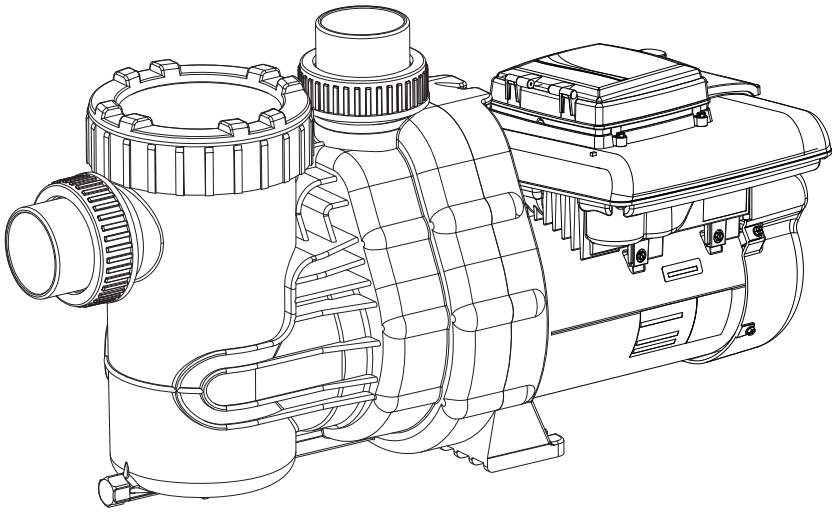
Installation, Operating, and Service Manual

PS270VSP

Variable Speed Pool Pump



APSP The Association of Pool & Spa Professionals™

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Raypak® A Rheem® Company PROFESSIONAL™

Catalog No. 6000.556 Effective. 01/21/2013 Replaces: NEW P/N 241509 Rev 1

Technical Support

Address: 7920 Interstate Court

North Ft. Myers, FL. 33917

Toll Free: 1-877-213-3726

Website: www.raypak.com

Date of Installation:	
Installed by:	
Serial Number:	
For Service Call:	

Safety

Safety is emphasized throughout the user manual. These are safety alert symbols. They alert the user to potential personal injury hazards. Obey all safety messages to avoid possible injury or death or damage to equipment.

CAUTION

WARNING

DANGER

SAVE THESE INSTRUCTIONS!

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Table of Contents

1 Important Safety Instructions

READ THIS MANUAL CAREFULLY BEFORE USING THE PUMP

READ AND FOLLOW ALL INSTRUCTIONS!

Important Notice:

This manual 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.

WARNING: *This product must be installed and serviced by a qualified pool professional, and must conform to all national, state, and local codes.*

WARNING: *Before Installing this product, read and follow all warning notices and instructions which are included. Failure to follow safety warnings and instructions can result in severe injury, death, or property damage. Call 1-877-213-3726 or visit www.raypak.com for additional copies of these instructions.*

WARNING: *California Proposition 65: This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.*

WARNING - Entrapment Prevention

DANGER: DO NOT BLOCK SUCTION

SUCTION HAZARD. *Can cause serious injury or death. Do not use this pump for wading pools, shallow pools, or spas containing bottom drains, unless pump is connected to at least two (2) functioning suction outlets.*

WARNING: ***Pump suction is hazardous and can trap and drown or disembowel bathers. Do not use or operate swimming pools, spas, or hot tubs if a suction outlet cover is missing, broken, or loose.***

The following guidelines provide information for pump installation that minimizes risk of injury to users of pools, spas, and hot tubs:

Entrapment Protection: *The pump suction system must provide protection against the hazards of suction entrapment.*

Suction Outlet Covers: *All suction outlets must have correctly installed, screw-fastened covers in place. All suction outlet (drain) covers must be maintained. Drain covers must be listed/certified to the latest published edition of ANSI/ASME A112.19.8 (ANSI/APSP-16, 2011). They must be replaced if cracked, broken, or missing.*

Number of Suction Outlets Per Pump: *Provide at least two (2) hydraulically-balanced main drains, with covers, as suction for each circulating pump suction line. The centers of the main drains (suction outlets) on any one (1) suction line must be at least three (3) feet apart, center to center.*

WARNING - Entrapment Prevention - continued

*The system **must** be built to include at least two (2) suction outlets (drains) connected to the pump whenever the pump is running. However, if two (2) main drains run into a single suction line, the single suction line may be equipped with a valve that will shut off both main drains from the pump. The system shall be constructed such that it shall not allow for separate or independent shutoff or isolation of each drain.*

More than one (1) pump can be connected to a single suction line as long as the requirements above are met.

Water Velocity: *The maximum water velocity through the suction fitting or cover for any suction outlet must be 1.5 feet per second, unless the outlet complies with the latest published edition of ANSI/ASME A112.19.8 (ANSI/APSP-16, 2011), the standard for Suction Fittings For Use in Swimming and Wading Pools, Spas, Hot Tubs, and Whirlpool Bathtub Applications. In any case, do not exceed the suction fitting's maximum designed flow rate.*

If 100% of the pump's flow comes from the main drain system, the maximum water velocity in the pump suction hydraulic system must be six (6) feet per second or less, even if one (1) main drain (suction outlet) is completely blocked. The flow through the remaining main drain(s) must comply with the latest published edition of ANSI/ASME A112.19.8 (ANSI/APSP-16, 2011), the standard for Suction Fittings For Use in Swimming and Wading Pools, Spas, Hot Tubs, and Whirlpool Bathtub Applications.

Testing and Certification: *Suction outlet covers must have been tested by a nationally recognized testing laboratory and found to comply with the latest published edition of ANSI/ASME A112.19.8 (ANSI/APSP-16, 2011), the standard for Suction Fittings For Use in Swimming and Wading Pools, Spas, Hot Tubs, and Whirlpool Bathtub Applications.*

Fittings: *Fittings restrict flow; for best efficiency use fewest possible fittings (but at least two (2) suction outlets).*

Avoid fittings that could cause an air trap.

Pool cleaner suction fittings must conform to applicable International Association of Plumbing and Mechanical Officials (IAPMO) standards.

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 National Electrical Code and all applicable local codes and ordinances. Improper installation will create an electric 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.*

Important Safety Instructions

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

READ AND FOLLOW ALL INSTRUCTIONS

WARNING: *To reduce the risk of injury, do not permit children to use this product unless they are closely supervised at all times.*

WARNING: *Risk of Electrical 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.*

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.

CAUTION: *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 may be readily disassembled for storage and reassembled to its original integrity.*

TO REDUCE THE RISK OF ELECTRICAL SHOCK, *connect ground wires to grounding screw located in the motor. Use no smaller than a #12 AWG (3.3mm^2) wire.*

TO REDUCE THE RISK OF ELECTRICAL SHOCK, *a bonding connector is provided for bonding to metal water pipes, metal rails, or other metal within 5 feet of the swimming pool. All local points should be bonded with a #8 AWG (8.4mm^2) wire.*

SAVE THESE INSTRUCTIONS.

2 General Description

Raypak Professional PS270VSP - Variable Speed

The PS270VSP is a premium efficiency variable speed pump that provides tremendous flexibility in speed and time settings. Spurred by consumer interest in energy-saving products and government mandated efficiency standards, the innovative PS270VSP has such features as Power Factor Correction which raises overall efficiency while reducing input amps. The integration of a Real Time Clock and Auxiliary Load Circuit (with configurable run time), eliminates the need for a separate timer making the installation faster and easier for service contractors. The PS270VSP has programmable speeds from 600 – 3450 RPM (25 RPM increments) and two adjustable manual override speeds. The User Interface has step-by-step on-screen navigational prompts for faster set-up and programming ease.

General Description - continued

The PS270VSP has the following features:

- Integrated LCD backlight and adjustable contrast
- Adjustable Freeze Protection
- Configurable Prime Settings
- Battery Backup – saves settings during a power outage
- UV and rain-proof enclosure
- Adjustable Manual High and Low Overrides
- On Screen Status – including mode, time remaining, RPM, and energy efficiency
- Auxiliary Load Circuit with configurable run time
- Noise Reduction Design
- User Interface – Display can be mounted on or off board, facing the pump or facing the lead-in

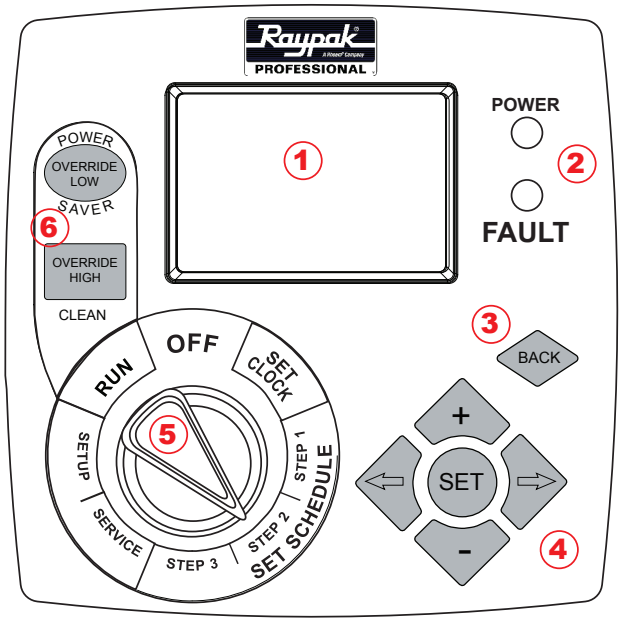


Figure 1

Controls and LEDs	Description
1	Display Screen
2	LED Lights Power: On Light (Green) Fault: Light (Red)
3	BACK: returns to previous program setting and does NOT accept current screen values
4	Navigation Selector ■ + or – increases/decreases selected value ■ ← or → Navigates to adjustable value (digit) ■ SET accepts the current screen values
5	Interface Selector
6	Override Buttons

NOTE: The selector knob must be turned to RUN for the pump to operate. When the user presses ← or → the cursor moves to the next or previous position. If the cursor is at the end of a line when the user presses the arrow, the cursor moves to the next line.

3 Installation Instructions

Preparation Guide

1. Upon receipt of the pump, check the carton for damage. Open the carton and check the pump for concealed damage, such as cracks, dents, or a broken base. If damage is found, contact the shipper or distributor where the pump was purchased.

2. Inspect the contents of the carton and verify that all parts are included. *See Section 7, Parts List and Exploded View for details.*

Pump Location

WARNING: *This product must be installed and serviced by a qualified pool professional, and must conform to all national, state, and local codes. Before installing this product, read and follow all warning notices and instructions of this product. Failure to follow warning notices and instructions may result in property damage, personal injury, or death.*

ATTENTION INSTALLERS: *This manual contains important information about the installation, operation, and safe use of this product. This manual should be given to the owner/operator of this equipment.*

1. Raypak recommends in order to achieve better priming, to install the pump as close to the pool as practical and run suction lines as direct as possible to reduce friction loss.

2. It is recommended that a minimum length of straight pipe, equivalent to five (5) times the pipe diameter be used between the pump suction inlet and any plumbing fittings (elbows, valves, etc.).

3. Install the pump on a level, solid foundation which provides a rigid and vibration-free base. Secure the pump to the base with screws or bolts to further reduce vibrations and stress on the plumbing.

4. Protect the pump against flooding and excess moisture. Select an area that will not flood when it rains. **DO NOT** install the pump in a damp or non-ventilated location.

5. Keep the motor clean and provide free circulation of air for cooling.

6. Although the pump is designed for outdoor use, it is recommended to protect the pump from direct sunlight and excessive moisture (rain, sprinklers, etc.).

7. **DO NOT** store or use gasoline or other flammable vapors or liquids in the vicinity of this pump. **DO NOT** store pool chemicals near the pump.

8. **DO NOT** remove any safety alert labels such as **DANGER, WARNING,** or **CAUTION**. Keep safety labels in good condition and replace any missing or damaged labels.

9. Provide access for future services by leaving a clear area around the pump. Allow plenty of space above the pump to remove lid and basket for cleaning.

WARNING: *Some Safety Vacuum Release System (SVRS) devices are not compatible with the installation of check valves. If the pool has an SVRS device, be sure to confirm that it will continue to safely operate when the check valves are installed.*

Pump Location - continued

NOTE: In Canada, the pump must be located a minimum of three (3) meters (approximately ten (10) feet) from the water (CSA C22.1).

Pipe Sizing

NOTE: All pipe sizes are able to withstand the pressures the pump will deliver, but not necessarily the flow. If the pipe is too small for the pump, or is elevated above water, the maximum gallons per minute (GPM) may not be delivered. If this happens, the pump will develop a pocket of air (cavitation) that makes noise. This may shorten the life of the pump.

SUCTION & DISCHARGE:
When the pump is located up to 50 feet from the pool, the recommended minimum pipe size for both the suction and discharge is 2".

For better efficiency and less restriction, use as few fittings (elbows, tees, valves, etc.) as possible.

Suction line diameter must be equal or be greater than the discharge line diameter.

Suction and discharge lines should be independently supported at a point near the pump to avoid strains being placed on the pump.

NOTE: If more than ten (10) suction fittings are needed, the pipe size must be increased.

Plumbing Installation

When installing the pump, care should be taken to see the suction line is below water level to a point immediately beneath and in front of the pump to ensure quick priming via a flooded suction line. The height between the pump and water level should not be more than five (5) feet.

If the pump is located below water level, isolation valves must be installed on both sides of the pump to prevent the back flow of pool water during any routine or required servicing. The PS270VSP - Variable Speed comes equipped with unions on both the suction and discharge ports. This feature simplifies installation and service and eliminates the possibility of leaks at the threaded adaptors.

Before starting the pump for the first time, remove the see-through lid. (Turn lid ring counter clockwise to remove.) Fill strainer tank with water until it is level with the suction inlet. Replace lid, making sure the o-ring is in place and not damaged. Screw down, hand tight.

Every new installation must be pressure tested according to local codes. *See the Pressure Testing Section on page 13.*

Bonding and Grounding

WARNING*: Ground and bond the pump before connecting to electrical power supply. Failure to ground and bond the pump can cause serious or fatal electrical shock hazard.* ***DO NOT*** *ground to a gas supply line. To avoid dangerous or fatal electrical shock, turn OFF power to the pump before working on electrical connections.*

Bonding and Grounding - continued

1. The motor frame must be grounded to a reliable grounding point using a solid copper conductor, No. 8 AWG or larger. In Canada, No. 6 AWG or larger must be used. If the pump is installed within five (5) feet of the inside walls of the swimming pool, spa, or hot tub, the motor frame must be bonded 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 the swimming pool, spa, or hot tub.

2. Bond the motor using the provided external lug.

WARNING: *In order to avoid the risk of property damage, severe personal injury, and/or death, make sure that the control switch, time clock, or control system is installed in an accessible location, so that in the event of an equipment failure or loose plumbing fitting, the equipment can be easily turned off.*

CAUTION: *The pump must be permanently connected to a dedicated electrical circuit. No other equipment, lights, appliances, or outlets may be connected to the pump circuit, with the exception of devices that may be required to operate simultaneously with the pump, such as a chlorinating device or heater.*

Electrical Installation

WARNING: *All electrical wiring must conform to the local NEC guidelines. A licensed, qualified electrician should complete the wiring for this product.*

Electrical Specifications:

- Voltage: 230 VAC +10%/-7%, Single Phase
- Amps: 10.5
- Speed Range: 600 – 3450 RPM
- Power Factor: >90%
- Peak Efficiency: 88%
- Ambient: 50° C
- Environmental Rating: NEMA Type 3R

The controller is designed to operate with 230 Vrms, single phase power. For a direct wire connection, the wire insulation should be stripped to a length of approximately 0.33” and the screw tightened to a torque of 10 in-lb. The terminal block is capable of handling solid or stranded wire up to 12 AWG in size. (See Table 1.0))

Table 1.0

Pin#	Wire Color	Description
L1	Black	Hot 1
L2	Red or White	Hot 2
GRD	Green	Ground
AUX1	Any	Auxiliary 1
AUX2	Any	Auxiliary 2

CAUTION: *Voltage at the pump **MUST NOT** vary by more than +10%/-7% of nameplate voltage. Components may overheat, causing overload tripping and reduced component life. Consult your power company if this condition exists.*

Note: Use only liquid tight fittings to protect the electronics and motor.

Figure 2 - Terminal Box Cover Removed

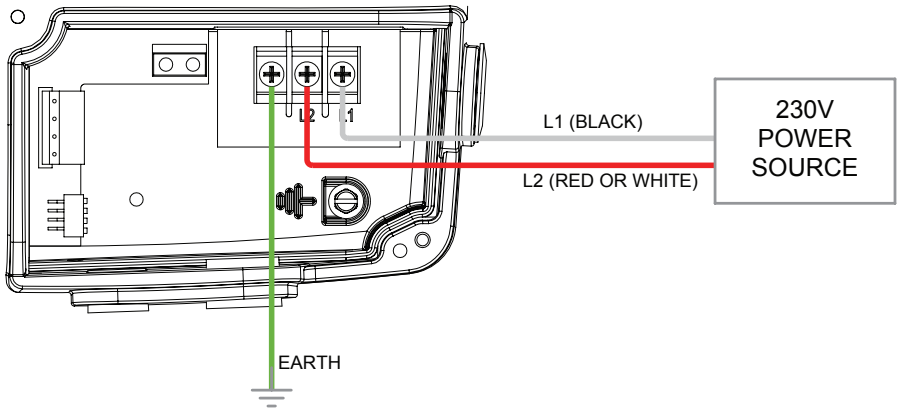


Figure 3 - Wiring Diagram without AUX Load

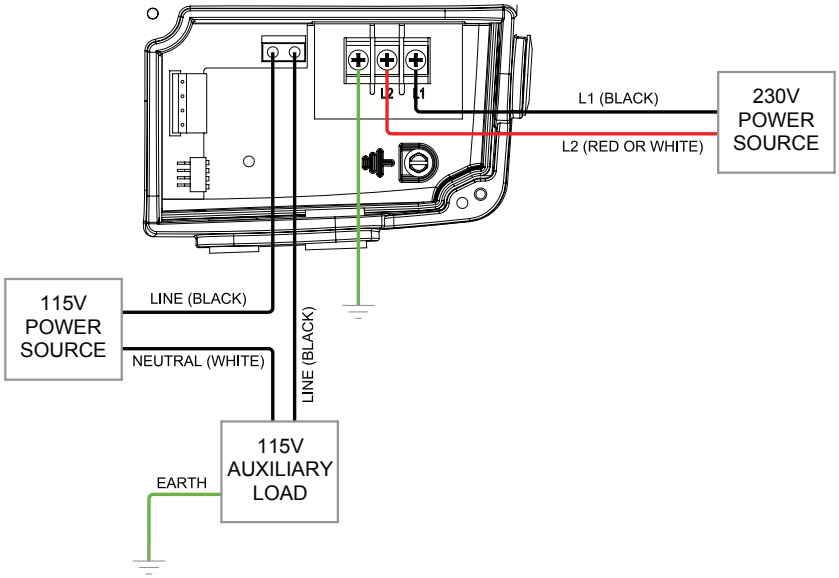


Figure 4 - Wiring Diagram with 115V AUX Load

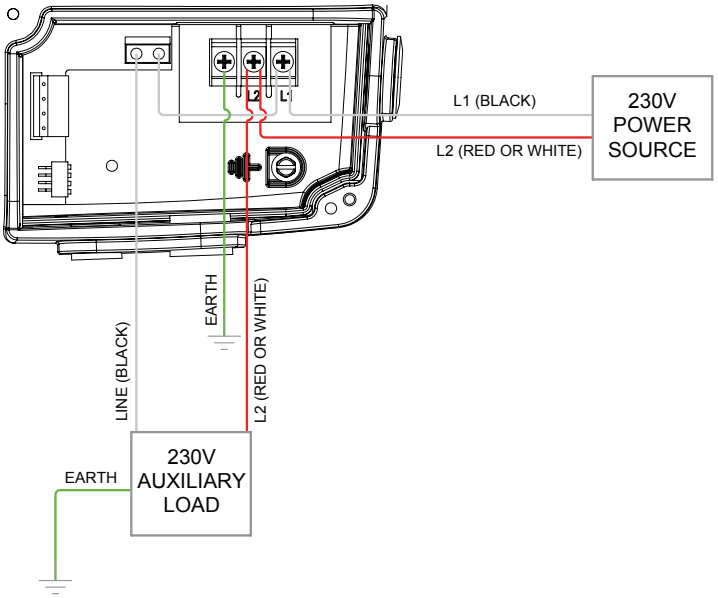


Figure 5 - Wiring Diagram with 230V AUX Load

Pressure Test

WARNING: *To minimize the risk of severe injury or death, the filter and/or pump should not be subjected to the piping system pressurization test.*

Local codes may require the pool piping system to be subjected to a pressure test. These requirements are generally not intended to apply to the pool equipment.

However, if the **WARNING** cannot be followed and pressure testing of the complete system must be done, follow the following guidelines:

1. RELEASE ALL AIR in the system before testing.

2. Water pressure for the test must NOT EXCEED 35 PSI.

3. Water temperature for the test must NOT EXCEED 100° F (38° C).

4. Limit the test to 24 hours. After the test, visually check the system to be sure it is ready for operation.

DO NOT USE COMPRESSED AIR TO PRESSURE TEST OR CHECK FOR LEAKS.

4 Operation

Start Up Guide

CAUTION: *Never run the pump without water. Running the pump "dry" for any length of time can cause severe damage to both the pump and the motor and will void the warranty.*

If this is a new pool installation, make sure all piping is clear of construction debris and has been properly pressure tested. The filter should be checked for proper installation, verifying that all connections and clamps are secure according to the manufacturer's recommendations.

WARNING: *To avoid risk of property damage, severe personal injury or death, verify that all power is turned off before starting this procedure.*

1. Depending on the location of the pump, do one of the following:

   - If the pump is located below the water level of the pool, open the filter pressure valve the prime the pump with water. Once all the air has left the filter, close the filter pressure release valve.

   - If the pump is located above the water level of the pool, remove the lid and fill the basket with water before starting the pump.

2. Prior to replacing the lid, check for debris around the lid o-ring seat. Debris around the lid o-ring seat will make it difficult to prime the pump.

3. **Hand-tighten** the lid to make an air tight seal. Do not use any tools to tighten the lid: **hand-tighten only**. Make sure all valves are open and the unions are tight.

4. Restore power to the system.

User Interface (Factory Default Schedule)

The PS270VSP is programmed with a pre-set schedule. Only the clock setting is required to enable the PS270VSP to operate.

Table 2.0 - Factory Default Schedule

	STEP 1	STEP 2	STEP 3
SPEED	3450 RPM	2600 RPM	1725 RPM
START TIME	8:00 AM	11:00 AM	1:00 PM
STOP TIME	11:00 AM	1:00 PM	9:00 PM

1. Turn Selector Knob to Set Clock. (See Figure 1)

2. Set the Time and Date using the **+, -,** ← and → buttons.

3. Turn the Selector Knob to Run.

NOTE: You must wait until "Prime Mode" is complete to make changes to OVERRIDE settings.

4. (Self Priming Pump) Open the filter pressure relief valve until all air has escaped and then close.

5. If pump does not prime and all instructions to this point have been followed, check for a suction leak. Repeat process.

6. For technical assistance call, Technical Support at 1-877-213-3726.

User Interface (Custom Schedule)

- The green Power On LED illuminates when the unit is powered on.
- The red Fault LED illuminates when a fault occurs.
- Use the ← and → arrow buttons to select menu areas.
- Use the + and – to change menu selection parameters.

1. Turn Selector Knob to SET CLOCK.

2. Adjust the Time and Date.

3. Turn the Selector Knob to SET SCHEDULE (STEP 1, 2, 3)

4. Set the Motor Speed, Start, and Stop times for STEP 1, 2, 3.

5. Turn the Selector Knob to SETUP (Use ← and → to scroll thru SETUP items)

    - Enable/Disable Freeze Protection
    - Set Display Screen Contrast
    - Set External Relay Speed and Time
    - Set Prime Speed and Duration
    - Reset Factory Defaults (Will return programmed schedule to Factory Defaults)

6. Turn Selector Knob to RUN.

7. Press OVERRIDE HIGH button (Not required to run normal schedule)

User Interface (Custom Schedule) - continued

8. Press SET to change OVERRIDE HIGH speed and duration.

9. Press OVERRIDE LOW button (Not required to run normal schedule)

10. Press SET to change OVERRIDE LOW speed and duration.

Menu Structure

1. SET CLOCK
   a. Date and Time

2. STEP 1 (Set Schedule)
   a. Speed, Start Time, Stop Time

3. STEP 2 (Set Schedule)
   a. Speed, Start Time, Stop Time

4. STEP 3 (Set Schedule)
   a. Speed, Start Time, Stop Time

5. SERVICE
   a. UNIT SERIAL NUMBER
   b. DC CAP VOLTAGE
   c. IGBT TEMPERATURE
   d. PCB TEMPERATURE
   e. FAULT HISTORY (1, 2, 3, 4)
   f. CONTROLLER SOFTWARE VERSION
   g. INTERFACE SOFTWARE VERSION

6. SETUP
   a. FREEZE PROTECTION
      i. Enabled/Disabled
      ii. Turn ON Temperature
   b. AUX LOAD SETUP
      i. Minimum Turn On Speed
      ii. Maximum Run Time (in 24 hours)
   c. PRIME CONFIGURATION
      i. Speed
      ii. Time
   d. RESET FACTORY DEFAULTS
      i. Yes/No
   e. SET CONTRAST

7. RUN
   a. MANUAL OVERRIDE HIGH
      i. Speed and Duration
   b. MANUAL OVERRIDE LOW
      i. Speed and Duration

8. OFF

Setting the Clock

NOTE: The clock must be set the first time the pump is powered-up for proper operation.

1. Turn the Selector Knob to SET CLOCK. (See Figure 6)

2. At any time, the user can press BACK to return to the previous screen.

3. Press + or – to change the Month. Press → to move to the Day setting.

4. Press the + or – to change the Day. Press → to move to the Year setting.

5. Press + or – to change the Year. Press → to move to the Hour setting.

6. Press + or – to change the Hour. Press → to move to the Minute setting.

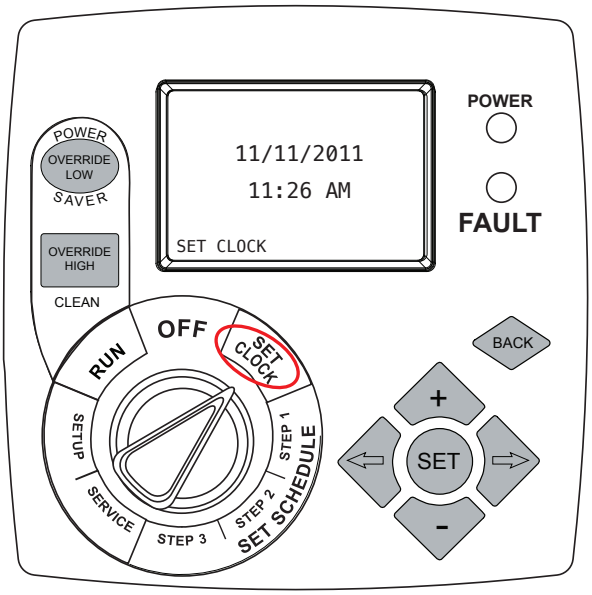


Figure 6 - Set Clock Menu Buttons

7. Press + or – to change the Minute. Press → to move to the AM or PM setting.

8. Press SET when the time is correct.

9. Press SET again if the user needs to make additional changes. The cursor returns to the Month setting.

10. If the date and time are correct, turn the Selector Knob to SET SCHEDULE, STEP 1.

Setting the Schedule

NOTE: Neither of the OVERRIDE buttons can be programmed from the SET SCHEDULE. The message "Invalid Key" appears if the user presses an Override button.

Set the Speed and Start/Stop times for the pump in the Set Schedule menu. The schedule is based on a 24-hour clock and will repeat each day of the week.

Table 3.0 - Record Schedule

Record Schedule				
	STEP 1	**STEP 2**	**STEP 3**	**OVERRIDE**
Speed (RPM)				
Start Time				
Stop Time				

By writing down the planned schedule, it will make the programming process easier and will help the user to remember the user's settings in case the programming is inadvertently lost. The User Interface will not allow the user to program an overlap between different steps of the schedule. The most recent setting will always take priority over any previous settings.

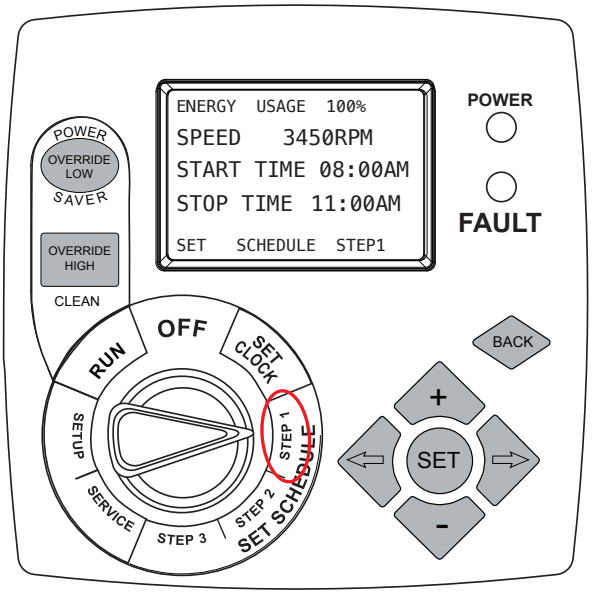


Figure 7 - Set Schedule - STEP 1

Setting the Schedule - continued

1. Turn the Selector Knob to SET SCHEDULE, STEP 1. (See Figure 7)

2. The first digit in the Speed setting flashes. Press + or – to change the first digit in the Speed setting. The number increases one unit at a time.

3. Press → to move to the second digit in the Speed setting. Press + or – to change the second digit. The number increases one unit at a time.

4. Press → to move to the third digit in the Speed setting. Press + or – to change the third digit. The number increases one unit at a time.

5. Press → to move to the fourth digit in the Speed setting. Press + or – to change the fourth digit. The number increases five units at a time.

6. Press → to move to the Start Time setting.

7. Press the + or – to change the Hour. Press → to move to the Minute setting.

8. Press the + or – to change the Minute. Press → to move to the AM or PM setting.

9. Press → to move to the Stop Time setting. Follow steps 6 through 8 to set the Stop Time settings.

10. Press Set to save the settings. If necessary, press SET again to move the cursor back to the first digit.

Unless changes are necessary, move the Selector Knob to STEPS 2 and 3 and repeat steps 2 - 10.

Service

The SERVICE menu allows the user to view, but not change, the following information.

- Unit model number and serial number
- User Interface Version number
- Controller Software Version
- The four most recent faults
- PCB Temperature
- IGBT Temperature
- DC Cap Voltage

Press the arrows to navigate between items viewed on the display screen. (See Figure 8)

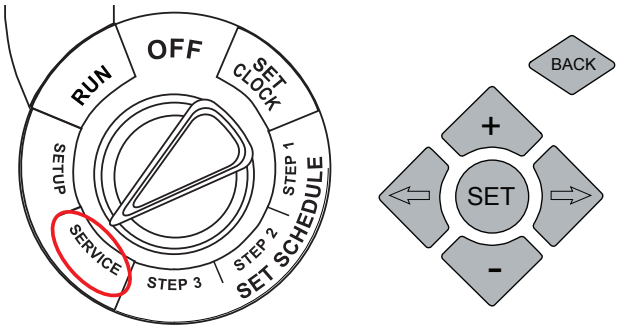


Figure 8 - Service Menu

Setup

SETUP allows the user to configure the following parameters:

- Freeze Protection
- Auxiliary Load Settings
- Prime Settings
- Reset Factory Defaults
- Set Contrast Level

Setup (Freeze Protection)

Freeze Protection can be either enabled or disabled when the user turns the User Interface Selector Knob to SETUP. If it is enabled, the user will be able to set the temperature at which the pump will turn on. The control is designed to run the pump for 8 hours at 2600 RPM if the temperature drops below the set point (the default temperature is 39° F).

1. Turn the Selector Knob to SETUP.

2. Press either + or – to change the Freeze Protection setting. Press SET to save any changes.

WARNING: *Freeze Protection will ONLY function with the Selector Knob in the RUN position. Damage may occur to the user's pool system if Freeze Protection is enabled and the switch is not in the RUN position.*

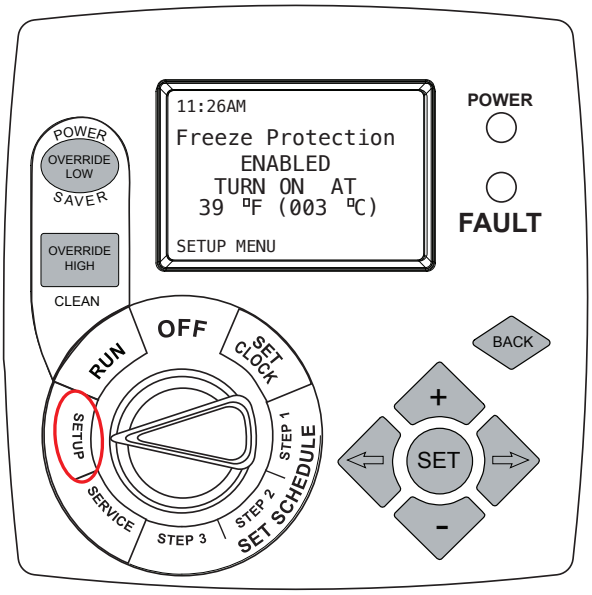


Figure 9 - Freeze Protection

Setup (Auxiliary Load Setup)

The Auxiliary Load is a relay inside the control designed to provide AC power to a load that should not be energized without adequate water flow from the pump (i.e. heater, boost pump, salt water chlorinator).

The control is designed to turn on the Auxiliary Load relay when the pump speed is above the MINIMUM ON SPEED (default is 2000 RPM). The Auxiliary Load relay will stay closed as long as the pump speed is above the MINIMUM ON SPEED. In addition, the control can be programmed to limit the amount of time the Auxiliary Load relay is closed in a 24-hour period. For example, if the pump runs at 3450 RPM for 12 hours a day, but the auxiliary load only needs to be powered for 6 hours, the user can set the MAXIMUM RUN TIME. Two examples of different settings are provided in Table 4.0 and Table 5.0.

1. Turn the Selector Knob to SETUP. (See Figure 10)

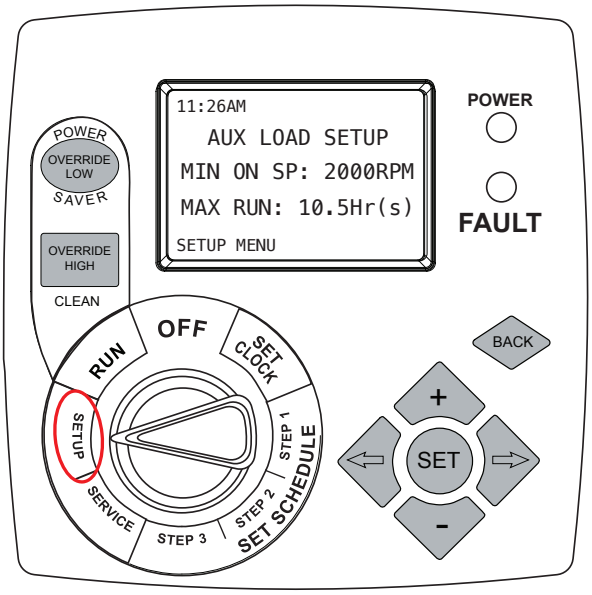


Figure 10 - Auxiliary Load

Setup (Auxiliary Load Setup) - continued

2. Press → one time to change the Auxiliary Load settings. Press SET to enter "change mode." Press + or – to increase or decrease the Minimum Speed. Press → to change the Maximum Run Time. Press the + or – to increase or decrease the Maximum Run Time. Press SET to save changes.

Table 4.0 - Auxiliary Load Setup Example #1

	Pump Motor Settings			Aux. Load Settings
	STEP 1	**STEP 2**	**STEP 3**	
Speed	3450 RPM	2600 RPM	1725 RPM	
Start Time	8:00 AM	11:00 AM	1:00 PM	
Stop Time	11:00 AM	1:00 PM	9:00 PM	
MIN ON SPEED				2000 RPM
MAX RUN TIME				10.5 Hours

Total run time for pump motor	13 Hours
Total run time for AUX. Load	5 Hours

Table 5.0 - Auxiliary Load Setup Example #2

	Pump Motor Settings			Aux. Load Settings
	STEP 1	**STEP 2**	**STEP 3**	
Speed	3450 RPM	2600 RPM	1725 RPM	
Start Time	8:00 AM	4:00 PM	8:00 PM	
Stop Time	4:00 PM	8:00 PM	11:00 PM	
MIN ON SPEED				2000 RPM
MAX RUN TIME				10.5 Hours

Total run time for pump motor	15 Hours
Total run time for aux. load	10.5 Hours

Setup (Prime Settings)

The priming speed and time can be adjusted within this menu. The minimum priming speed is 1500 RPM. The maximum priming time is 10 minutes. *(NOTE: The factory default is 2600 RPM for 1 minute.)*

1. Turn the Selector Knob to SETUP.

2. Press → two (2) times to change the Prime settings.

3. Press SET to enter "change mode."

4. Press + or – to increase or decrease the Prime Speed.

5. Press → to change the Prime Time.

6. Press the + or – to increase or decrease the Maximum Run Time. Press SET to save changes.

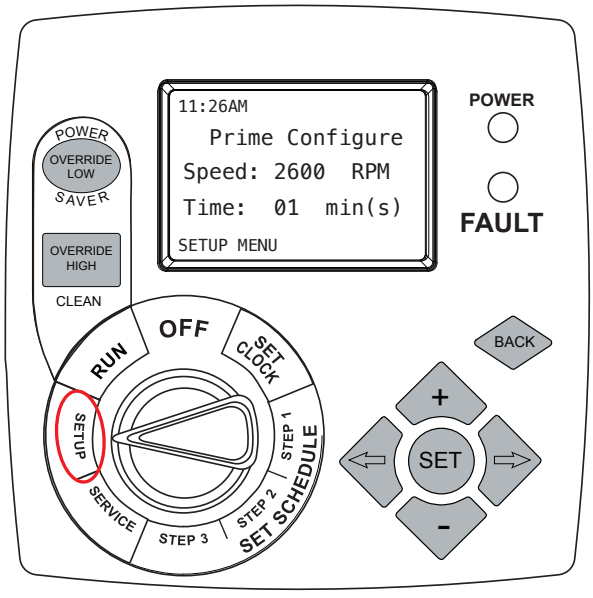


Figure 11 - Prime Configuration

Note: If the pump fails to prime it will activate the fault code "Prime Failure" and the control will retry.

Setup (Reset Factory Defaults)

This menu will permit the user to reset all settings in the control to the factory default settings.

1. Turn the Selector Knob to SETUP.

2. Press → three (3) times to Reset to Factory Default settings.

3. Press SET two (2) times to verify intent to Reset to the Factory Default settings.

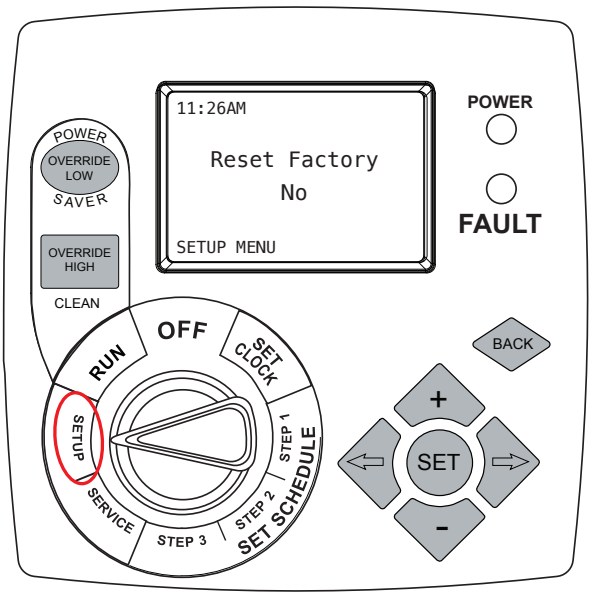


Figure 12 - Factory Defaults

Setup (Set Contrast)

This menu will change the contrast of the LCD screen to optimize viewing for various lighting conditions. Ensures the display can be viewed easily in dark, shady, or direct sunlight conditions.

1. Turn the Selector Knob to SETUP.

2. Press → four (4) times to change the Contrast setting. Use + and – to adjust the contrast level.

3. Press SET to save the setting.

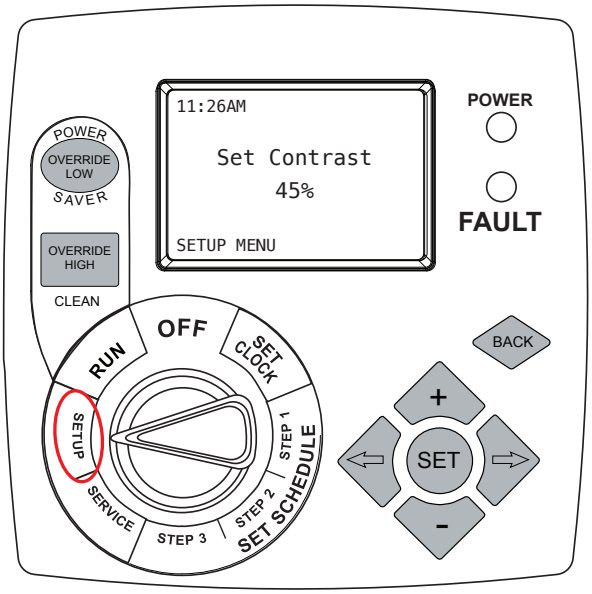


Figure 13 - Set Contrast

Run (Schedule)

The display screen in the RUN switch position shows the following.

- Current clock time
- Remaining time
- Which Step or Prime is running and at what RPM
- Pump status (for example, Program Running)

Pump “RUN” allows the user to set the Override parameters. Run the Override settings if the pump needs to perform a certain function immediately. (Example: vacuuming)

Run (Schedule) - continued

If the user presses +, -, ←, or → the message “Speed and Time Cannot be Changed” appears.

If the user presses the Back button the message “Speed and Time Cannot be Changed” appears unless an Override setting is running.

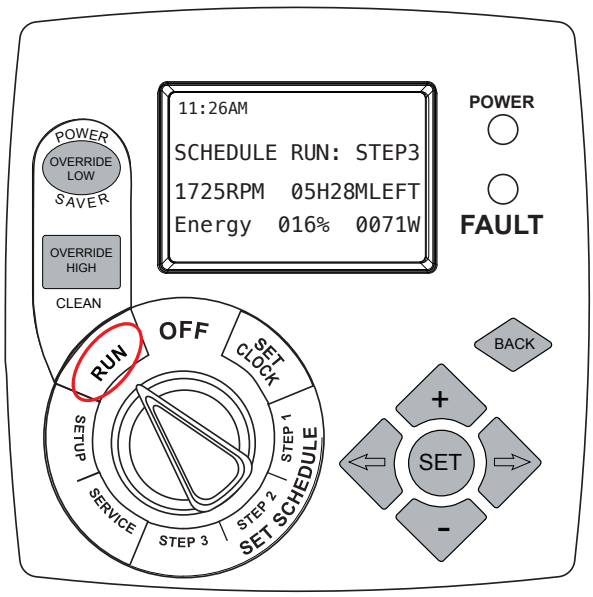


Figure 14 - Run Screen

Override (Low)

The OVERRIDE LOW button can program the motor to temporarily run at speeds between 600 and 3450 RPM. Override Low is recommended for low circulation requirements that exist outside of the daily operating schedule. Once the Override Low duration is completed, the motor will automatically return to the programmed schedule.

NOTE: Press + to increase the speed. If the value is at 3450, the screen reads “Maximum Speed for this Motor is 3450 RPM.” If the fourth digit is flashing, press + and the speed increases by 5. If the third digit is flashing and the value of the speed is 3445 then the speed increases to 3450. If the third digit is flashing and is less than 3445, the speed increases by 10. If the second digit is flashing and greater than or equal to 3350, the speed increases to 3450. If the third digit is flashing and less than 3350, the speed increases by 100. If the first digit is greater than or equal to 2450, the speed increases to 3450. If the first digit is flashing and less than 2450, the speed increases by 1000. Hold + and the values increase rapidly.

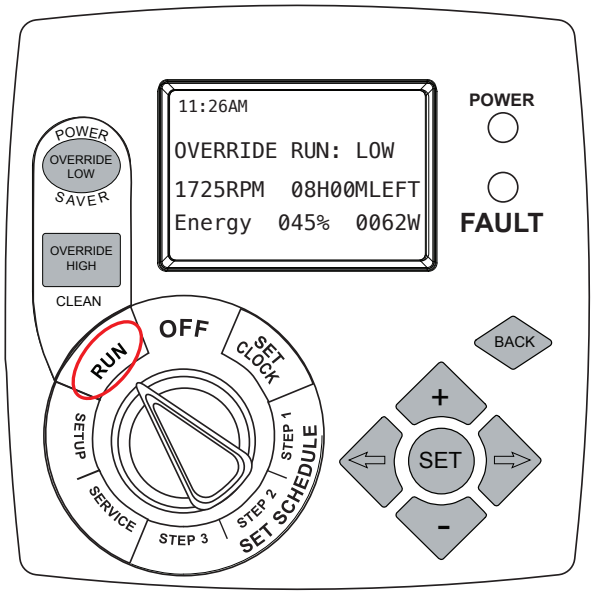


Figure 15 - Override Low Screen

Press – to decrease the speed. If the value is at 0 RPM, the screen reads “Minimum Speed for this Motor is 0 RPM.” If the value of the high speed is 600 then it decreases to 0 RPM. If the fourth digit is flashing, press – and the speed decreases by 5. If the third digit is flashing and the value of the speed is 605, the speed decreases to 600. If the third digit is flashing and greater than 605, the speed decreases by 10. If the second digit is flashing and less than or equal to 700, the speed decreases to 600. If the second digit is flashing and greater than 700, the speed decreases by 100. If the first digit is less than or equal to 1600, the speed decreases to 600. If the first digit is flashing and greater than 1600, the speed decreases by 1000. Hold – and the values decrease rapidly.

Override (Low) - continued

1. Press OVERRIDE LOW button.

2. Press SET to change the Override Low settings.

3. Press + or – to increase or decrease the first digit in the speed. The maximum speed is 3450 RPM and the minimum speed is 600 RPM.

4. Press → to move to the second, third, and fourth digits in the speed.

5. Press SET to save the speed setting. The motor runs at the Override Low setting. The Override Low Duration Time setting flashes.

6. Press + or – to increase or decrease the Override Low Duration Time. The maximum duration is 24 hours and the minimum is 0.5 hours (half an hour).

7. Press SET to save the Override Low Duration Time setting.

Override (High)

The OVERRIDE HIGH button can program the pump to temporarily run at speeds between 600 and 3450 RPM. OVERRIDE HIGH is recommended for high flow uses such as a pool heater startup, backwash, filtering, and cleaner water requirements that exist outside of the daily operating schedule. Once the Override High duration is completed, the pump will automatically return to the programmed schedule.

NOTE: Press + to increase the speed. If the value is at 3450, the screen reads "Maximum Speed for this Motor is 3450 RPM." If the fourth digit is flashing, press + and the speed increases by 5. If the third digit is flashing and the value of the speed is 3445 then the speed increases to 3450. If the third digit is flashing and is less than 3445, the speed increases by 10. If the second digit is flashing and greater than or equal to 3350, the speed increases to 3450. If the third digit is flashing and less than 3350, the speed increases by 100. If the first digit is greater than or equal to 2450, the speed increases to 3450. If the first digit is flashing and less than 2450, the speed increases by 1000. Hold + and the values increase rapidly.

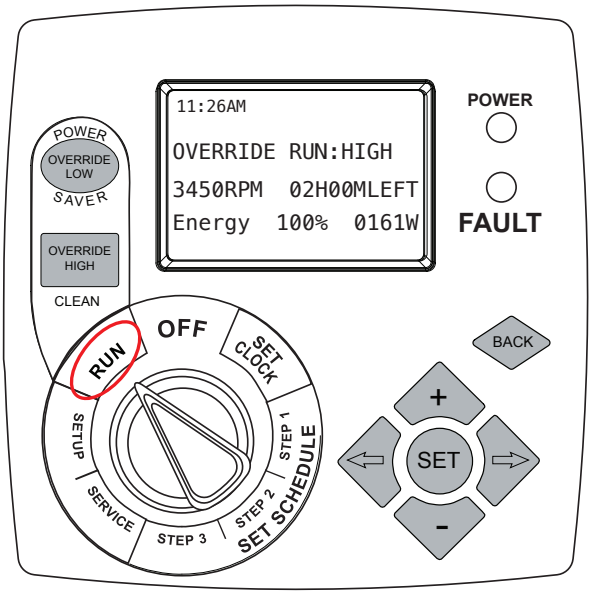


Figure 16 - Override High Screen

Press – to decrease the speed. If the value is at 0 RPM, the screen reads "Minimum Speed for this Motor is 0 RPM." If the value of the high speed is 600 then it decreases to 0 RPM. If the fourth digit is flashing, press – and the speed decreases by 5. If the third digit is flashing and the value of the speed is 605, the + speed decreases to 600. If the third digit is flashing and greater than 605, the speed decreases by 10. If the second digit is flashing and less than or equal to 700, the speed decreases to 600. If the second digit is flashing and greater than 700, the speed decreases by 100. If the first digit is less than or equal to 1600, the speed decreases to 600. If the first digit is flashing and greater than 1600, the speed decreases by 1000. Hold – and the values decrease rapidly.

Override (High) - continued

1. Press OVERRIDE HIGH button.

2. Press SET to change the Override High settings.

3. Press + or – to increase or decrease the first digit in the speed. The maximum speed is 3450 RPM and the minimum speed is 600 RPM.

4. Press → to move to the second, third, and fourth digits in the speed.

5. Press SET to save the speed setting. The motor runs at the Override High setting. The Override High Duration Time setting flashes.

6. Press + or – to increase or decrease the Override High Duration Time. The maximum duration is 24 hours and the minimum is 0.5 hours (half an hour).

7. Press SET to save the Override High Duration Time setting.

Key Lockout Feature

The PS270VSP User Interface has a key lockout feature to prevent unwanted changes to the settings. To lock the keys, hold down the "+, -, and SET" buttons for more than 3 seconds. The display will then show a symbol of a key indicating the buttons are locked. The user can unlock the keys by holding down the same buttons for more than 3 seconds.

Remote Mounting User Interface

The PS270VSP user interface can be mounted remotely from the controller. In order to complete this procedure, the following steps should be followed:

1. Remove main power from the controller.

2. Remove the terminal box cover from the controller (two screws).

Table 6.0 - RS485 UI Remote Mount Connections

Pin #	Wire Color	Description
1	Red	+10 V
2	Green	RS485-A
3	Black	RS485-B
4	Yellow	Isolated Ground

Figure 17 - Terminal Box Cover Removed

Remote Mounting User Interface - continued

3. Remove the plastic wiring cover inside the terminal box (one screw).

Figure 18 - Internal Plastic Cover Removed

4. Disconnect the 4-pin communication connector (J103) by pulling up on the connector.

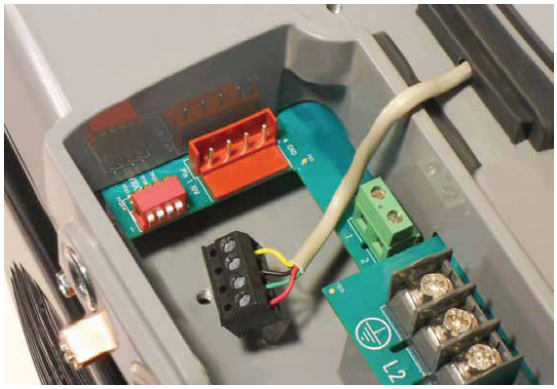


Figure 19 - Communication Connector Removed

5. Install a longer cable of the desired length to the J103 connector on the controller.

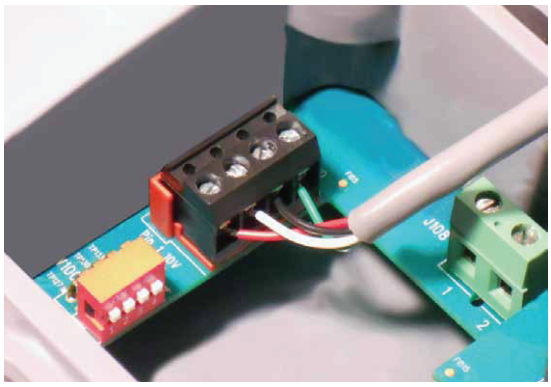


Figure 20 - UI Connector Installed

6. Replace the plastic cover inside the terminal box (one screw).

Figure 21 - Plastic Cover Installed in Terminal Box

Remote Mounting User Interface - continued

7. Replace the metal terminal box cover. It is **VERY IMPORTANT** to make sure the communication cable fits into the slot on the terminal box cover **BEFORE** the screws are tightened. This will prevent the cable from being damaged.

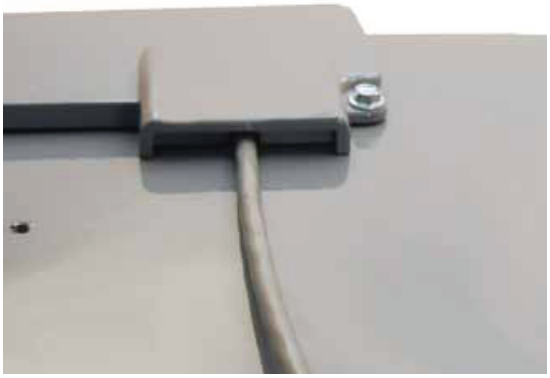


Figure 22 - Wire Routing

8. Remove the small cover on the back of the User Interface (two screws).

9. Remove the 4-pin connector from the CN1 connector on the User Interface.

10. Attach the other end of the longer cable to the CN1 connector on the User Interface.

11. Replace the small cover on the back of the User Interface.

12. Mount the User Interface to the desired location (i.e. wall, post, fence, etc.)

Figure 23 - Cover Installed

Optional kit for mounting the User Interface remotely: PN: 2512723-001
However, it is not mandatory to purchase this kit to mount the User Interface remotely.

5 Service and Maintenance

The PS270VSP is very reliable and robust in harsh environments. However, this product does contain electronics that are cooled by a fan mounted to the motor. In order to ensure optimum reliability of this product, it is recommended to clean the fan inlet on the back of the motor once a month. It is important to keep this area free of large debris such as leaves, branches, mulch, plastic bags, etc.

Routine Maintenance

This pump requires little or no service other than reasonable care and periodic cleaning of the strainer basket.

1. Inspect the pump basket for debris by looking through the clear pump lid.

Routine Maintenance - continued

2. Turn off the power to the pump. If the pump is located below the water level, close isolation valves on the suction and discharge sides of the pump to prevent back flow of water.

3. Remove any debris, because as the debris accumulates, it will begin to block the flow of water through the pump. Keep the basket clean and clear to improve the performance of the pump.

4. Turn the lid's lock ring counter clockwise until it stops. Carefully remove the lid and lock ring.

5. Remove the basket and properly dispose of the debris into the trash and rinse out the basket. Check basket for cracks, if crack is found replace basket.

6. Replace basket back into the pump, align the basket properly with the suction pipe. Then fill with water up to the suction pipe. Clean clear cover, lid o-ring and sealing surface of the pump of any debris.

7. Replace lid with locking ring. *Hand-tighten* the lid to make an air-tight seal. ***Do not use any tools to tighten the lid.***

8. Verify that all valves have been returned to the proper position for normal operation. Turn on the power to the pump.

Winterizing

CAUTION: ***The pump must be protected when freezing temperatures are expected. Allowing the pump to freeze will cause severe damage and void the warranty.***

There are two options when winterizing the pump

Option 1:
1. Drain all the water from the pump, system equipment, and piping.

2. Remove drain plugs. Do not replace plugs. Store the plugs in the empty strainer basket for winter.

3. Keep the motor covered and dry.

Option 2:
1. Drain all the water from the pump, system equipment, and piping.

2. Remove the pump and motor from the plumbing and store indoors in a warm and dry location.

Note: After removing the pump, cover open plumbing connections to prevent intrusion of any foreign objects.

Note: When the winter season is over the pump will need to be primed prior to start. Refer to Section 4 Operation, Start Up Guide.

CAUTION: ***DO NOT*** *run the pump dry. If the pump is run dry, the mechanical seal will be damaged and the pump will start to leak at the seal. If this occurs, the mechanical seal will need to be replaced.* ***ALWAYS*** *maintain the proper water level in your pool. Continued operation in this manner could cause a loss of pressure, resulting in damage to the pump casing, impeller, and mechanical seal (voiding warranty).*

6 Troubleshooting

Fault Codes - Fault LED (Red)

WARNING: *The pump must be serviced by a professional service technician qualified in pool/spa installation. The following procedures must be followed exactly. Improper installation and/or operation can create dangerous electrical hazards, which can cause high voltage to run through the electrical system. This can cause property damage, serious personal injury, and/or death. Improper installation and/or operation will void the warranty.*

The red Fault LED illuminates when a fault occurs. Turn the Selector Knob to SERVICE and use the ← and → arrow buttons to select and view the last four fault codes.

Display (Fault Code)	Description	Controller Action
SW Over current	Software over current	Control will retry
HW Over current	Hardware over current	Control will retry
DC Over voltage	DC capacitor over voltage	Control waiting for voltage to drop
DC Under voltage	DC capacitor under voltage	Control waiting for voltage to rise
PCB Temperature	Printed circuit board over temperature	Control waiting for temperature to drop
IGBT Temperature	Inverter IGBT over temperature	Control waiting for temperature to drop
Imbalance Current	Motor current imbalance	Control will retry
Prime Failure	Failure to Prime Pump	Control will retry
Startup Failure	Failure to Start Pump	Control will retry
Low Power	Low power	Control will retry
Loss of Phase	Loss of phase	Verify motor connected. Control will retry
Processor Failure	Processor failure	Control will retry
POWERING DOWN	Power down	
Generic Fault	All other faults	Control will retry

If the motor does not restart following motor retry, please contact your service professional.

Note: The fault message "Communication Error, Check Connections" appears if the user interface is unable to establish communications with the controller within five seconds.

General Pump Troubleshooting

Problem	Possible Cause	Solution
1. Pump will not prime.	A. Suction air leak	Make sure see-through lid and o-rings are clean and properly positioned. Hand tighten see-through lid. Tighten all pipes and fittings on suction side of pump. Be sure water in pool is high enough to flow through skimmer.
	B. No water in pump.	Make sure strainer tank is full of water.
	C. Closed valves or blocked lines.	Open all valves in system. Clean skimmer and strainer tank. Open pump and check for clogging of impeller.
	D. Low voltage to motor.	Check voltage at motor. If low, pump will not come up to speed.

General Pump Troubleshooting - continued

Problem	Possible Cause	Solution
2. Motor Fails to Start	A. No power to motor.	Check that all power switches are on. Be sure fuse or circuit breaker is properly set. Time set properly? Check motor wiring at terminal.
	B. Pump jammed	With power off, turn shaft. It should spin freely. If not, disassemble and repair.
	C. Controller DIP switches not configured properly	Verify that the DIP switches are in the correct position.
3. Motor Runs then Stops	A. Over temperature fault	Check the back of the motor is free from dirt and debris.
	B. Over current fault	Motor will automatically restart after one minute.
4. Motor is noisy	A. Debris in contact with fan	Check that the back of the motor is free from dirt and debris.
	B. Debris in strainer basket	Clean strainer basket.
	C. Loose mounting	Check that the mounting bolts are tight.
5. Motor Runs, but no flow	A. Impeller is loose	Check that motor is spinning by looking at the fan on the back of the motor. If so, check that pump impeller is correctly installed and undamaged.
	B. Air Leak	Check plumbing connections and verify they are tight.
	C. Clogged or restricted plumbing	Check for blockage in strainer or suction side piping. Check for blockage in discharge piping including partially closed valve or dirty pool filter.
	D. Dirty Filter	Back wash filter when pressure is high, or clean cartridges.

Blocked Impeller

WARNING: *Before servicing the pump, switch off the circuit breakers at the power source. Severe personal injury or death may occur if the pump starts while your hand is inside the pump.*

1. Turn off the pump. Switch off the circuit breaker to the pump motor.

2. Remove the pump lid and strainer basket.

3. Look inside pump for debris. Remove any debris found inside.

4. Replace the strainer basket and lid.

5. Switch on the circuit breaker to the pump motor.

Blocked Impeller - continued

6. Turn on the pump, see if the problem is resolved.

7. If the impeller is still blocked with debris and it is not possible to remove the debris using Steps 2 - 4, the pump will need to be disassembled in order to access the inlet and outlet of the impeller.

Removal and Replacement of the Impeller and/or Mechanical Seal

WARNING: *Before servicing the pump, switch off the circuit breakers at the power source. Severe personal injury or death may occur if the pump starts while your hand is inside the pump.*

1. Turn off the pump. Switch off the circuit breaker to the pump motor. If you are not replacing the motor, do not disconnect the electrical wiring.

2. Turn off any valves to prevent pool water from reaching the pump. Drain water from the pump by loosening the unions or removing the drain plugs.

3. Remove the ten (10) screws connecting the pump casing to the flange.

4. Pull the motor, seal housing, flange out from the pump casing. Remove the pump casing o-ring. The impeller is connected to the motor shaft.

5. Remove the diffuser by gently pulling the diffuser (the diffuser is the cover over the impeller) horizontally until the pins clear the seal housing.

6. Place a 5/16” Allen head wrench through the center hole of the fan cover and into the recess on the end of motor shaft.

7. While holding the motor shaft, turn the impeller counter-clockwise.

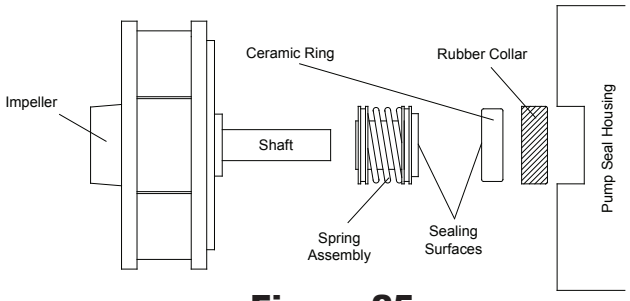


Figure 25

8. Gently pull the mechanical seal from the impeller shaft noting the way it was originally installed.

CAUTION: *Do not damage the ceramic or carbon surfaces of the seal. If the surfaces are damaged, leaks will occur.*

9. Using water with a small amount of dish soap, brush the impeller shaft for ease of assembly.

10. With the carbon side up, push the mechanical seal onto the impeller shaft and wipe carbon surface with a clean cloth.

CAUTION: *Do not use grease or lube to install seal. It will damage the seal and cause failure.*

11. The ceramic side of the seal can be pushed out from the rear of the seal housing. Please note its position before removing.

12. Using water only, wet the ceramic side of the seal and using your thumbs push into the seal housing. Clean surface with a clean cloth.

13. Wipe the motor shaft of all debris. Re-install the seal housing and apply a single drop of Loctite to the motor shaft threads.

Removal and Replacement of the Impeller and/or Mechanical Seal - continued

14. Install impeller by spinning it clockwise onto the motor shaft. Continue to turn clockwise until the carbon and ceramic sides make contact and the seal spring slightly compresses.

15. Install the diffuser by aligning the diffuser pin with the holes in the seal housing and pressing together.

16. Make sure the diffuser and casing o-rings are in place and free of debris. Reassemble in reverse, sliding the seal housing back into the casing.

17. Tighten (torque of 8 Nm or 70.8 in-lb.) the ten (10) screws using a cross pattern from side to side and top to bottom.

CAUTION: *Do not over-tighten or you will strip the casing threads.*

Motor Replacement

WARNING: *The pump must serviced by a professional service technician qualified in pool/spa installation. The following procedures must be followed exactly. Improper installation and/or operation can create dangerous electrical hazards, which can cause high voltage to run through the electrical system. This can cause property damage, serious personal injury, and/or death. Improper installation and/or operation will void the warranty.*

1. Disconnect the wiring from the side of the motor. *(Refer to the Electrical Installation)*

2. Remove the ten (10) screws holding the flange to the pump casing.

3. Slide the motor and flange from the casing.

4. Remove the diffuser by gently pulling the diffuser horizontally until the pins are clear from the seal housing.

5. Place a 5/16” Allen head wrench through the center hole of the fan cover and into the recess on the end of the motor shaft.

6. While holding the motor shaft, turn the impeller counter-clockwise.

7. After removal of the impeller, the seal housing will slide easily off the motor shaft.

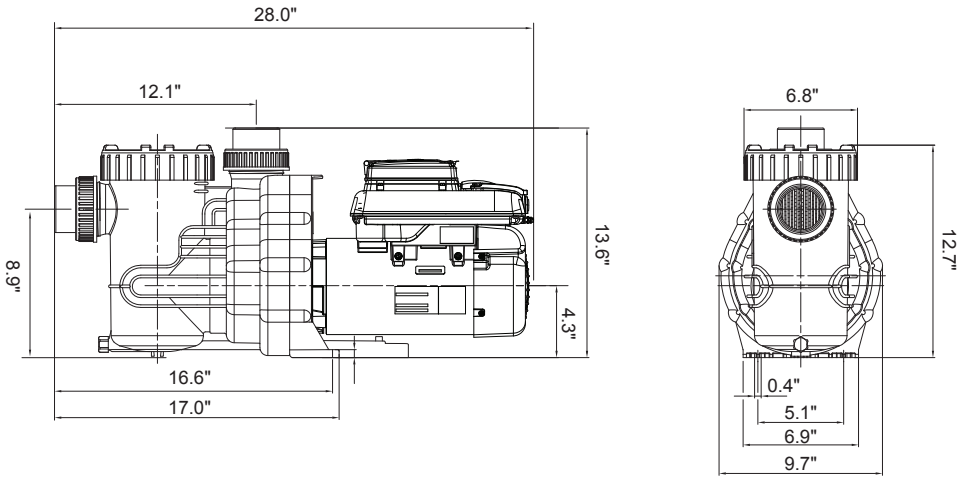
8. Using a flathead screwdriver, remove the four bolts and washers securing the flange to the motor.

9. Clean the surfaces of the seal *(Refer to the Removal and Replacement of the Impeller and/or Mechanical Seal Section page 29-30 steps 9 -17)*.

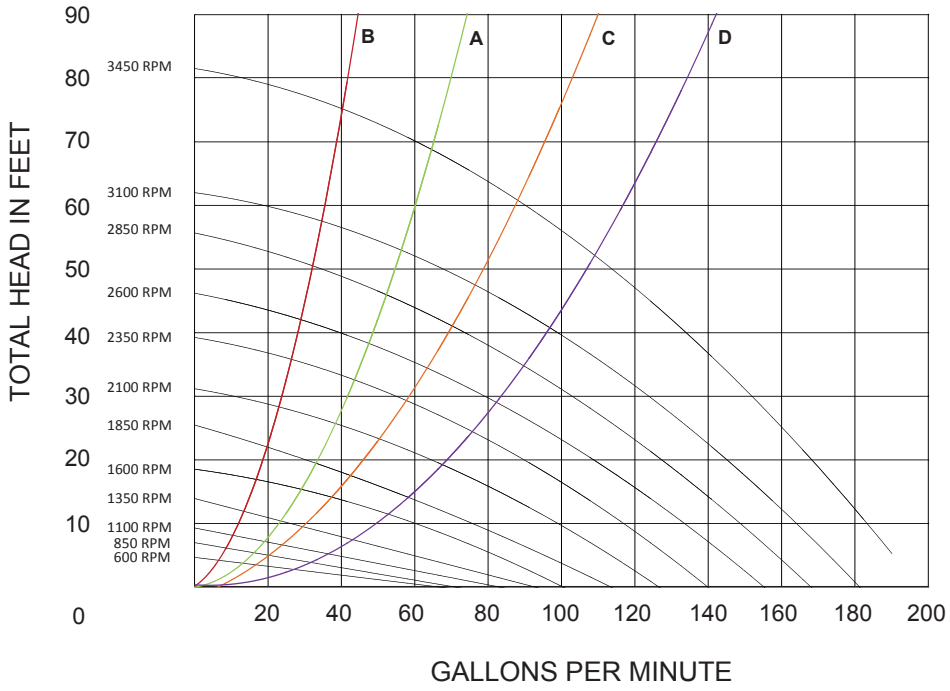
7 Product Specifications

Dimensional Drawing

Dimensional Drawing - continued



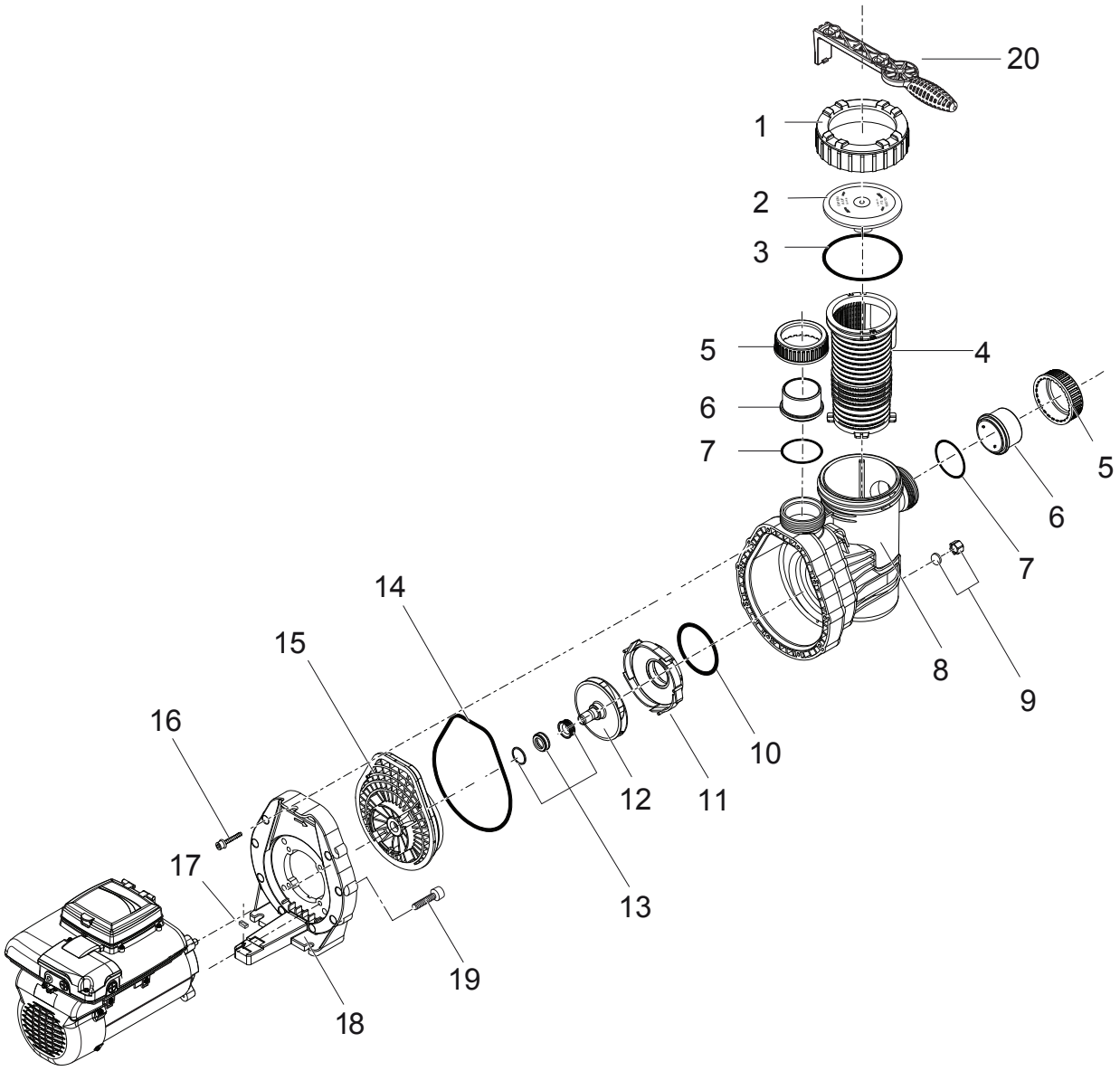
Performance Curve



B, A, C, and D represent average system curves for pools with the pipe diameter mentioned below.

B = 1 1/2" Pipe
A = 2" Pipe
C = 2 1/2" Pipe
D = 3" Pipe

Replacement Parts and Exploded View



KIT NUMBER	CALL-OUT	QTY	DESCRIPTION
014329F	1	1	LID LOCK RING - DARK GRAY
014328F	2	1	LID - CLEAR
014330F	3	1	O-RING - LID 137 x 5mm
014331F	4	1	BASKET - WHITE ONE PIECE
014344F	5	2	NUT - UNION ABS
014354F	6	2	UNION END - 2" GRAY PVC
014355F	7	2	O-RING - UNION 68 X 3.5mm
014332F	8	1	CASING
014333F	9	1	DRAIN CAP - DARK GRAY (3/8") WITH GASKET - CASING
014336F	10	1	O-RING - DIFFUSER 90 x 5mm

KIT NUMBER	CALL-OUT	QTY	DESCRIPTION
014368F	11	1	DIFFUSER
014353F	12	1	IMPELLER 2.7 THP 116 / 16mm 3V
014339F	13	1	MECHANICAL SEAL (20mm) - COMPLETE
014340F	14	1	O-RING - CASING 206 x 6mm
014341F	15	1	SEAL HOUSING 49mm
014335F	16	10	SCREW - CASING 3/8 HEX/SLOT M7 x 48mm SS
014334F	17	3	LEGO SPACER
014342F	18	1	FLANGE
014343F	19	4	SCREW - 3/8 -16 X 2" SLOTTED
014345F	20	1	SPANNER - LID

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