

+: increase a digit.

-: decrease a digit.

(10) **Quick Clean:** to run pump at a certain speed for a certain duration time. Speed and duration can be preset by pressing “Quick Set” button when in quick clean mode.

(11) **Set Time:** set local time for pump.

(12) **Start Stop:** start or stop the pump. LED will turn off once speed reduces to 0.

(13) **Mode:** switch among manual mode, schedule mode and external control mode(if there is).

**(14) LEDs:**

On: indicates pump is power on.

Warning: LED is on if a warning condition is present.

Alarm: LED is on if an alarm condition occurs.

## Operating Pump

This section describes how to operate the pump using the control panel buttons.

### Start the pump

- Make sure the pump is power on and the green “On” power LED is on.
- Press the “Start Stop” button to start the pump.

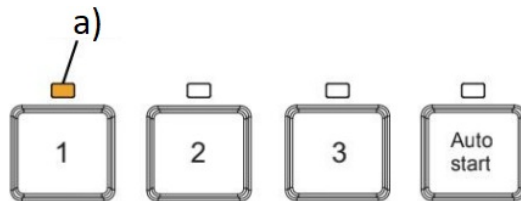
### Stop the pump

- Press the “Start Stop” button to stop the pump.

## Run pump at preset speeds

The variable speed pump is programmed with three default speeds of 750, 2500 and 3450 RPM. A speed button(1, 2, 3) is assigned to each of the preset speeds as shown. Follow instructions to run the pump at one of the preset speeds:

- Make sure the pump is in manual mode by pressing the “Mode” button.
- Press the Speed button (1, 2, 3) corresponding to the desired preset speed, the LED above the Speed button will turn on as shown.
- Press the “Start Stop” button, the pump will quickly ramp to the selected preset speed.



a) LED lit

## Adjust the pump speed

- Press the “+” or “-” button to increase or decrease the value of speed, new value will be saved automatically.

## Run pump in schedule mode

- Make sure the pump is in schedule mode by pressing the “Mode” button.
- Pump will come into the proper cycle according to the current time, the LED above the Cycle button will turn on to indicate the current cycle#.
- Press the “Start Stop” button, the pump will quickly ramp to the preset speed of the current cycle.

## Set schedule cycle 1-3

Factory settings:

Cycle#	Start Time (24-hours)	Stop Time (24-hours)	Speed (RPM)
1	06:00	09:59	1700
2	10:00	15:59	3000
3	16:00	05:59	1200

Program of each cycle is allowed:

- Go to the schedule mode by pressing “Mode” button until the phrase “Schedule Cycle” appears on the screen.
- Press “Quick Set” button to go into the speed setting page of schedule cycle1.
- Change the value of speed by pressing the arrow and “+”/”-” button.
- Press “Enter” to save and go into start time setting page of schedule cycle1.
- Change the value of start time by pressing the arrow and “+”/”-” button.
- Press “Enter” to save and go into stop time setting page of schedule cycle1.
- Change the value of stop time by pressing the arrow and “+”/”-” button.
- Press “Enter” to go into the speed setting page of schedule cycle2.
- Change the value of speed by pressing the arrow and “+”/”-” button.
- Press “Enter” to save and go into start time setting page of schedule cycle2.
- Change the value of start time by pressing the arrow and “+”/”-” button.
- Press “Enter” to save and go into stop time setting page of schedule cycle2.
- Change the value of stop time by pressing the arrow and “+”/”-” button.
- Press “Enter” to go into the speed setting page of schedule cycle3.
- Change the value of speed by pressing the arrow and “+”/”-” button.
- Press “Enter” to save and go into start time setting page of schedule cycle3.
- Change the value of start time by pressing the arrow and “+”/”-” button.
- Press “Enter” to save and go into stop time setting page of schedule cycle3.
- Change the value of stop time by pressing the arrow and “+”/”-” button.

#### Set time

- Make sure the screen is in the home page.
- Press “Set Time” button.
- Change value of the clock by pressing the arrow and “+”/”-” button. Note: time unit is 24 hours.
- Press “Enter” to save and go back to the home page.

#### Set quick clean

Factory set quick clean speed at 3450RPM with duration 5 hours. Follow the instruction below if any value should be changed:

- Make sure the screen is in the home page.
- Press “Quick Clean” button and go into quick clean mode.
- Press “Quick Set” button to go into clean speed setting page.
- Change the value of clean speed by pressing the arrow and “+”/”-” button.
- Press “Enter” to save and go into clean time (duration) setting page.
- Change the value of clean time by pressing arrow button and “+”/”-” button.
- Press “Enter” to save and go back to the home page.

#### Set antifreeze

Factory set antifreeze function enabled with speed 750RPM when temperature is below 4°C. Follow the instruction below if any value should be changed:

- Make sure the screen is in the home page.
- Press “Anti” button and go into antifreeze information page.
- Press “Quick Set” button to go into enable/disable setting.
- Change the value to “OFF” to make it inactive or keep it “on” to make this function active.
- Press “Enter” to save and go into antifreeze speed setting page.
- Change the value of antifreeze speed by pressing arrow button and “+”/“-” button.
- Press “Enter” to save and go into temperature setting page.
- Change the value of temperature by pressing arrow button and “+”/“-” button.

Note: temperature unit is °C

- Press “Enter” to save and go back to the home page.

## Basic Parameters

**Noise:** noise is adjustable, the larger the noise value is, the more electric protection pump will have. Factory set noise at 10, which meets the electrical leakage standard of most Countries and Areas. Please DO NOT change it if unnecessary.

**Pump Address:** this is available only in pump with RS485 modbus connector.

**Minimum Speed:** this allows the minimum speed the pump can run. Factory set at 450RPM, follow the instruction below to change it if necessary:

- Make sure the screen is in the home page.
- Press “Inv” button and the screen will show the current pump performance data.
- Press “Quick Set” button and go into setting page.
- Press “Enter” several times until “min-speed” is shown on the screen.
- Change value of minimum speed by pressing arrow and “+”/“-” button.
- Press “Enter” to save.
- If no other change needed, press “Quick Set” button to

**Maximum Speed:** this allows the maximum speed the pump can run. Factory set at 3450RPM, follow the instruction below to change it if necessary:

- Make sure the screen is in the home page.
- Press “Inv” button and the screen will show the current pump performance data.
- Press “Quick Set” button and go into setting page.
- Press “Enter” several times until “max-speed” is shown on the screen.
- Change value of maximum speed by pressing arrow and “+”/“-” button.
- Press “Enter” to save.
- If no other change needed, press “Quick Set” button to go back to home page

**External Speed:** this is available only on pump with RS485 modbus connector, not apply to all the models.

**Baudrate:** this is available and useful only on pump with RS485 modbus connector, not apply to all the models.

**Parity:** this is available and useful only on pump with RS485 modbus connector, not apply to all the models.



**Wait Time:** this is available and useful only on pump with RS485 modbus connector, not apply to all the models.

**Accelerate Time:** this is available and useful only on pump with RS485 modbus connector, not apply to all the models.

**Decelerate Time:** this is available and useful only on pump with RS485 modbus connector, not apply to all the models.

**Electric Consumption:** this is the accumulated energy consumption of the pump from the last restore of factory settings to the current moment. It is normal if it is not 0 before user runs the pump, as each pump is tested before leaving factory.

**Restore Factory Settings:** this allows user to delete all the settings of the pump and all data will be restored to factory settings.

## MAINTENANCE

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This section describes how to service and maintain the pump.

### Strainer basket

The strainer basket locates in the pump strainer and can be seen when look down into the pump lid. It should be inspected and cleaned regularly(once a week is recommended) to keep the pump working efficiently.

How to service the strainer basket:

- Stop pump and turn off power supply.
- Relieve pressure in the system.
- Remove the pump lid.
- Take out the strainer basket and remove all the debris. Note: if the basket is cracked, replace it.
- Rinse out the basket.
- Put the basket back to the pump strainer housing.
- Fill the pump strainer housing with water up to the inlet port level.
- Re-install the pump lid.

**Warning:** Do not service pump when plug in, fail to follow this may cause injury.

### Pump Motor

Though pump is designed for outdoor use, it is highly recommended to place it in a ventilate shadow and avoid direct sun light and rain.

Keep away from any foreign matter, dirt or moisture. If the motor is wet, dry it before running.

### Storage

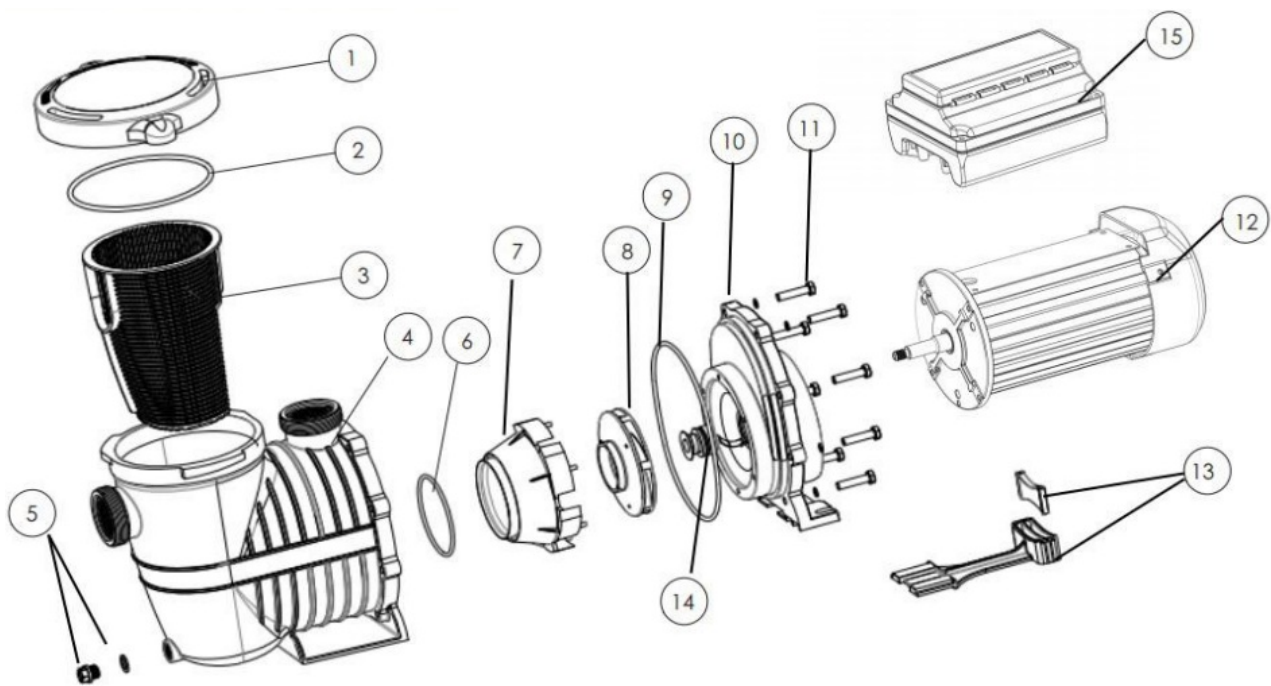
Dry the pump before storage.

Do not wrap motor and controller with plastic or other air tight materials during storage.

## TROUBLE SHOOTING

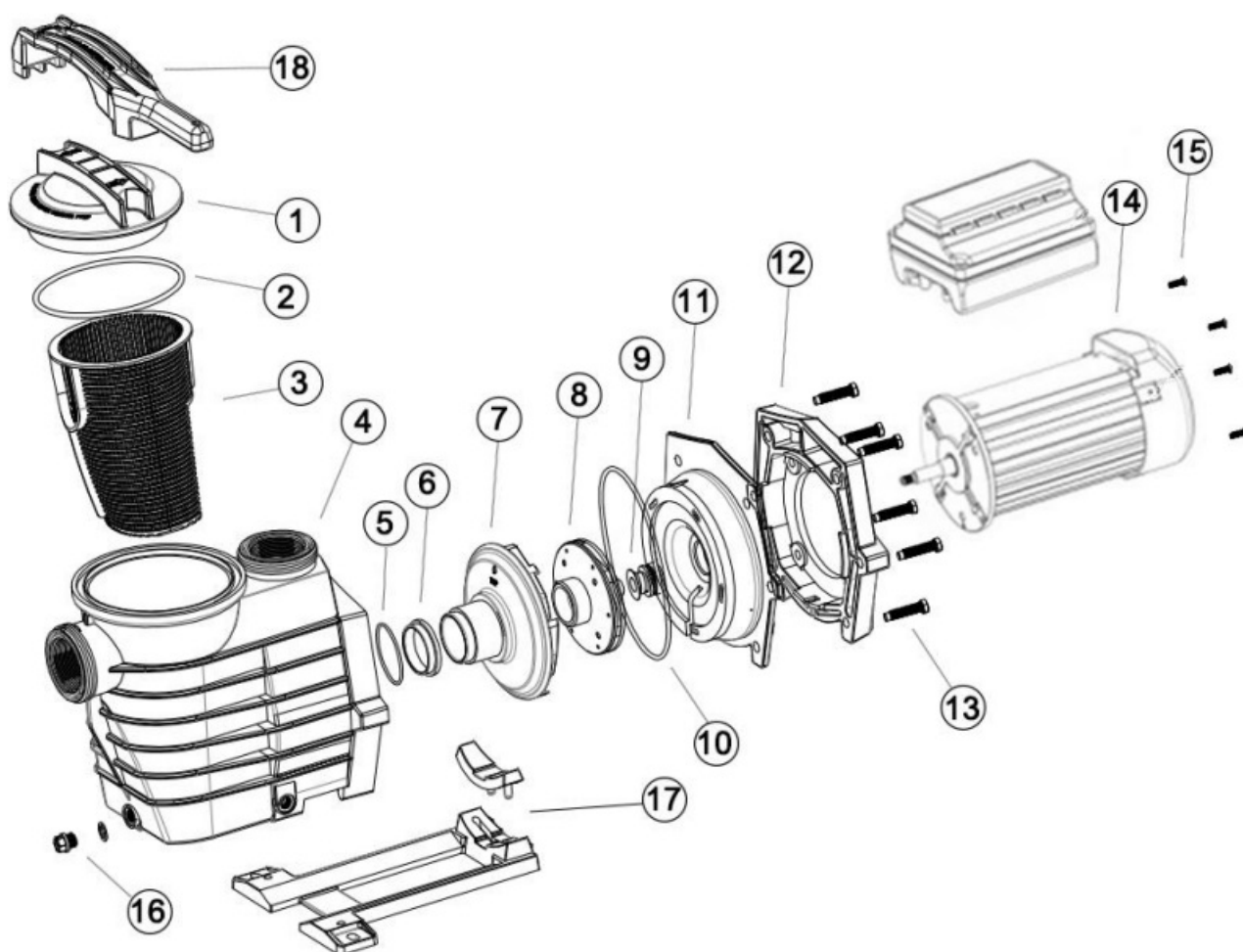
ISSUE	POSSIBLE SOLUTION
MOTOR WILL NOT START	<b>Wrong wiring; Loose electrical connection; Open switches or relays; Tripped circuit breakers, GFCI's, or blown fuses. No power supply or improper power supply.</b>
	<b>Open the motor back cover and rotate the shaft manually to make sure it is not trapped.</b>
	<b>If pump connects to a timer, make sure it works.</b>
MOTOR SHUTS OFF	<b>Improper wiring(wrong wiring size or extension cords); Loose connections.</b>
	<b>Low voltage</b>
	<b>Electrical overload.</b>
	<b>Motor overheating due to damage in violent transportation</b>
MOTOR HUMS BUT DOES NOT START	<b>Centrifugal switch stuck in OPEN position.</b>
	<b>Trapped impeller or motor shaft.</b>
PUMP WON'T PRIME	<b>Make sure pump strainer housing is filled with water. Check to see if strainer cover is sealed properly without air leakage.</b>
	<b>Make sure all necessary valves are in open position and the water can circulate freely.</b>
	<b>Check to see if pump develops a vacuum, if so, there might be air leakage in the plumbing, please further check each pipe and joint in the plumbing; If pump does not develop any vacuum, please further check if there's air leakage from the pump lid or connectors/fittings. Also, make sure impeller is not trapped by debris.</b>
LOW FLOW	<b>The filter screen or suction pipe is blocked or restricted.</b>
	<b>Pipe not big enough for more water to go through.</b>
	<b>Filter pressure too high due to dirty filter media. If pump connects to a sand filter, backwash the sand filter; If pump connects to a cartridge filter, replace the cartridge.</b>
	<b>Leakage from the pump lid or connectors/fittings. If air leaks in suction pipe, pump will rumble constantly.</b>
	<b>Cavitation due to restricted or undersized suction line or leak at any joint, low water level in pool, and unrestricted discharge return lines. Correct suction condition or throttle return lines, if practical. Holding hand over return fitting will sometimes prove this point or putting in a smaller eyeball fitting.</b>
NOISY PUMP	<b>Pump base vibration.</b>
	<b>Foreign matters in the pump, especially around the impeller, try to remove the foreign matters from the pump.</b>
	<b>Motor bearings noisy from normal wear, rust, overheating, or concentration of chemicals causing seal damage which will allow chlorinated water to seep into bearings wiping out the grease causing bearing to whine. All seal leaks should be replaced at once.</b>

## REPLACEMENT PARTS



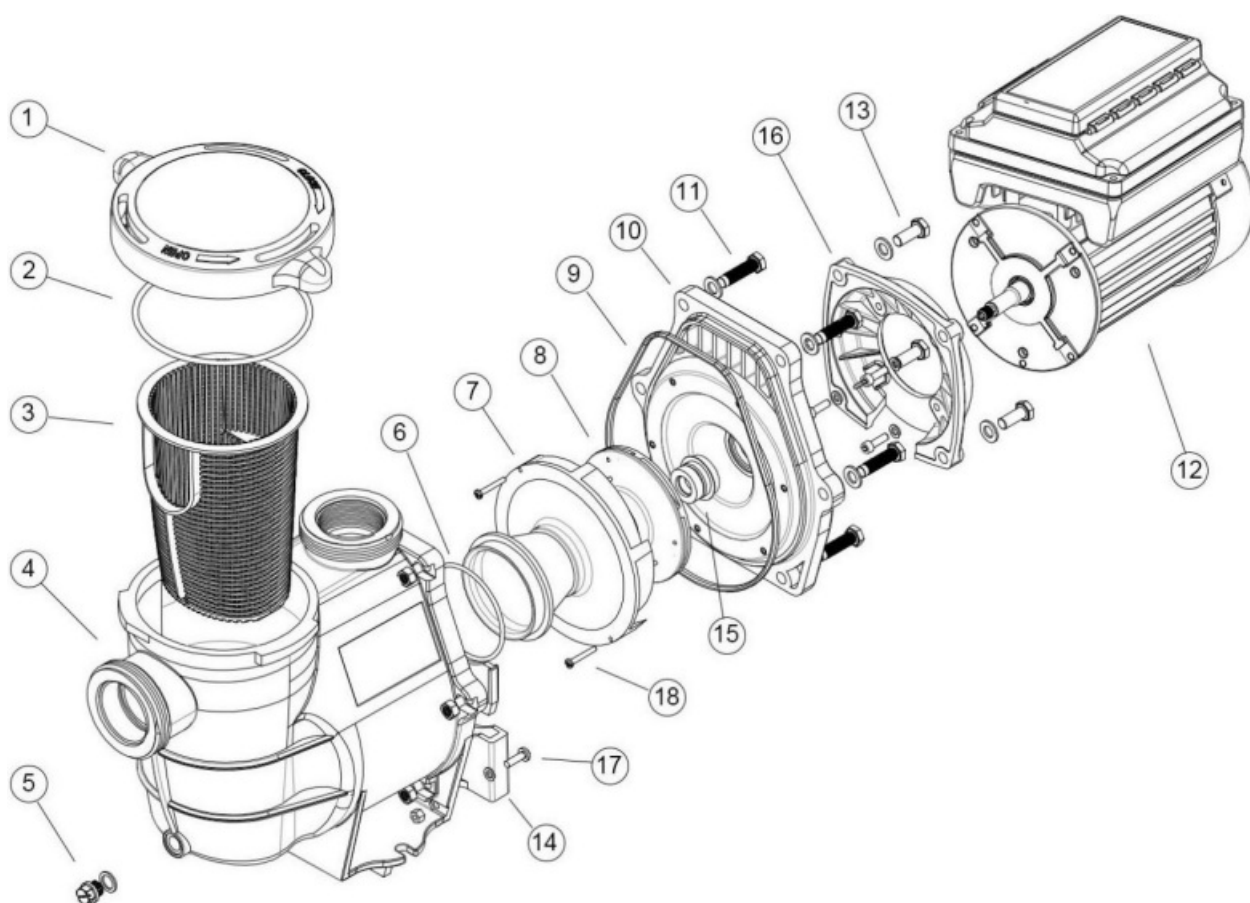
No.	Description
A-1	Lid & Clamp Ring
A-2	O-Ring
A-3	Basket
A-4	Strainer Casing
A-5	Drain Plug
A-6	Diffuser O-Ring
A-7	Diffuser
A-8	Impeller

A-9	Pump Casing O-Ring
A-10	Pump Housing
A-11	Screw
A-12	Motor
A-13	Carrier
A-14	Shaft Seal
A-15	Controller



No.	Description
B-1	Lid
B-2	O-ring
B-3	Basket
B-4	Strainer Casing
B-5	Diffuser O-ring
B-6	Impeller Cover
B-7	Diffuser
B-8	Impeller
B-9	Shaft Seal
B-10	Pump Housing O-ring
B-11	Pump Housing
B-12	Pump Cover
B-13	Screw

B-14	Variable Speed Motor
B-15	Screw
B-16	Drain Plug
B-17	Carrier
B-18	Lid Removal Tool



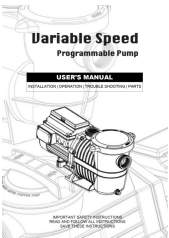
No.	Description
C-1	Lid

C-2	O-ring
C-3	Basket
C-4	Strainer Casing
C-5	Drain Plug
C-6	Diffuser O-ring
C-7	Diffuser
C-8	Impeller
C-9	Pump Housing O-ring
C-10	Pump Housing
C-11	Pump Housing Screw
C-12	Variable Speed Motor
C-13	Motor Screw
C-14	Carrier
C-15	Shaft Seal



C-16	Flange
C-17	Carrier Screw
C-18	Diffuser Screw

## Documents / Resources

	<p><a href="#">PENTAIR Variable Speed Programmable Pump</a> [pdf] Instruction Manual Variable Speed Programmable Pump, Programmable Pump, Pump</p>
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