



## Digital Variable Speed Control, One Pump Version

The **Digital VSC Control** (1 pump version system) is a versatile control consisting of a Power Box, a Keypad with Digital Display, and temperature probe. It is designed to interface with universal AC motors up to 1.5 HP rating and is capable of controlling one pump plus one light via standard NEMA-style AC sockets.

## Electrical Specifications

**Power Input:** 117 VAC +-10% 60 HZ only 16 Amps Maximum (requires 20 AMP service connection)

**Output Jet Pump:** 16 Amps Maximum, Universal AC Pump motor only; do not use with AC induction motor pumps.

**Output Light or auxiliary:** 16 amps capable, reduced by the amount of current required by the jet pump. Therefore, if the jet pump requires 12 amps maximum, the Light outlet can supply  $16-12=4$  amps maximum. When used to control a 12VAC or 24VAC low voltage lighting system, an external step-down/isolating transformer **MUST** be used. **NEVER plug a low-voltage lighting system directly into the light output socket or the lights will be destroyed!**

**Input, Temperature Sensor:** nominal resistance 30Kohms at 25 degrees Centigrade, custom probe.

## Operation

**Power Turn-on:** With the unit connected as shown in Figure 1, the Keypad/Display will show 888 and all status indicators should be **ON** for a period of 2 seconds. This is a convenient “lamp test” function to prove all indicators are functioning. All outputs will be powered up in the “OFF” state. After two seconds, the display will revert to showing the water temperature in degrees Fahrenheit. If the temperature sensor is defective, either disconnected/open or shorted, the display will show 5n for **S**ensor failure instead of temperature.

**ON/OFF Key:** Depressing the **ON/OFF** key will activate the jet pump at the highest speed level provided there is sufficient water in the tub or a jumper is inserted into the water level sensor input. The pump will remain ON for maximum time of 20 minutes of operation, after which it will automatically shut off. If the jet pump is already ON, depressing the **ON/OFF** key again will turn the pump OFF.

When the jet pump is ON, the status indicator for PUMP will be illuminated. The digital display will alternate between the Water Temperature to the Speed Level (1-10) to the time remaining (1-20 minutes). Each display period lasts for 2 seconds. Thus assuming the water temperature is 104, the initial display will show **104** (water temperature) then **L10** (for speed level 10) then **t20** (for 20 minutes remaining) back to **104** etc.

**Speed Adjust (UP/DN) Key:** If the jet pump is OFF, depressing the **UP/DN** key has no effect. If the jet pump is ON, depressing the **UP/DN** key will change the speed on by level as follows: initially the jet pump is turned ON at L10, the highest level. If the **UP/DN** key is depressed, the level is changed to L9 and the display will show L9 for 3 seconds. If the **UP/DN** key is depressed again, the speed will lower to L8. Depressing the **UP/DN** key again will lower the speed to L7 then L6 ... down to L1, the lowest speed. If the **UP/DN** key is depressed again, the speed will increase to L2, then L3, L4...until level 10 (the highest speed) is reached again, at which time this process will be repeated.

**Massage Key:** If the jet pump is OFF, depressing the **MASSAGE** key has no effect. If the jet pump is ON, depressing the **MASSAGE** key will initiate the massage mode of the control. The speed will be under automatic control and will vary from lowest to highest speed in period manner to simulate a “massage” action of the jets. This action will continue for the remainder of the 20 minute timeout period or until cancelled by either depressing the **ON/OFF** key or the **UP/DN** key.

If the **UP/DN** key is depressed, the massage mode will be cancelled and the speed will revert to one level above or below the speed that the pump was running before the Massage mode was activated. Thus if the jet pump was running at level 8 before the Massage key was depressed, it will now be at level 7. If the **ON/OFF** key is depressed while the Massage mode is active, the jet pump will be shut OFF immediately.

**Light Key:** The **Light** key turns the light output ON and OFF. It is totally independent of the rest of the system. Hence it is not dependent upon whether the water level is sufficient for normal operation or whether the jet pump is active or not. If light output is ON, the light status indicator will be ON; if the light output is OFF, the light status indicator is OFF. There is NO automatic timeout function on this output.

## Troubleshooting Guide

**(1) Keypad is not illuminated/non operational:**

- ✓ Is the circuit breaker or power source to the system tripped?
- ✓ Is the Power Box line cord connected to a 120VAC?
- ✓ Is the keypad plugged into the Power Box?
- ✓ Is the cable going from the Keypad to the power box connected at the keypad end?

**(2) Keypad is illuminated but pump does not operate when the ON/OFF key is depressed:**

- ✓ Does the Display show alternating temperature→speed→time remaining? If true, go to (3) below
- ✓ Is the water level sensor connected to the Power Box and the tub have sufficient water level to cover the sensor probes?

If there is no water level sensor, is a shorting jumper connected to the water level sensor input.

**(3) Keypad shows that the jet pump is active, but the pump is not ON:**

- ✓ Is the jet pump connected to the correct outlet of the power box?
- ✓ Is the pump motor hot? Possibly the thermal protection has tripped, in which it will probably cool down and begin operation again.
- ✓ Measure the pump outlet socket with a voltmeter: if voltage is present, then possibly the pump is defective. Note: the pump outlet is controlled by a triac; if no load is connected and a DVM is used to measure AC voltage, please be aware that there is sufficient leakage current through the triac and associated snubber network to read almost full line voltage when the outlet is still in the OFF state; if using a DVM, insure a pump load is connected to the outlet before measuring.

**(4) Jet pump overheats and shutdowns within a few minutes of activating the MESSAGE key:**

Be sure the jet pump motor is a Universal motor; the power box cannot be used with an AC induction motor.

**(5) The light is not illuminated when the LIGHT key and status indicator are ON:**

- ✓ Is a step-down transformer connected to the LIGHT socket?
- ✓ Measure the secondary output of the transformer: is it about 14VAC for a 12 V system? If no, possibly the transformer is defective.
- ✓ Are the lights possibly burned out or not connected to the transformer?

**(6) The pump is off ; when I depress the MESSAGE key, nothing happens:**

- ✓ The Jet Pump must be ON first by depressing the ON/OFF key. The Message Key only enables or disables Message when the pump is ON.