

ECO-V 150 Pool Pump

Owners Manual Installations

Product Image to be supplied Joey.

This equipment must be installed and serviced by a qualified technician. Improper installation can create electrical hazards which could result in property damage, serious injury or death. Improper installation will void the warranty.

Notice to Installer

This manual contains important information about the installation, operation and safe use of this product. Once the product has been installed this manual must be given to the owner/ operator of this equipment.

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LOCATION

The pump must be located as close as practical to the pool. The pump must also be in a position that enables easy access for periodic servicing. Care must also be taken to position the pump in an area that is free from flooding in a well ventilated and dry area.

INSTALLATION

Waterco Limited use the latest technology when designing and manufacturing our pumps, a few simple precautions during installation will ensure years of trouble free operation.

1. The pump suction line should be not smaller than 1 1/2" (40mm imperial).
2. The suction line is to have as few bends or elbows as possible. There must not be an air trap on the suction line.
3. Use only the pump barrel unions supplied with the pump.
4. Bolt the pump to the required position (prevent movement).
5. The pump electrical cable must be wired for the proper voltage and rotation in accordance with the wiring instructions.
6. All wiring (electrical) work must be carried out by licensed electricians and must be installed in accordance to the local codes.
7. The motor must be grounded.
8. The weight of the plumbing and fittings is to be independently supported and not carried by the pump.
9. The pump motor cooling fan must have a minimum clearance of 150mm.

~ IMPORTANT ELECTRICAL NOTICE ~

The electrical installation is to be done by a licensed electrician. Each pump requires a circuit breaker to separate the pump from the electrical supply.

The contact separation has to provide full disconnection in all poles under overvoltage category III conditions.

If the pump is to be installed on a swimming pool or pond situation it is MANDATORY that an earth leakage circuit breaker with a rated tripping current not exceeding 30mA be installed.

Check the pumps name plate for the following: Voltage, Amp draw and Cycle. The power cord, including the ground wire shall have a quality of 245 IEC66 (HO7RN-F) for models greater than 1Kw power input.

For models less than 1Kw input the quality shall be of 245 IEC57 (H05RN-F).

All installations must comply with local codes, based on IEC 364-7-702 requirements

Failure to bond pump to pool structure will increase risk for electrocution and could result in injury or death. To reduce the risk of electric shock, the electrician must comply with installation instructions and must bond the pump accordingly. In addition, the licensed electrician must also conform to local electrical codes for bonding requirements.

ELECTRICAL CONNECTION

Check that the information on the nameplate corresponds to the power supply.

Employ a competent electrician to ensure wiring installation is made in accordance with any local electrical codes. Every motor requires either a fused disconnect switch or a circuit breaker.

A SINGLE PHASE MOTOR has a built in thermal overload switch.

The Waterco ECO-V 150 pool pump is a premium efficiency variable speed motor that provides tremendous program flexibility in terms of motor speed and time settings. The variable speed Waterco ECO-V 150 is intended to enable running at the lowest speeds needed to maintain a sanitary environment, which in turn minimizes energy consumption. Pool size, the presence of additional water features, chemicals used to maintain sanitary conditions, and environmental factors will impact optimal programming necessary to maximize energy conservation.

GENERAL SAFETY RULES

1. The machines mentioned in the manual are specially designed for the pre-filtering and re-circulation of water in swimming pools.
2. They are designed to work with clean water at a temperature not exceeding 35 degrees Celsius (95 degrees Fahrenheit).
3. The installation should be carried out in accordance to the safety instructions of swimming pools, especially Standard HD 384.7.702, and the specific instructions for each facility.
4. The rules enforce on accident prevention should be carefully followed.
5. Any modification of the pump requires the prior consent of the manufacturer. Original replacement parts and accessories authorized by the manufacturer ensure a high level of safety. The manufacturer of the pump assumes no liability for the damage and injuries caused by unauthorized replacement parts and accessories.
6. During operation, some parts of the pump are subject to dangerous electric voltage. Work may only be performed on each pump or on the equipment connected to it after disconnecting them from the mains power, and after disconnecting the starting device.
7. The user should make sure that assembly and maintenance tasks are carried out by qualified authorized persons and that these persons have first carefully read the instructions for service and installation.
8. The operating safety of the pump is only guaranteed if the installation and service instructions are correctly followed.
9. The limit values stated in the Technical table should not be exceeded under any condition.
10. In the event of defective operation or fault, contact the technical support department of the manufacturer or its nearest authorized agents.
11. If the supply cord is damaged, it must be replaced by an authorized service agent.
12. This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

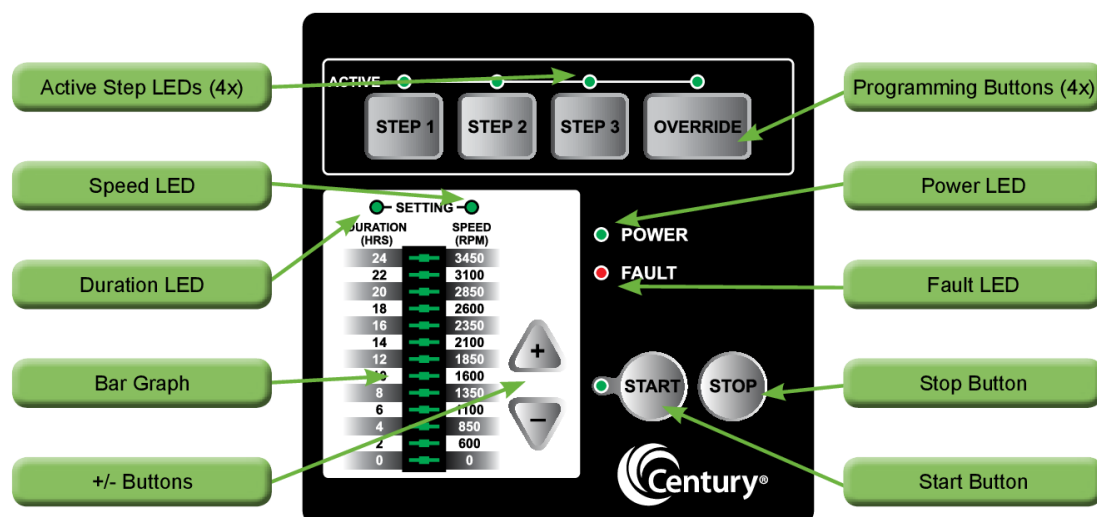
13. The appliance is not intended for use by young children. Young children should be supervised to ensure that they do not play with the appliance.

The Waterco ECO-V 150 is for use with 208-230 Vrms nominal, and in pool pump applications ONLY. Connection to the wrong voltage, or use in other application may cause damage to equipment or personal injury.

The integrated electronics interface controls the speed settings as well as the run durations. The Waterco ECO-V 150 can run at speeds ranging between 600 and 3450 RPM and is rated for 208-230 Vrms at an input frequency of 60 Hz.

Navigation Overview

- +, - Increases/decreases selected value
- Pressing any key following a change accepts the current value displayed inside the setting



Refer Joey re panel image

Figure 1: Waterco ECO-V 150 User Interface Button Descriptions

CAUTION

If power is connected to the Waterco ECO-V 150 motor, pressing any of the following buttons referred to in section 2 could result in the motor starting. Failure to recognize this could result in personal injury or damage to equipment.

Note: The START button must be pressed for the Waterco ECO-V 150 to operate. The START LED will illuminate after the button has been pressed indicating the Waterco ECO-V 150 is capable of operating. Pressing the stop button will turn off the START LED and stop the motor if running.

Quick Start Instruction

If power is connected to the Waterco ECO-V 150 motor, pressing any of the following buttons referred to in section 3 could result in the motor starting. Failure to recognize this could result in personal injury or damage to equipment.

The following table describes the factory default settings for DURATION and SPEED order:

Button	Duration (In Hours)	Speed (In RPM)
STEP 1	4	3100
STEP 2	4	2600
STEP 3	8	1600
OVERRIDE	2	3450

Refer Joey re chart image

Pressing the START key will start the Waterco ECO-V 150 based on the factory default schedule.

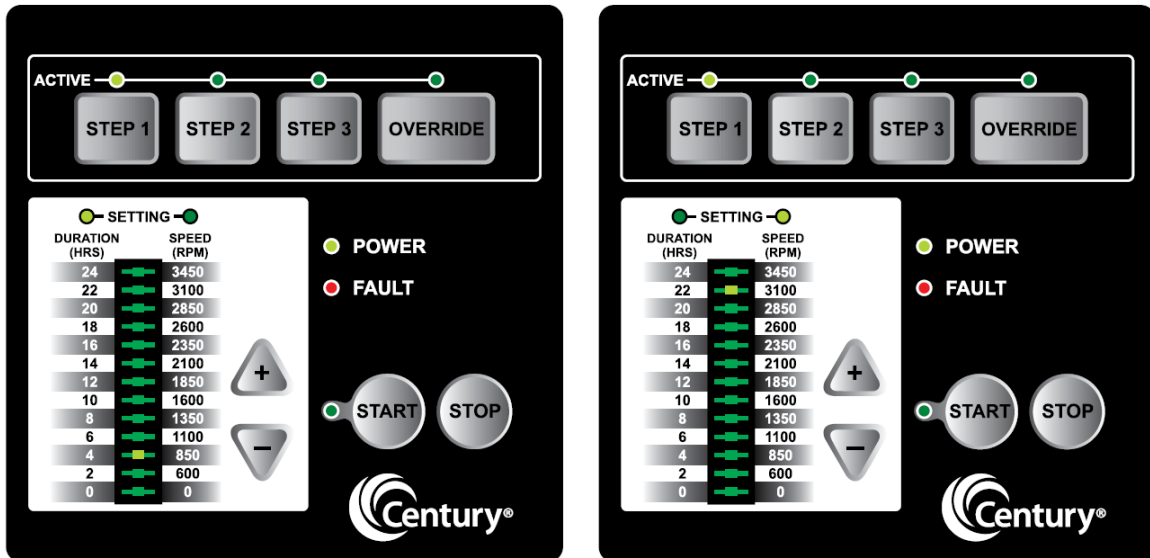
Note: If power is cycled to the Waterco ECO-V 150 and the user does not press the STOP key, the Waterco ECO-V 150 will **automatically** start and run the programmed default schedule shown in the chart above. This feature ensures that the Waterco ECO-V 150 will re-start in the event of a power outage.

3.2 Quick Start Guide (User-defined custom schedule)

A Waterco ECO-V 150 user can set the program DURATION and SPEED for STEP 1, STEP 2, STEP 3 & OVERRIDE keys.

Note: Waterco ECO-V 150 must be **Stopped (Press STOP Key)** for programming DURATION and SPEED of the STEP 1, STEP 2, and STEP 3 keys. OVERRIDE DURATION and SPEED can be programmed when the Waterco ECO-V 150 is **either** stopped or running.

Press the STEP 1 key. The STEP 1 button and DURATION setting LEDs will illuminate. The bar graph will show default DURATION for STEP 1.



Refer Joey re chart image

1. Press UP (+) or DOWN (-) arrows to change the DURATION
2. Press the STEP 1 key again to change the SPEED setting. The SPEED setting LED will illuminate. The bar graph will show default SPEED for STEP 1.
3. Press UP (+) or DOWN (-) arrows to change the SPEED.
4. Press any STEP or OVERRIDE key to save the DURATION and SPEED settings for STEP 1. If the user decides not to save the settings, pressing the STOP key will revert back to the previously stored setting.
5. Press STEP 2, STEP 3, or OVERRIDE key. Repeat steps 1- 4 to program the corresponding DURATION and SPEED for each button.
6. Press START to run the Waterco ECO-V 150 based on the programmed 24 hour schedule.
7. Pressing the STOP button will stop the Waterco ECO-V 150.

Note: The Waterco ECO-V 150 can only be set to operate on a 24-hour schedule. If a user attempts to program a schedule with a combined duration for all three steps greater than 24 hours, the Waterco ECO-V 150 software will retain the current STEP time duration only, and will zero out the other two STEP time settings. As an example, if STEP 1 equals eight (8) hours, STEP 2 equals nine (9) hours, and STEP 3 equals eight (8) hours – for a combined 25 hours – the Waterco ECO-V 150 will retain the setting for the current Step being programmed and zero out the remaining two. For details regarding the set-up of the three steps as part of a 24-hour schedule, see section 6.

4. Overview

Note: The Waterco ECO-V 150 can and should be optimized to suit individual pool conditions. Specific conditions including pool size, other devices, features, and environmental factors can all impact the optimal settings.

Program customization may require some trial and error to determine the most satisfactory settings as dictated by the conditions. In all cases, setting the Waterco ECO-V 150 at the lowest speed for the longest duration is the best strategy to minimize energy consumption. However, conditions may require running the Waterco ECO-V 150 at a higher speed for some duration of time each day to maintain proper filtration to achieve satisfactory sanitation.

The User Interface is located on top of the Waterco ECO-V 150. To the right of the STEP buttons is the OVERRIDE button. This button can be used to operate the Waterco ECO-V 150 at speeds outside of the normal operating schedule.



Refer Joey re chart image

Figure 2: Waterco ECO-V 150 Overview

5. Wiring

Warning: The Waterco ECO-V 150 controller must be wired according to the locally adopted version of the NEC. A licensed, qualified electrician should complete the wiring for this product. Failure to comply with this may result in death, serious personal injury or property damage.

The Waterco ECO-V 150 controller must be wired according to the locally adopted version of the NEC. A licensed, qualified electrician should complete the wiring for this product.

The controller is designed to operate with 208-230 Vrms, single phase power.

The Waterco ECO-V 150 is designed to handle either a bare wire connection or a quick disconnect connection. The quick disconnect tab is 0.250" and will handle any commonly available mating connectors. For a direct wire connection, the wire insulation should be stripped to a length of approximately 0.33." The terminal block is capable of handling solid or stranded wire up to 12 AWG in size. The screw for the mains connections should be properly tightened to a torque value of 10 in-lb.

Pin #	Wire Color	Description
L1	Black	Hot 1
L2	Red or White	Hot 2
Green screw	Green	Earth

Refer Joey re chart image

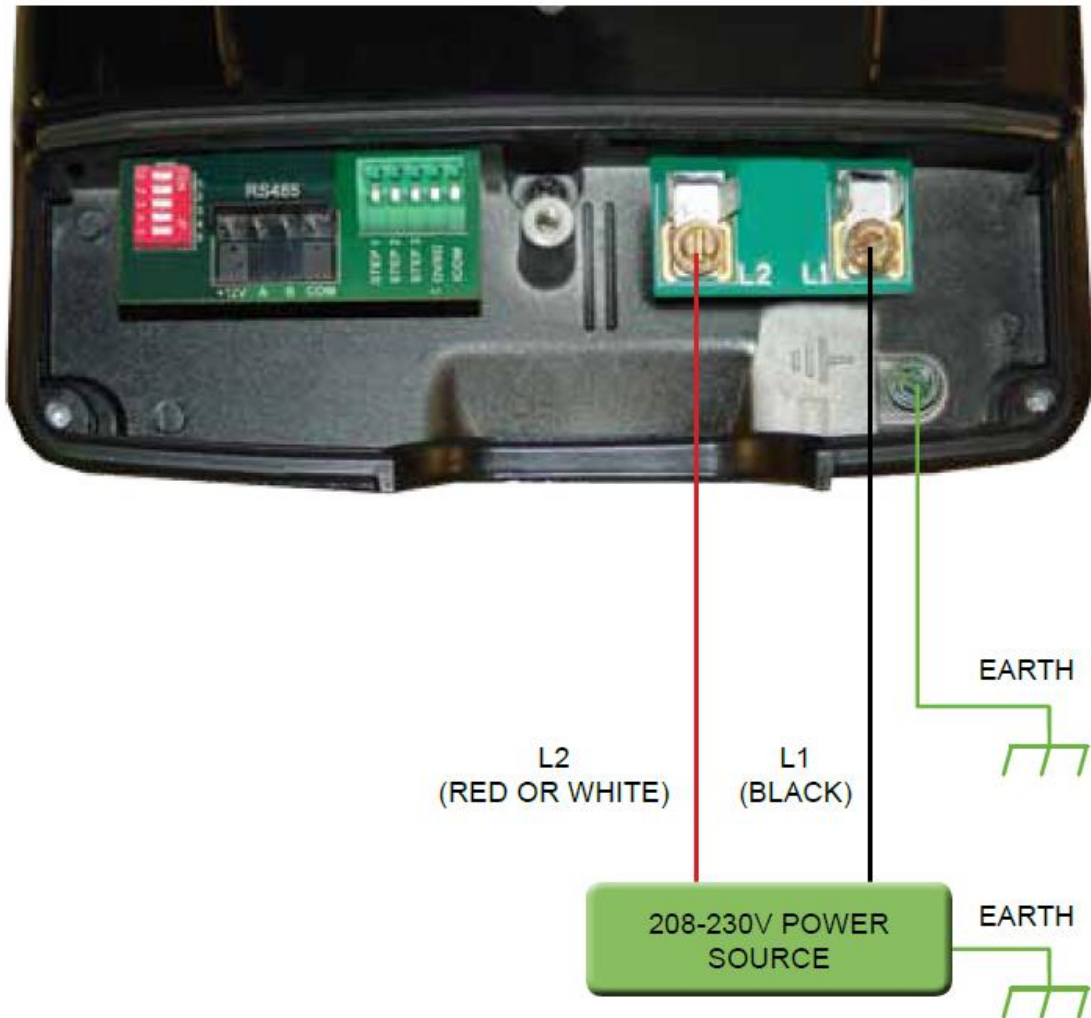
Table 1: Mains Connection

Pin #	Wire Color	Description
J201 - 1	Red	+12V
J201 - 2	Black	A
J201 - 3	Yellow	B
J201 - 4	Green	COM

Refer Joey re chart image

Table 2: Communication Connection

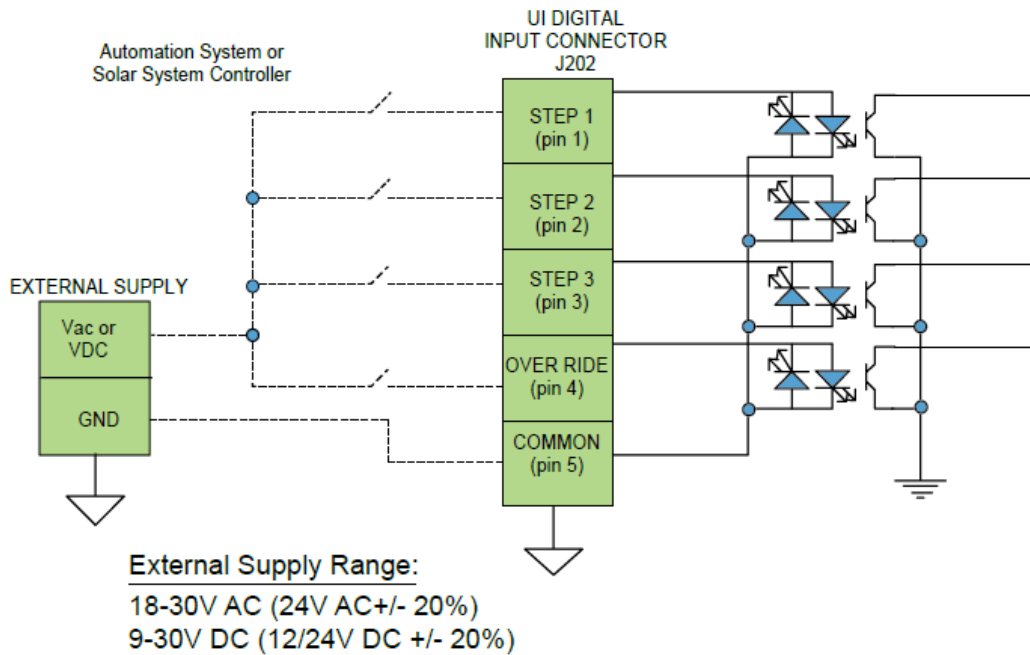
Warning: Power should be turned off when installing, servicing, or repairing electrical components. Observe all warning notices posted on the existing equipment, Waterco ECO-V 150, and in these installation instructions.



Refer Joey re chart image

Figure 3: Mains Connection Diagram

Waterco ECO-V 150 Controller



Refer Joey re chart image

Figure 4: Wiring Diagram for Digital Inputs

Warning: Access to these terminals is in close proximity to the mains connectors which carry line voltage capable of causing personal injury or damaging the equipment if contact is made.

Power should be turned off when accessing this area.



Refer Joey re chart image

Figure 5: Digital Input connector

6 User Interface Operation

6.1 LED and Function Overview

Key for LEDs	
X	Solid ON Indication
*	Blinking @ 1 sec
**	Alternates between DURATION and SPEED
#	Blink for three times @ 1 sec

LED → Function ↓	Power	START	FAULT	STEP1	STEP2	STEP3	OVERRIDE	SPEED SETTING	DURATION SETTING	BARGRAPH
Power On	X									
Keypad Functions										
Step1	X	X		X				**	**	**
Step2	X	X			X			**	**	**
Step3	X	X				X		**	**	**
Override	X	X					X	**	**	**
Keypad lock	X			*	*	*				
Keypad Unlock	X			X	X	X				
Schedule Advance	X	*							X	X
Restore Default settings	X									# (All LED)
Motor pause	X	*					*	X		X
Temporary stop	X									* (0 RPM)
Digital Input Functions										
DI1 ON	X			*				X		X
DI2 ON	X				*			X		X
DI3 ON	X					*		X		X
DI4 ON	X						*	X		X
Serial Communication Functions										
Serial Communication	X							*		
Motor spinning	X							*		X
Freeze Protection										
Freeze Protection	X								*	X
Fault Handling										
UI fault	X		*							
Controller fault	X		X							

Refer Joey re chart image

Figure 6: LED Functionality Table

6.2 User Interface Key Pad Overview

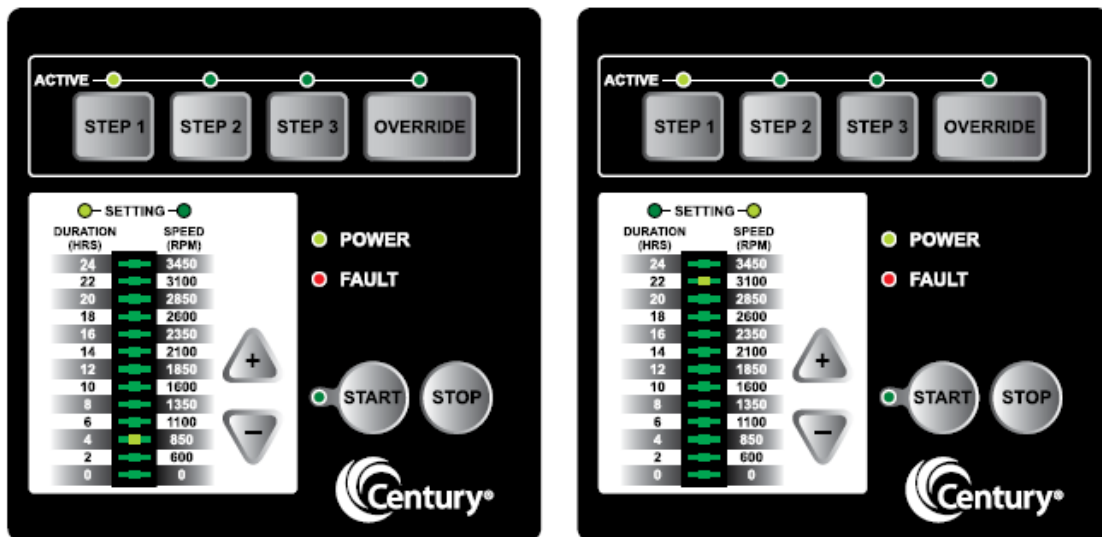
Caution: If power is connected to the Waterco ECO-V 150 motor, pressing any of the following buttons referred to in this section 6.2 could result in the motor starting. Failure to recognize this could result in personal injury or damage to equipment.

1. STEP 1 (Set Schedule) → DURATION and SPEED
2. STEP 2 (Set Schedule) → DURATION and SPEED
3. STEP 3 (Set Schedule) → DURATION and SPEED
4. OVERRIDE (Settings) → DURATION and SPEED
5. START
6. STOP

6.3 Set the Schedule

Caution: If power is connected to the Waterco ECO-V 150 motor, pressing any of the following buttons referred to in this section 6.3 could result in the motor starting. Failure to recognize this could result in personal injury or damage to equipment.

Set the DURATION and SPEED for the Waterco ECO-V 150 using the keys on the User Interface. The schedule is based on a 24-hour schedule and will repeat each day of the week.



Refer Joey re chart image

The highest speed rating for the Waterco ECO-V 150 is 3450 RPM and the lowest is 600 RPM. Unless a new user-defined schedule is entered, the Waterco ECO-V 150 will operate based on the following factory default schedule:

Button	Duration (In Hours)	Speed (In RPM)
STEP 1	4	3100
STEP 2	4	2600
STEP 3	8	1600
OVERRIDE	2	3450

Refer Joey re chart image

Table 3: Factory default **schedule**

Schedule Tables

Use the tables below to record a personalized operating schedule. Recording the planned schedule in the table below will make the programming process easier and will help the user remember the custom settings in case of inadvertent loss of schedule.

The user interface will not allow the user to program an overlap between different STEPs of the schedule. The STEP currently being set will always take priority over any previous settings. In the event a user attempts to program with a combined duration greater than 24 hours, the current STEP setting will be retained whereas the other two STEP settings will be cleared to zero hours requiring the user to reset them.

Prior to beginning the actual programming process, it is advisable for the user to review the planned schedule as outlined in chart form to ensure the cumulative duration is not greater than 24 hours and no overlaps exist. It is always a good idea to double check your programmed settings for accuracy once you have completed the programming process.

Setup #1			
	Step 1	Step 2	Step 3
Duration			
Speed			

Refer Joey re chart image

Setup #2			
	Step 1	Step 2	Step 3
Duration			
Speed			

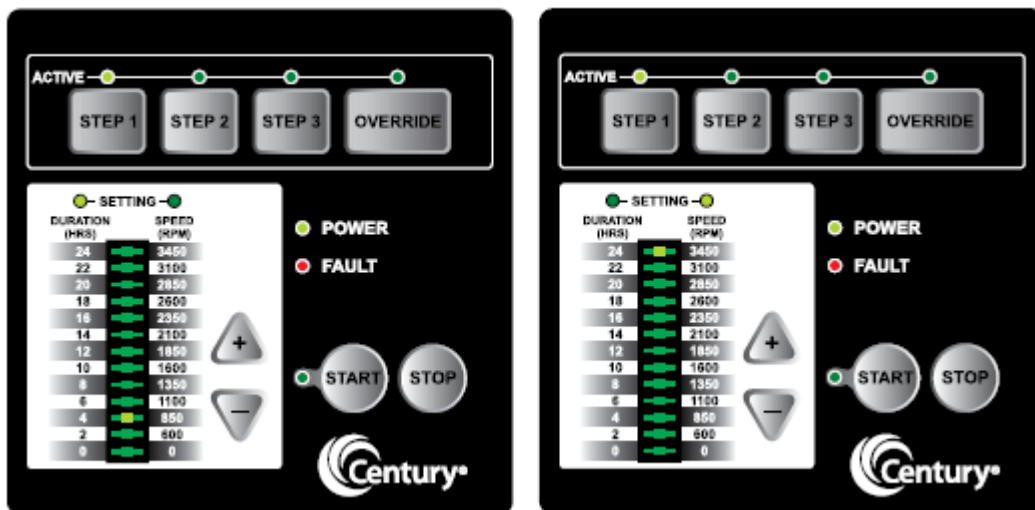
Refer Joey re chart image

Table 4: Custom Schedule

6.4 Running Waterco ECO-V 150 from Keypad

Caution: If power is connected to the Waterco ECO-V 150 motor, pressing any of the following buttons referred to in this section 6.4 could result in the motor starting. Failure to recognize this could result in personal injury or damage to equipment.

1. Press the START key and the Waterco ECO-V 150 will run the programmed 24 hour duration schedule. The START event will be stored in the controller. Should a power outage occur, the Waterco ECO-V 150 will automatically re-start at STEP 1 when power is restored.
2. The Waterco ECO-V 150 will always run the PRIMING sequence when it starts from the OFF state, including when it automatically restarts following a power outage. The default Prime setting is defined in the “Priming” section of this document.
3. The Waterco ECO-V 150 then starts running in STEP 1 at the programmed DURATION and SPEED. The “ACTIVE LED” for STEP 1 will turn ON. The DURATION and SPEED setting LEDs along with the respective bar graph LED will blink back and forth every three (3) seconds.



Refer Joey re chart image

4. This sequence will then repeat for STEP 2 and then STEP 3 without the Waterco ECO-V 150 stopping.

5. At the end of STEP 3, the Waterco ECO-V 150 will wait if necessary for the completion of the 24-hour schedule. During this waiting period (if applicable), all of the “active step LEDs” will remain OFF.

However, the START LED will still be illuminated. After completion of the 24 hour schedule, the system restarts at STEP 1 and this cycle will repeat indefinitely until the user presses the STOP key.

Note: Pressing a STEP key other than for the STEP currently running will cause an immediate transition to the newly selected STEP. The Waterco ECO-V 150 will continue with the programmed schedule from that point forward.

Note: If STOP is pressed during normal schedule operation, the 24 hour schedule will stop. When START is pressed again, the 24 hour schedule will start from STEP 1.

Note: If power is lost while the Waterco ECO-V 150 is running a 24 hour schedule, upon restoration of power the Waterco ECO-V 150 will start the 24 hour schedule from STEP 1.

Note: If a digital input (provided from an external source) is detected, the Waterco ECO-V 150 will start running on the STEP 1, STEP 2, STEP 3, or OVERRIDE speed corresponding to the digital input. Upon removing the digital input (provided from an external source), the Waterco ECO-V 150 will stop and the user will need to press START to begin the 24 hour schedule operation.

However, if START was already pressed prior to receiving a digital input, then the Waterco ECO-V 150 will resume running the 24 hour schedule once the digital input is removed.

NOTE: Pressing STOP at any time turns the Waterco ECO-V 150 OFF and clears the start time for the 24 hour schedule.

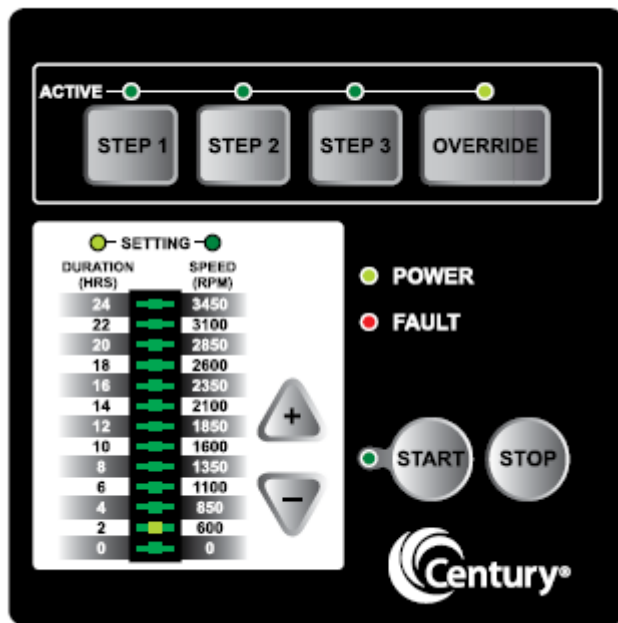
6.5 OVERRIDE

The Waterco ECO-V 150 is equipped with an OVERRIDE feature, which can be engaged to temporarily run at higher or lower speeds ranging between 600 to 3450 RPM. Once the OVERRIDE duration has elapsed, the Waterco ECO-V 150 will automatically return to the programmed schedule.

1. Pressing the OVERRIDE key while the Waterco ECO-V 150 is running will cause the Waterco ECO-V 150 to start running in the OVERRIDE mode at the programmed DURATION and SPEED. The “active LED” for OVERRIDE will illuminate. The

DURATION and SPEED setting LEDs along with its respective bar graph LED will blink back and forth at three (3) second intervals.

2. The UP (+) / DOWN (-) arrows allow the user to configure OVERRIDE DURATION and SPEED. These settings can be changed while the Waterco ECO-V 150 is running. These settings are stored each time the UP (+) / DOWN (-) arrows are pressed.



Refer Joey re chart image

NOTE: When the OVERRIDE duration ends, the Waterco ECO-V 150 resumes the 24 hour schedule at the point in the currently programmed 24 hour schedule where it normally would be running at that time.

The OVER-RIDE duration will not affect the start or stop times of the 24 hour schedule. For example, if OVERRIDE runs during a period overlapping with a later part of STEP 1 and an early part of STEP 2, the start time of STEP 3 is not affected.

Note: Pressing/Holding OVERRIDE key for more than three (3) seconds will cancel OVERRIDE mode.

Note: During the OVERRIDE mode, the Waterco ECO-V 150 will not start with the priming sequence.

Note: It is recommended that you do not set the OVERRIDE duration to 0 HRS. Setting the OVERRIDE duration to 0 HRS will not allow you to change the duration setting while the motor is running. The motor will have to be stopped in order to change the OVERRIDE settings if the duration is set to 0 HRS.

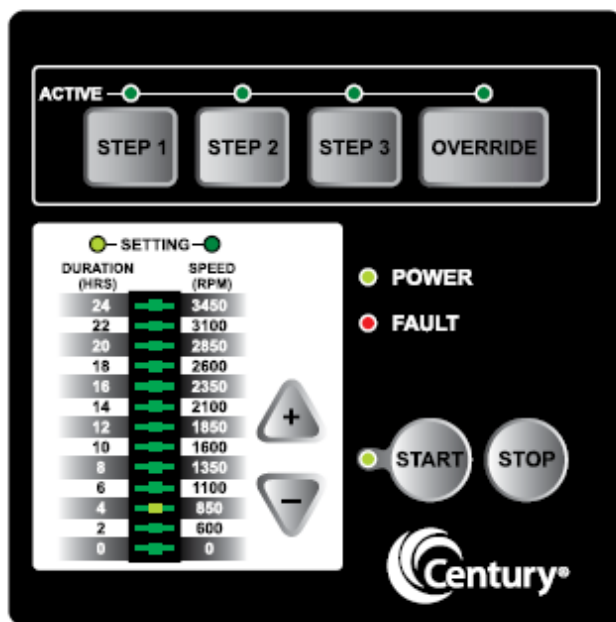
6.6 Schedule Advance

Danger: Do not perform any maintenance on the motor while the motor is in Schedule Advance Mode. The motor may start without warning. This event could cause death or serious personal injury.

The Schedule Advance mode allows the user to press the START button at one time of the day, with the 24-hour schedule starting at a different time of day. The Waterco ECO-V 150 can run in the Schedule Advance mode (by using the OVERRIDE button) and upon completion will begin the programmed 24 hour schedule at STEP 1 DURATION and SPEED.

The following steps should be followed to set Schedule Advance mode:

1. With the Waterco ECO-V 150 stopped, press and hold the START key for more than three (3) seconds. The START LED will blink at a rate of one second per pulse. The DURATION setting LED and respective bar graph LED will remain turned ON until the Schedule Advance mode is complete.



Refer Joey re chart image

2. Press the UP (+) or DOWN (-) arrows to set the desired delay time after which the 24-hour schedule should start. The Schedule Advance mode will automatically start after the desired delay time is selected. The Schedule Advance mode can be cancelled by pressing the STOP key.

Note: The OVERRIDE button will still function when the Schedule Advance mode is active. This will allow the user to run the Waterco ECO-V 150 during the period of the Schedule Advance mode.

Note: While the Waterco ECO-V 150 is in the Schedule Advance mode, if a user presses STEP 1, STEP 2, STEP 3 or the START key, the system will start the normal schedule and the Schedule Advance mode will be cancelled.

Note: While the Waterco ECO-V 150 is in the Schedule Advance mode, if a user presses the STOP key, then the Schedule Advance mode is cancelled.

Note: If power is lost while the Waterco ECO-V 150 is in the Schedule Advance mode, then the 24-hour schedule will automatically start when power is restored.

6.7 Key Lockout

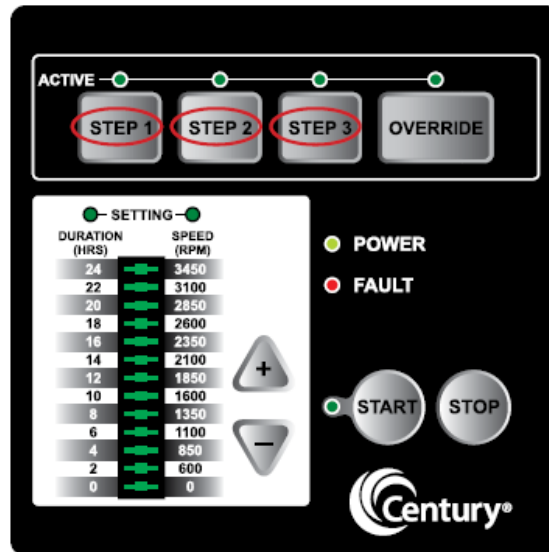
Caution: Key lockout will not prevent the motor from being stopped by pressing the STOP button. If the motor is operating in “key lockout” mode, and being controlled through a digital or serial input, the motor will only temporarily stop (4 min.) it will then restart.

The Waterco ECO-V 150 user interface has a “key lockout” feature to prevent unwanted changes to the settings.

To lock the keys, hold down the “STEP 1, STEP 2, and STEP 3” buttons all at the same time for at least three seconds. The “active LEDs” for STEP 1, STEP 2, and STEP 3 will blink for 30 seconds indicating that the keypad is locked.

The user can unlock the keys by holding down the same three STEP buttons for at least three seconds. The “active LEDs” for STEP 1, STEP2, and STEP 3 will illuminate temporarily indicating the keypad is un-locked.

Note: While operating in “key lockout” mode the motor can still be stopped by pressing the stop key. If no digital or serial input is present the motor will remain stopped. If the motor is being controlled by a digital or serial input the motor will only temporarily stop for 4 minutes. See section 6.9 for more information on temporary stop.



Refer Joey re chart image

6.8 Motor Pause

The Waterco ECO-V 150 user interface has a “motor pause” feature that will allow the user to temporarily stop the Waterco ECO-V 150 for maintenance work without disrupting the 24 hour schedule (i.e., for backwashing the filter). If the Waterco ECO-V 150 is currently running, the user can press and hold the START button for more than three (3) seconds and the Waterco ECO-V 150 will stop and remain off until the user presses and holds the START button again for more than three (3) seconds.

The START and OVERRIDE buttons will blink once every second indicating that the “motor pause” feature is enabled. These LEDs will stop blinking once this feature is cancelled.

6.9 Temporary Stop with Digital / Serial Input

Caution: Temporary stop functionality only works while the Waterco ECO-V 150 is being controlled by a digital or serial input. If the motor is being controlled by the integrated key pad and STOP is pressed, the motor will stop and remain stopped.

The Waterco ECO-V 150 has a “temporary stop” feature that will immediately stop the Waterco ECO-V 150 when being controlled by a serial or digital input. The user can press the STOP button while the Waterco ECO-V 150 is running and the Waterco ECO-V 150 will stop and stay off for four (4) minutes.

Once this time has elapsed, the Waterco ECO-V 150 will return to normal operation and accept an input from digital or serial input source. Refer to section 9 for additional details on digital inputs.

Note: If the Waterco ECO-V 150 is operating from serial or digital input, the ‘0 RPM’ LED of the bar graph will blink once every second indicating the “temporary stop”

feature has been activated. After the specified time period, the Waterco ECO-V 150 will return to normal operation and accept an input from any digital or serial input source. Refer to section 9 for additional details on digital inputs.

6.10 Reset Factory Defaults

The Waterco ECO-V 150 user interface has a “Reset to Factory Defaults” feature to restore the schedule settings back to the original values programmed at the factory. The user must press and hold the STOP and OVERRIDE buttons for three (3) seconds to reset the settings back to factory defaults. All of the UI bar graph LED's will flash three (3) times to confirm the settings were restored to factory defaults.

7 Priming

The Waterco ECO-V 150 will always run the PRIMING sequence when starting from the OFF state, except when starting in OVERRIDE. The factory Prime settings are 2600 RPM for three (3) minutes.

8 Freeze Protection

NOTICE

The freeze protection function will NOT operate if the START button is not pressed. This can be confirmed by verifying that the START LED is illuminated. In the event that the outside air temperature drops below a set threshold, the Waterco ECO-V 150 will automatically turn on (assuming the START button has been pressed) and circulate the pool water. The Freeze Protection will run according to the following conditions (utilizing the factory default settings):

Freeze Protection turn ON temperature = 39°F
Freeze Protection Duration = 8 Hours

By utilizing the Waterco ECO-150 user interface (accessory sold separately) these factory default settings can be changed.

Once this eight (8) hour period has elapsed, the Waterco ECO-V 150 will check the ambient temperature again. If the temperature is still below the set threshold, the Waterco ECO-V 150 will run for an additional 8 hours. If the temperature is above the threshold, the Waterco ECO-V 150 will automatically return to the 24-hour based schedule.

9 Control with Digital Inputs

The user can run the Waterco ECO-V 150 at the programmed STEP 1, STEP 2, STEP 3, or OVERRIDE speeds by utilizing the four digital inputs. STEP 1, STEP 2, STEP 3, or OVERRIDE are equivalent to Digital Input 1, 2, 3 or 4 respectively.

Note: The controller is rated to accept digital inputs of 18V-30V AC (24V AC +/- 20%) and 9-30V DC (12/24V DC +/- 20%).

Note: The Waterco ECO-V 150 will detect either a 50/60Hz for AC input or an active low signal for DC digital inputs.

The items below describe the functionality of the digital inputs:

1. If the user provides any one of the 4 digital inputs, then the corresponding ACTIVE STEP LED will blink every one (1) second. The SPEED LED and corresponding bar graph LED will be illuminated to indicate the Digital Input is functioning properly.

2. The START LED will be OFF when a digital input is present.

Warning: Access to these terminals is in close proximity to the mains connectors which carry line voltage capable of causing personal injury or damaging the equipment if contact is made. Power should be turned off when accessing this area.

Note: A generic wiring diagram is provided in figure 7 for connecting the Waterco ECO-V 150 to a "System Level Controller". This concept can be applied to a solar system or any other type of control system.

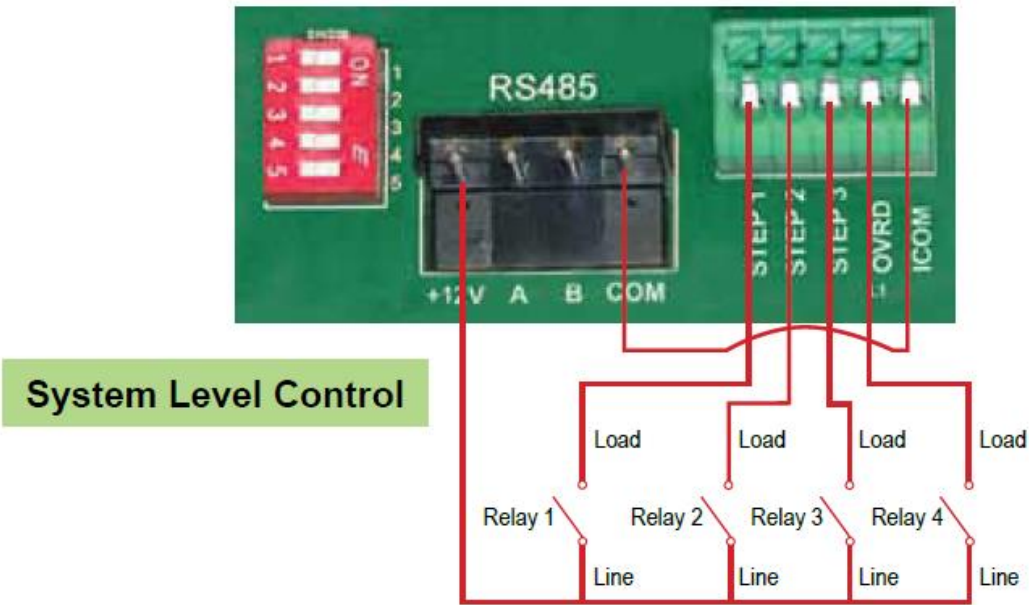
Note: There is no schedule for digital inputs. The timing for each speed is controlled directly by the digital inputs.

Note: The digital inputs have the highest priority amongst all the inputs (i.e., keypad, serial, or digital). Therefore the serial commands as well as the User Interface inputs will be ignored when a digital input is present.

Note: If more than one digital input (switch) is present, then the Waterco ECO-V 150 will give priority to the highest number digital input. Therefore OVERRIDE has highest priority followed by STEP 3, then STEP 2, then STEP 1.

Note: If no digital input is detected, the Waterco ECO-V 150 will automatically start the 24 hour schedule if the START key was pressed prior to the application of a digital input.

Warning: Access to these terminals is in close proximity to the mains connectors which carry line voltage capable of causing personal injury or damaging the equipment if contact is made. Power should be turned off when accessing this area.



System Level Control

Refer Joey re chart image

Figure 7: System Level Control Wiring Diagram

10 DIP Switches

Warning: Access to these terminals is in close proximity to the mains connectors which carry line voltage capable of causing personal injury or damaging the equipment if contact is made. Power should be turned off when accessing this area.

The DIP switches can be used to configure different settings for the Waterco ECO-V 150. Each DIP switch and their corresponding function is defined in Table 5.

Switch #	Function
1	Power output on/off
2	Not Used
3	Not Used
4	Not Used
5	Not Used



Refer Joey re chart image

Table 5: DIP Switch Functions

Figure 8: DIP Switches

11 Care and Maintenance

The Waterco ECO-V 150 is both reliable and robust in harsh environments. However, this product does contain electronics that are cooled by a fan mounted to the Waterco ECO-V 150. In order to ensure optimum reliability of this product, it is recommended to clean the fan inlet on the back of the Waterco ECO-V 150 once a

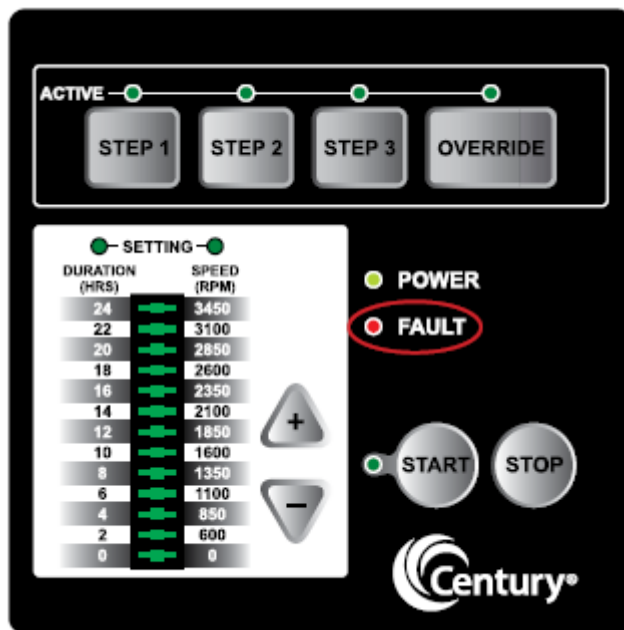
month. It is also important to keep this area free of large debris such as leaves, branches, mulch, plastic bags, etc.

12 FAULT Status

Warning: While the FAULT LED is illuminated the motor will not run, upon clearing the fault, the motor may automatically resume running depending on where in the schedule the FAULT occurred. This may cause personal injury or damage to the equipment.

The paragraphs below illustrate the possible faults that can occur with the Waterco ECO-V 150. If the Waterco ECO-V 150 does not restart automatically following the FAULT, cycle ac power to the Waterco ECO-V 150 and wait five (5) minutes.

The Waterco ECO-V 150 reads the FAULT status and provides feedback to the user via the FAULT LED. The Waterco ECO-V 150 will illuminate the FAULTLED when a FAULT is present. The Waterco ECO-V 150 will stop and remain OFF when the FAULT is present. Once the FAULT is cleared, if the Waterco ECO-V 150 was previously running, it will automatically resume running the normal schedule.



Refer Joey re chart image

Below is the behaviour of the FAULT LED when a FAULT is detected:

1. When a FAULT is present, and the motor is not running, only the FAULT LED and power LED will illuminate.
2. When a FAULT is present, and the motor is running, then the FAULT LED will illuminate. During the FAULT condition, the bar graph LEDs on the interface will turn OFF. However, the power LED, start LED & active STEP LED will remain illuminated.

3. When a FAULT is present and the FAULT LED is illuminated, only the STOP key will function. The remaining buttons become disabled.


4. When the FAULT LED is continuously ON (i.e. not blinking), a FAULT is present in the controller. When the FAULT LED is blinking every one (1) second, a FAULT is present in the user interface.

5. When the FAULT has cleared, the FAULT LED will turn OFF.

6. Once the FAULT is cleared, if the Waterco ECO-V 150 was previously running, it will **automatically** resume running the normal schedule.

Please see Section 14 for troubleshooting issues and their resolutions.

13 Specifications

Overall Ratings	
Input Voltage	208 - 230 Vrms nominal
Input Current	10.5 - 10.0 Arms
Input Frequency	Single phase, 60 Hz
Control Terminals	18-30V AC (24V AC +/- 20%) or 9-30V DC (12/24V DC +/- 20%)
Auxiliary Load Terminals	N/A
Maximum Continuous Load	1.65 THP (Total Horse Power)
Speed Range	600 - 3450 RPM
Environmental Rating	NEMA Type 3R
Agency Approval	R/C XDNW2.E302804 R/C XDNW8.E302804
	
Ambient Conditions	
Storage	-40°C to +85°C (-40°F to +185°)
Operating	0°C to +50°C (+32°F to +122°F)
Humidity	Relative 0 to 95 % non-condensing

Refer Joey re chart image

Remove crossed section from Chart

WARNINGS FOR INSTALLATION AND ASSEMBLY TASKS

1. When connecting electric cables to the motor of the pump, be careful to correctly arrange them inside the connection box, verify that no bits of cable are left inside the box on closing it. See that the earth wire is correctly connected. When connecting the motor, follow the wiring diagram supplied with the pump.
2. Be especially careful that no water enters the motor or electrical parts under voltage.
3. In the event that the planned use is not as specified, adaptations and supplementary technical rules may be necessary.

• WARNINGS FOR START UP

Before starting the pump, verify the calibration of the electrical protection devices of the motor and that the protections against electrical and mechanical contacts are correctly positioned and attached.

FLUID TEMPERATURE

The permissible temperature is $>$ than 32° F (0° C) and $<$ than 95° F (35° C). The pump should never be operated outside of these temperatures or damage may occur.

WARNINGS FOR ASSEMBLY AND MAINTENANCE TASKS

1. Be especially careful that no water enters the motor or the electrical parts under voltage.
2. Avoid all contact, even accidental, with the moving parts of the pump.
3. Wait until the pump has stopped completely before handling it in any way.
4. Before carrying out electrical or mechanical maintenance tasks, make sure that the machine has been disconnected from the mains and that starting devices have been locked.
5. It is advisable to follow the steps listed below before handling the pump in any way.
 - a) Turn off the voltage to the pump.
 - b) Lock starting devices.
 - c) Verify that there is no voltage in the circuits, including ancillary devices and auxiliary circuits.
 - d) Wait until motor stops completely.

The above list should be considered indicative and not binding for the purpose of safety; specific safety rules may exist in particular regulations.

Regularly verify:

1. The correct attachments of the mechanical parts and of the support screws of the pump.
2. The correct position, attachment and condition of the supply cables and of the insulating parts.
3. The temperature of the motor. In the event of any irregularity stop the machine immediately and have it repaired.
4. The vibration of the pump. In the case of any irregularity, stop the machine immediately and have it repaired.

Owing to the complexity of the cases covered, the instructions for installation, use and maintenance contained in this manual do not attempt to examine all possible and imaginable cases of service and maintenance. If supplementary instructions are required or if special problems.

14 Troubleshooting Guide

Warning: Diagnosing certain symptoms may require close interaction with, or in close proximity to, components that are energized with electricity. Contact with electricity can cause death, personal injury, or property damage. When troubleshooting the Waterco ECO-V 150, diagnostics involving electricity should be cared for by a licensed professional.

Symptom	Possible Causes	Potential Solutions
V-GREEN 165 FAILS TO START	Controller DIP switches not configured properly	Verify that the DIP switches of SW100 under the controller terminal box cover are in the correct position. Refer to section 10.
	Mains Voltage is not present	Replace fuse, reset breaker/GFI. Tighten mains wire connections.
	User Interface is not connected	Check connections at J201 connector.
	V-Green 165 shaft is locked	Check if the V-Green 165 can be rotated by hand and remove any blockage.
	V-Green 165 shaft is damaged	Replace V-Green 165.
V-GREEN 165 RUNS THEN STOPS	Over temperature FAULT	Check that back of V-Green 165 is free from dirt and debris. Use compressed air to clean.
	Over current FAULT	V-Green 165 will automatically restart after one (1) minute.
V-GREEN 165 IS NOISY	Debris in contact with fan	Check that back of V-Green 165 is free from dirt and debris. Use compressed air to clean.
	Debris in strainer basket	Clean strainer basket.
	Loose mounting	Check that mounting bolts of V-Green 165 and pump are tight.
V-GREEN 165 RUNS, BUT NO FLOW	Impeller is loose	Check that V-Green 165 is spinning by looking at fan on back of V-Green165. If so, check that pump impeller is correctly installed.
	Air leak	Check plumbing connections and verify they are tight.
	Clogged or restricted plumbing	Check for blockage in strainer or suction side piping. Checked for blockage in discharge piping including partially closed valve or dirty pool filter.

Refer Joey re chart image, the V-Green is listed in this chart.

Warning: If the Waterco Limited pump is within the stated warranty period and you experience faults always contact your supplier or the nearest Waterco Limited branch for advice. Failure to do this may void warranty. Refer to warranty documentation supplied with pump.

All electrical work is to be carried out by a Qualified Electrician; under no circumstances should you attempt repairs on the electrical components of Waterco Limited pumps unless you are qualified to do so.

