



VARIABLE SPEED MOTOR

INSTALLATION AND USER'S INSTRUCTIONS



READ AND FOLLOW ALL INSTRUCTIONS BEFORE INSTALLING MOTOR



Danger indicates a dangerous situation, if not avoided, may result in death or serious injury

WARNING indicates a hazardous situation which, if not avoided, could result in minor or moderate injury



CAUTION indicates special instructions not related to hazards

SAVE THESE INSTRUCTIONS

TABLE OF CONTENTS

IMPORTANT SAFETY INSTRUCTIONS.....	3-4
INTRODUCTION	
Technical Specifications.....	5
INSTALLATION	
Electrical Requirements.....	5
Wiring.....	5-6
Bonding and Grounding.....	6
OPERATION	
Panel Overview.....	7
Priming Program	8
Clock Set.....	8
Default Schedule.....	9
Custom Schedule and Quick Clean.....	9-10
MAINTENANCE	
Freeze Protection Program.....	11
TROUBLESHOOTING	
Error Code.....	11-12
Common Problem.....	12-13
WARRANTY.....	13

IMPORTANT SAFETY INSTRUCTIONS

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



Installed units intended for use on 15 or 20 ampere, 125 through 240 volt, single phase branch circuits.



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



To reduce the risk of electrical shock, replace damaged, broken, cracked, missing, or not securely attached suction outlet components immediately. An improperly attached suction outlet may cause severe injury and/or death due to body suction entrapment, hair entrapment, mechanical entrapment, evisceration, limb entrapment.



THIS DEVICE OPERATES UNDER HIGH PRESSURE. When any circulation system or part is serviced, air can enter the device and become pressurized air can cause the lid to blow off which can result in service **INJURY, DEATH, OR PROPERTY DAMAGE.** TO AVOID THIS POTENTIAL HAZARD, FOLLOW THESE INSTRUCTIONS.



Trapped air in system can cause the filter lid to be blown off, which can result in death, serious personal injury, or property damage. Be sure all air is out of the system before operating.



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



Risk of Electric Shock. Connect only to a branch circuit protected by a ground-fault circuit-interrupter (GFCI). Contact a qualified electrician if you cannot verify that the circuit is protected by a GFCI.



Always disconnect power to the pool pump at the circuit breaker before servicing the pump. Incorrectly installed equipment may fail, causing severe injury or property damage. The pump is capable of high flow rates. Be careful when installing and programming to limit pumps performance potential with questionable or old equipment.



To reduce the risk of property injury or damage, do not attempt to change the backwash (slide, full flow or multiport) valve position with the pump running.



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



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



Do not store pool chemicals near your equipment. Chemical fumes and spills can weaken pool/spa equipment. Corrosion can cause filters and other equipment to fail, resulting in severe injury or property damage.



Failure to keep suction outlet components clear of debris, such as leaves, dirt, hair, paper and other material can result in an increased potential for suction entrapment. Do not start pump dry! Running the pump dry for any length of time will cause severe damage and will void the warranty.



Do not install beneath the skirt of a hot tub. The pump requires adequate ventilation to maintain air temperature at less than the maximum ambient temperature rating listed on the motor rating plate.



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.



Do not install within an outer enclosure or beneath the skirt of a hot tub. The pump requires adequate ventilation to maintain air temperature at less than the maximum ambient temperature rating listed on the motor rating plate.



Never use pool or spa if any suction outlet component is damaged, broken, cracked, missing, or not securely attached.

INTRODUCTION

Congratulations on purchasing your new Variable Speed Motor. This manual provides proper installation, operation and maintenance for the Variable Speed Motor, save these instructions. This pump uses a quiet TEFC motor for energy-efficient, you can select speeds from 450-3450 RPM. Operate at low speed costs, lower noise levels and reduce greenhouse emissions.

Technical Specifications

Overall Ratings		
Model	EE-140	EE-270
Input Voltage	230 Vac	
Input Frequency	Single phase, 50 or 60 Hz	
Input Current	5.5A	10 A
Maximum Continuous Load	1.4 HP	2.7 HP
Speed Range	450 - 3450 RPM	

INSTALLATION

Electrical Requirements

FOR YOUR SAFETY



This Pump must be installed by a qualified pool professional or licensed or certified electrician and must conform to National Electrical Code all national, state, and local codes. Before installing this product, read and follow all warning notices and instructions that accompany this product. Failure to follow warning notices and instructions can result in property damage, personal injury, or death.

Turn OFF the power supply before installing or servicing pump.

Before installing the pump, open the carton and check the pump for concealed damage, for example, dents, a broken base, cracks etc. If any damage is found, please contact the original purchasing shop.

Wiring

Note: This pump **ONLY** use for home voltage 230Vac, single phase input power. Connection to the wrong voltage, or use in other application may cause damage to equipment or personal injury.

RISK OF ELECTRIC SHOCK



- The pump shall be installed follow the National Electric Code and any local code.
- Make sure connect to correct voltage 230Vac.
- All electrical connections are tight and clean.
- Before wiring the pump, make sure that all circuit breakers and switches are turned off. After disconnecting the power to the pump, be sure to wait six (6) minutes before turning on or servicing the drive.

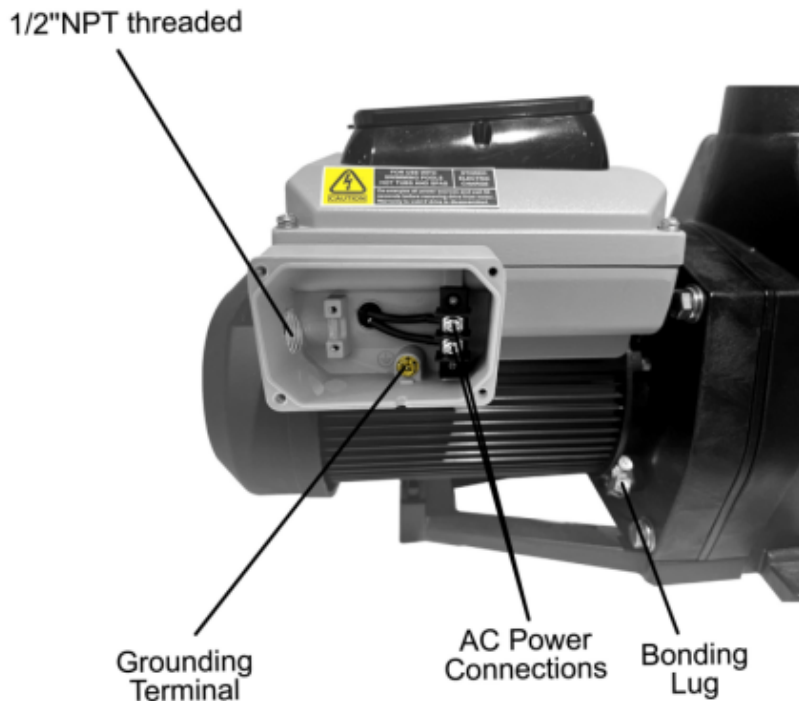
Bonding and Grounding

The pump must be installed in accordance with the National Electrical Code all national, state and local codes. Connect the electrical service ground using the green ground terminal. To reduce the risk of a current, the pump motor must be bonded to all metal parts of the swimming pool, conduit within 5 ft. (1.5 m) of inside walls. Use a solid copper bonding conductor not smaller than 8 AWG. For Canada requires a solid copper bonding conductor 6 AWG or larger.

The pump should be permanently connected to either a circuit breaker, 2-pole timer or 2-pole relay. If AC power is supplied by a GFCI circuit breaker, use a dedicated circuit breaker 3-that has no other electrical loads.

Connect the pump permanently to a circuit. Make sure no other lights or appliances are on the same.

The field wiring compartment has a 1/2" NPT threaded conduit port for the liquid tight fitting. The bonding lug should be used to bond the motor frame to the equipment pad.





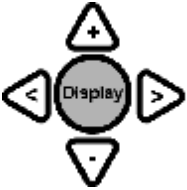

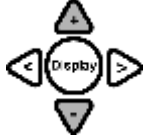


wiring diagram		
Line---	$\Phi L1$	L
Line---	$\Phi L2$	N
GRD---	●	US EU

*SUITABLE FOR FIELD WIRING
USE COPPER CONDUCTORS ONLY
USE SOLID WIRE #8 AWG IN USA AND #6 AWG IN
CANADA FOR BONDING*

OPERATION

Panel Overview

	<p>Start/Stop Button</p>	<p>Start or Stop the pump</p>
	<p>Speed Buttons</p>	<p>Select the speed. The LED above the Speed Buttons will illuminate when that speed is selected or is currently running.</p>
	<p>LED Indicators</p>	<p>Speed-current running speed Time-current time Duration-remaining time at current running speed</p> <p>The LED above the Speed Buttons will illuminate when that speed is selected or is currently running.</p>
	<p>Mode Select Button</p>	<p>Choose manual or schedule</p>
	<p>Quick Clean Button</p>	<p>Run a selected speed and duration programmed for Quick Clean. When the LED is illuminated the Quick Clean schedule is active.</p>
	<p>Display Mode Indicators LED</p>	<p>An illuminated LED indicates the information being displayed on the screen at any specific point. A flashing LED indicates that the parameter is currently being edited.</p>
	<p>Display Button</p>	<p>Toggle between the different available display modes. This button is also used to set the 24-hour clock and screen resolution.</p>
	<p>“<” and “>” Arrows</p>	<p>Choose between a 12 or 24 hour time format</p>
	<p>“+” and “-” Arrows</p>	<p>Make on screen adjustments to the pump settings. Pressing and holding down either arrow button will increase or decrease the incremental changes faster.</p>

Priming Program

The installer should set the priming speed to be sufficient for priming the pump from a fresh install, but not so fast that there is a substantial waste of energy. The time the pump needs to achieve prime can change based on local environmental conditions such as water temperature, atmospheric pressure, and your pool's water level. All of these things should be taken into consideration when setting the priming speed.

This feature is disabled by default. To enable priming program:

- Ensure the pump is in STOP mode by cycling the START/STOP button until the red LED above it is not lit.
- Long press DISPLAY button for 6 seconds to enter the priming settings.
- While in this menu, use the < and > arrows to cycle between options.
- The default priming speed is 3400 RPM. Use the + and - arrows to set this to your desired speed between 2000-3450 RPM.
- The default duration is 0 minutes which means this feature is disabled. Set duration more than 0 minutes to activate this feature.
- Use the + and - arrows to set this to your desired duration between 0-10 minutes.
- Long press DISPLAY button for 2 seconds to save the settings.

Clock Set

When the pump is first installed, it is necessary to set the clock. It must be based on a daily schedule set by the user.

ATTENTION: Below Steps 1-4 are used for Schedule Mode and Manual Mode. Step 5 is only used for Schedule Mode. If the power goes out, the driver retains a memory of settings for next 24 hours. The clock has to be re-set again if the power is out more than 24 hours. Otherwise, the program will automatically run as speed 1 and start to blink.

Clock set steps:

1. When power is applied to the pump, the Time LED light will begin blinking and you must press the Display button **within 5 seconds to enter the clock setup mode.** (If Display button is not pressed within 5 seconds, you may press "<" and ">" together for 3 seconds to begin again. The time LED light will begin blinking. Quickly press the Display button within 5 seconds to enter the clock setup mode.)
2. Pressing the arrows to choose between a 12 or 24 hour time format.
3. Pressing the "+" and "-" buttons to change the displayed time to the correct time of day. In the 12 hour time format AM/PM will display in the bottom left corner.
4. To exit the clock setup mode, press and hold the Display button until the TIME light goes out. The clock is now set.

In Schedule mode, Press START and allow pump to run on Default Schedule for at least one OFF-ON cycle. If motor does not start, press any speed button.

Default Schedule

SPEED 1 duration = 2 hours 3000 RPM

SPEED 2 duration = 10 hours 1500 RPM

SPEED 3 duration = 2 hours 2500 RPM

SPEED 4 duration = 4 hours 1000 RPM

Press **Start/Stop** button and LED is on for pump to run.

SPEED 1 is set to begin at 8:00am and run at 3000 RPM for 2 hours. When SPEED 1 is complete the pump immediately begins running the default SPEED 2. SPEED 2 is factory default to 1500 RPM and will last for 10 hours. When SPEED 2 has completed its run, the pump will run SPEED 3 at 2500 RPM for a duration of two hours. When SPEED 3 has completed its run, the pump will run SPEED 4 at 1000 RPM for a duration of four hours.

After 18 hours of run time and completing its run of SPEED 4, the pump will enter a paused state for the next 6 hours. The pump will restart at 8:00am every morning and go over the default schedule again. Except for default schedule, custom schedule is also available.

Custom Schedule and Quick Clean

To customize the run schedule for your Variable Speed Pump, the pump must be stopped. Be sure that the **Start/Stop** button LED is not illuminated.

Programming a Custom Schedule:

When programming, the LED light next to the parameter ("Speed", "Time" and "Duration") you are setting will blink.

1. Stop the pump if it is running by pressing the **Start/Stop** button.
2. Press the "1" button. The LED above the selected SPEED will begin to blink and the "Speed" parameter LED will blink while editing. See **Figure 1**.
3. Use the "+" and "-" arrows to adjust the speed in RPM for SPEED 1. Speed is adjusted up or down by increments of 10 RPM.
4. Press the "1" button again and the display will change to SPEED 1 start time. The "Time" parameter LED will begin to blink. See **Figure 2**.
5. Use the "+" and "-" arrows to adjust the daily start time for SPEED 1.
6. Press the "1" button again and the display will change to SPEED 1 duration. The "Duration" parameter LED will begin to blink. See **Figure 3**.
7. Use the "+" and "-" arrows to adjust the duration for SPEED 1 in hours and minutes. The duration parameter is adjusted in 1 minute increments.
8. Pressing the "1" button will continue to cycle through these parameters, but the changes are immediately saved as they are adjusted.
9. Press the "2" button. The LED above SPEED 2 will begin to flash and the corresponding parameter LED will flash while editing.
10. Use the "+" and "-" arrows to adjust the speed in RPM for SPEED 2.
11. Press the "2" button again and the display will change to SPEED 2 duration.

SPEED 2 and 3 do not have a start time, as they begin their duration immediately after the previous SPEED finishes.

12. Use the “+” and “-” arrows to adjust the duration for SPEED 2 in hours and minutes.

13. Repeat steps 9-12 to program SPEED 3-4, same procedures for QUICK CLEAN.

Remember that the duration allowed for SPEED 3 will be limited to the remaining time in a 24 hour day. Any time in the 24 hour day not programmed into SPEEDs 1-4, the pump will remain in a stationary state. [SPEED 1 + SPEED 2 + SPEED 3 +SPEED 4 <24 Hours]

14. Press the **Start/Stop** button and ensure the LED is lit. The pump is now on and will run the custom user-programmed schedule.

If the pump has been stopped via the **Start/ Stop** button, the pump will not run until the pump is turned back on by the **Start/Stop** button. If the **Start/Stop** LED is illuminated then the pump is on and will run the programmed schedule.



Figure 1 Setting Speed



Figure 2 Setting Start Time



Figure 3 Setting Duration

NOTE: When set schedule duration, priorities for SPEEDS are follows: SPEED 1 -> SPEED 2 -> SPEED 3 -> SPEED 4.

Example:

Starting Schedule (Before Adjustment)

SPEED 1 duration = 18 hours

SPEED 2 duration = 2 hours

SPEED 3 duration = 2 hours

SPEED 4 duration = 2 hours

If the user reprograms SPEED 1 to run for 22 hours, SPEED 2 (lower priority speed) will automatically adjust to a 1 hour duration and SPEED 4 (lowest priority speed) will adjust to a 0 hour duration. End Schedule (After Adjustment)

SPEED 1 duration = 22 hours

SPEED 2 duration = 1 hour

SPEED 3 duration = 1 hours

SPEED 4 duration = 0 hours

NOTE: The total program duration is always shorter than 24 hours.

MAINTENANCE

Freeze Protection Program

This pump comes equipped with an automatic freeze protection circuit that will power the pump on if surrounding air reaches the freeze protection temperature setting. The circuit provides continual, moderate flow through plumbing to protect pool equipment.

This feature is enabled by default. To enable Freeze Protection:

- Ensure the pump is in STOP mode by cycling the START/STOP button until the red LED above it is not lit.
- Press and hold the ^ and v arrows simultaneously to enter the freeze protection settings.
- While in this menu, use the < and > arrows to cycle between options.
- The default freeze protection speed is 1000 RPM. Use the ^ and v arrows to set this to your desired speed between 750-3450 RPM.
- Next, use the + and - arrows to set the duration in hours the pump runs once freeze protection is triggered.
- Set duration to 0 to deactivate freeze protection.
- Lastly, use the + and - arrows to set the activation temperature between 40° F and 50° F.
- The MODE SELECT button will cycle between Fahrenheit or Celsius.

The freeze protection minimum activation temperature is 40° F due to the pump's proximity to the warmer ground and its own latent/stored heat after running during the day. When the pump sensor detects temperatures in this range, it is often already near or below freezing in other areas of the pool equipment pad.

TROUBLESHOOTING

Error Code

The screen will display error codes once the pump encounter problems and stop running. When error codes occur, un-plug the pump power cord to shut down the pump, wait for the LED lights to go out. Reconnect the power supply to the pump. Troubleshooting is required if the error code appear again. Details error code and troubleshooting description list in below table.

Error Code	Description	Error Code	Description
E-01	Inverter unit protection	E-10	Inverter overload
E-02	Acceleration over current	E-11	Phase loss at input side
E-03	Deceleration over current	E-12	Phase failure at output side
E-04	Constant speed over current	E-14	Module overheating
E-05	Acceleration over voltage	E-16	Communication fault
E-06	Deceleration over voltage	E-17	Current detection fault
E-07	Constant speed over voltage	E-24	Inverter hardware fault
E-08	Under voltage fault		
E-09	Motor overload		

E-08:

Absolute AC low voltage is detected. This may be caused by normal voltage changes and will clear itself. Use a multimeter to check whether the input voltage is lower than 220v. If the input voltage is lower than 220v, there is a problem with the supply voltage. If the input voltage is correct, there may be a problem with the controller.

E-14:

Overheated module. This may be caused by overloading. Or the ambient temperature is too high (above 40°C /104°F). Check whether the fan blade cover is blocked and whether the fan blade is damaged.

E-16:

The communication line between HMI and controller is lost or damaged. Check the communication wire on the back of the keypad on the top cover of the controller. Check whether the 6-pin communication wire is correctly inserted into the socket. Check whether the communication wire is damaged.

E-01, 02, 03, 04, 05, 06, 07, 09, 10, 24:

Internal error. If the above alarms occur frequently, there may be a problem with the rotating components of the pump (motor, impeller, sealing parts, or bearing). Please disassemble the pump and check whether there is a problem with the impeller, sealing parts, or bearings. Refer to page 17 of the instruction manual for disassembling the pump.

Common Problems

Fail to start

- **No display**

Check that all electrical switches are on. Ensure the circuit breakers are properly set. Check if timer is set properly. Check motor wiring at terminals.

- **Pump shaft locking**

Check that the pump can be rotated by hand and remove any blockage.

- **The pump shaft is damaged**

Replace the motor or the bearing.

Pump Fault

- **The pump does not start, leak, too much air**

Check the suction pipe and bonnet on any suction gate valve. Secure the cover to the pump filter tank and ensure that the cover gasket is in place. Check the water level to ensure that the skimmer is not inhaling the air.

- **The pump does not start up, and there is not enough**

Ensure that the suction lines, pumps, filters, and pump volute are filled with water. Make sure that the valves in the suction line are working and open (some systems have no valves). Check the water level to ensure that there is water through the skimmer.

Pump filter basket is blocked

- Clean the pump body. Replace the filter basket.

Reduced capacity

- **Air bags or suction lines leak**

Check the suction lines and bonnet on any suction gate valve. Secure the cover to the pump filter tank and ensure that the cover gasket is in place. Check the water level to ensure that the skimmer is not inhaling the air.

- **Closed impeller, pump filter plug**

Turn off the power supplied to the pump. Disassemble (see page 15, "Pump Disassembly") and remove debris from the impeller. If you cannot clear the debris, complete the following steps: Remove the left threaded screw bolts and O-ring seal. Remove, clean, and reinstall the impeller. Reassembly (see "Pump Reassembly" on page 18) Clean the suction trap.

No water flow at the pump operation

- **No water flow at the pump operation**

Check that the pump is rotating by viewing the fan on the back of the shift pump. If yes, check that the pump impeller is properly installed.

- **Air leakage**

Check the pipe connections and verify that they are tight.

- **Plugged or restricted pipes**

Check that the filter or suction side pipe is blocked. Check whether the discharge pipe is blocked, including partial shut-off valve or dirty pool filter.

The pump runs, then alarm and stop

- **The display the fault code "Error Code", see page 15 "Error Code"**

The pump is noisy

- **The fan has debris**

Check the back of the pump for no dirt and debris.

- **The filter basket has debris**

Clean up with compressed air.

- **There is foreign matter inside the impeller**

Clean the filter basket.

- **The installation is loose**

Check the pump and pump mounting bolts for tightening.

The pump shaft is damaged

- **Replace the motor or the bearings.**