HAYWARD®

EcoStar™

Variable Speed Pump and Drive Technical Guide

Version 2
Drive FW 1.02
Interface FW 2.56 residential
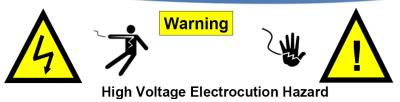Interface FW 1.01 commercial

Table of Contents

HAYWARD

Safety Precautions

Warning

High Voltage Electrocution Hazard

❖ **Read and follow all instructions in the owner's manual and on the equipment. Failure to follow instructions can cause severe injury and/or death.**

❖ **This product should be installed and serviced only by a qualified professional.**

❖ **All electrical wiring MUST be in conformance with all applicable local codes, regulations, and the National Electric Code (NEC). Hazardous voltage can shock, burn, and cause death or serious property damage. To reduce the risk of electric shock, do NOT use an extension cord to connect unit to electric supply. Provide a properly located electrical receptacle. Before working on drive or motor, turn off power supply to the drive.**

❖ **Failure to bond drive to pool structure will increase risk for electrocution and could result in injury or death. To reduce the risk of electric shock, see installation instructions and consult a professional electrician on how to bond drive. Also, contact a licensed electrician for information on local electrical codes for bonding requirements.**
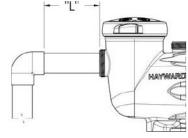
Installation - Plumbing

New Pools: When installing the EcoStar on a new pool, care should be taken to ensure proper pipe and equipment sizing to handle the maximum flow required (fig 1).

Existing Pools: When installing the EcoStar on existing pools, care should be taken to insure the maximum flow does not exceed the capacity of the pipe and equipment* (fig 1).

Note: length of pipe (L) between pump suction port and first elbow or fitting should be at least 5 times pipe size.

MAXIMUM RECOMMENDED SYSTEM FLOW RATE BY PIPE SIZE			
1.5"	**2"**	**2.5"**	**3"**
51gpm 8fps	84gpm 8fps	120gpm 8fps	184gpm 8fps
38gpm 6fps	63gpm 6fps	89gpm 6fps	138gpm 6fps

* Refer to equipment manuals for flow rates.

Figure 1

Installation - Electrical

Remove the electrical cover plate as shown below
(fig 2, 3 & 4)

Figure 2

Figure 3

Figure 4

Note: If power is removed from the pump, all settings will be protected for at least 5 years.

Installation – Electrical

Internal wiring locations (fig 5)

Wiring connection for incoming motor wires

Wiring plug for relay connected controls & stop switch

Wiring plug for wall mounted interface

Figure 5

Wire connection for incoming line voltage (230v)

Channel for running low voltage data cable

Wiring plug for data link with Hayward/Goldline compatible software Controls

Installation – Electrical/High Voltage

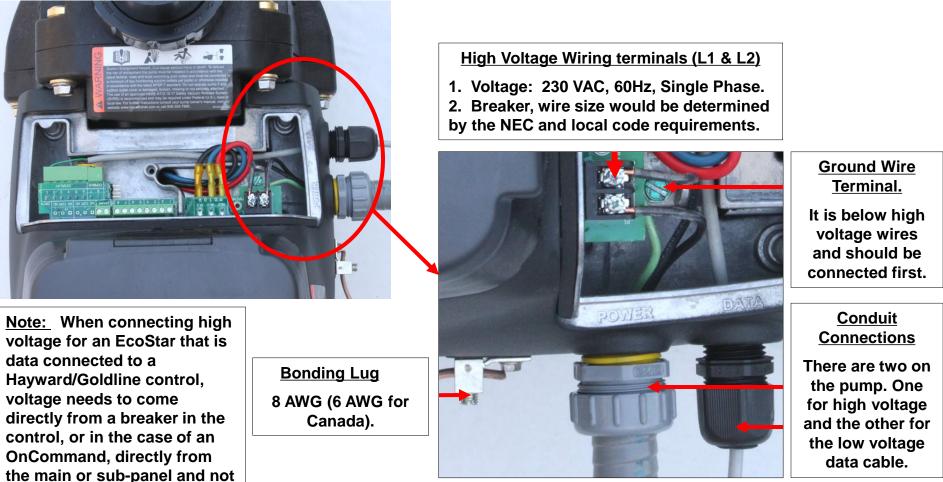High Voltage Wiring terminals (L1 & L2)

1. Voltage: 230 VAC, 60Hz, Single Phase.
2. Breaker, wire size would be determined by the NEC and local code requirements.

Ground Wire Terminal.

It is below high voltage wires and should be connected first.

Conduit Connections

There are two on the pump. One for high voltage and the other for the low voltage data cable.

Note: When connecting high voltage for an EcoStar that is data connected to a Hayward/Goldline control, voltage needs to come directly from a breaker in the control, or in the case of an OnCommand, directly from the main or sub-panel and not from the filter pump relay.

Bonding Lug

8 AWG (6 AWG for Canada).

Figure 6

Make sure the unit is both bonded and grounded

Installation–Interface removal/positioning

Figure 7

The interface assembly on the EcoStar can be configured in four different positions.

1. Remove the two screws as shown (fig 7).

2. Remove the interface assembly as shown (fig 8).

3. Reposition interface assembly as shown (fig 7, 9, 10 & 11) and re-secure with the two screws (fig 7).

Figure 8

Figure 9

Figure 10

Figure 11

HAYWARD

Installation–Interface /Wall mount

1. Wall mount kit is included with the EcoStar and includes blank cover, mounting bracket and new terminal block for connecting to the interface assembly. Maximum 500' for data cable used for wall mount or control connection.

2. After removal of the interface assembly (Page 7) remove the plug connecting the drive to the interface (fig 12).

3. Plug is permanently attached (fig 13), install the blank cover over the plug (fig 14).

Figure 12

Figure 13

Figure 14

Installation–Interface /Wall Mount

4. The data cable needs to be routed through the second (low voltage) conduit opening (fig 15).

5. Remove the wall mounting data plug from the electrical compartment as shown (fig 16).

6. You will need to procure a six wire data cable, as short as possible, and attach the wires to the data plug as shown (fig 17) taking care to note the color and corresponding number next to the data plug (fig 15).

Data cable is routed separate of high voltage and in it's own channel within the motor electrical compartment

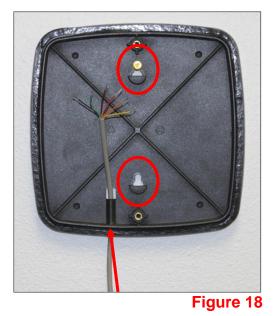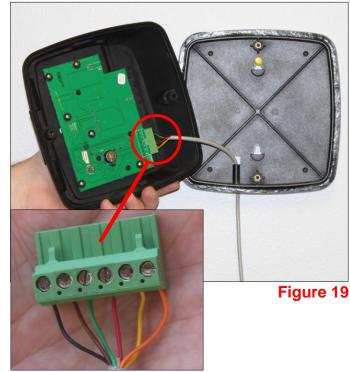**Data Plug**

Figure 15

Figure 16

Figure 17

Installation–Interface/Wall Mount

7. Secure the wall mounting bracket and route the six wire data cable through the channel on the bottom of the bracket (fig 18).

8. Attach the six wires to the new data plug as shown, taking care to note the color and corresponding number on the data plug as you did with the data plug on the pump (fig 20). Install the plug into the interface assembly (fig 19).

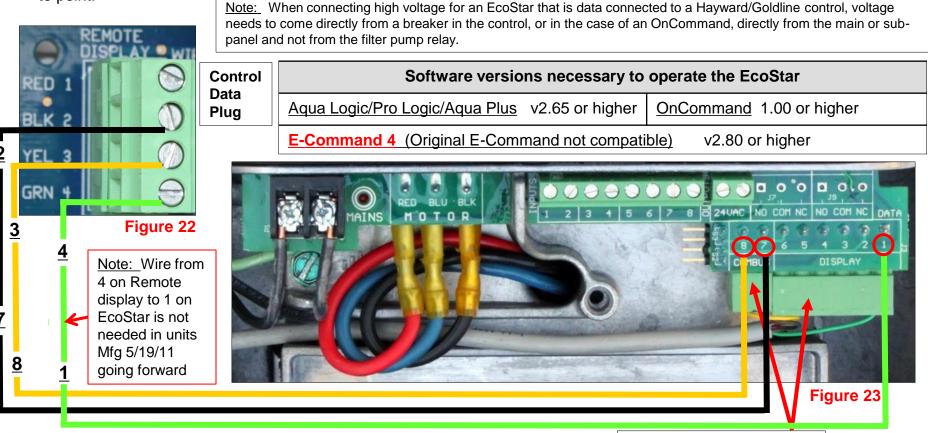9. Attach the interface assembly to the mounting bracket with the two screws provided (fig 21).

Figure 18

Figure 19

Figure 20

Figure 21

Installation-Hayward/Goldline Controls
(Compatible software shown below)

1. Maximum 500' for data cable The data cable needs to be run through the second (data) conduit opening and channel (Page 8).

2. Remove the two data plugs (COMBUS & DISPLAY) from the wiring compartment (fig 23) and the 4 connector data plug from the controller (fig 22). Wire 7 on the pump to 2 on the controller, 8 on the pump to 3 on the controller and 1 on the pump to 4 to the controller as shown (fig 22 & 23). Reinstall plugs. Wire colors can be different as those shown as long as they match point to point.
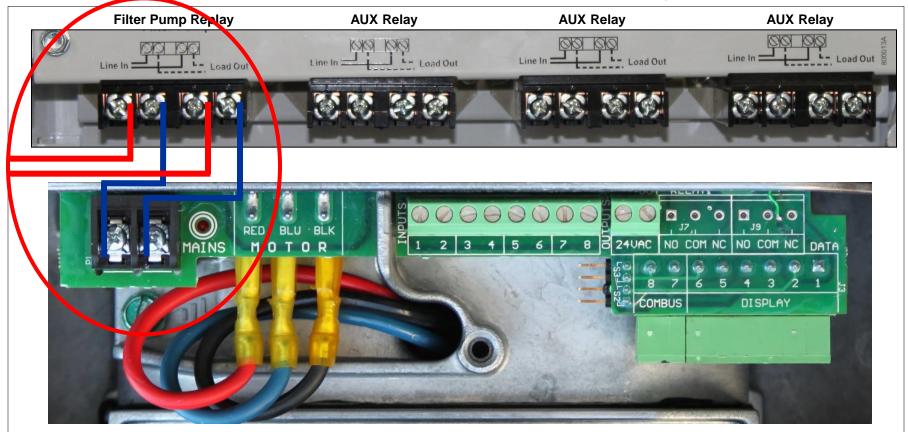
> Note: When connecting high voltage for an EcoStar that is data connected to a Hayward/Goldline control, voltage needs to come directly from a breaker in the control, or in the case of an OnCommand, directly from the main or sub-panel and not from the filter pump relay.

Control Data Plug

Software versions necessary to operate the EcoStar	
Aqua Logic/Pro Logic/Aqua Plus v2.65 or higher	OnCommand 1.00 or higher
E-Command 4 (Original E-Command not compatible) v2.80 or higher	

Figure 22

> Note: Wire from 4 on Remote display to 1 on EcoStar is not needed in units Mfg 5/19/11 going forward

Figure 23

Pump Terminal Data Plugs

Installation–Relay Connected Controls
(Non Hayward/Goldline compatible software & third party controls)

1. Pump power (230 VAC) needs to be brought into the "line in" contacts on the Filter Pump Relay from a breaker in the control box. The "Load Out" side will feed the incoming high voltage for the pump (fig 24). Cable used for data connections should be rated for maximum voltage in motor compartment.

Fig 24

Installation–Relay Connected Controls
(Non Hayward/Goldline compatible software & third party controls)

2. **1, 3 and 5** from the pump terminal needs to be wired to the **Load** side of each control relays as shown (fig 25).

3. One side of the 24 VAC connection on the pump terminal needs to be wired with **2, 4 & 6 on the pump terminal** as shown (fig 25).

4. The other **leg** of the 24 VAC connection on the pump terminal needs to be wired to the **line** side of the relays in series as shown (fig 25).
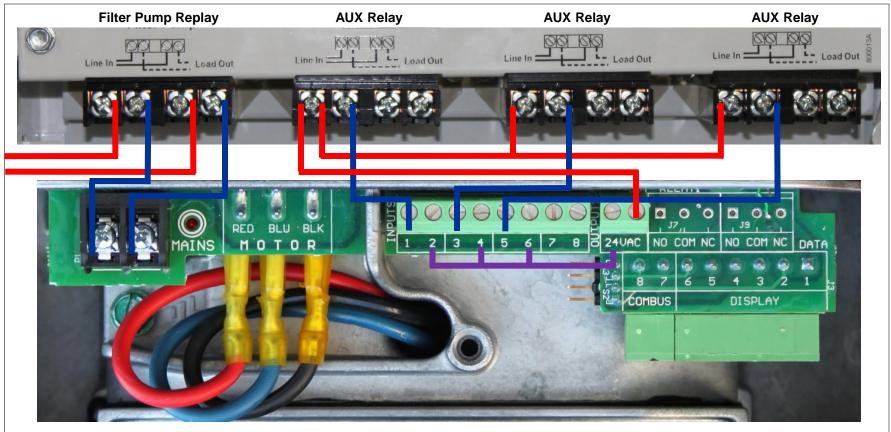

Fig 25

HAYWARD

Page 12

Installation–Relay Connected Controls
(Non Hayward/Goldline compatible software & third party controls)

5. By using a sequence of off and on, timer speeds can be controlled.

As shown by the charts, the number of speeds available depends on the number of aux relays used.

Filter pump relay plus 3 aux relays allows control of eight speeds				
	Filter Pump Relay	**1st Aux (1)**	**2nd Aux (3)**	**3rd Aux (5)**
Timer 1 Speed	On	Off	Off	Off
Timer 2 Speed	On	On	Off	Off
Timer 3 Speed	On	Off	On	Off
Timer 4 Speed	On	On	On	Off
Timer 5 Speed	On	Off	Off	On
Timer 6 Speed	On	Off	On	On
Timer 7 Speed	On	On	Off	On
Timer 8 Speed	On	On	On	On

Fig 26

Filter pump relay plus 2 aux relays allows control of 4 speeds			
	Filter Pump Relay	**1st Aux (1)**	**2nd Aux (3)**
Timer 1 Speed	On	Off	Off
Timer 2 Speed	On	On	Off
Timer 3 Speed	On	Off	On
Timer 4 Speed	On	On	On

Fig 27

Note: The numbers in (blue) on each chart are the corresponding connecting points on the pump for each relay.

Filter pump relay plus 1 aux relay allows control of 2 speeds		
	Filter Pump Relay	**1st Aux (1)**
Timer 1 Speed	On	Off
Timer 2 Speed	On	On

Fig 28

HAYWARD

Installation–Remote Stop Switch

1. **One side of the 24 VAC** on the pump terminal needs to be wired to **8** on the pump terminal as shown (fig 29).

2. Terminal **7** on the pump terminal and the **other leg** of the 24 VAC on the pump terminal need to be wired to the emergency switch (fig 29).

   Note: The emergency switch needs to be a latching style that is normally open (NO). Some switches have wiring for both NO and NC (normally Closed). Refer to the e-switch for its internal wiring. When the switch is pressed the 24v circuit is completed and the pump will shut down operation.
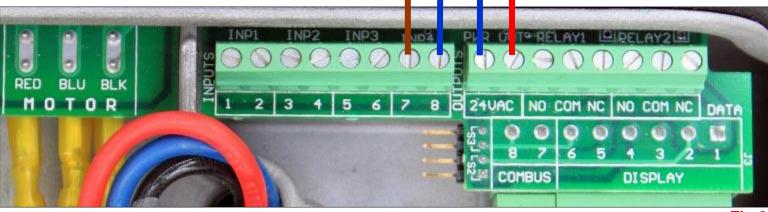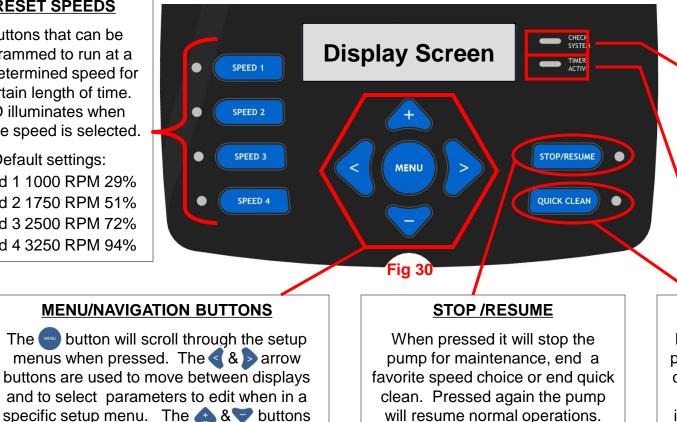
Remote stop switch purchased separately

Fig 29

Programming – User Interface

Display Screen

Fig 30

PRESET SPEEDS

4 buttons that can be programmed to run at a pre-determined speed for a certain length of time. LED illuminates when favorite speed is selected.

Default settings:
Speed 1 1000 RPM 29%
Speed 2 1750 RPM 51%
Speed 3 2500 RPM 72%
Speed 4 3250 RPM 94%

SPEED 1
SPEED 2
SPEED 3
SPEED 4

CHECK SYSTEM
TIMER ACTIVE
STOP/RESUME
QUICK CLEAN
MENU

CHECK SYSTEM LED

LED will illuminate solid when there is an error condition. It will blink when in the quick clean mode with the SVRS models.

TIMERS ACTIVE LED

LED will illuminate once the timers have been programmed., even if the pump is not running.

MENU/NAVIGATION BUTTONS

The MENU button will scroll through the setup menus when pressed. The < & > arrow buttons are used to move between displays and to select parameters to edit when in a specific setup menu. The + & - buttons are used to change the parameters.

STOP /RESUME

When pressed it will stop the pump for maintenance, end a favorite speed choice or end quick clean. Pressed again the pump will resume normal operations. LED will illuminate indicating the pump has stopped.
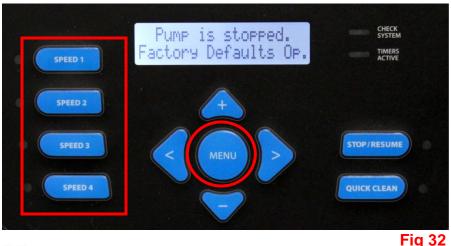
QUICK CLEAN

Elevates the speed of the pump to max set speed for cleaning. Places SVRS in unprotected mode if included with pump (1 hour default timer). Unprotected mode requires manual verification.

HAYWARD

Programming

1. When power is supplied to the pump, the pump model will display, then the following screens (fig 31 & 32). Timer 1 will have default setting of 1750 RPM (50%), 7 days a week from 12:00 am – 11:45 pm.

2. Since timer 1 has a factory default setting the pump will come on and run until the timer is changed or set as off. Press the MENU button (fig 32) to select the Configuration menu (fig 33).

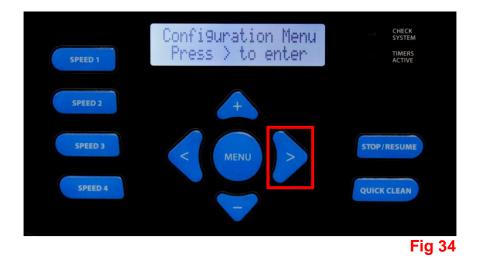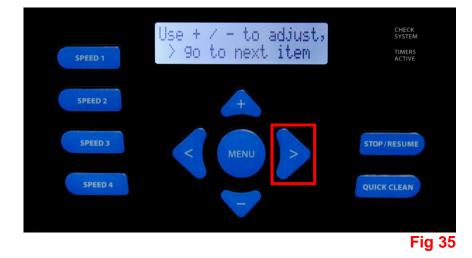3. Press and hold down the < & > buttons as shown to unlock and enter the Configuration menu (fig 33).

Fig 31

Fig 32

Fig 33

Programming-Configuration

4. On the next screen you will be asked to press the **>** button to enter the Configuration Menu (fig 34).

5. On the next screen it will tell you how to use the **+** & **−** buttons to adjust, and the **>** to go to the next item (fig 35). Press the **>** button to continue.

Fig 34

Fig 35

Programming-Configuration

6. This screen allows you to change the day and time by pressing the ⊕ button to access or skip by pressing the ▷ button (fig 36).

7. You now Use the ▷ button to highlight the day, hour, minute and AM/PM. Use the ⊕ & ⊖ buttons to change (fig 37). After setting the AM/PM press the ▷ button to continue.
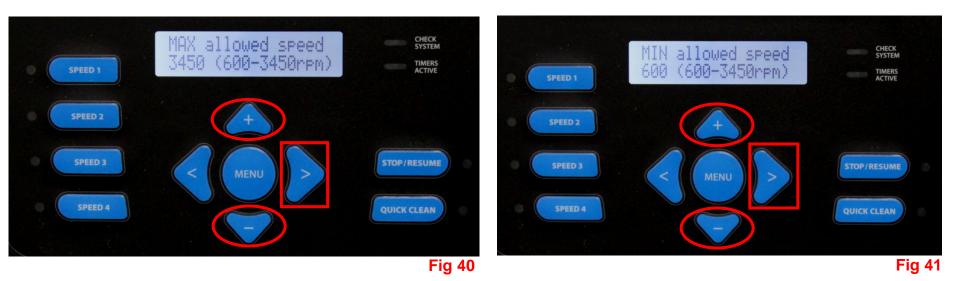

Fig 36

Fig 37

Programming-Configuration

8. You now select the speed indicator for RPM (revolutions per minute) or % of full speed (100% equals 3450 RPM) by pressing the ⬆ + & ⬇ − buttons (fig 38 & 39). The setting you select will be used throughout programming. Press the ▷ button to continue.

Fig 38

Fig 39

Programming-Configuration

9. You will now see the MAX allowed speed. You can set this from 600-3450 RPM or 17 to 100% by pressing the ➕ & ➖ buttons (fig 40). See page 3 for the max allowed flow for pipe. SVRS model will not go lower than 1000 rpm (29%) Press the ❯ button to continue.

10. You will now see the MIN allowed speed. Same as #10 above for setting speed (fig 41).   Press the ❯ button to continue.

Note: When hooked up to a Hayward/Goldline compatible software controls place the MIN and MAX settings at the lowest and highest settings respectively so as to not conflict with the setting within the controller.

Fig 40

Fig 41

Programming-Configuration

11. You will now see the max-speed Prime period. Press + & − buttons for Auto Sense (3000 RPM), or a 3 min (max set speed) prime period (fig 42).This function only works in Standalone and Relay Control modes. Press the > button to continue.

12. You will now see the Remote Control Mode screen. Use the + & − buttons to toggle between Stand alone/Hayward (Stand alone or Hayward/Goldline compatible software controls), or Relay Control (other controls including third party models) (fig 43 & 44). Press the > button to continue .
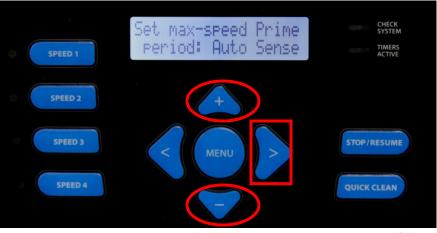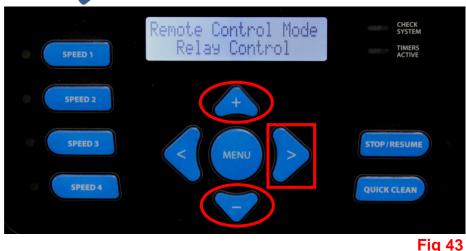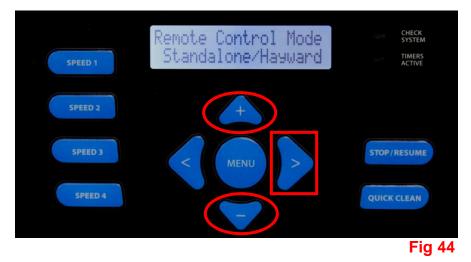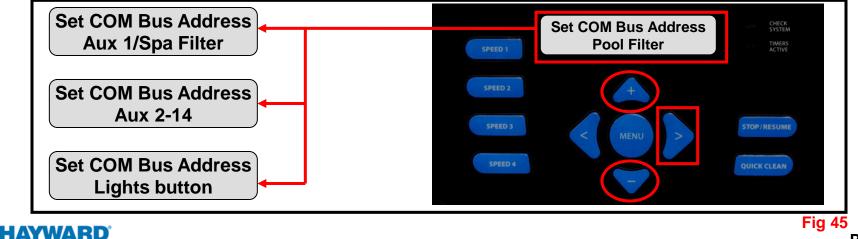

Fig 42

Fig 43

Fig 44

Programming-Configuration

Hayward/Goldline Compatible Software Control

13. **For EcoStar interface software v2.51** data linked to a Goldline/Hayward compatible software control pressing ⬆ + & ⬇ buttons will give you 9 address choices. The Goldline/Hayward controller will only recognize address 1 (Pool Filter) and address 2 (Dual Spa Filter). Press the ▷ button to continue.

14. **For EcoStar interface software v2.55** data linked to a Hayward/Goldline compatible software control v4.20 or less will only recognize address 1 (Pool Filter) and address 2 (Aux 1/ Spa Filter). ProLogic control software **v4.30** or higher will allow for the control of up to 8 EcoStars assignable to individual relays/Auxiliaries (fig 45). Press the ▷ button to continue.
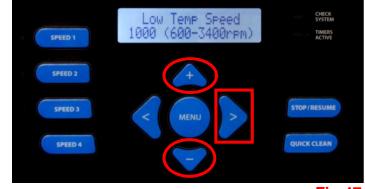
Note: In the Hayward/Goldline compatible software mode the timers do not need to be set, as all settings will be handled in the control. Only the Menu, and Stop/Resume button is active on the EcoStar.

Fig 45

Programming-Configuration

15. At this point you will be asked to enable or disable the Low Temp Operation (Default is Disabled) by pressing the ⬆ & ⬇ buttons.(fig 46). Enabling this feature will turn on the EcoStar, if stopped, to protect the drive . Press the ▶ button to continue.

16. If the Low Temp Operation is enabled you will be asked to set the Low Temp Speed (fig 47). The default is 1000 rpm (29%). This speed can be adjusted between 600 rpm (17%) and 3450 rpm (100%) by pressing the ⬆ & ⬇ buttons. Press the ▶ button to continue.

17. In this screen you will be asked to set the Drive Temp Setting (fig 48). Default is 41º F. This Temperature can be adjusted between 35.6 and 50º F. by pressing the ⬆ & ⬇ buttons. Press the ▶ button to continue. Setting will show in both "C" and "F".
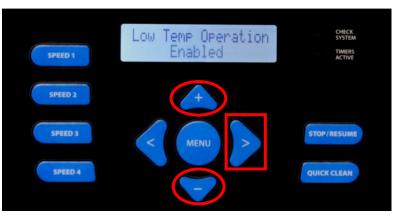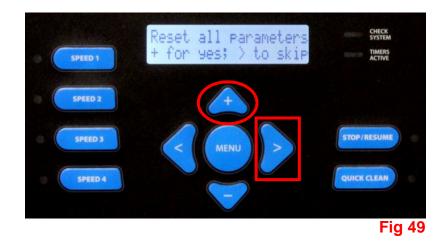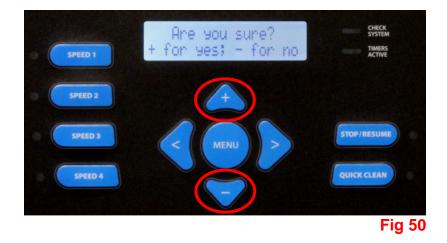

Fig 46

Fig 47

Fig 48

Note: **Low Temp operation is for drive protection only**

Programming-Configuration

18. At this point you will be asked if you would like to reset to the default parameters (factory settings) (fig 49). If yes, press ➕ and confirm on the next screen. If no, press the ▶ button to continue (fig 50).

19. If the Relay Control or the Stand alone feature is being used the timer menus would be the next to program. There will be a screen telling you to use the timers mode to set or change time clock perimeters. Press the ▶ button to continue.
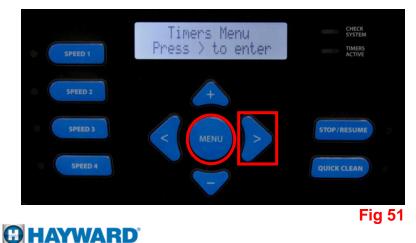

Fig 49

Fig 50

Programming-Timers

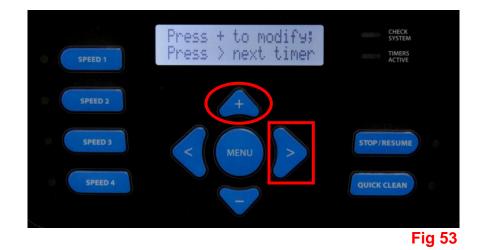| Stand alone/Hayward	Stand alone:	Both times and speeds need to be set.
	Compatible Software controller:	No timer or speed settings necessary. Com bus address needs to be set.
Relay Control	Only requires that speed be set as relays on controller will start and stop pump.	
Note: All speed settings in the timer menu are limited to the Max Settings set in Configuration.		

1. Press the (MENU) button until you see the Timers Menu (fig 51). Press the (>) button to continue.

2. Timer 1 will be factory set to 1725 rpm (50%), 7 day operation from 12 am to 11:45 pm (fig 52). This is used to run the pump if the data link fails on control connected pumps. Timer 1 can be changed as needed. .

Fig 51

Fig 52

Programming-Timers
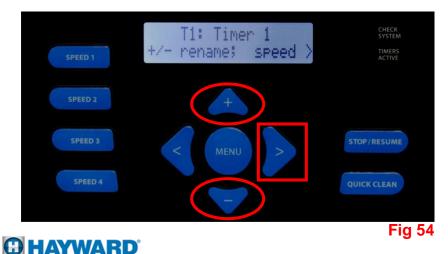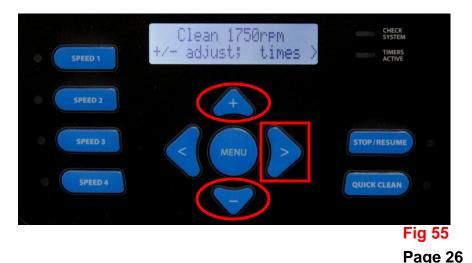
3. This screen (fig 53) will alternate with fig 49 on the previous page. This screen tells you to use the ⊕ button to modify the timer setting or the button ▷ to go to the next timer.

4. This screen allows you to rename Timer 1 to match a selection including; Cleaner, Water Feature, Clean, etc by pressing the ▲ & ▼ button (fig 54). Press the ▷ button to continue.

5. This screen will allow you to adjust the speed setting from 600 RPM (17%) to 3450 RPM (100%) by pressing the ▲ & ▼ buttons (fig 55). Press the ▷ button to continue.

Fig 53

Fig 54

Fig 55
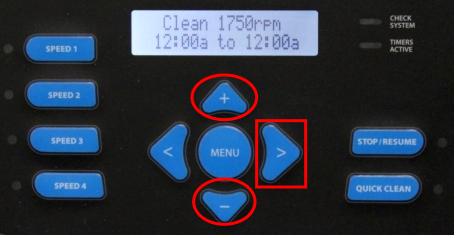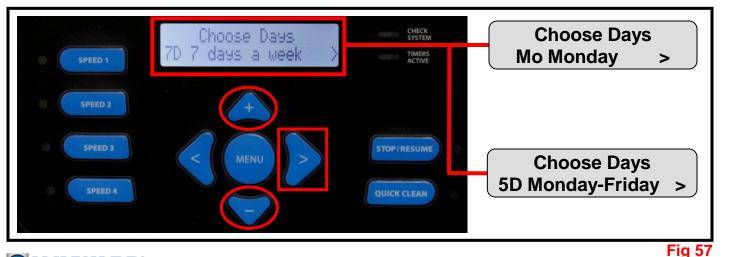
Programming-Timers

6. This screen will allow you to change the start and stop time for the specific timer. Start time will be blinking, press the ➕ & ➖ buttons to change. Press the ▶ button to change the stop time, also using the ➕ & ➖ buttons (fig 56). Press the ▶ button to continue.

7. This screen will allow you to choose the days this timer will be active. You can choose an individual day, 7 day or 5 day by using the ➕ & ➖ button (fig 57). Press the ▶ button to continue to the next timer.

Fig 56

Choose Days
Mo Monday   >

Choose Days
5D Monday-Friday   >

Fig 57
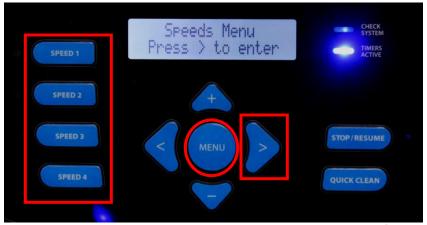
Note: There are 8 timers available. The lower numbered timer will be the most dominate. If setting one timer to cover low speed for overall time period, make it timer #8 as it is the least dominate.

Setting the start and stop time the same will disable that timer and show that it is off.

HAYWARD

Programming - Speeds 1-4
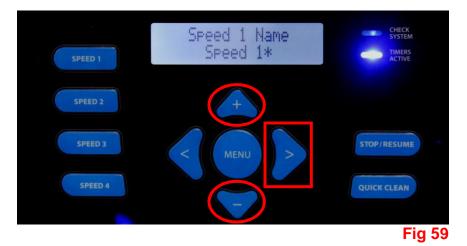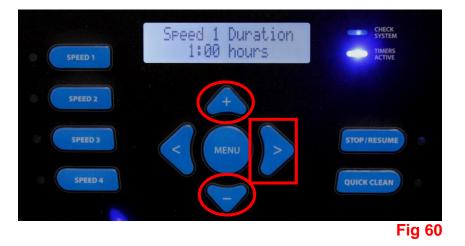
1. Press the (MENU) button until Speeds Menu appears (fig 58). There are four (4) Speed buttons that can be set.   Press the > button to enter Speeds Menu.

2. Pressing the + & − buttons allows you to select a variety of names to apply to this Speed button (fig 59). Press the > button to continue.

3. While in this screen you can change the Speed duration from 30 minutes to 12 hrs in 30 minute increments by pressing the + & − button (fig 60). Press the > button to continue.

Note: The timers active light is now on as the timers have been set per previous steps.

Fig 58

Fig 59

Fig 60

HAYWARD

Programming - Speeds 1-4

4. While in this screen you can set the speed from 600 RPM (17%) to 3450 RPM (100%) by pressing the ▲ + & ▼ − button (fig 61). Press the > button to continue.

5. You can now set Speed 2, 3 & 4 following the directions for Speed 1. After Speed 4 is set press the MENU button to continue.

   Note: Refer to page 30 for instructions on speed changing while operating speeds.

Fig 61

If at any time during settings for any menu item you press the menu button, you will be asked to confirm any changes.

Operation

1. Once configuration is completed and 1 or more timers are set, the pump will begin to operate as long as one or more of the timer settings matches the current time.

2. If the timer setting does not match the current time the pump will not start unless one of the speed buttons or the quick clean button is pressed.

3. When the pump starts it will go into the prime mode selected during configuration, prior to the speed selected or timed. Auto Prime and the 3 minute prime only works in the stand alone mode. In Auto Prime, pump will show "Prime Failed" if prime is not achieved within 15 minutes.

4. The consumption in watts will show on the display while the pump is running.

5. If the EcoStar you are using is an SVRS model and there is a trip, both the Stop/Resume and Check System lights will be illuminated and the trip message below will be displayed on the interface. Clear the reason for SVRS Trip then press the Stop/Resume button to restart the pump. The SVRS trip will also reset in 24hrs with revision 2.56/1.01   If the error message does not clear, cycle off the power to the pump a few times.   If this does not clear the message the drive may need to be replaced.

   | Drive Error |
   | SVRS Trip |

6. When the Low Temp Operation is activated you will see these screens alternate during operation

   | Monday   1:30p | Low Temp Operation |
   | 2500 RPM   2000 Watts | 2500 RPM   2000 Watts |
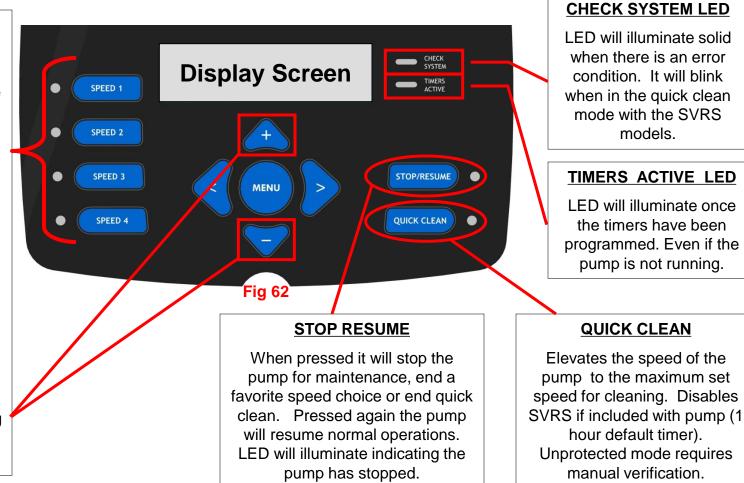
Operation

PRESET SPEEDS
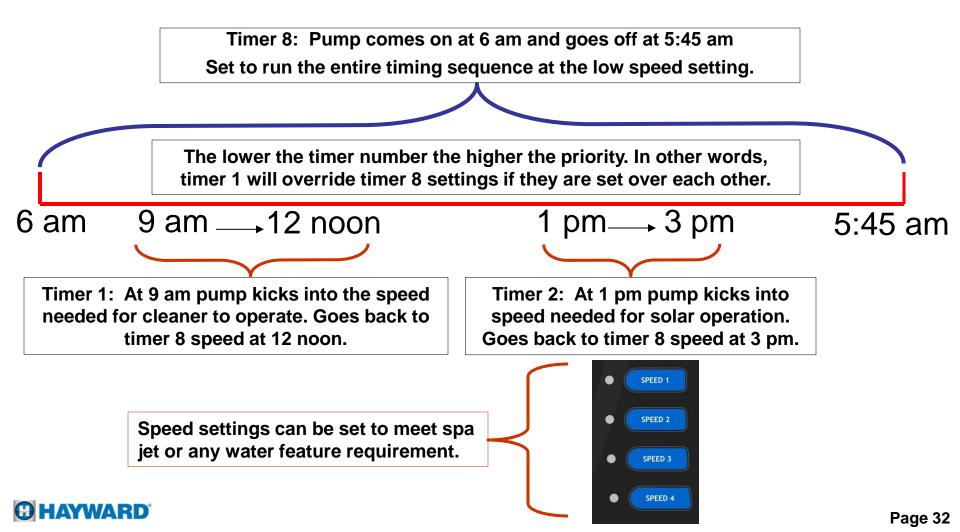
Any time one of the speed buttons is pressed it will go to the speed and duration that was set in the Speed Setup Menu. Each subsequent pressing of the speed button will add the preset speed time up to 12 hrs maximum.

Pressing the '+' or '-' key during a speed choice will raise or lower the speed. Holding down the speed button for 3 seconds after adjusting speed will lock in the new speed setting.

Display Screen

SPEED 1
SPEED 2
SPEED 3
SPEED 4

+
< MENU >
−

CHECK SYSTEM
TIMERS ACTIVE

STOP/RESUME
QUICK CLEAN

Fig 62

CHECK SYSTEM LED

LED will illuminate solid when there is an error condition. It will blink when in the quick clean mode with the SVRS models.

TIMERS ACTIVE LED

LED will illuminate once the timers have been programmed. Even if the pump is not running.

STOP RESUME

When pressed it will stop the pump for maintenance, end a favorite speed choice or end quick clean. Pressed again the pump will resume normal operations. LED will illuminate indicating the pump has stopped.

QUICK CLEAN

Elevates the speed of the pump to the maximum set speed for cleaning. Disables SVRS if included with pump (1 hour default timer). Unprotected mode requires manual verification.

HAYWARD

Programming Scenarios

Below is one possible <u>Stand Alone</u> scenario.

Timer 8: Pump comes on at 6 am and goes off at 5:45 am

Set to run the entire timing sequence at the low speed setting.

The lower the timer number the higher the priority. In other words, timer 1 will override timer 8 settings if they are set over each other.

6 am   9 am → 12 noon   1 pm → 3 pm   5:45 am

Timer 1: At 9 am pump kicks into the speed needed for cleaner to operate. Goes back to timer 8 speed at 12 noon.

Timer 2: At 1 pm pump kicks into speed needed for solar operation. Goes back to timer 8 speed at 3 pm.

Speed settings can be set to meet spa jet or any water feature requirement.

SPEED 1
SPEED 2
SPEED 3
SPEED 4

Disassembly/Assembly

This guide will only cover the disassembly of the drive and motor area for this guide. The wet end disassembly of the EcoStar is exactly like the standard TriStar pump.

Wiring Compartment Cover

Interface Assembly

Motor/Fan Shroud

Variable Speed Drive

Motor

Figure 63

Disassembly/Assembly

1. Shut down power to the pump by moving the breaker supplying power to the pump to the off position.

2. Remove the screw as shown (fig 64). Remove the wiring compartment cover as shown (fig 65).

Figure 64

Figure 65

Disassembly/Assembly

3.   Remove the two screw as shown (fig 66).

4.   Remove the interface assembly from the Motor drive (fig 67).

5.   Remove the plug as shown (fig 68) and place the interface assembly aside.

Figure 66

Figure 67

Figure 68

Disassembly/Assembly

6. Remove the four hex head screws (two on each side) using a ¼" socket as shown (fig 69 & 70). Make sure during reassembly to tighten these screws fully as they act as the ground between the drive and the motor.

7. Pull the three wire connectors off the spade terminals as shown. Note the color designation for each spade when reassembling (fig 71 & 72).
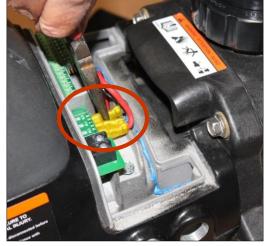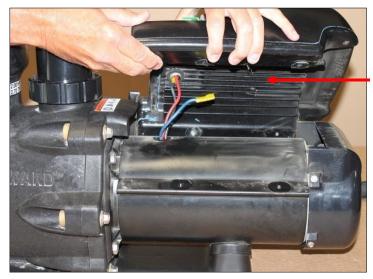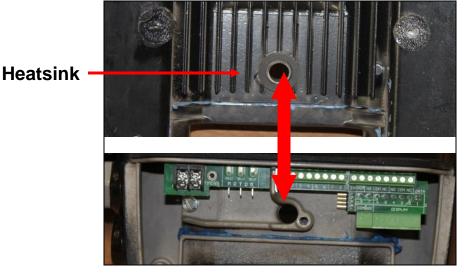

Figure 69

Figure 71

Figure 72

Figure 70

Disassembly/Assembly

8. Lift the drive assembly partially off the motor and carefully pull each of the three wires individually through the hole provided (fig 73).

9. Do not attempt to pull all three wires through the hole as you may cause damage. Note the hole size (fig 74). The bottom of the drive is called the heatsink (fig 73 & 74). During reassembly make sure all three wires are pulled completely through the hole provided to prevent pinching between the motor and the drive.

10. The drive assembly is one sealed unit and cannot be disassembled. It is replaced as an assembly. Make sure any debris is removed before reassembly.

Heatsink

Figure 73

Figure 74

Disassembly/Assembly

11. Remove the two screws on each side of the fan shroud as shown (fig 75).

12. Remove the fan Shroud as shown (fig 76).

   Note: The fan shown (fig 73) comes as part of the motor assembly. It should also be noted that the fan shroud can be installed upside down. Square top section of shroud should always be on the top section of motor.
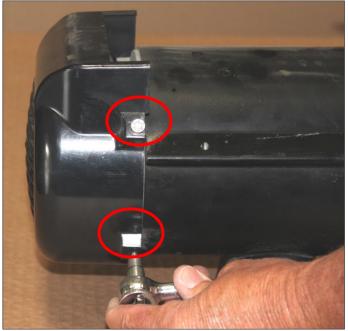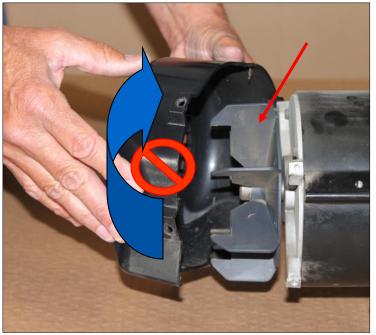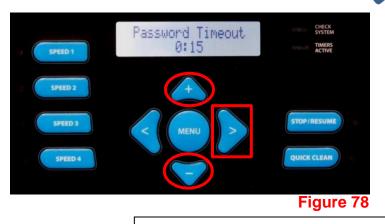

Figure 75

Figure 76

Password Protection-Commercial
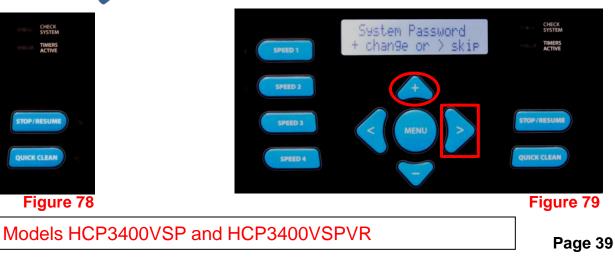
1. If you have a commercial EcoStar you will see this screen (fig 77) after Low Temp Operation. At this point you can enable or disable the Password Protection feature by pressing the ▲ & ▼ button. Press the ▶ button to continue.

Figure 77

2. At this point (fig 78) you can set the Password Timeout in 15 min increments up to 3 hrs by pressing the ▲ & ▼ button. If you enable this feature and the timeout has elapsed the user will be prompted to enter the password, The default password is **1234** to re-enter if a new one had not been set. Press the ▶ button to continue.

3. At this point (fig 79) you will be prompted to change the password by pressing the '**+**' button or skip by pressing the ▶ button.

Figure 78

Figure 79

Models HCP3400VSP and HCP3400VSPVR

Password Protection-Commercial
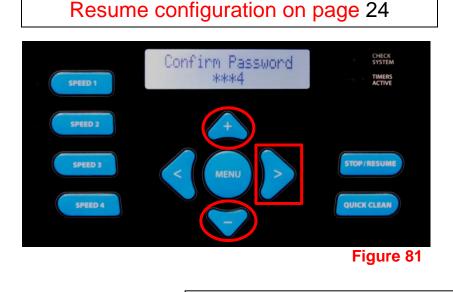
4. If you selected to change the password you will see this screen (fig 80) to set the password and the next screen (fig 81) to confirm the password.   Use the ⬆ & ⬇ button to change the password number and the > button to move between password characters and on to the next screen.

5. When you press any key other than the Stop/Resume button after the timeout has passed, you will be asked to enter the password (fig 82).

Figure 80

Resume configuration on page 24

Figure 81

Figure 82
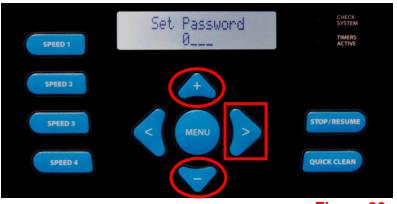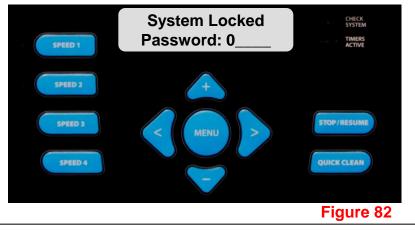
Note: If the password has been changed it may be reset to factory default by pressing and holding the speed 1 and 4 buttons at the same time while powering on the pump, or by resetting all parameters in the Configuration menu.

Models HCP3400VSP and HCP3400VSPVR

Diagnostics
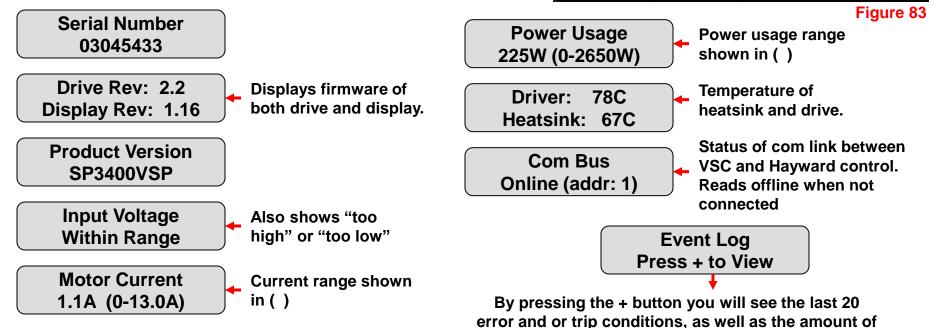
1. Press the Menu button until the Diagnostic screen appears (fig 83). This menu provides important information about the performance of the pump that can be used during troubleshooting. Below are the different screens and their meaning. These are all real-time displays. Press the '>' button to view information.

Figure 83

| Serial Number 03045433 |

| Drive Rev: 2.2 Display Rev: 1.16 | ← **Displays firmware of both drive and display.**

| Product Version SP3400VSP |

| Input Voltage Within Range | ← **Also shows "too high" or "too low"**

| Motor Current 1.1A (0-13.0A) | ← **Current range shown in ( )**

| Power Usage 225W (0-2650W) | ← **Power usage range shown in ( )**

| Driver: 78C Heatsink: 67C | ← **Temperature of heatsink and drive.**

| Com Bus Online (addr: 1) | ← **Status of com link between VSC and Hayward control. Reads offline when not connected**

| Event Log Press + to View |

By pressing the + button you will see the last 20 error and or trip conditions, as well as the amount of time that has elapsed since the condition occurred.

HAYWARD®

Troubleshooting/Fault Codes

This guide will cover only those problems with the VSC and Motor. All other pump problems including seals, gaskets, impellers, etc along with priming problems are addressed in the owners manual.

Code/Fault	Indications
Drive Error! **Drive is Overheated**	Indicates that the internal components of the drive have become overheated. Motor airflow path should be checked. Follow disassembly/assembly procedures (pages 32-37). Clear all debris from the heatsink on the bottom of the drive (page 36). Check fan and shroud for blockage. If error still occurs, replace drive.
Drive Error! **PFC Circuit Hi**	Indicates internal drive voltage is too high. Check incoming line voltage (page 4) and verify that it is within +/- 10% of 230 VAC. If line voltage is correct and error still occurs, replace drive.
Drive Error! **Drive Overload**	Indicates that the motor is drawing excessive current. Check impeller, diffuser and shaft seals for issues. If there are no issues remove the **Blue**, **Black** and **Red** wires (page 4) from the drive and check each motor lead to ground. There should be no continuity. Check continuity from lead to lead. Ohms readings should be between 0.5 and 1.0 ohms max. If any of these readings are outside limits, replace motor. If they are within range, replace drive.

HAYWARD®

Troubleshooting/Fault Codes

Code/Fault	Indications
Drive Error! **PFC Circuit Low**	Indicates internal drive voltage is too low. Check incoming line voltage (page 4) and verify that it is within +/- 10% of 230 VAC. If line voltage is correct and error still occurs, replace drive.
Drive Error **AC Voltage Too Low**	Indicates that the incoming line voltage has dropped below 185 VAC and pumps stops. Check incoming line voltage (page 4) and verify that it is within +/- 10% of 230 VAC. If line voltage is correct and error still occurs, replace drive.
Drive Error **AC Voltage Too High**	Check incoming supply voltage, if greater than 264 VAC, correct incoming supply voltage. If less than 264 VAC, refer to Hayward Service Bulletin "Pump Error: Ac Volts too High" and follow instructions for registry change. If line voltage is correct and error still occurs after registry change, replace drive.
Drive Error **Heatsink Overheated**	Indicates that the heatsink on the bottom of the drive (page 36) has overheated. Motor air flow path should be checked. Follow disassembly/assembly procedures (pages 32-37). Clear all debris from the heatsink (page 36) on the bottom of the drive. Check fan and shroud for blockage. If error still occurs, replace drive.

Troubleshooting/Fault Codes

Code/Fault	Indications
Drive Error **Drive failed to Start.**	Indicates that the drive was not able to start the motor. Pump will attempt to start three times before stall error is displayed. Check to be sure motor shaft turns freely. Check motor connections to drive (page 4) to insure a good connection. If pump is being controlled via data link to a Hayward/Goldline Controller, disconnect the com ground wire between terminal 1 with EcoStar and terminal 4 with Hayward/Goldline Control (page 10). If no change check to insure other data wires are connected correctly (page 10). If error still exists remove all data links and run Standalone. Check values in Diagnosis menu and if they are all (0) check connection between interface and drive. If error still exists remove the **Blue**, **Black** and **Red** wires (page 4) from the drive and check each motor lead to ground. There should be no continuity. Check continuity from lead to lead. Ohms reading should be between 0.5 and 1.0 ohms max. If any of these readings are outside limits, replace motor. If they are within range, replace drive.

Troubleshooting/Fault Codes

Code/Fault	Indications
Drive Error **Pump has Stalled**	Check impeller and motor shaft for freedom of movement. If free, remove the **Blue**, **Black** and **Red** wires (page 4) from the drive and check each motor lead to ground. There should be no continuity. Next, check continuity from lead to lead. Ohms reading should be between 0.5 and 1.0 ohms max. If any of these readings are outside limits, replace motor. If they are within range, replace drive.
Drive Error **Memory Failure**	Indicates that the drive memory has been damaged or corrupted and drive needs to be replaced.
Drive Error **Prime Failed**	This code is only enabled in Standalone/Auto Prime mode. Indicates the pump was not able to prime within 15 minutes of startup. In many instances the pump basket may not fill up completely. Check to insure all valves are open and skimmer baskets are clean.. Plumbing and fittings should be checked for potential air leaks or obstructions and corrected. Check pump basket o-ring and replace if necessary. If the above does not allow the pump to prime, switch from Auto Prime to 3 minute prime (Page 21).

Troubleshooting/Fault Codes

Code/Fault	Indications
Warning NO Comm	Inspect the data wire between the interface and drive. Disconnect the wires from the display and re-connect. If the error has not been eliminated, check the Diagnostic Menu. If the values are at "0" replace the interface. If the values are correct, replace the drive.
EcoStar is connected to a GL/Hayward control. When it comes on, the pump will ramp up and down in speed. Control reads "Pool bridge comm"	This indicates interference on the comm. ground between the control and EcoStar. This is caused by frequency noise emitted from the pump drive. It travels on the comm. ground and AC ground wire and interferes with the commands being sent from the control. Install RS485 isolator, or new interface v2.55 rev. 1.1. Contact Clemmons Tech Service for isolator.
The breaker is tripping.	Check input wiring and breaker. Disconnect **Blue**, **Black**, and **Red** motor leads (page 4) from drive. If still tripping breaker, replace drive. If not, replace motor.

Troubleshooting/Fault Codes

Code/Fault	Indications
EcoStar is connected and configured to operate with a GL/Hayward control. The pump comes on in Standalone mode. Control reads "Pool bridge comm."	Check comm. wires between GL/Hayward control and EcoStar. Be sure they are on the EcoStar comm. bus connection and NOT the input connections for relay control (page 10) . Be sure EcoStar is configured for Standalone/Hayward. . The EcoStar should be wired to a dedicated 15 amp double pole breaker. No connections are made to the line or load side of the filter pump relay in the control (page 5).
EcoStar is connected and operating via GL/Hayward control. The %/rpm reading does not match between the pump interface and the control	Check to make sure the Min and Max setting on the EcoStar is set at the minimum (600rpm/17%) and the maximum (3450rpm/100%) so as to not interfere with the settings in the control (page 20)
EcoStar reverts to Standalone mode even when properly connected to the GL/Hayward control. No error on control display.	Check the settings in the control filter configuration menu and set to variable speed .

Troubleshooting/Fault Codes

Code/Fault	Indications
The freeze protection in the EcoStar does not work properly.	The freeze protection is actually for protection of the EcoStar drive. It will not and should not be expected to protect any plumbing or other equipment from freezing temperatures. (page 23)
My EcoStar is connected and operating via the GL/Hayward control. The Speed buttons and Quick Clean buttons on the pump interface do not work.	This is correct. When the control is operating the EcoStar, the Speed buttons and the Quick Clean button is inactive. Only the Stop/Resume and Menu button is active.
The EcoStar is experiencing interference with an X-10 home automation control and is causing other devices to come on and off.	Try changing channel on X-10. If problem persists, purchase (2) model XPF 20A 3-wire noise filters through X-10 website.
The EcoStar is wired and set to operate via the GL/Hayward control. When a command is sent to the pump, the EcoStar interface reads "Remote Stop Engaged".	This indicates that the comm. wires from the control are connected in the EcoStar to the input terminals for relay control. Remove wires and connect to the comm. bus plug on the drive (page 10).