

HELIOTROPE POOL HM-5000D SOLAR POOL HEAT CONTROLLER FOR PUMP AND VALVE DIVERter CONTROL

Installation Instructions

DESCRIPTION

The HM-5000D Helio-Matic is a combination 120 Volt or 240 Volt controller for solar pool heating. The HM-5000D turns on or off a circulation pump and/or a 24VAC flow director valve. When used with 120 Volt, up to a 3/4 HP pump can be controlled and the 240 Volt will control up to a 3 HP pump.

The HM-5000D is a temperature differential unit shipped from the factory preset at 6° ON/3° OFF. This differential system automatically measures (through ohm resistance) the temperature at the solar collector panels and in the pool suction pipe. If there is sufficient heat at the solar collector panels and the pool water temperature is below the desired temperature knob setting at the controller, the HM5000D sends a 24 VAC signal to the Solar Diverter Valve and directs water from the pool circulation to the solar collector panels on the roof. The HM5000D can also power a relay in its circuitry to operate a solar or circulation pump up to 3 HP.

High limit is adjustable from 70° to 100° and when the set temperature is reached the pumped water flow to the collectors is stopped. This adjustment is with the knob on the front panel.

The controller normally uses one 10K AS-2-10 roof sensor and one 10K IS-1.0 pool sensor. If a threaded sensor is desired in place of the IS-1.0 a 10K BP-25-1/4" threaded brass plug can be utilized in the 1/4" pipe plug located in the filtration pump's strainer housing.

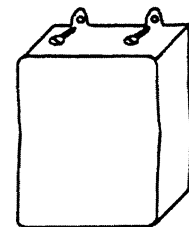
In normal installations, the solar collector panels are at an elevation higher than the pool water surface and because of this configuration there is no need for additional collector freeze protection. Should the

collector be mounted below the pool water surface, or the pump allowed to run 24 hours per day in freezing weather, there must be provision for collector freeze protection.

The HM-5000D can also be used to control a 12/24VAC, 0.8 Amp actuator valve for diverting the filtration pumped flow either to the collectors or bypassing the collectors. (This function is identical to the HM-4000D.)

CONTROLLER INSTALLATION

Mount the controller box with the two mounting tabs at the top of the box.



**SCREW INTO
WALL**

Outdoor mounting is acceptable because the controller is inside a weather-proof housing.

THE CONTROLLER MUST BE LOCATED AT LEAST FIVE OR MORE FEET FROM THE POOL.

BEFORE WIRING CAUTION

Keep the switch on the HELIO-MATIC front cover in the "OFF" position until all wiring is finished, including the sensors, sensor wiring and valve wires.

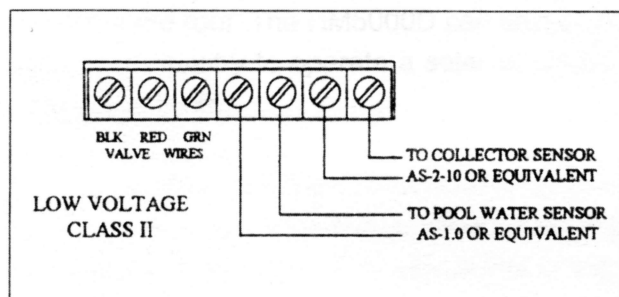
POWER WIRING

Verify whether the supply voltage is 120V or 240V. Disconnect power to the controller before wiring. Remove the cover on the High Voltage compartment of the controller by removing the two screws. The controller should be installed by a qualified electrician and conform to the National Electric Code and

in contact with the collector array.

The 10K IS-1.0 pool sensor is designed to be inserted directly into a 1-1/2" or 2" PVC pipe. Ideally, this sensor should be installed at the lowest available point in the pool plumbing area before any salt chlorination systems. Drill a 5/16" hole in the pipe (do not pre-drill a pilot hole) and insert the sensor in place. Tighten down the hose clamp to insure a water tight installation. This sensor inputs pool temperature to the controller for differential and high limit function. It should be located as close as possible to the point where water exits from the pool to supply the solar pump for accurate temperature sensing. Should a threaded sensor be desired instead of the 10K pool sensor IS-1.0 pool sensor, the 10K BP-25-10 sensor is a 1/4" brass plug, and is typically installed into the basket strainer which precedes the filtration pump.

If the installation has glazed collectors, it may be desirable to not use the 10K AS-2-10 sensor. Direct sensing of the collector water temperature can be accomplished by using the 10K SAS-10 sensor clamped to the collector outlet pipe and insulated with a covering of pipe insulation.



SENSOR ELECTRICAL HOOK-UP

Hook-up between the controller and sensors is accomplished with an 18-24 gauge two conductor hook-up wire. The sensor leads are CLASS 2 wiring and carry 4 VDC. Because the sensor wiring is exposed to the elements it is important to utilize heavy insulated wire for its mechanical protection plus UV-inhibited cable to prevent sun damage and a service call within several years.

If lightning frequently occurs in your area, it is recom-

mended to use a shielded hook-up wire with the shield grounded to the earth ground terminal. Connect the collector sensing wire to the Low Voltage terminals 6 and 7. Connect the pool sensor to terminals 4 and 5.

At the termination of all sensors, weather insulating procedures should be exercised.

THERMISTOR SENSOR TEST

TEMPERATURE vs. RESISTANCE CHART 10K Thermistor @ 25°C		
°F	°C	Ohms Resistance 10K
Open		Infinite
32	0	32,630
41	5	25,380
50	10	19,890
59	15	15,710
68	20	12,490
77	25	10,000
86	30	8,057
95	35	6,531
104	40	5,326
113	45	4,368
122	50	3,601
131	55	2,985
140	60	2,487
149	65	2,082
158	70	1,751
176	80	1,255
194	90	917
212	100	680
Short		0

All sensors manufactured by Heliotrope Pool are tested to be within 0.6°F of a reference test sensor. This means that all sensors manufactured by Heliotrope Pool are compatible with one another. If one sensor was to fail, it would be necessary to replace that failed sensor only.

The sensors have a negative temperature coefficient, which means they exhibit a very high resistance

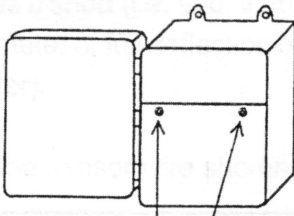
at low temperatures and a very low resistance at high temperatures. To properly perform a sensor check you will need a volt-ohmmeter set to perform resistance (ohms) measurements. Connect the volt-ohmmeter leads to the two wire leads coming from the sensor.

If the volt-ohmmeter shows an infinite reading (e.g. a "1" in the reading on a digital volt-ohmmeter or no deflection on an analog type volt-ohmmeter) this indicates an open circuit. The HM-5000D sensor should read 10,000 Ohms at 77°F.

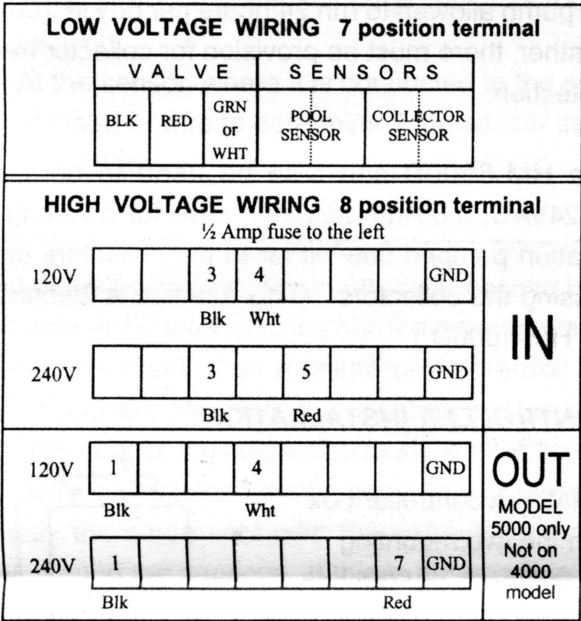
Check the following:

1. The sensor lead-in wires to the sensor for a break in the wire. This would be found around sharp metal corners or edges such as roof flashing.
2. The sensor lead-in wire where it connects to the

prevailing local codes. Depending on whether the supply is 120V or 240V, wire as shown in the illustration.



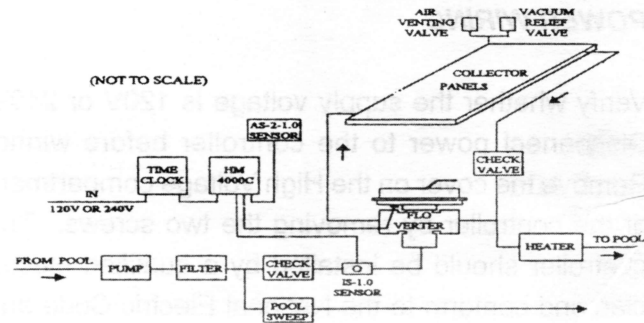
REMOVE SCREWS



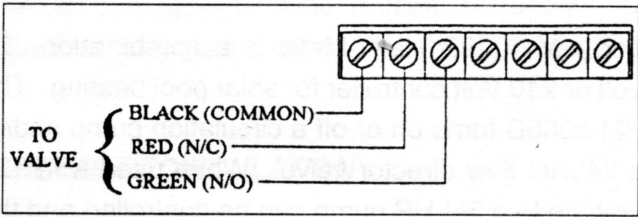
To reduce the risk of electric shock, connect the “earth ground” terminal to the grounding terminal of the electrical service or supply panel with a continuous green insulated copper wire equivalent in size to the circuit conductors supplying this equipment, but no smaller than No. 12AWG (3.3mm).

INSTALLATION OF THE FLO-VERTER VALVE
(May not be utilized in all systems)

Install Flo-Verter valve in any position except upside down in the pool filtration system as shown in the illustration below:



The valve diverter is designed with a small amount of bypass which allows the collector to drain when the pump is off or when water flow is not diverted through the solar collector panels. Install a check valve as shown in illustration. The check valve prevents water from the solar collectors panels passing backward through the filter into the pool when the pump is off.



Attach the black, red and green wires from the Actuator Valve to the corresponding black, red, and green contact position at the controller. (Note: The Flo-Verter valve will operate with a 24VAC input.)

Reversing Direction of Water Flow

Should the valve be installed backwards, or it is desired to reverse the action of the valve, the green and red wires may be reversed. This causes a 180° change in the valve position.

Other Brand Valves

When using a Jandy or Compool/Pentair valve, connect the black wire to the terminal identified black and the other two wires to the terminals identified red and green. Depending upon how the valve was installed (which port to collector) the flow can be correctly directed by using the toggle switch on the Jandy actuator, or reversing the green and red wires on the Compool/Pentair valve.

SENSOR INSTALLATION

The HM-5000D control normally uses a 10K AS-S-10 “block sensor” and an 10K IS-1.0 water sensor. The thermal performance of the 10K AS-2-10 tends to simulate the solar collectors.

Mount the 10K AS-2-10 sensor in such a position that it “sees” the same amount of sun as the collector array. It is not recommended that the 10K AS-2-10 be

sensor leads for a possible disconnection.

If the volt-ohmmeter indicates a short (i.e. a "0" in the display on a digital volt-ohmmeter or full deflection on an analog type volt-ohmmeter).

Check the following:

1. A nail or staple through the sensor wire shorting both leads.
2. Insulation that has been scraped off the sensor wires around sharp metal edges such as roof flashing.
3. At the sensor, where it is connected to the sensor lead-in wire to determine if the sensor itself is shorted.

If the volt-ohmmeter indicates a large variation in the resistance reading relative to what you believe is the true temperature referencing the Temperature versus Resistance chart, then a failure of the sensor may have occurred. However, this is not always the case. To further check the suspected faulty sensor you can compare it to another known good sensor placed in exactly the same spot with the same insulation, if any, around the sensors. If this is not possible, you can disconnect the suspected faulty sensor from the system and compare it at room temperature with a good sensor. Be sure to leave both sensors in the room together for about 30 minutes so they can reach the same temperature. If the suspect sensor shows a large variation from the good sensor, this would

confirm a faulty sensor. If not, the sensor is good and the large temperature variation experienced in the system is probably a problem in the plumbing of the system.

CHANGING TEMPERATURE DIFFERENTIALS

The factory setting is 6° ON/3° OFF. If cycling is experienced or a glazed collector is used, it is probably desirable to change the differentials to 9° ON/6° OFF.

FREEZE RECIRCULATION

If the collectors are below pool level or are plumbed so they will not drain, freeze recirculation is the only available method of freeze protection. This means that the HM-5000D must be wired to a continuous source of power and not the time clock. It is necessary to turn the pump on to prevent freezing the collectors. Turning the pump on the times when a freeze could occur is the function of the normally open freeze sensors. The industry standard sensor is the FS-4 and this sensor should be wired in parallel with the collector sensor.

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