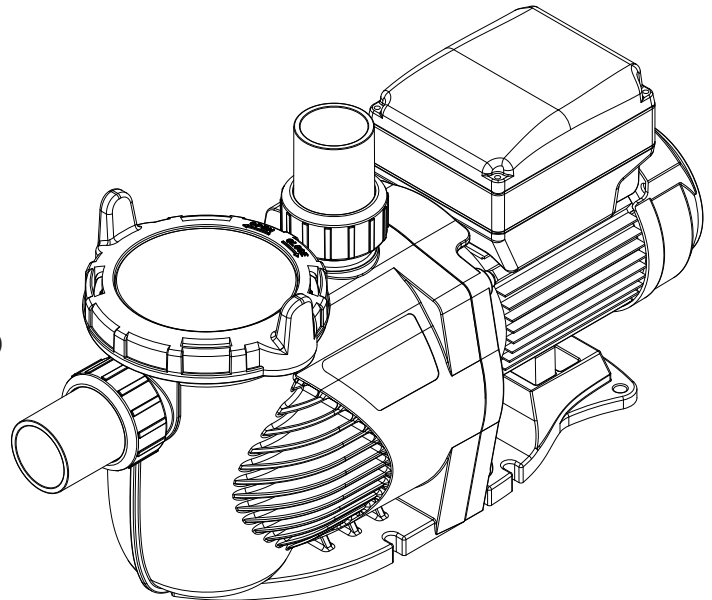


INSTALLATION AND OPERATION MANUAL

VARIABLE SPEED PUMP Models RPVSP1



For more information visit
www.energystar.gov

IMPORTANT SAFETY INSTRUCTIONS. READ AND FOLLOW ALL INSTRUCTION. SAVE THESE INSTRUCTIONS.

NOTE: The instructions in this manual are for the use of qualified individuals specially trained and experienced in the installation and maintenance of this type of equipment and related system components. Installation and service personnel are required by some states to be licensed. Persons not qualified shall not attempt to install, service, or maintain this equipment.

This manual should be maintained in legible condition and kept adjacent to the variable speed pump or in a safe place for future use.

Raypak[®]
A Rheem[®] Company

Effective: 09-15-20
Replaces: 01-15-20
P/N 241832 Rev 4

Revision 4 reflects the following changes:

Energy Star logo added on page 1. RS485 Connection section added on page 9. Figure 8 on page 10 revised. Anti-Freeze Protection section added on page 13. RS485 Setting revised on page 15. Modbus Register map added on page 20. Limited Warranty Effective Date section revised on page 21.

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1. WARNINGS

Pay Attention to these Terms

⚠ DANGER	Indicates the presence of immediate hazards which will cause severe personal injury, death or substantial property damage if ignored.
⚠ WARNING	Indicates the presence of hazards or unsafe practices which could cause severe personal injury, death or substantial property damage if ignored.
⚠ CAUTION	Indicates the presence of hazards or unsafe practices which could cause minor personal injury or product or property damage if ignored.
CAUTION	CAUTION used without the warning alert symbol indicates a potentially hazardous condition which could cause minor personal injury or product or property damage if ignored.
NOTE	Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

⚠ WARNING: Do not permit children to use or operate this pump.

⚠ WARNING: Before installing this product, read and follow all warnings notices and instructions in this manual. Failure to follow warnings and instructions can result in severe injury, death, or property damage. Call 1-(877)-213-3726 for additional free copies of these instructions. Please refer to www.raypak.com for more information related to this product.

⚠ DANGER: Installers, pool operators and pool owners must read these warnings and all instructions before using the sand filter.

⚠ WARNING: A pool or spa pump must be installed by a qualified pool and spa service professional in accordance with the National Electrical Code and all applicable local codes and ordinances. Improper installation may cause an electrical hazard which could result in death or serious injury to pool users, installers, or others due to electrical shock, and also cause property damage.



⚠ DANGER: ELECTROCUTION OR ELECTRICAL SHOCK RISK. DISCONNECT ELECTRICITY BEFORE WORKING ON PUMP, OR SHOCK, BURN OR ELECTROCUTION CAN RESULT.

Always disconnect pool pump power at the circuit breaker before servicing the pump. Death or serious injury to service people, pool users or others due to electric shock could result from failure to avoid the high danger risk.

NOTE: This pump operates with electrical voltage, and can generate both vacuum and pressure in the water system. When properly wired and plumbed, this pump will operate in a safe manner.

⚠ WARNING: Never work on the pump while it is running or the power is still connected. High voltage can cause serious or fatal injury. A suitable ground fault interrupter (GFCI) should always be installed at the power supply source of this unit. Article 681-31 of the NEC requires that a GFCI be used if this pump is used with a storage pool. Be sure to ground the motor before connecting to electrical AC power source. Failure to ground the motor can cause serious or fatal electrical shock hazard. **DO NOT** ground to a gas supply pipe line.

⚠ WARNING: Do not bury the electrical cord. Place the cord so as to eliminate contact from lawnmowers, hedge trimmers, other equipment and to avoid a tripping hazard.

⚠ WARNING: To reduce the risk of electrical shock, do not use an extension cord to connect the pump to the electrical supply, use a properly located outlet instead.

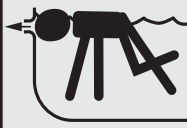
⚠ WARNING: To reduce the risk of electrical shock, replace any damaged electrical cord immediately.

⚠ 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.

⚠ WARNING: To reduce the risk of electrical shock, connect ground wires to grounding screw located in the motor. Use no smaller than a #12 AWG (3.3mm²) wire.

⚠ WARNING: For continued protection against possible electrical shock, this unit is to be mounted to the base in accordance with the installation instructions.

⚠ DANGER: DO NOT BLOCK SUCTION. SUCTION HAZARD. Suction can cause serious injury or death. Do not use this pump for wading pools, shallow pools, or spas containing bottom drains, unless the pump is connected to at least 2 functioning suction outlets.



⚠ DANGER: Hazardous suction can trap hair or body parts, causing severe injury or death. Do not block suction.

⚠ 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.

⚠ 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.

NOTE: Always turn off all power to the pool pump before installing the cover or working on any suction outlet.

⚠ WARNING: Pumps are not a substitute for properly installed and secured pool drain covers. An ANSI/ASME A112.19.8 approved anti-entrapment drain cover must be used for each drain. Pools and spas should utilize a minimum of 2 drains per pump. If a drain cover becomes loose, broken or is missing, close the pool or spa immediately and shut off the pump until an approved anti-entrapment drain cover is properly installed with the manufacturer's supplied screws.

⚠ WARNING: Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury or loss of life.

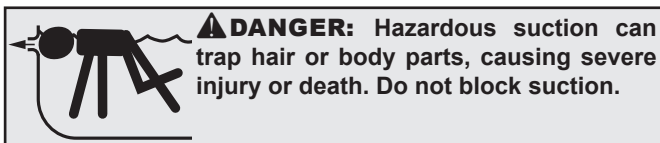
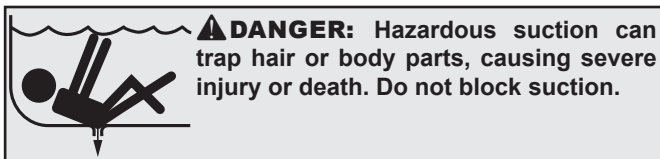
⚠ DANGER: Serious bodily harm or death can result if this pump and motor is not installed and used correctly.

⚠ WARNING: Risk of electrical shock. More than one disconnect switch may be required to de-energize the equipment before servicing.

⚠ 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.

Entrapment Prevention

▲ DANGER: DO NOT BLOCK SUCTION.



SUCTION HAZARD. Suction 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 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 screw-fastened covers installed. 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 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 suction line must be at least 3 ft (.9 m) apart, center to center.

The system **must** be built to include at least two suction outlets (drains) connected to the pump whenever the pump is running. However, if two 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 so that it does not allow for separate or independent shutoff or isolation of each drain.

More than one 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 ft (.5 m) 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 6 ft (1.8 m) per second or less, even if one 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 the fewest possible fittings (but at least two 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.

2. INSTALLATION

▲ WARNING: Blockage of suction fittings can cause serious or fatal injury due to drowning. To reduce the risk of injury, do not permit children to use this product.

▲ WARNING: Never work on the pump while it is running or power is still connected. High voltage and cause serious or fatal injury. A suitable ground fault interrupter (GFCI) should always be installed at the power supply source of this unit. Article 681-31 of the NEC requires that a GFCI be used if this pump is used with a storage pool. Be sure to ground the motor before connecting to electrical AC power source. Failure to ground the motor can cause serious or fatal electrical shock hazard. DO NOT ground to a gas supply pipe line.

▲ WARNING: The system's centrifugal pump operates with electrical voltage, and can generate both vacuum and pressure in the water system. When properly wired and plumbed, this pump will operate in a safe manner.

⚠ WARNING: Chemical fumes and/or spills can cause serious corrosion to the filter and pump structural components. Structurally-weakened components can cause filter, pump or valve attachments to separate and could cause serious bodily injury or property damage.

Packaging

A union kit is included and needed to make the connections.



Figure 1. Union Kit

Pump

1. Only qualified, licensed personnel should install pump and wiring.
2. Electrical Contractors Please Note: All 220VAC 60Hz pumps must be wired to the main power supply through an approved and correctly-rated contractor.
3. Allow for gate valve in suction piping.

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.

Inspect the contents of the carton and verify that all parts are included. See "8. ILLUSTRATED PARTS LIST" on page 19.

1. Install the pump as close to the pool as possible, preferably in a dry, well-ventilated area away from direct sunlight. Protect the pump from excessive moisture. Make sure there is drainage available at the place where the filter is to be installed. Give consideration to:
 - a. Drainage far away from pump.
 - b. Ventilation of pump motor.
 - c. Access for future servicing and winterizing.
2. Place the pump as close to the water source as possible, so that the suction pipe is short, straight and direct to reduce friction loss. Do not install the pump more than 10 ft (3 m) above pool water level.

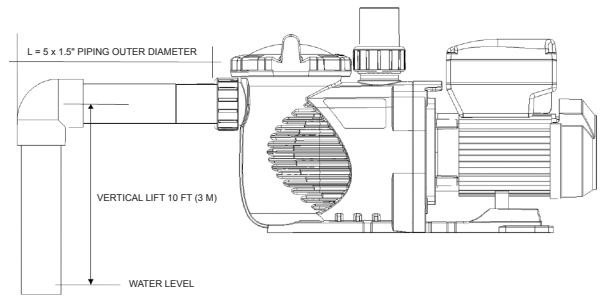


Figure 2. Pump Installation

3. Before installing the pump, make sure that the surface is solid, elevated, rigid and vibration-free.
4. Secure the pump to the base with screws or bolts to limit the vibration and the stress on the pipe or the joints.
5. Leave enough space for the gate valves in the suction and discharge piping, if required.
6. Connect the suction and discharge pipe to the outlet and inlet of the swimming pool.
7. Make sure that floor drainage is adequate to prevent flooding.
8. This pump must be equipped with an isolating transformer, or through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.
9. DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this pump.
10. DO NOT store pool chemicals near the pump.
11. DO NOT remove any safety alert labels such as DANGER, WARNING, or CAUTION. Keep the safety labels in good condition and replace any missing or damaged labels.
12. Make sure that the pump and piping are accessible for servicing.

NOTE: The pump suction and discharge connections have molded-in thread stops. DO NOT try to screw the pipe beyond these stops.

Electrical Wiring

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

The pump operates with a single-phase 230VAC connection. There are two terminals labeled AC-L and AC-N. Attach the power leads to these terminals.

Connect L1 (Black Color) to L, L2 (Red color) to N and Earth to Ground. See **Figure 3**.

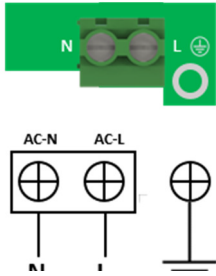


Figure 3. Terminals

1. Permanently ground motor. Locate the ground terminal located on the rear side of the motor and use the wire gauge and type required by code to connect the motor ground terminal to the electrical service ground. On cord-connected circuits, check for proper grounding.
2. Bond permanently-wired pumps. The National Electrical Code requires that the motor be electrically bonded to the appropriate permanently-installed pool or spa/hot tub structure using a solid copper

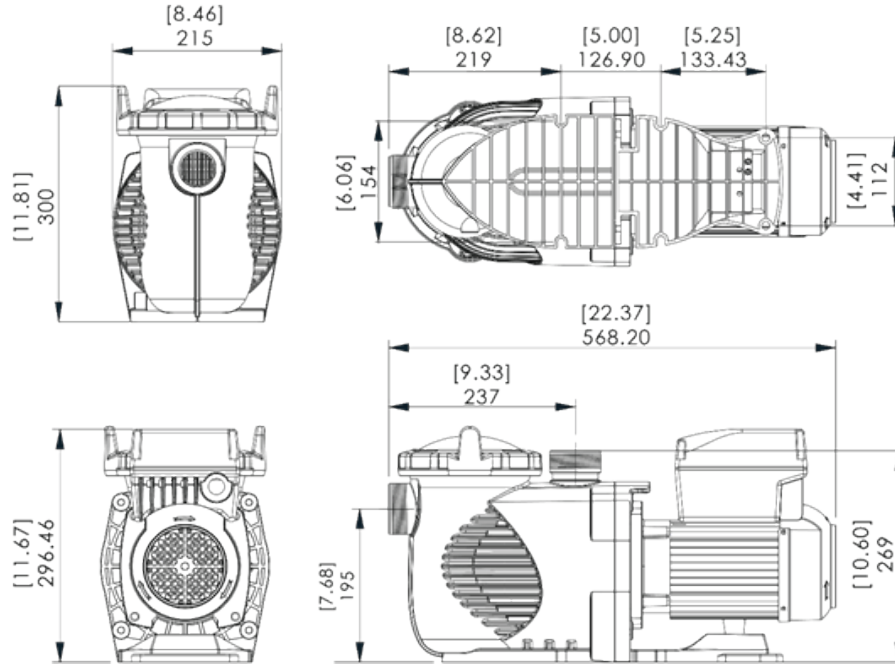


Figure 4. Motor Dimensions

Model	Voltage/ Frequency	Max Current	Connection ID/OD	Input Power	Horse power	RPM
RPVSP1	220-240V/ 50-60 Hz	5.9-5.4A	1.5"/2"	1.30 (kW)	1.5 hp	800-3400

Table A. Electrical Specifications

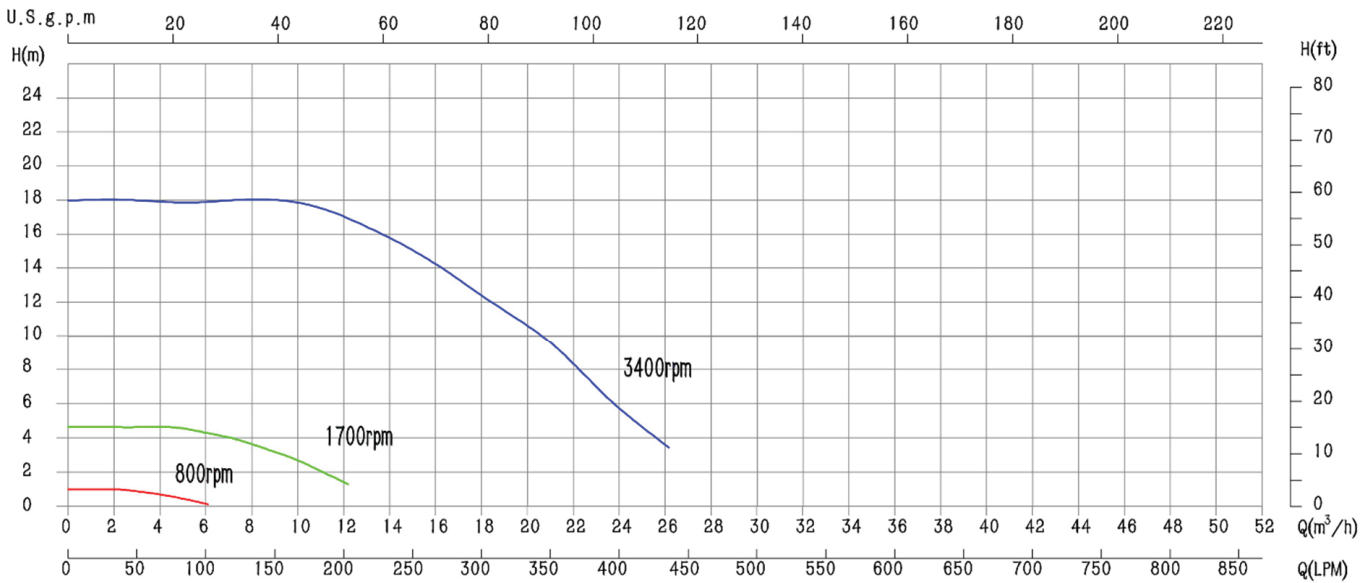


Figure 5. Performance Curves

conductor no smaller than No. 8 AWG. The 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 5 ft (1.5 m) 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.

RS485 Connection

Specifications:

- Max baud rate: 9600bps
- Protocol: MODBUS RTU
- Functions: 0x03, 0x04, 0x06, 0x16 hex
- ID: 1 to 247 slave address, default is 2
- Isolated A/B data bus, without 120 ohm terminal resistor
- Connector: SP1310 4-pin

The RS485 connection point is located at the side of the VS drive and should be connected to MODBUS controller by a cable connector assembly (only a connector without a cable is provided) as shown below in **Figure 7**.

RS485 Cable Assembly Instructions,

1. Disassemble the female connector. Pin out numbers can be found on the base of the terminals.
2. Prepare a 2-wire 22 AWG unshielded twisted pair cable for RS485. The length is up to the PUMP distance away from the MODBUS controller which is no more than 100 m (109 yards).

NOTE: For long distance wiring, pin 4 is needed for grounding and 120 ohm terminal resistor across A/B signal line.

3. Solder pin 1 for A and 2 for B respectively.
4. Assemble the connector again and plug into the RS485 socket on VS pump.

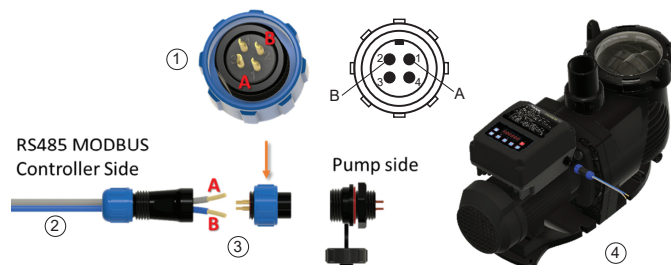


Figure 7. RS485 Illustration

3. OPERATION

⚠ WARNING:

- **NEVER** run the pump dry! Running the pump dry will damage seals, causing leakage and flooding. Fill the pump with water before starting.
- Always **STOP THE PUMP** before and **RELEASE ALL PRESSURE** from the pump and the piping system before proceeding.
- **NEVER** tighten or loosen screws while the pump is operating.
- **Do not block the pump suction.**

Initial Start-Up

The wide range of pump settings makes it suitable for multiple purposes. The pump controller is used to program motor speeds and schedules as described in the "Operation Procedure" section of this manual.

Priming Pump

⚠ WARNING: Tighten / un-tighten the pump lid by hand only.

1. Release all air from filter and piping system (consult your filter user manual).
2. In a flooded suction system (water source higher than pump), the pump will prime itself when suction and discharge valves are opened.
3. If pump is not installed in a flooded suction system, unscrew and remove pump lid and fill it with water.
4. Turn on power and wait for the pump to prime, which can take up to 14 minutes at 10 ft. (3 m) vertical length of 1.5" inlet piping. Priming will depend on vertical length of suction lift and horizontal length of suction pipe. If the pump does not prime within 14 minutes, stop the motor and determine the cause.

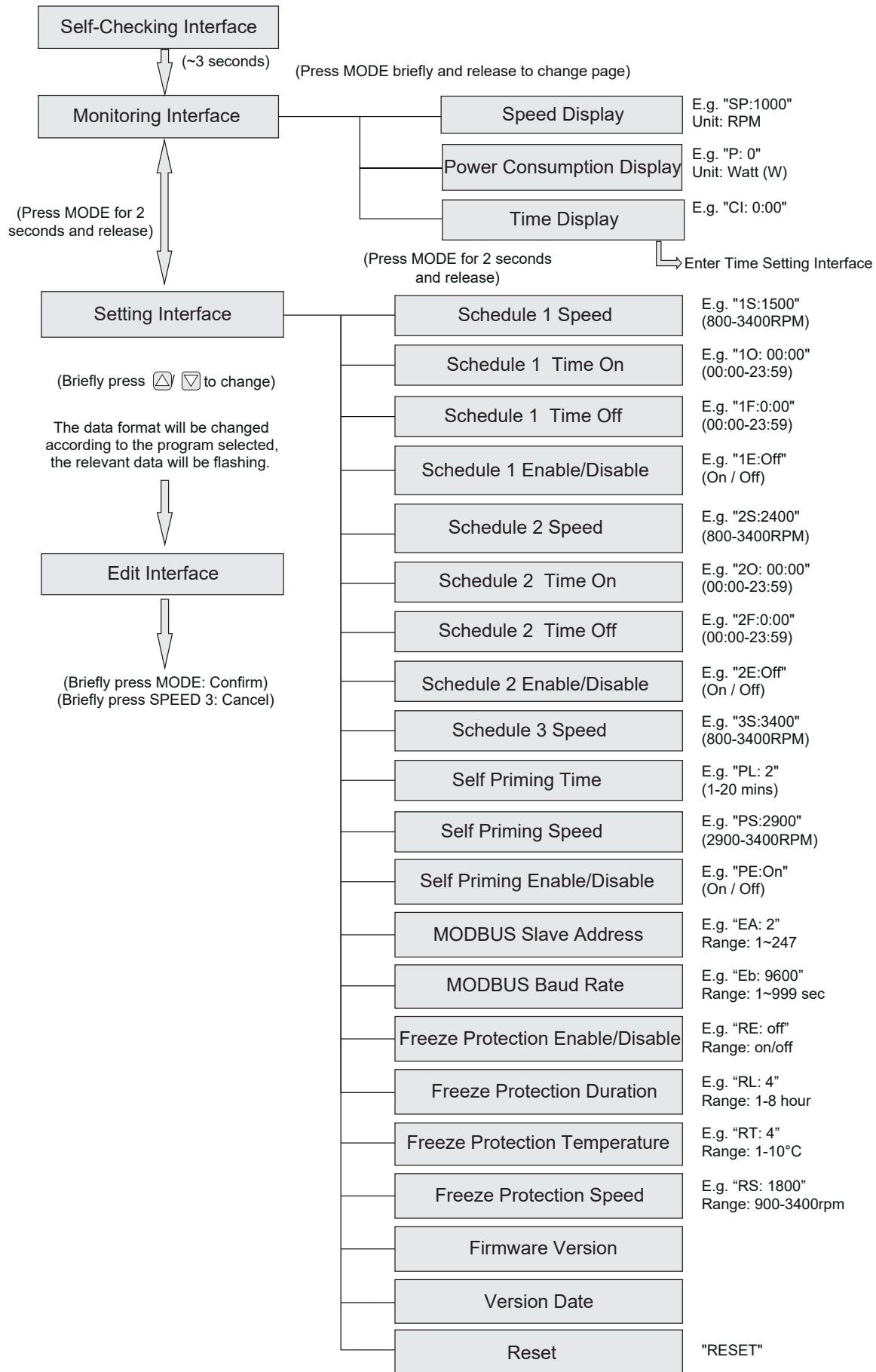


Figure 8. Programming Flow Chart

4. CONTROLS

Overview

The panel include the below display or control functions to monitor and control the pump.

- Clock: Real Time Clock display.
- Running Status: Running speed and power rating display.
- Pre-set Speed: 3 pre-set running speeds.
- Function settings: Real time clock, 3 pre-set speeds, 2 schedule settings, NO flow self-priming settings.
- Error display: overcurrent, overvoltage, undervoltage, overheating fault code.
- Auto-recovery: After an overcurrent, overvoltage, undervoltage, overheating or power failure, the settings will be restored to their prior state before the error.
- Power failure recovery: When there is a power interrupt, the pump will be restored to the previous settings it was when the power resumes.
- Wi-Fi: Wi-Fi ready indication after start up.
- RS485 Connection: external automation control over MODBUS.

Control Display

This controller matches with the variable-speed drive for the swimming pool variable-speed pump. Functions are shown below:

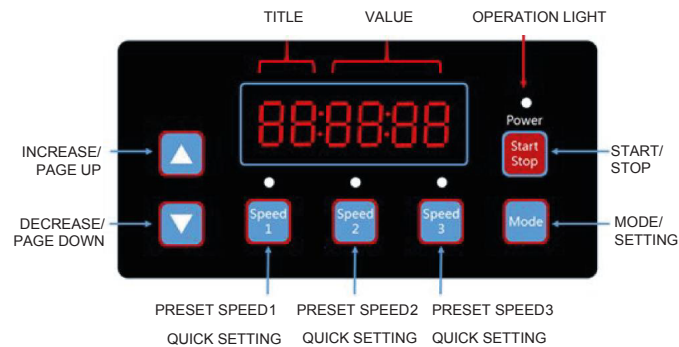


Figure 6. Display

Operation Procedure

Power Up

Plug in the power and the pump will perform self-diagnostic checks.

- If there is error, it will display as shown below. Call your installer or dealer to fix the problem.

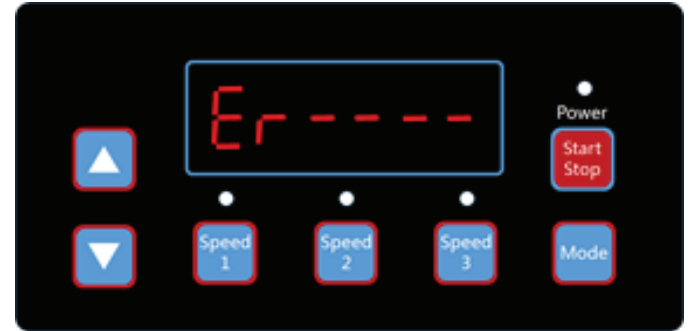




Figure 9. Error

- Normal display is as shown below. Use the  or  buttons to adjust the speed (SP) in RPM.

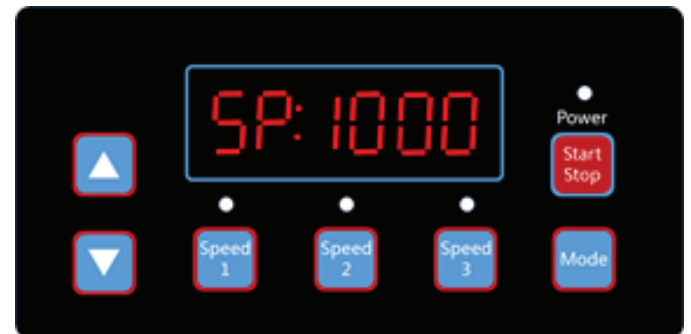


Figure 10. Power

- Briefly press MODE again to display the power consumption (P) in Watts.
- Briefly press MODE again to display the clock (CL).



Figure 11. Clock

Clock Setting

In order to have the schedule run properly, the clock must be set at your local time.

1. Hold down the MODE button for 2 seconds to access clock settings.
2. Briefly press SPEED 1 and SPEED 2 to shift between Hour and Minute. The applicable digits will flash.
3. Press \triangle or ∇ to adjust the value.
4. Briefly press the MODE button to save setting, or press SPEED 3 to cancel.
5. The unit will then exit the clock setting mode.

Preset SPEED 1-3

There are three preset speeds: press SPEED 1, SPEED 2 and SPEED 3 to change the pump speed.



Figure 12. SPEED 1 = 1500 RPM

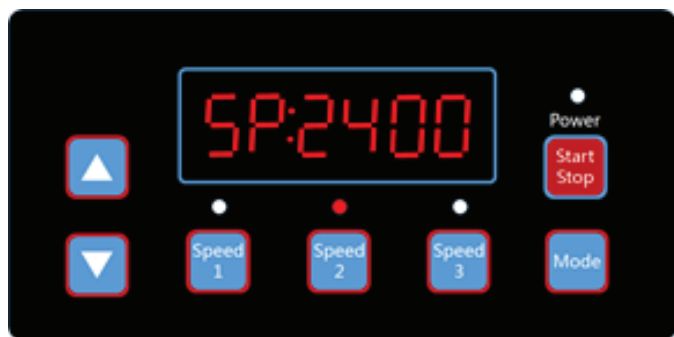


Figure 13. SPEED 2 = 2400 RPM

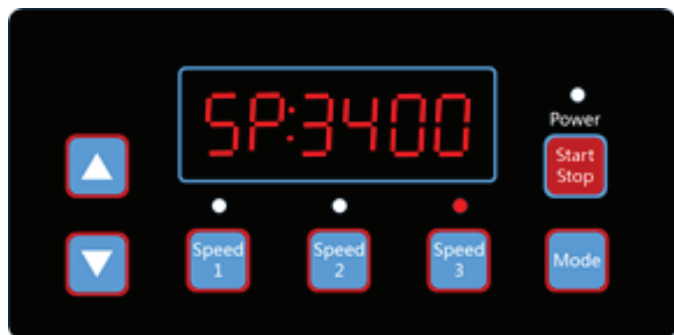


Figure 14. SPEED 3 = 3400 RPM

Change Preset SPEED 1-3

- Press SPEED 1 and hold down the MODE button for 2 seconds. The four digital speed values will flash.
- Press \triangle or ∇ to adjust the speed.
- Briefly press MODE to save the setting, or press SPEED 3 for cancellation.
- Repeat above for SPEED 2 and SPEED 3 setting.

Setting Schedule

In order to prevent any conflict, stop the pump before any schedule setting change.

- When the display is back to SP:1000. (Current speed display)
- Press MODE and hold for 2 seconds to access **Schedule 1** setting. Default speed is 1500 RPM.



Figure 15. Schedule 1

- The corresponding speed is SPEED 1 and it cannot be changed from this point. Change would need to be from the SPEED 1-3 setting procedure above.
- Briefly press \triangle or ∇ to set START TIME (10:00:00). Default is 00:00.

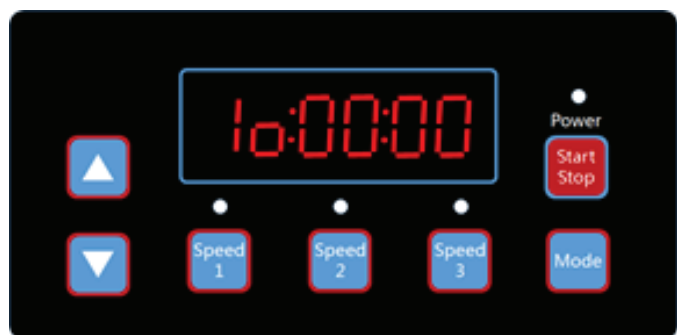


Figure 16. Start Time

- Briefly press SPEED 1 and SPEED 2 to shift between Hour and Minute. The applicable digits will flash.
- Press \triangle or ∇ to adjust the value.
- Briefly press MODE to save the setting, or press SPEED 3 to cancel.

- Briefly press \triangle or ∇ to set END TIME (IF:00:00) . Default is 00:00.
- Briefly press SPEED 1 and SPEED 2 to shift between Hour and Minute. The applicable digits will flash.
- Press \triangle or ∇ to adjust the value.
- Briefly press MODE to save the setting, or press SPEED 3 to cancel.
- Briefly \triangle or ∇ to access the ON / OFF enable setting. Default is OFF.

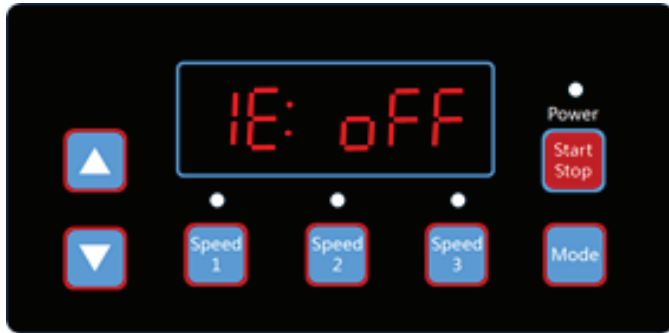


Figure 17. Enable Setting

- Press \triangle or ∇ to turn it ON or OFF (enable or disable).
- Briefly press MODE to save the setting, or press SPEED 3 to cancel.
- Briefly press \triangle or ∇ for Schedule 2 setting. Default speed is 2400 RPM.

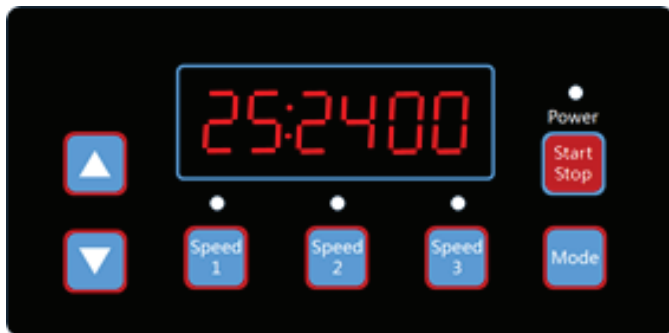


Figure 18. Schedule 2 Setting

- Repeat the above procedure for Schedule 2 setting.
- Briefly press \triangle or ∇ for Schedule 3 speed setting display only. Default is 3400 RPM.



Figure 19. Schedule 3 Setting

Schedule Policy

- Programmed Schedule Priority, Schedule 1 > Schedule 2.
- If more than 1 schedule is enabled within the same time period, the controller will operate only with the highest priority schedule and speed. The corresponding indication light will turn on.
- If all schedules are completed according to their pre-set times, the controller will return to the previous operating condition before the schedules were set or started.
- When running on a programmed schedule, the pump can be interrupted by any of the following actions such as Start / Stop, speed adjust by \triangle or ∇ , SPEED 1-3 and any change by external RS485 MODUS. The schedule timer and speed will resume when it is re-started after pressing the Start / Stop to run it again.
- The scheduled settings and auto-recovery cannot contradict each other. When there is an error, the variable-speed driver will restore the settings to those before the error. (The priority setting is still applicable).



Priming Setting

Priming Time

- Briefly press \triangle or ∇ to access PRIME TIME setting. Default is 2 minutes.



Figure 20. Prime Time



- Press  or  to adjust the value.
- Briefly press MODE to save the setting, or press SPEED 3 to cancel.

Prime Speed

- Briefly press  to access PRIME SPEED setting.



Figure 21. Prime Speed

- Press  or  to adjust the value.
- Briefly press MODE to save setting, or press SPEED 3 to cancel.

Priming Enable / Disable




- Briefly press  to access enable and disable setting. Default is ON.



Figure 22. Prime Enable/Disable

- Press  or  to set ON or OFF.
- Briefly press MODE to save setting, or press SPEED 3 to cancel.

Anti-Freeze Protection

The system has an automated anti-freeze function which will circulate the system water through the piping in cases where ambient temperature approaches freezing point, so as to avoid damage to piping and other pool equipment. This automated response is typically triggered at night.

The triggering event to initiate freeze protection is an ambient temperature lower than the threshold temperature. At such a point, the pump will run according to whatever settings are selected for speed and duration of operation. The pump will shut off when the ambient temperature

becomes higher than the threshold temperature, or the duration of pump operation selected.

There are four settings which can be adjusted.

Enable / Disable

The default is OFF. The installer needs to be proactive and set this up in all cases where freezing temperatures are expected, or potentially possible.

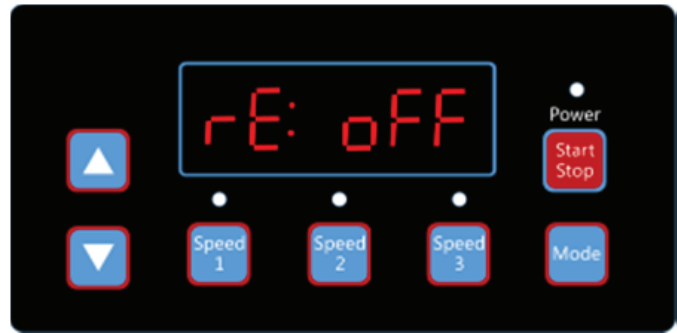


Figure 23. Enabling Freeze Protection

Duration

The default is 4 hours and is typically recommended. The total adjustment range is 1-8 hours, and the installer is free to set the circulation time, based on local environmental factors, between 1 and 8 hours.

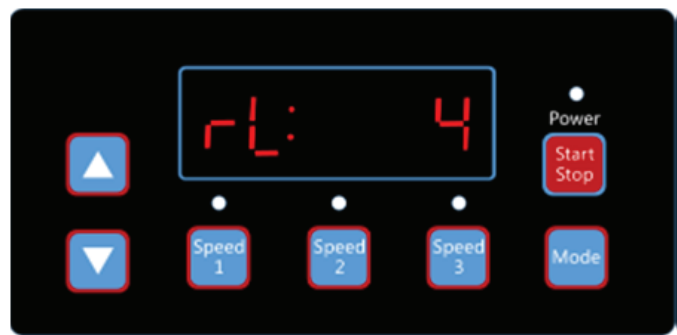


Figure 24. Freeze Protection Duration/Length

Threshold Temperature

The default is 4°C/39°F based on typical customary practice. The slightly higher setting is due to the fact that the temperature sensor is inside the pump and not in direct contact to the water itself.

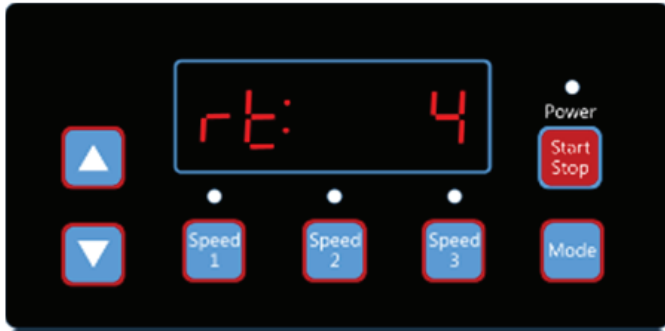


Figure 25. Threshold Temperature

Speed

Set the speed to keep circulation at a high enough flow, to ensure that the water does not freeze. Typical practice is a setting of 1800 rpm for energy savings. It is generally recommended to keep this default flow speed.



Figure 26. Circulation Speed

RS485 Setting

The pump is equipped with a RS485 communication interface to use with an external automation controller. It is not intended to be accessed by domestic users.

Refer to the RS-485 Connection section for wiring details, see page 9.

Contact your dealer for MODBUS programming manual if you are a system integrator.

SLAVE ADDRESS

There are two parameters that can be changed.

- Briefly press to access Slave Address setting. Default is 2.



Figure 27. Slave Address Setting

- Press to adjust the value.
- Briefly press MODE to save the setting or press SPEED 3 to cancel.

Baud Rate

- Briefly press to access BAUD RATE Setting. Default is 9600 bps.

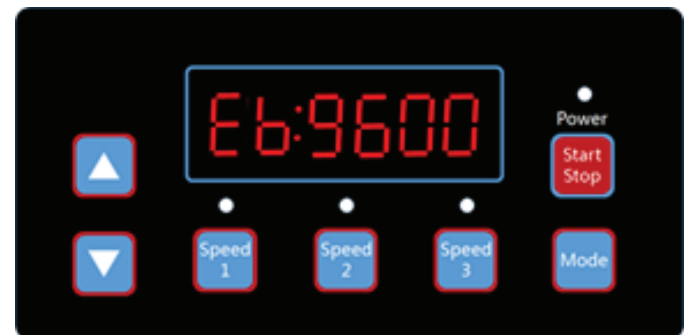


Figure 28. Baud Rate Setting

- Press or to adjust the value among 1200, 2400, 4800 or 9600.
- Briefly press MODE to save the setting or press SPEED 3 to cancel.
- Briefly press to check the firmware version.

System Reset To Factory Default Setting

- Briefly press  to access system RESET function.

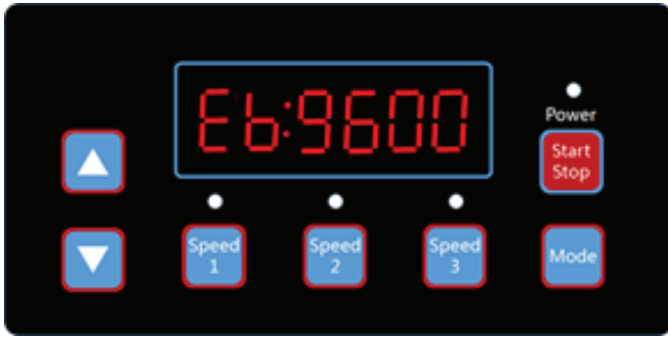


Figure 29. Factory Default Setting

- Press MODE to confirm reset to factory default setting.

Auto-Recovery

When there is an overcurrent, overvoltage, undervoltage or overheating error, the system will recover automatically. If two errors occur within 60 seconds, the auto-recovery time will increase once. If the auto-recovery increases by 3 times, the system will direct you to the ERROR menu, and will not execute the auto-recovery. The auto-recovery page will display the error details during the first 5 seconds and the countdown details during the following 5 seconds.



Figure 30. Auto Recovery

Press START/STOP button to cancel the countdown during the auto-recovery process or to activate the auto-recovery immediately (without activating the auto-run). If there is an error and the variable-speed driver is in operation, then after auto-recovery, the system will display the auto-start page. The auto-start page will show the error details

(same as auto-recovery, which lasts for 5 seconds) plus the countdown details.

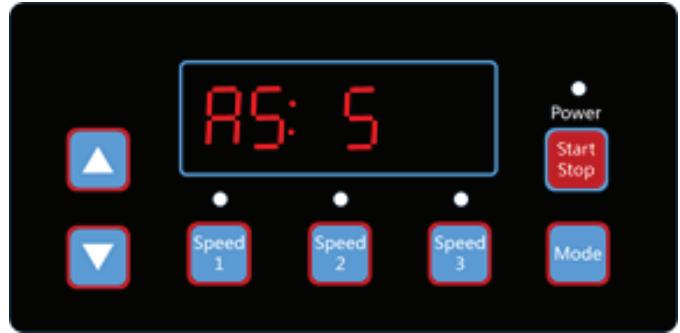


Figure 31. Countdown

Press RUN to cancel the procedures and to auto-recover immediately (the default settings of the variable-speed driver will appear).

Error Menu

The Error Menu display will show all error details and all lights will start flashing. Briefly press RUN at the error menu to auto-recover the variable-speed driver (keep the driver off).



Figure 32. Error Menu Display

5. GENERAL MAINTENANCE

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

The only routine maintenance needed is inspection and cleaning of the trap basket (pre-filter basket). Debris or trash that collects in the basket will reduce or prevent water flow through the pump. Follow the instructions below to clean the trap.

- Stop the pump, close the suction and discharge gate valves, and release all pressure from the system before proceeding.
- Unscrew the trap lid (pre-filter lid) by turning counterclockwise.
- Remove the strainer basket and remove debris. Be sure all holes in the basket are clear of obstructions,

flush the basket with water and put the trap (pre-filter) back on with the large opening facing the pipe connection port. If the basket is replaced backwards, the cover will not fit on the trap body.

4. Clean and inspect the lid.
5. Clean the O-ring and its groove on trap body (pre-filter) and replace the lid. To help keep the lid from sticking, tighten by hand only.
6. Prime pump. See "Priming Pump" on page 9.

Winterizing

⚠ CAUTION: The pump must be protected when freezing temperatures are expected. Allowing the pump to freeze may cause severe damage. Such damage will not be covered under 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 the drain plugs. Do not leave them in place, store them 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: When the winter season is over the pump will need to be primed prior to start. Refer to "Initial Start-Up" on page 9.

⚠ 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 not covered under warranty.

6. ERROR DESCRIPTIONS

Communication Error

If the communication error ("ER ---") appears, make sure that the plug has good electrical contact with the current. Reset the system by unplugging the equipment from the power supply, then wait at least 60 seconds before reconnecting. If the error continues, contact your technical service.

Operation Errors

When the controller is not working, an error code will be shown on the controller display, such as "Er: OV". Press the START/STOP button to restore the controller.

The common error codes are the following:

Error	Description	Reason
OC	Overcurrent: driver current output exceeds the threshold (200% of rated current).	Driver output failure
		Driver IPM module damaged
OV	Overvoltage: the main circuit DC voltage exceeds the threshold.	Exceeding power supply maximum
		Power supply voltage exceeds the control settings
UV	Under-voltage: the main electric current is too low.	Ambient temperature is too high
		Supply voltage fluctuation is too large
OH	1.1kW Overheating: the motor heat sink is overheated.	Ambient temperature is too high
		Motor cooling fan does not work

Table C. Common Errors

7. TROUBLESHOOTING

Problem	Cause	Action
Motor does not start	Disconnected switch, or circuit breaker is in ON position	Check electrical wiring
	Thermal overload open	Let the motor naturally cool down
	Locked motor shaft	Check for obstructions inside pump body
	Low voltage	Check that electric power is 220-240VAC
Pump delivers no water	Pump is not primed	Suction lines, pump, strainer, and pump body are not full with water
	Closed valve in the suction or discharge line	Open the valves in the suction and discharge lines
	Air leakage into the suction piping	Check for leakage in the piping system
	Impeller clogged	Disassemble the pump and clear obstructions within the pump body
Leakage of water at the shaft	Shaft seal requires replacement	Replace seal
Low pump capacity	Valve in the suction or discharge line partly closed	Fully open both valves
	Suction or discharge line partly plugged	Check and clean obstructions
	Suction or discharge line is too small	The suction and discharge lines must be 1.5"
	Plugged basket in skimmer or hair and lint strainer	Clean the basket
	Dirty filter	Backwash the filter
	Impeller clogged	Disassemble the pump and clear obstructions within the impeller
High pump pressure	Discharge valve or inlet fittings closed too much	Re-do the piping system layout
	Return lines is too small	Enlarge the return lines
	Dirty filters	Backwash the filter
Noisy pump and motor	Plugged basket in skinner or hair in lint strainer	Clean the strainer basket
	Worn motor bearings	Replace bearings
	Valve in suction line partly closed	Open the suction valve
	Suction line partly plugged	Check for obstructions
	Vacuum hose plugged or too small	Clean the vacuum hose or enlarge it
	Pump not supported properly	Check the base mounting screw and tighten as needed
Air bubbles at inlet fittings	Leakage of air into the suction line connections or valve stem	Check for piping air leakage
	Cover gasket of hair and lint strainer needs cleaning	Clean the basket and check the lid O-ring
	Low water level in the pool	Add water to the pool
Motor does not start	Disconnect switch or circuit breaker is in OFF position	Check electrical wiring
	Thermal overload open	Let the motor naturally cool down
	Locked motor shaft	Check for obstructions within the pump body
	Low voltage	Check that electric power is 220-240VAC
Pump delivers no water	Pump is not primed	Suction lines, pump, strainer, and pump body need to be filled with water
	Closed valve in suction or discharge line	Open valves in the suction and discharge lines
	Leakage or air into suction system	Check for leakage in the piping system
	Impeller clogged	Clean obstruction inside the pump body

Note: If the above recommendations do not solve your particular problem(s), please contact your local service provider for further assistance

8. ILLUSTRATED PARTS LIST

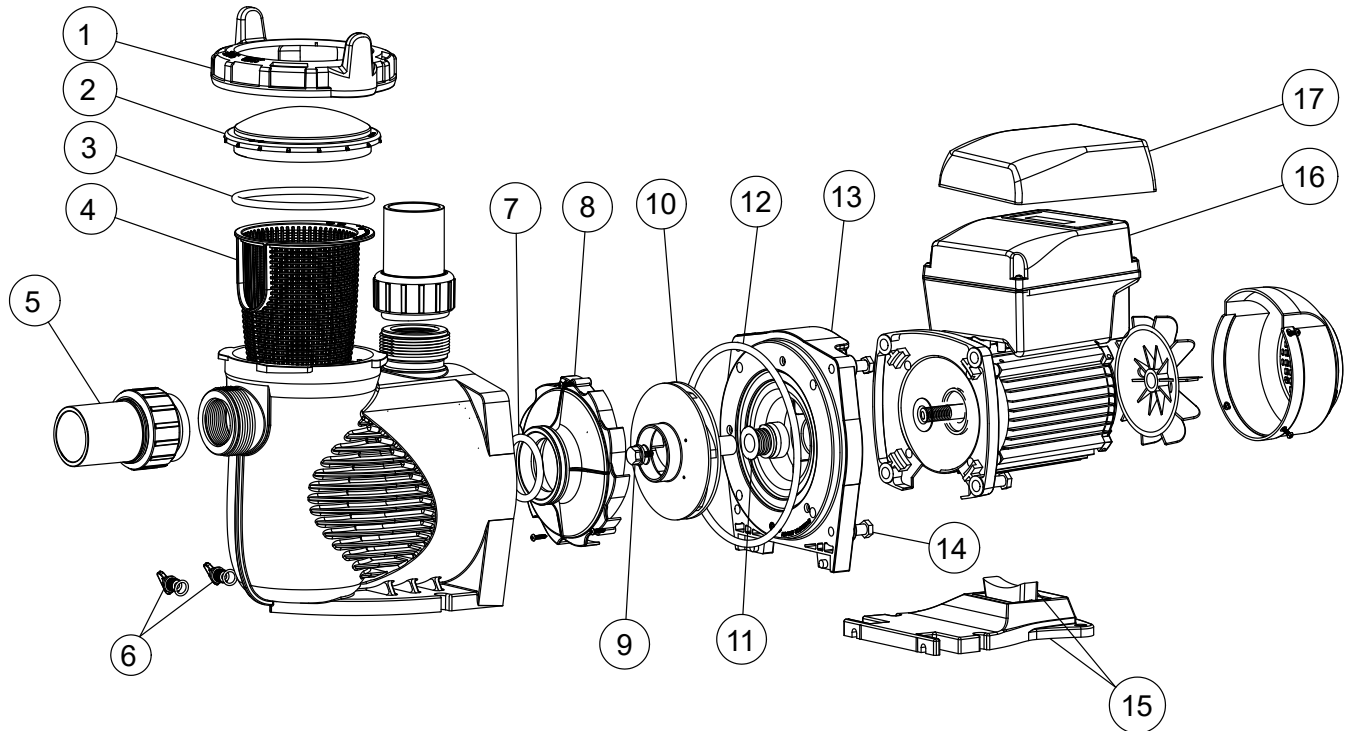


Figure 33. Parts Exploded View

Item	Description	Raypak Order No.
1		
2	Kit - Transparent Cover VSP	018228F
3		
4	Kit - Pump Basket VSP	018229F
5	Kit - Water Union 1-1/2" PVC	018230F
6	Kit - Drain Plug With O-ring	018231F
7	Kit - Pump Diffuser with O-Ring	018232F
8		
9	Kit - Pump Impeller with Screw	018233F
10		
11		
12	Kit - Mechanical Seal 3/4" with O-Ring and Flange	018234F
13		
14		
15	Kit - Pump Base	018235F
16	Kit - Programmable Controller	018236F
17	Kit - Controller Cover	018237F

Table D. Replacement Parts

9. MODBUS REGISTER MAP

Modbus - Holder Registers							
Address	NAME	Size	Use	Min	Max	Default	Description
0	CurrentMin	word	RW	0	59	-	Current time (Minutes)
1	CurrentHour	word	RW	0	23	-	Current time (Hours)
8	RunCtrl	word	RW	0	1	0	1 = Run, 2= Stop
9	SetSpeed	word	RW	0	3400	0	RPM
10	SetSelectspeed	word	RW	1	3	1	Range: 1-3
16	Speed1	word	RW	800	3400	900	RPM, default 900rpm
17	Speed2	word	RW	800	3400	1500	RPM, default 1500rpm
18	Speed3	word	RW	800	3400	2500	RPM, default 2500rpm
32	Sch1En	word	RW	0	1	0	1 = enable, 0 = disable
33	Sch1TimeOnMin	word	RW	0	59	30	Range: 0-59 minutes
34	Sch1TimeOnHour	word	RW	0	23	8	Range: 0-23 hours
35	Sch1TimeOffMin	word	RW	0	59	30	Range: 0-59 minutes
36	Sch1TimeOffHour	word	RW	0	23	11	Range: 0-23 hours
40	Sch2En	word	RW	0	1	0	1 = enable, 0 = disable
41	Sch2TimeOnMin	word	RW	0	59	30	Range: 0-59 minutes
42	Sch2TimeOnHour	word	RW	0	23	14	Range: 0-23 hours
43	Sch2TimeOffMin	word	RW	0	59	30	Range: 0-59 minutes
44	Sch2TimeOffHour	word	RW	0	23	17	Range: 0-23 hours
144	Priming_Enable	word	RW	0	1	1	1 = enable, 0 = disable
145	Priming_Time	word	RW	1	20	2	Range: 1-20 minutes
146	Priming_Speed	word	RW	800	3400	2900	RPM, default 2900 RPM
255	Reset	word	RW	0	1	0	1 = Reset

Modbus - Input Registers							
Address	NAME	Size	Use	Min	Max	Default	Description
0	Current Time	word	R	0	65535	-	Current time HHMM, HH (hi) MM (lo)
1	Current Speed	word	R	0	-	-	RPM
2	Current Power	word	R	0	-	-	Watts
3	Run Status	word	R	0	1	-	1 = Run, 0 = Stop
4	Error	word	R	0	1	-	1 = Error, 0= No error
5	Error Code	word	R	0	-	-	Check Error code table
6	Current Speed 1-3 switch	word	R	1	3	-	Range: 1-3
9	Current Schedule	word	R	0	5	0	0 = Schedule disable 1 = Schedule enable 5 = Variable speed mode

Modbus - Error Codes													
Code	Display	Code	Display	Code	Display	Code	Display	Code	Display	Code	Display	Code	Display
0	OC1	9	OL3	18	DRE	28	BER4	38	OPE8	55	PGO	69	POE2
1	OC2	10	OH2	19	PRE	30	UV	39	OPE9	56	PGE	73	UV
2	OV1	11	BRE	20	EST	31	OPE1	40	OPF	57	OL2	74	NF
3	OV2	12	BD	21	EF	32	OPE2	41	OUT	58	OL3	75	SVRS
4	OC3	13	BER1	22	LE	33	OPE3	50	OH1	59	OL1		
5	UV1	14	BER2	23	PRE1	34	OPE4	51	PF1	60	EE		
6	OC4	15	CRDE	24	PRE2	35	OPE5	52	PF2	62	CCE		
7	OV3	16	PGF	25	PRE3	36	OPE6	53	OS1	65	JE		
8	GF	17	CE	27	BER3	37	OPE7	54	OS2	68	POE1		

10. WARRANTY

LIMITED WARRANTY ABOVE GROUND SWIMMING POOL PUMPS Models: RPAGP75, RPAGP100, RPAGP102, RPAGP150, RPAGP152, and RPVSP1

SCOPE OF WARRANTY

Raypak, Inc. ("Raypak") warrants to the original owner that the above ground swimming pool pump models listed above and sold with this Limited Warranty certificate (the "Pump"), when installed in the United States of America with a pool, will be free from defects in materials and workmanship under normal use and service for the Applicable Warranty Period defined herein. In accordance with the terms of this Limited Warranty, Raypak will, at its option, repair or furnish a replacement for the PUMP or any defective part of the PUMP that fails in normal use and service during the Applicable Warranty Period. The repair or replacement will be warranted for only the unexpired portion of the original Applicable Warranty Period, or the Extended Warranty Period, as the case may be.

EFFECTIVE DATE

The Effective Date of this Limited Warranty is the date of original installation if properly documented. If you are not able to provide documentary proof of the date of original installation, the Effective Date will be thirty (30) days after date of purchase, not to exceed one (1) year after date of manufacture. All Applicable Warranty Periods specified in this Limited Warranty are measured from the Effective Date.

APPLICABLE WARRANTY PERIOD – UNREGISTERED

If the PUMP is installed with a pool, the Applicable Warranty Period is ninety (90) days from the Effective Date, parts only, for the PUMP and component parts.

EXTENDED WARRANTY PERIOD – REGISTERED

If, within 90 days of the Effective Date, the PUMP is installed in a pool at a single family residential dwelling and registered with Raypak (www.raypak.com/warranty), then the Applicable Warranty Period is one (1) year from the Effective Date for the PUMP and component parts.

LABOR AND SHIPPING COSTS

This Limited Warranty does **NOT** cover any travel time or any labor costs. Furthermore, unless applicable state law provides otherwise, this Limited Warranty does **NOT** cover any shipping costs to and from Raypak's designated service provider or to or from the installation site. All of the foregoing costs and expenses are your responsibility, unless applicable state law provides otherwise.

WARRANTY EXCLUSIONS

This Limited Warranty does **NOT** apply:

1. if the PUMP has been moved from its original place of installation, or if the original owner no longer owns the property where the original installation was made;
2. if the PUMP is not properly installed in a pool in accordance with applicable local codes and ordinances, good trade practices and the manufacturer's installation instructions;
3. if the rating plate(s) or serial number(s) are altered or removed;
4. if the PUMP is modified in any way, or if non-factory authorized accessories or other components are used in conjunction with the PUMP;
5. to damage, malfunctions or failures resulting from failure to properly install, operate or maintain the PUMP in accordance with the manufacturer's instructions;
6. to damage, malfunctions or failures resulting from abuse, act of nature, accident, fire, flood, freeze, lightning or the like;
7. to damage, malfunctions or failures resulting from connected system control devices;
8. to performance problems caused by improper sizing of the PUMP or electric service voltage, wiring or fusing;
9. to damage, malfunctions or failures resulting from any alteration, including the use of any attachment, including without limitation, any energy saving device not authorized by the manufacturer;

10. to damage, malfunctions or failures resulting from misuse or neglect, including but not limited to, freeze-ups.

HOW TO MAKE A WARRANTY CLAIM

You should immediately notify your dealer and provide proof of purchase model number serial number and date of installation. If the dealer is not available, please contact Raypak customer service at 805-278-5300. **Proper authorization MUST be obtained PRIOR to any repairs for the Limited Warranty to apply. This Limited Warranty is VOID if the product is repaired or altered in any way by ANY persons or agencies other than those authorized by Raypak.**

When requesting support please be ready to supply the model number, serial number, date of original installation and a description of the problem. Raypak reserves the right at all times to inspect, or require the return of, the defective PUMP or component part and to verify warranty coverage at its factory.

Warranty service CANNOT be initiated until the status of the warranty coverage has been established.

EXCLUSIVE WARRANTY -LIMITATION OF LIABILITY

THE LIMITED WARRANTY IS THE ONLY WARRANTY PROVIDED BY RAYPAK IN CONNECTION WITH THE PUMP AND ITS COMPONENT PARTS. NO ONE IS AUTHORIZED TO MAKE ANY OTHER WARRANTIES ON RAYPAK'S BEHALF. ANY IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE WARRANTY PERIOD SPECIFIED IN THIS LIMITED WARRANTY. RAYPAK'S SOLE LIABILITY WITH RESPECT TO ANY DEFECT SHALL BE AS SET FORTH IN THIS LIMITED WARRANTY. IT IS AGREED THAT RAYPAK SHALL HAVE NO LIABILITY WHETHER UNDER THIS LIMITED WARRANTY OR IN CONTRACT, TORT OR NEGLIGENCE OR OTHERWISE FOR CLAIMS FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING NO LIABILITY FOR DAMAGE FROM WATER LEAKAGE), ALL OF WHICH ARE EXPRESSLY EXCLUDED, NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, OR FOR THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

We suggest you immediately record the model, serial number, date of original installation and receipt of purchase and retain this Limited Warranty Certificate in the event warranty service is needed.

DO NOT RETURN THIS DOCUMENT TO RAYPAK. KEEP IT WITH YOUR POOL PUMP OR BUSINESS RECORDS.

Register your product online at www.raypak.com/warranty

RAYPAK, INC., 2151 Eastman Avenue, Oxnard, CA 93030 • (805) 278-5300 FAX (800) 872-9725

Notes



ISO 9001

REGISTERED QUALITY MANAGEMENT SYSTEM

www.raypak.com

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