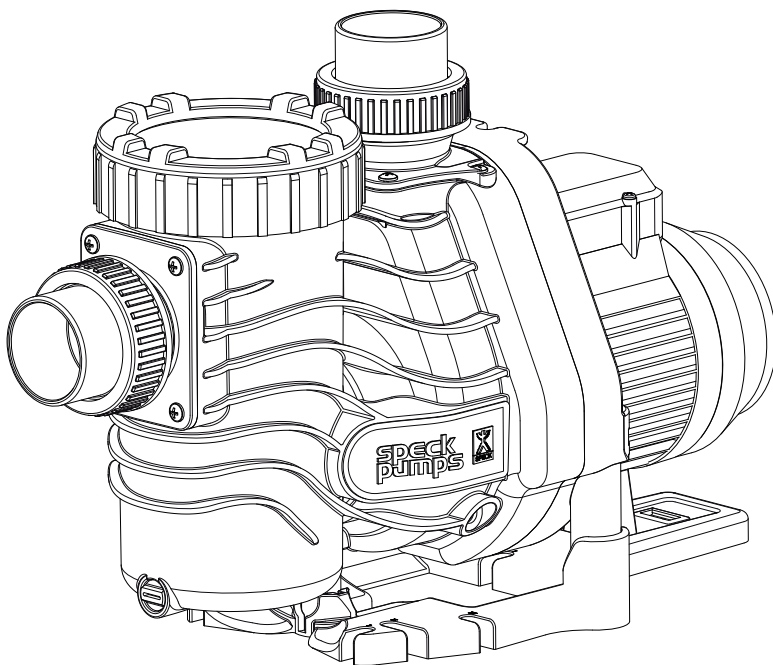


Installation, Operating, and Service Manual

EasyFit[®] 1.65 THP

Swimming Pool Pump



SPECK
pumps 
SPECK

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Technical Support:

Address: Speck Pumps
8125 Bayberry Road
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Phone: 904-739-2626

Fax: 904-737-5261

Website: www.usa.speck-pumps.com

Email: technical.usa@speck-pumps.com

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

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SAVE THESE INSTRUCTIONS!

OWNER'S MANUAL

Swimming Pool Pump



READ THIS MANUAL CAREFULLY BEFORE USING THE SPECK PUMP

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

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

WARNING: *Before installing this product, read and follow all warning notices and instructions which are included. Failure to follow safety warnings and instructions can result in severe injury, death, or property damage. Call (800) 223-8538 or visit www.usa.speck-pumps.com for additional copies of these instructions.*

IMPORTANT SAFETY INSTRUCTIONS

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

1. READ AND FOLLOW ALL INSTRUCTIONS.

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

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

4. WARNING - To reduce the risk of electric shock, replace any damaged cord immediately.

5. DO NOT install within an outer enclosure or beneath the skirt of a hot tub or spa.

6. CAUTION - This pump is for use with permanently-installed pools and may also be used with hot tubs and spas if so marked. **DO NOT** use with storable pools. A permanently-installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it is capable of being readily disassembled for storage and reassembled to its original integrity.

7. 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.

8. TO REDUCE RISK OF ELECTRICAL SHOCK, A copper bonding connector (8 AWG) is provided for bonding the motor to all metal parts of the swimming pool, spa, or hot tub structure and to all electrical equipment, metal conduit, and metal piping within 5 feet of the inside walls of a swimming pool, spa, or hot tub, when the motor is installed within 5 feet of the inside walls of the swimming pool, spa, or hot tub.

NOTE: To installer and/or operator of the Speck Swimming Pool Pump; the manufacturer's warranty will be voided if the pump is improperly installed and/or operated.

9. SAVE THESE INSTRUCTIONS!

SECTION 1 EQUIPMENT OPERATION AND MAINTENANCE

1/1 LOCATION

1. Locate the pump as close to the pool as practical. Consult local codes for minimum distance between pool and pump.
2. The piping should be as direct and free from turns or bends as possible, as elbows and other fittings greatly increase friction losses.
3. Place pump on a solid foundation which provides a rigid and vibration-free support so that it is readily accessible for service and maintenance.
4. Though the pump is designed for outdoor use, it is advised to protect the pump from continuous direct heat. Install the pump in a well ventilated location protected from excessive moisture (flooding, sprinklers, rain downspouts, etc.).
5. Protect the pump against flooding and excess moisture, prevent foreign objects from clogging air circulation around motor. All motors generate heat that must be removed by providing proper ventilation.
6. **DO NOT** store or use gasoline or other flammable vapors or liquids in the vicinity of this pump. **DO NOT** store pool chemicals near the pump.
7. **DO NOT** remove any safety alert labels such as **DANGER**, **WARNING**, or **CAUTION**. Keep safety labels in good condition and replace missing or damaged labels.
8. Provide access for future services by leaving a clear area around the pump. Allow plenty of space above the pump to remove lid and basket for cleaning.

1/2 INSTALLATION

1. This pump is designed as a direct replacement for pumps made by several manufacturers. It can also be installed as a new pump with easy to connect unions. Refer to Figure 1 & Table 1 for various connection options.
2. Use Figure 1 to select the appropriate suction fitting (part# 153), discharge fitting (part# 156), pump risers (part# 182.1 & 182.2), and motor supports (part# 920/921).
3. Install the 76 x 6mm o-ring (part #918) on the back of suction fitting. Secure the suction fitting to the front of the pump casing (part #101) using four (4) 6 x 22mm tapping screws (part #917).

CAUTION: Screws should be **HAND TIGHT. DO NOT** use drills or pneumatic tools. **DO NOT** over tighten!

4. Install the 70 x 6mm o-ring (part# 919) on the back of the discharge fitting. Secure the discharge fitting to the top of the pump casing (part# 101) using four (4) 6 x 22mm tapping screws (part# 917). **CAUTION:** Screws should be **HAND TIGHT. DO NOT** use drills or pneumatic tools. **DO NOT** over tighten!

5. Insert the pump risers (part# 182.1 & 182.2) into base plate (part# 894). See Exploded View.

6. Insert the motor supports (part #920/921) into the base plate (part #894). See Exploded View.

7. When connecting pipework to pump with threaded ports it is recommended that thread seal tape be used. If the suction pipe is not sealed correctly, the pump will not prime properly and will pump small volumes of water or none at all.

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

BONDING: As required by National Electrical Code Article 680-22, the pump motor must be electrically bonded to the pool structure (reinforced bars, etc.) by a solid copper conductor not smaller than #8 AWG (8.4 mm²) wire via the external copper bonding lug on the pump motor.

GROUNDING: Permanently ground the pump motor using a conductor of appropriate size. Connect to the #10 green headed ground screw provided inside the motor terminal box.

For more information about the motor operation refer to the motor manual.

NOTE: DO NOT connect to electric power supply until the unit is permanently grounded

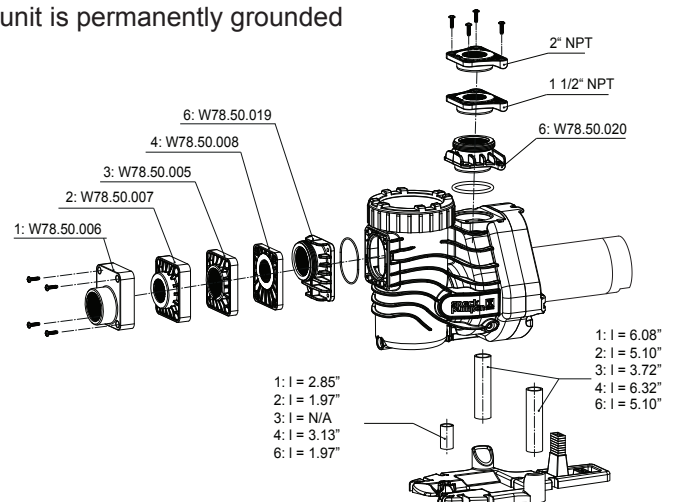


Figure 1.0 - Replacement Pump Connection Options

SECTION 1 EQUIPMENT OPERATION AND MAINTENANCE

Option #	Suction Fitting	Discharge Fitting	Replaces Pump Model(s)
1	W78.50.006	1.5" or 2" NPT	Pentair® Ultra-Flow®
2	W78.50.007	1.5" or 2" NPT	Pentair® WhisperFlo® & IntelliFlo®
3	W78.50.005	1.5" or 2" NPT	Hayward® Super Pump® & Super Pump VS®, Pentair® SuperFlo®
4	W78.50.008	1.5" or 2" NPT	STA-RITE® Dura-Glas & Max-E-Glas™
6	W78.50.019	W78.50.020	STA-RITE® Dyna-Glas™

Table 1.0 - Replacement Pump Connection Options

1/3 MAINTENANCE

The pump requires little or no service other than reasonable care and periodic cleaning of the strainer basket. **DO NOT** strike basket to clean. When cleaning the basket inspect the lid o-ring for damage and replace if necessary.

NOTE: It is normal for a few drops of water to escape from the mechanical seal from time to time. This is especially true during the break-in period.

The mechanical seal may come worn and/or loose during the course of time, depending on the running time and water quality. If water continually leaks out, a new mechanical seal should be fitted. After long periods of NOT operational (seasonal storage, etc.), the pump must be checked for ease of rotation while it is switched off.

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

Place a screwdriver, allen wrench or appropriate tool in the end of the motor shaft and turn it clockwise. OR Remove the fan cover and turn the fan in a clockwise direction manually. This may require removal of the cover at the rear of the motor or small circular cap at the rear center of the motor.

To Replace the Mechanical Seal

To replace the mechanical seal, remove the sixteen (16) bolts holding the casing to the seal housing. Slide the motor part including the seal housing out. Remove the terminal cover from the rear of the motor and secure the center motor shaft with a 1/2" wrench. Remove impeller nut by turning it counter-clockwise when facing it. Pull the impeller from the motor shaft noting the position of the seal. Remove the seal from the impeller shaft. To re-assemble, reverse the process. Use only water as a lubricant to install both sides of the seal. Make sure both sides of the seal (ceramic and spring portion) are clean. Gently wipe polished faces with soft and dry cotton cloth. Surfaces can easily be damaged by dirt and scratching. (Use a drop of loc-tite to secure the impeller nut.)

1/4 WINTERIZING

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

There are two options when winterizing the pump:

Option 1:

Drain all the water from the pump, system equipment, and piping. Remove drain plug(s). **DO NOT** replace plug(s). Store plug(s) in the strainer basket for winter. Keep the motor covered and dry.

Option 2:

Drain all the water from the pump, system equipment, and piping. Remove the pump and motor from the plumbing and store indoors in a warm and dry location.

NOTE: When the winter season is over the pump will need to be checked and primed prior to start.

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

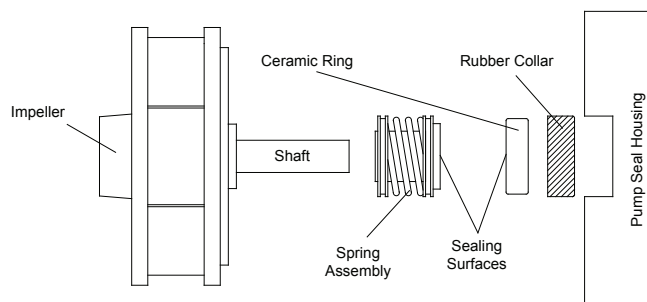


Figure 2.0

SECTION 2 TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSES	SOLUTION
1. Pump will not prime.	<p>a. Suction air leak.</p> <p>b. No water in pump.</p> <p>c. Closed valves or blocked lines.</p> <p>d. Low voltage to motor.</p>	<p>Make sure the see-through lid and o-ring are clean and properly positioned. Tighten see-through lid (hand tight). Tighten all pipes and fittings on suction side of the pump. Be sure water in the pool is high enough to flow through skimmer.</p> <p>Make sure strainer tank is full of water.</p> <p>Open all valves in system. Clean skimmer and strainer tank. Open pump and check for clogging of impeller.</p> <p>Check voltage at motor. If low, pump will not come up to speed.</p>
2. Motor does not turn.	<p>a. No power to motor.</p> <p>b. Pump jammed.</p>	<p>Check that all power switches are on. Be sure fuse or circuit breaker is properly set. Time set properly? Check motor wiring at terminals.</p> <p>With power off, turn shaft. It should spin freely. If not, disassemble and repair.</p>
3. Low flow.	<p>a. Dirty filter.</p> <p>b. No skimmer basket.</p> <p>c. Closed valves or blocked lines.</p> <p>d. Suction air leak.</p>	<p>Back wash filter when filter pressure is high, or clean cartridges.</p> <p>Clean skimmer and pump strainer basket.</p> <p>See problem 1.</p> <p>See problem 1.</p>
4. Noisy operation of motor.	<p>a. Bad bearings.</p>	<p>Noise when shaft is turned up by hand. Motor is hot in bearing area when running. Replace bearing.</p>
5. Motor runs hot.	<p>These motors will run hot to the touch, however, this is normal. They are designed that way. Thermal overload protector will function to turn them off if there is an overload or high temperature problem. Excessive heat can be cause by:</p> <p>a. Low voltage.</p> <p>b. Installed in direct sun.</p> <p>c. Poor ventilation.</p>	<p>Increase size of electrical wire. Be sure motor is operating on correct voltage.</p> <p>Shield motor from sun's rays.</p> <p>Do not tighten cover or enclosure motor.</p>
6. Noisy operation of pump.	<p>a. Air leak in suction line. Bubbles in water returning to pool at inlet.</p> <p>b. Restricted suction line due to blockage or under size pipe. Indicated by high vacuum reading at pump suction.</p> <p>c. Foreign matter (gravel, metal, etc.) in pump impeller.</p> <p>d. Cavitation.</p>	<p>Repair leak. Check suction pipe, see-through lid in place? O-ring clean?</p> <p>Remove blockage or increase suction pipe size. Make sure strainer tank is clean. Are all suction valves fully open?</p> <p>Disassemble pump and remove foreign matter from impeller.</p> <p>Improve suction conditions. (Reduce suction life, reduce number of fittings, increase pipe size.) Increase discharge pressure and reduce flow by throttling discharge valve.</p>

SECTION 2 TROUBLESHOOTING GUIDE - continued

PROBLEM	POSSIBLE CAUSES	SOLUTION
7. Motor overload protection "kicks out".	a. Motor is not connected properly.	Check wiring diagram on motor.
	b. Low voltage due to under size wire or low incoming voltage.	Check with volt meter. Increase size of supply wire. Reports low supply voltage to power company. Voltage at motor must be within 10% of motor nameplate voltage.
	c. Wrong size heaters in protective device.	Heaters should be one size larger than full load amps shown on motor nameplate.
	d. Overload due to binding in pump or wrong size impeller.	Indicated by high amperage readings on motor, binding shaft. Disassemble unit and correct.

SECTION 3 SERVICING INFORMATION

When calling the manufacturer regarding a question or problem with your pump, please have the serial number available.

The serial number is located on the pump either on the casing and/or motor. Replacement parts may be available from your installer.

SECTION 4 LIMITED WARRANTY

Speck Pumps-Pool Products, Inc. grants solely to the original consumer purchaser ("Buyer") of the pump and motor the following personal, non-transferable and limited warranty on the following terms and conditions (the "Limited Warranty"): the pump and motor is warranted to be free of material defects in materials or workmanship under normal use for a period of two (2) year beginning on the date of the Buyer's purchase of the pump and motor. Notwithstanding any provisions herein to the contrary, the warranties and obligations hereunder shall not in any event extend for more than three (3) years beyond the date of shipment of the pump and motor from the factory (the "Limited Warranty Period"). The Limited Warranty is subject to each of the following additional terms and conditions:

1. IN THE EVENT OF ANY BREACH OF THE LIMITED WARRANTY, SPECK PUMPS - POOL PRODUCTS, INC.'S ENTIRE OBLIGATION AND LIABILITY TO BUYER, AND BUYER'S SOLE AND EXCLUSIVE REMEDY SHALL BE AS FOLLOWS: Speck Pumps - Pool Products, Inc. will, at its option, either repair or replace the pump and motor or refund to Buyer the purchase price actually paid by Buyer for the pump and motor subject to the Limited Warranty. Speck Pumps - Pool Products, Inc. shall have no obligations under the Limited Warranty unless Buyer delivers timely written notice to Speck Pumps - Pool Products, Inc. of the Limited Warranty claim within the Limited Warranty Period and returns the pump and motor to Speck Pumps - Pool Products, Inc. if requested. To the fullest extent permitted by law, Speck Pumps - Pool Products, Inc. expressly disclaims any liability for, and the Limited Warranty does not include or cover, any labor, costs or other expenses in connection with the removal, transportation, shipment, insurance, replacement, repair, or installation of repaired or replaced parts or for any other costs or expenses or damages to property or things including, but not limited to, those arising in connection with the use of, or inability to use, the pump and motor.

2. To the fullest extent permitted by law, the Limited Warranty will be void and of no force or effect and Speck Pumps - Pool Products, Inc. will have no liability, responsibilities or obligations to Buyer or with respect to the pump and motor in the event of the occurrence of any one or more of the following:

- (a) Any damage to the pump and motor caused by Buyer, any third party, ground movement, other natural forces, acts of God or any other sources or causes not arising from a breach of the Limited Warranty, excluding ordinary wear and tear;
- (b) Any replacement, modification, alteration or repair of any parts or components of the pump and motor by anyone other than Speck Pumps - Pool Products, Inc.;
- (c) Any abuse, misuse, accident, tampering with, improper installation or modification of the pump and motor or any other actions, inactions or failures to act that violate the terms and conditions of this Limited Warranty;

SECTION 4 LIMITED WARRANTY - continued

- (d) Buyer's failure or inability to present an invoice, bill, receipt or other documentation clearly evidencing that the pump and motor was installed and maintained in strict compliance with this Limited Warranty and that the claim was timely submitted within the Limited Warranty Period; and/or
 - (e) Buyer's failure to comply with the conditions and contingencies set forth in paragraph 3 below.
3. The Limited Warranty is expressly conditioned and contingent upon Buyer's strict compliance with each of the following:
- (a) Installation of the pump and motor by an experienced and qualified pool industry professional and a licensed electrician who is licensed within the jurisdiction in which the pump and motor is installed and will be used; and
 - (b) Buyer's operation and maintenance of the pump and motor in strict accordance with Speck Pumps - Pool Products, Inc.'s printed operator/maintenance manuals delivered with the pump and motor.

4. **DISCLAIMER: THE LIMITED WARRANTY IS THE ONLY WARRANTY MADE AND IS IN LIEU OF ALL OTHER WARRANTIES, AND ANY AND ALL IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, THE IMPLIED WARRANTY AGAINST INFRINGEMENT, AND THE IMPLIED WARRANTY OR CONDITION OF FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED IN THEIR SCOPE AND DURATION TO THE TWO YEAR TERM OF THE LIMITED WARRANTY SET FORTH HEREIN. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO THE BUYER.**

5. **TO THE FULLEST EXTENT PERMITTED BY LAW, IN NO EVENT SHALL SPECK PUMPS - POOL PRODUCTS, INC. OR ITS OFFICERS, DIRECTORS, EMPLOYEES, SHAREHOLDERS, AGENTS, OR REPRESENTATIVES BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES OR LOSS, INCLUDING TIME, MONEY, GOODWILL, AND LOST PROFITS IN ANY WAY WHICH MAY ARISE HEREUNDER OR FROM THE USE OF OR INABILITY TO USE THE PUMP AND MOTOR OR THE PERFORMANCE OR NONPERFORMANCE OF ANY OBLIGATION UNDER THIS LIMITED WARRANTY. THIS PARAGRAPH, THE WARRANTY DISCLAIMERS IN PARAGRAPH 4 ABOVE, AND THE SOLE AND EXCLUSIVE REMEDY SET FORTH IN PARAGRAPH 1 ABOVE SHALL APPLY EVEN IF SPECK PUMPS - POOL PRODUCTS, INC. HAS BEEN NOTIFIED OF THE POSSIBILITY OR LIKELIHOOD OF SUCH DAMAGES OCCURRING, WHETHER SUCH LIABILITY IS BASED ON CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY, PRODUCTS LIABILITY OR OTHERWISE, AND EVEN IF ANY REMEDY STATED HEREIN FAILS OF ITS ESSENTIAL PURPOSE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF SPECIAL, INDIRECT, INCIDENTAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES OR LOSS, SO THE ABOVE EXCLUSIONS AND LIMITATIONS MAY NOT APPLY.**

6. This Limited Warranty gives the Buyer specific legal rights, and the Buyer may also have other rights, which vary from state to state.

7. A return merchandise authorization ("RMA") must be obtained from Speck Pumps - Pool Products, Inc. before returning any product. Products returned without an RMA will be refused and returned, unopened, to the Buyer. All returned products are to be sent freight prepaid and insured for Buyer's protection to the manufacturer at 8125 Bayberry Road, Jacksonville, Florida 32256. Under no condition will products be accepted after the expiration of the Limited Warranty Period. Speck Pumps - Pool Products, Inc. shall not bear any costs or risks incurred by Buyer in shipping a defective pump and motor to Speck Pumps - Pool Products, Inc. or in shipping a repaired or replaced pump and motor to Buyer.

Technical Support:

Address: Speck Pumps
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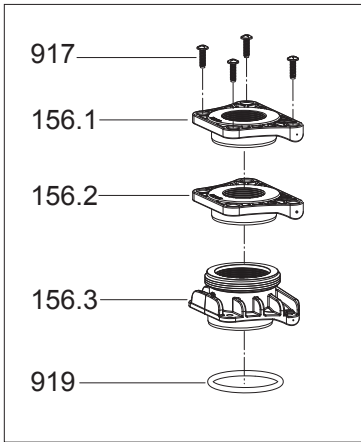
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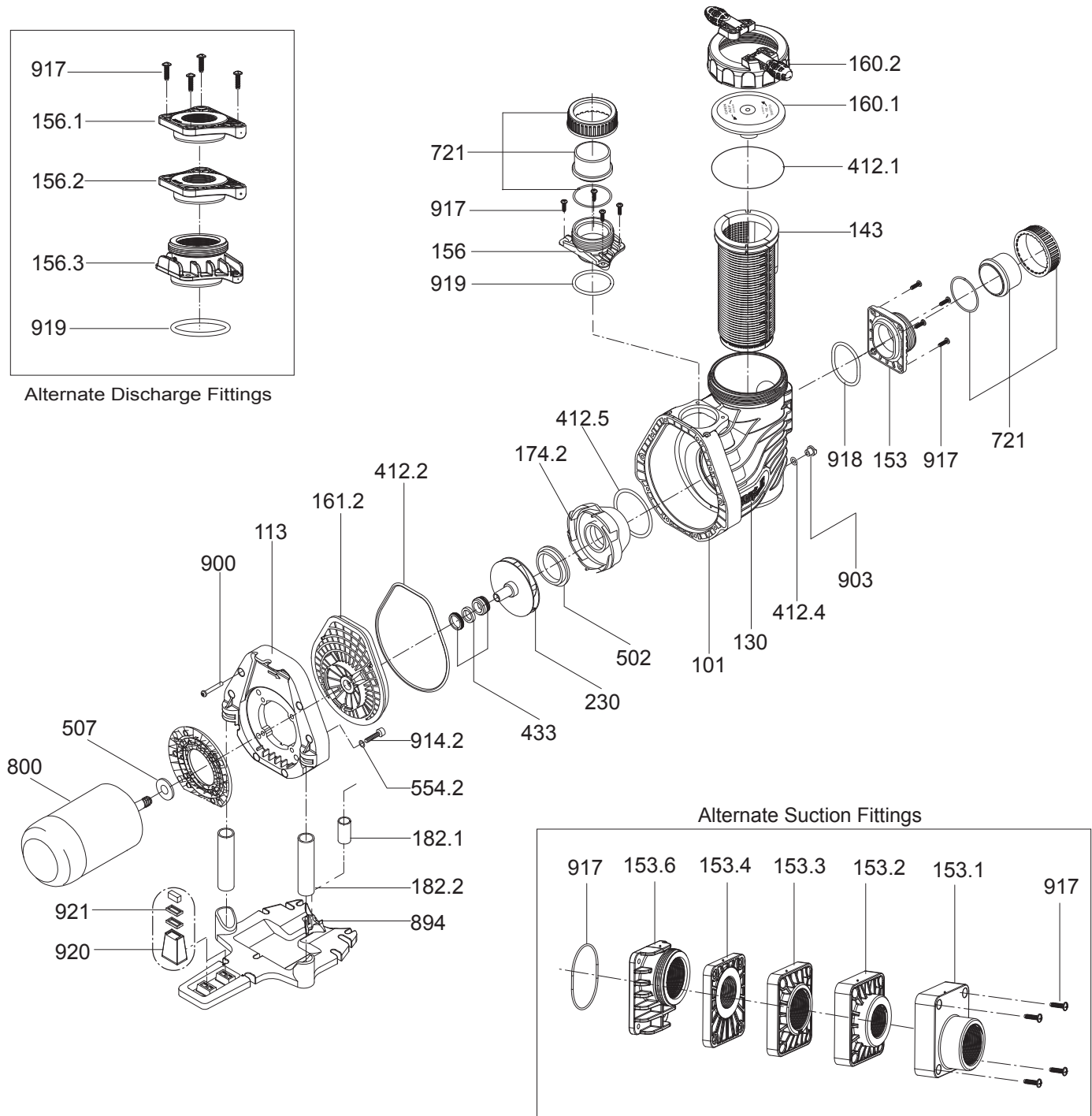
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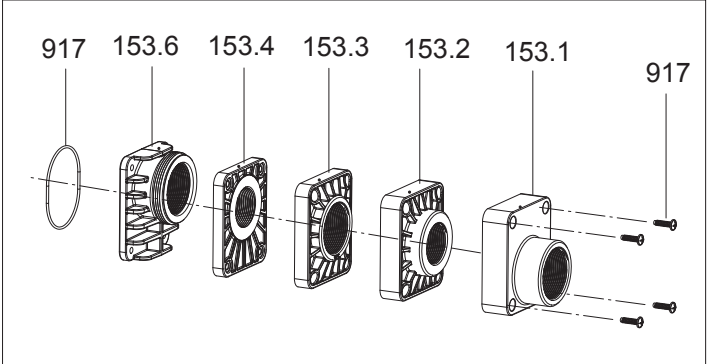
SECTION 5 REPLACEMENT PARTS & EXPLODED VIEW



Alternate Discharge Fittings



Alternate Suction Fittings



SECTION 5 REPLACEMENT PARTS & EXPLODED VIEW - continued

PART NUMBER	DRAWING NUMBER	QTY REQUIRED	DESCRIPTION
2921116022	160.2	1	LOCK RING WITH HANDLES - LID
2901410122	101	1	CASING
2901413002	130	2	NAME PLATE - ORANGE
2901411304	113	1	FLANGE
2901489400	894	1	BASE
2901416102	161.2	1	SEAL HOUSING (-I, -II, -IV, -V, -VI)
2901416103	161.2	1	SEAL HOUSING (1.65, -III)
2901417421	174.2	1	DIFFUSER (-I, -II)
2921317421	174.2	1	DIFFUSER (1.65, -III)
2901417422	174.2	1	DIFFUSER (-IV, -V)
2901417420	174.2	1	DIFFUSER (-VI)
2920750200	502	1	FLOATING EYE SEAL (-I, -II)
2901450700	502	1	FLOATING EYE SEAL (-IV, -V)
TBD	230	1	IMPELLER (-I)
2901423015	230	1	IMPELLER (-II) 113 / 5.3mm
2901423009R	230	1	IMPELLER (-III) 118 / 5.0mm
2901423009	230	1	IMPELLER (1.65 THP) 124 / 5.0mm
2901423016	230	1	IMPELLER (-IV) 120 / 8.7mm
2901423017	230	1	IMPELLER (-V) 120 / 10.0mm
2901423013	230	1	IMPELLER (-VI) 120 / 7.8mm
2923591201	903	1	PLUG - CASING DRAIN (1/4")
2920141240	412.4	1	O-RING - DRAIN PLUG 11 x 2.5mm
2921141210	412.1	1	O-RING - LID 137 x 5mm
2901441210	412.2	1	O-RING - CASING 206 x 6mm
2920141210	412.5	1	O-RING - DIFFUSER 90 x 5mm
2991000091	900	10	SCREW - CASING HEX/SLOT M7 x 48mm SS
2901116010	160.1	1	LID - CLEAR
2920343310	433	1	MECHANICAL SEAL (20mm) COMPLETE
2920110200	598	1	MOTOR FLANGE - 56 FRAME
2991400028	914.2	4	SCREW - 3/8"-16 x 2"
2901414303	143	1	BASKET - ONE PIECE
5879006022	917	8	SCREW - 6 x 22mm, A2
2901441270	918	1	O-RING - SUCTION FITTING (ALL) 76 x 6mm
2901441282	919	1	O-RING - DISCHARGE FITTING (ALL) 67 x 6mm
2902089420	920	1	ADAPTER
2920889410	921	7	LEGO SPACER
2901415300A	153	1	FITTING - STANDARD SUCTION KIT
2901415600A	156	1	FITTING - STANDARD DISCHARGE KIT
2901418213	182.1	1	RISER - FRONT
2901418223	182.2	2	RISER - REAR

OPTIONAL PARTS

2901415306	153.1	1	FITTINGS - 1.5" NPT SUCTION (Ultra-Flow®)
2901415316	153.1	1	FITTINGS - 2" NPT SUCTION (Ultra-Flow®)
2901415307	153.2	1	FITTINGS - 1.5" NPT SUCTION (WhisperFlo® / IntelliFlo®)
2901415317	153.2	1	FITTINGS - 2" NPT SUCTION (WhisperFlo® / IntelliFlo®)
2901415305	153.3	1	FITTINGS - 1.5" NPT SUCTION (Super Pump® / SuperFlo®)
2901415315	153.3	1	FITTINGS - 2" NPT SUCTION (Super Pump® / SuperFlo®)
2901415308	153.4	1	FITTINGS - 1.5" NPT SUCTION (Dura-Glas / Max-E-Glas™)
2901415318	153.4	1	FITTINGS - 2" NPT SUCTION (Dura-Glas / Max-E-Glas™)
2901415323	153.6	1	FITTINGS - 2" NPT SUCTION (Dyna-Glas™)
2901415602	156.1	1	FITTINGS - 1.5" NPT DISCHARGE (Pentair®, Hayward®, STA-RITE®)
2901415612	156.2	1	FITTINGS - 2" NPT DISCHARGE (Pentair®, Hayward®, STA-RITE®)
2901415623	156.3	1	FITTINGS - 2" NPT DISCHARGE (STA-RITE® Dyna-Glas™)
2901418212	182.1	1	RISER - FRONT (Ultra-Flow®)
2901418213	182.1	1	RISER - FRONT (WhisperFlo® / IntelliFlo® / Dyna-Glas™)
2901418214	182.1	1	RISER - FRONT (Dura-Glas / Max-E-Glas™)
2901418222	182.2	2	RISER - REAR (Ultra-Flow®)
2901418223	182.2	2	RISER - REAR (WhisperFlo® / IntelliFlo® / Dyna-Glas™)
2901418221	182.2	2	RISER - REAR (Super Pump® / SuperFlo®)
2901418224	182.2	2	RISER - REAR (Dura-Glas / Dyna-Glas™)

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READ THIS MANUAL CAREFULLY

BEFORE USING THE SPECK PUMP



DANGER: DO NOT BLOCK SUCTION

⚠ DANGER



Hazardous suction.
Can trap hair or body parts, causing severe injury or death.
Do not block suction.

⚠ DANGER




Hazardous suction.
Can trap hair or body parts, causing severe injury or death.
Do not block suction.

1. Pump suction is hazardous and can trap and drown or dismember bathers.
2. Blocking suction with body may cause severe or fatal injury.
3. Do not use or operate swimming pools, spas or hot tubs if a suction outlet cover is missing, broken or loose.
4. All suction outlets covers must be maintained. They must be replaced if cracked, broken or missing.
5. All suction outlets must have correctly installed screw-fastened covers in place.
6. The pump suction system must provide protection against the hazard of suction entrapment or hair entrapment /entanglement.
7. Provide at least two hydraulically balanced (3' apart) main drains, with covers as suction outlets for each circulating pump suction line.



WARNING: RISK OF ELECTRICAL SHOCK

⚠ WARNING



Hazardous voltage.
Can shock, burn, or cause death.
Disconnect power before working on pump or motor.

1. To avoid dangerous or fatal electrical shock, turn OFF power to motor before working on electrical connections.
2. To reduce the risk of electrical shock, unplug motor before working on pump or motor.



SAVE THESE INSTRUCTIONS!

V-Green[®] 165

VARIABLE SPEED USER MANUAL

Premium Efficiency Variable Speed Motor



A Regal Brand

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June 2013/USA

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SAFETY

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

DANGER



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION



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

NOTICE



NOTICE identifies potential equipment damage or failure conditions and alerts personnel to potentially dangerous situations.

1 Introduction

The V-Green® 165 is a premium efficiency variable speed motor that provides tremendous program flexibility in terms of motor speed and time settings. The variable speed V-Green 165 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.

⚠ WARNING

The V-Green 165 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 V-Green 165 can run at speeds ranging between 600 and 3450 RPM and is rated for 208-230 Vrms at an input frequency of 60 Hz.

2 Navigation Overview

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

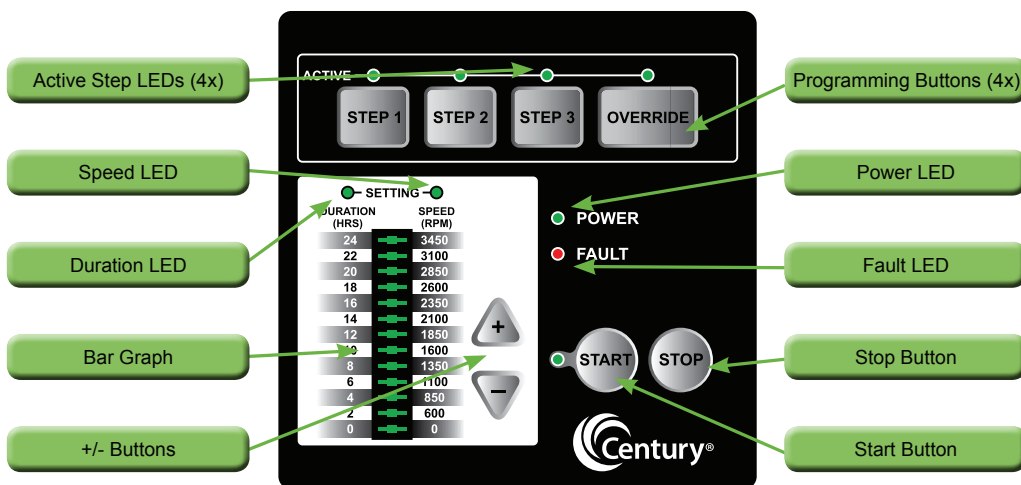


Figure 1: V-Green 165 User Interface Button Descriptions

⚠ CAUTION

If power is connected to the V-Green 165 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 V-Green 165 to operate. The START LED will illuminate after the button has been pressed indicating the V-Green 165 is capable of operating. Pressing the stop button will turn off the START LED and stop the motor if running.

V-Green 165 Features


- Simple user interface
- Digital inputs for compatibility with pool automation systems
- Motor design reduces noise emissions
- UV and rain-proof enclosure
- Freeze Protection
- Manual OVERRIDE
- Compatibility w/ V-Green 270 user interface
(sold as a separate accessory)
- High efficiency electromechanical motor and control design

Benefits of adding an optional V-Green 270 user interface with the V-Green 165 motor

- Ability to conduct field troubleshooting (i.e., view FAULT codes and real time operating parameters).
- Ability to set a pump running schedule based on a real clock setting (i.e., must input actual time which then determines pump start and stop times).
- Ability to remotely mount the V-Green 270 user interface (provides easy access of user interface depending on pump location).
- Ability to configure **prime speed** and **prime duration**.

- Ability to configure **freeze protection** temperature.
- Ability to view actual speed and power of the V-Green 165 in real time.
- Ability to adjust the V-Green 165 motor speed in 25 RPM increments (to fine tune flow for certain pool installations).
- Battery backup to store time setting.

3 Quick Start Instruction

 CAUTION
If power is connected to the V-Green 165 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.

3.1 Quick Start Guide (Using the factory default schedule)

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

Pressing the START key will start the V-Green 165 based on the factory default schedule.

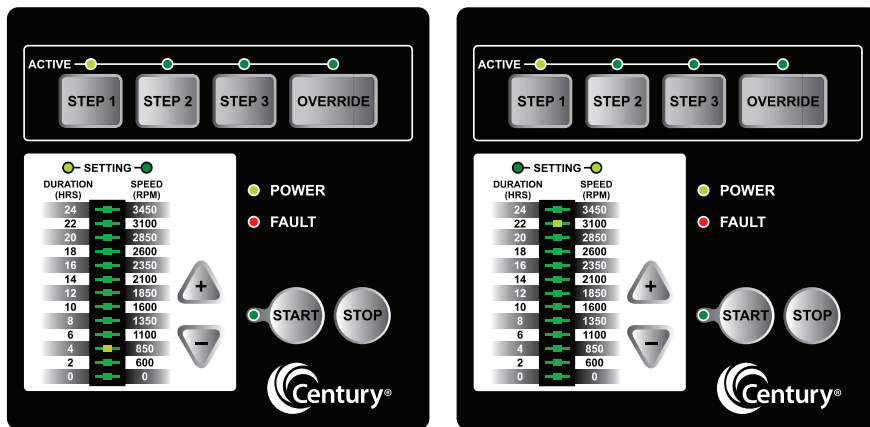
NOTE: If power is cycled to the V-Green 165 and the user does not press the STOP key, the V-Green 165 will **automatically** start and run the programmed default schedule shown in the chart above. This feature ensures that the V-Green 165 will re-start in the event of a power outage.

3.2 Quick Start Guide (User-defined custom schedule)

A V-Green 165 user can set the program DURATION and SPEED for STEP 1, STEP 2, STEP 3 & OVERRIDE keys.

NOTE: V-Green 165 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 V-Green 165 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.



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 V-Green 165 based on the programmed 24 hour schedule.
7. Pressing the STOP button will stop the V-Green 165.

NOTE: The V-Green 165 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 V-Green 165 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 V-Green 165 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

NOTICE

The V-Green 165 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 V-Green 165 at the lowest speed for the longest duration is the best strategy to minimize energy consumption. However, conditions may require running the V-Green 165 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 V-Green 165. To the right of the STEP buttons is the OVERRIDE button. This button can be used to operate the V-Green 165 at speeds outside of the normal operating schedule.

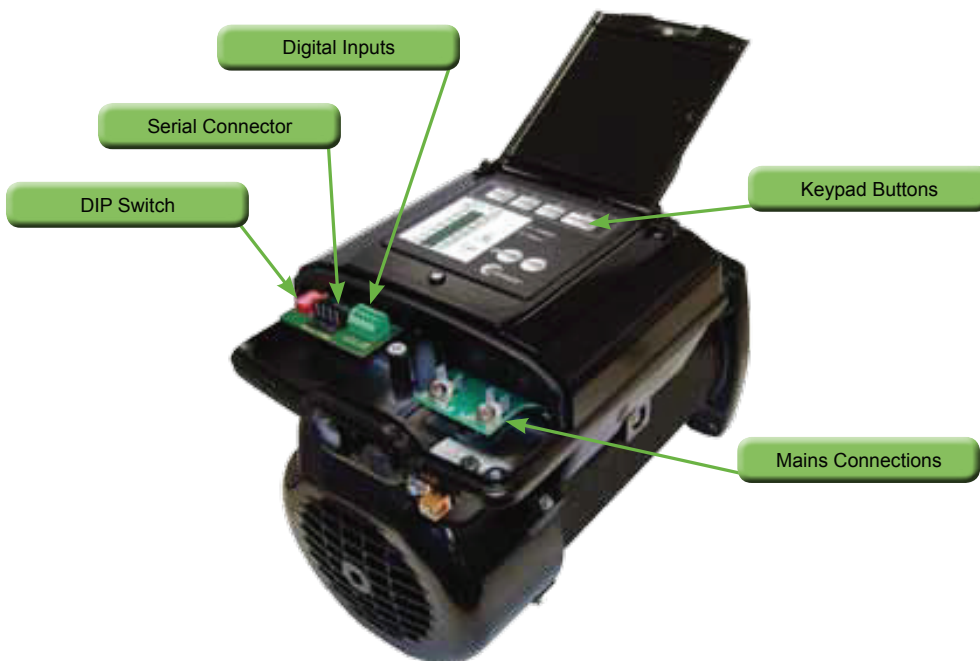


Figure 2: V-Green 165 Overview

5 Wiring

⚠ WARNING

The V-Green 165 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 V-Green 165 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 V-Green 165 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

Table 1: Mains Connection

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

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, V-Green 165, and in these installation instructions.

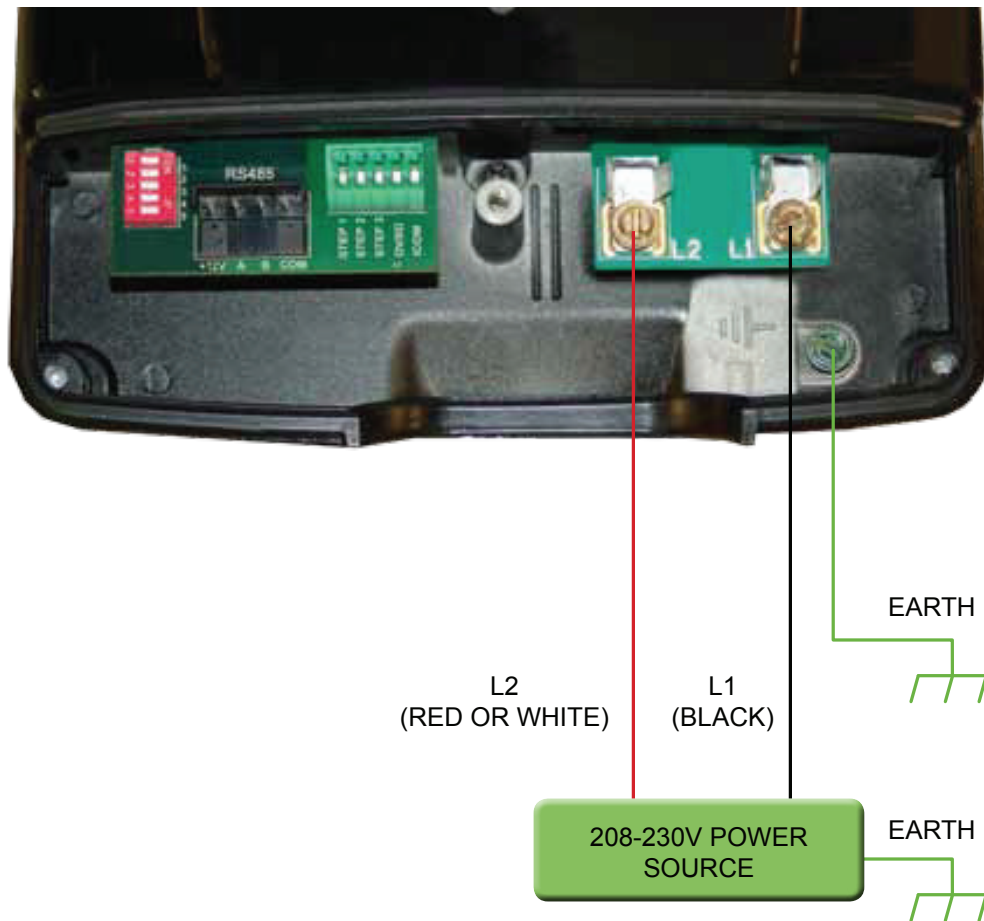


Figure 3: Mains Connection Diagram

V-Green 165 Controller

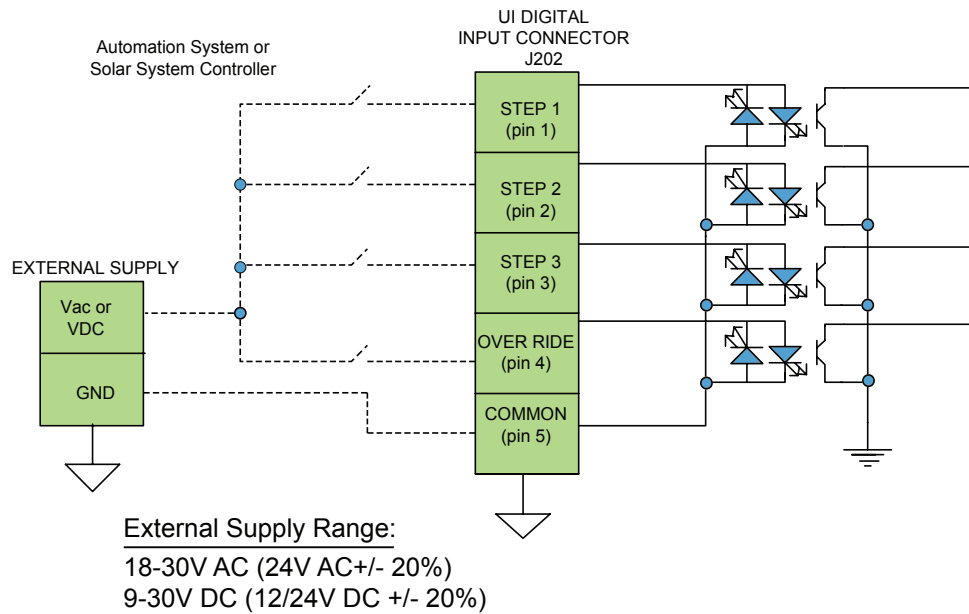


Figure 4: Wiring Diagram for Digital Inputs

⚠ 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.



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							

Figure 6: LED Functionality Table

6.2 User Interface Key Pad Overview

⚠ CAUTION

If power is connected to the V-Green 165 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.

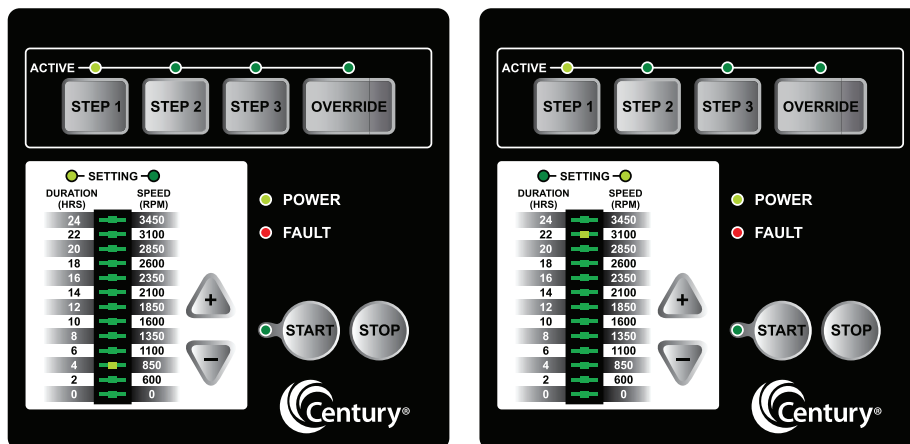
1. **STEP 1 (Set Schedule)** → DURATION and SPEED
2. **STEP 2 (Set Schedule)** → DURATION and SPEED
3. **STEP 3 (Set Schedule)** → DURATION and SPEED
4. **OVERRIDE (Settings)** → DURATION and SPEED
5. **START**
6. **STOP**

6.3 Set the Schedule

⚠ CAUTION

If power is connected to the V-Green 165 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 V-Green 165 using the keys on the User Interface. The schedule is based on a 24-hour schedule and will repeat each day of the week.



The highest speed rating for the V-Green 165 is 3450 RPM and the lowest is 600 RPM. Unless a new user-defined schedule is entered, the V-Green 165 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

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			

Setup #2			
	Step 1	Step 2	Step 3
Duration			
Speed			

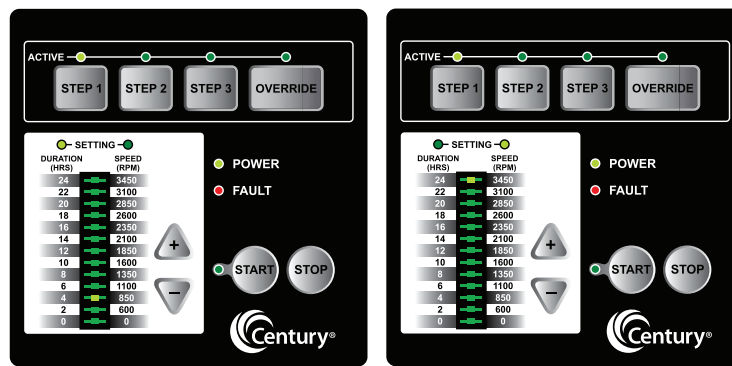
Table 4: Custom Schedule

6.4 Running V-Green 165 from Keypad

⚠ CAUTION

If power is connected to the V-Green 165 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 V-Green 165 will run the programmed 24 hour duration schedule. The START event will be stored in the controller. Should a power outage occur, the V-Green 165 will automatically re-start at STEP 1 when power is restored.
2. The V-Green 165 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 V-Green 165 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.



4. This sequence will then repeat for STEP 2 and then STEP 3 without the V-Green 165 stopping.
5. At the end of STEP 3, the V-Green 165 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 V-Green 165 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 V-Green 165 is running a 24 hour schedule, upon restoration of power the V-Green 165 will start the 24 hour schedule from STEP 1.

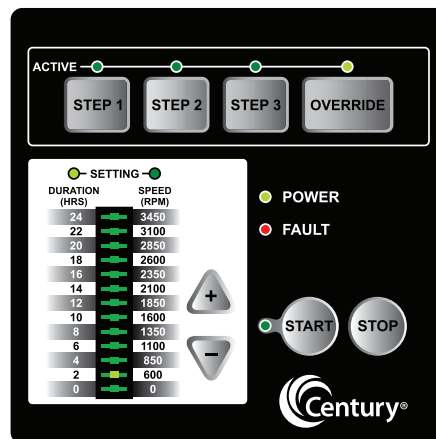
NOTE: If a digital input (provided from an external source) is detected, the V-Green 165 will start running on the STEP 1, STEP 2, STEP 3, or OVERRIDE speed corresponding to the digital input. Upon removing the digital input (provided from an external source), the V-Green 165 will stop and the user will 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 V-Green 165 will resume running the 24 hour schedule once the digital input is removed.

NOTE: Pressing STOP at any time turns the V-Green 165 OFF and clears the start time for the 24 hour schedule.

6.5 OVERRIDE

The V-Green 165 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 V-Green 165 will automatically return to the programmed schedule.

1. Pressing the OVERRIDE key while the V-Green 165 is running will cause the V-Green 165 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 OVER RIDE DURATION and SPEED. These settings can be changed while the V-Green 165 is running. These settings are stored each time the UP (+) / DOWN (-) arrows are pressed.



NOTE: When the OVERRIDE duration ends, the V-Green 165 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 V-Green 165 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

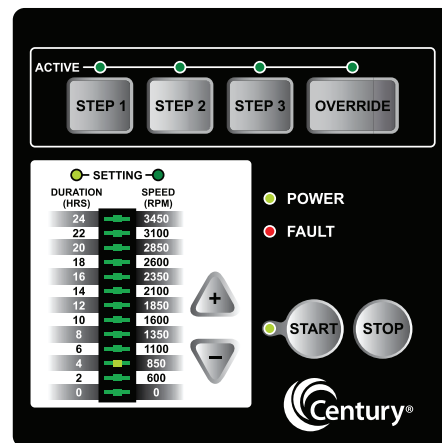
⚠ DANGER

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 V-Green 165 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 V-Green 165 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.



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 canceled 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 V-Green 165 during the period of the Schedule Advance mode.

NOTE: While the V-Green 165 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 canceled.

NOTE: While the V-Green 165 is in the Schedule Advance mode, if a user presses the STOP key, then the Schedule Advance mode is canceled.

NOTE: If power is lost while the V-Green 165 is in the Schedule Advance mode, then the 24-hour schedule will automatically start when power is restored.

6.7 Key Lockout

⚠ CAUTION

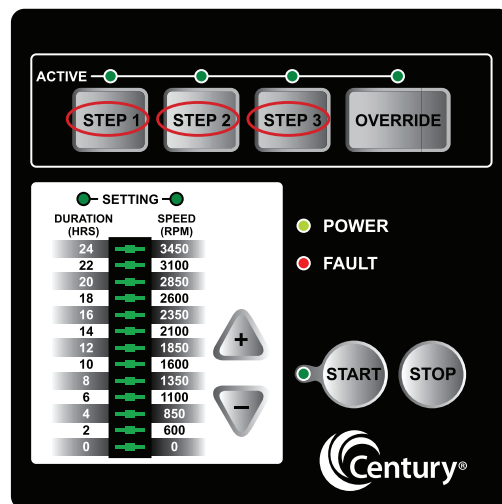
Key lockout will not prevent the motor from being stopped by pressing the STOP button. If the motor is operating in “key lockout” mode, and being controlled through a digital or serial input, the motor will only temporarily stop (4 min.) it will then restart.

The V-Green 165 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, STEP 2, and STEP 3 will illuminate temporarily indicating the keypad is unlocked.

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.



6.8 Motor Pause

The V-Green 165 user interface has a “motor pause” feature that will allow the user to temporarily stop the V-Green 165 for maintenance work without disrupting the 24 hour schedule (i.e., for backwashing the filter). If the V-Green 165 is currently running, the user can press and hold the START button for more than three (3) seconds and the V-Green 165 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 canceled.

6.9 Temporary Stop with Digital / Serial Input

 CAUTION

Temporary stop functionality only works while the V-Green 165 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 V-Green 165 has a “temporary stop” feature that will immediately stop the V-Green 165 when being controlled by a serial or digital input. The user can press the STOP button while the V-Green 165 is running and the V-Green 165 will stop and stay off for four (4) minutes. Once this time has elapsed, the V-Green 165 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 V-Green 165 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 V-Green 165 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 V-Green 165 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 V-Green 165 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 V-Green 165 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 V-Green 270 user interface (accessory sold separately) these factory default settings can be changed.

Once this eight (8) hour period has elapsed, the V-Green 165 will check the ambient temperature again. If the temperature is still below the set threshold, the V-Green 165 will run for an additional 8 hours. If the temperature is above the threshold, the V-Green 165 will automatically return to the 24-hour based schedule.

9 Control with Digital Inputs

The user can run the V-Green 165 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 V-Green 165 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 V-Green 165 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.

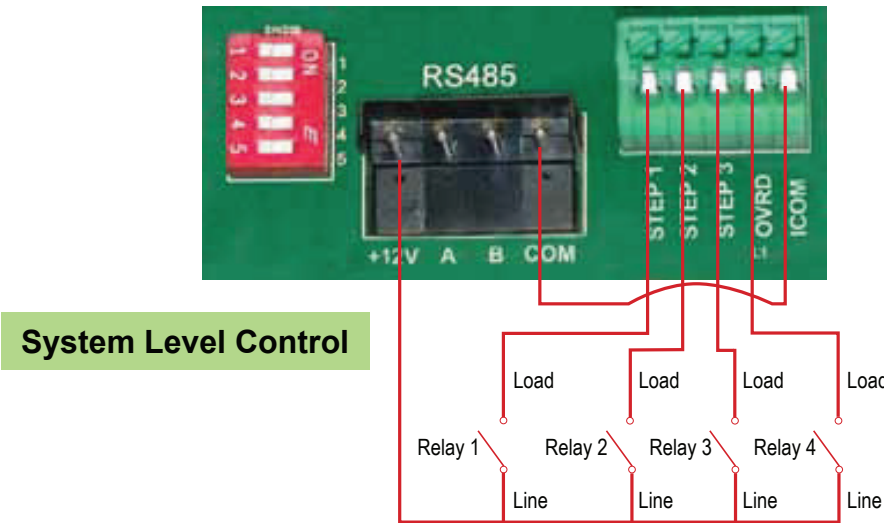
NOTE: The digital inputs have the highest priority amongst all the inputs (i.e., keypad, serial, or digital). Therefore the serial commands as well as the User Interface inputs will be ignored when a digital input is present.

NOTE: If more than one digital input (switch) is present, then the V-Green 165 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 V-Green 165 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

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 V-Green 165. 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

Table 5: DIP Switch Functions



Figure 8: DIP Switches

11 Care and Maintenance

The V-Green 165 is both reliable and robust in harsh environments. However, this product does contain electronics that are cooled by a fan mounted to the V-Green 165. In order to ensure optimum reliability of this product, it is recommended to clean the fan inlet on the back of the V-Green 165 once a month. It is also important to keep this area free of large debris such as leaves, branches, mulch, plastic bags, etc.

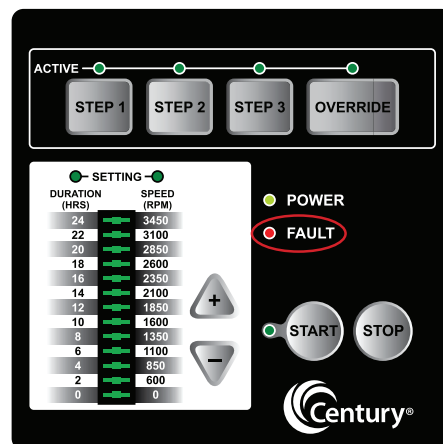
12 FAULT Status

⚠ 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 V-Green 165. If the V-Green 165 does not restart automatically following the FAULT, cycle ac power to the V-Green 165 and wait five (5) minutes. If this does not correct the situation, please contact Customer Service at 1-800-262-6484.

The V-Green 165 reads the FAULT status and provides feedback to the user via the FAULT LED. The V-Green 165 will illuminate the FAULT LED when a FAULT is present. The V-Green 165 will stop and remain OFF when the FAULT is present. Once the FAULT is cleared, if the V-Green 165 was previously running, it will automatically resume running the normal schedule.



Below is the behavior 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 V-Green 165 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



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 trouble shooting the V-Green 165, 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-Green 165. 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.

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