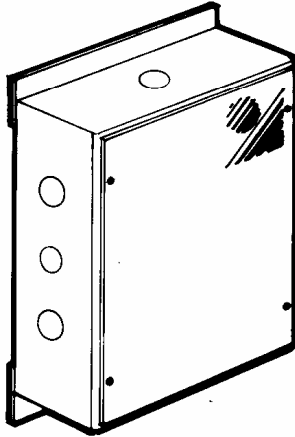


INSTALLATION

S.O.L.A.R. 1500.00.100

6-1977



SOLARONTM Controller HC0115

FOR USE WITH AU0400 &
AU0500 AIR HANDLER

CONTAINS OPERATION &
MAINTENANCE DETAILS

Applications:

1. Heating Only
2. " " w/Fan Circ.
3. Heating and Cooling
(NON HEAT PUMP)

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SOLARON CORPORATIONTM

300 GALLERIA TOWER
720 SO. COLORADO BLVD.
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ION MANUAL

LOCATING THE SOLARON CONTROL PANEL AND TRANSFORMER

Mount the control panel in a convenient location that allows easy access for electrical wiring and "summer/winter" switch operation. Generally the mechanical room is the best location. Electrical service consisting of one 115 VAC circuit is ample to power the 100 VA, 120 VAC/24VAC transformer accompanying the control panel. Separate power circuits may be needed for the AU0400 or AU0500 unit and the auxiliary heating unit (refer to local and national building codes).

Low voltage wiring is needed to connect the Solaron space thermostat to the Solaron control panel as well as between the auxiliary heating unit, damper motors and the control panel. Damper motors are low voltage.

The thermostat MUST be wired through the Solaron control panel, it CANNOT be wired direct to the auxiliary heating unit and/or Solaron air handling unit.

SOLAR SYSTEMS SENSORS

Sensors must be properly placed in the following locations before system start-up can be accomplished:

1. Tco - Sensor must be in absorber plate air channel (not in duct connection or manifold plenum).
2. Tci - Locate at junction of house return air duct and duct connecting to bottom of heat storage (for systems with by-pass of heat storage for summer water pre-heating, locate in duct to collector where "by-pass" tees in).
3. Ts - Top of rock in heat bin.
4. Tw - Locate in bottom of water storage tank (not the auxiliary water heater) near inlet of heat exchanger coil. (If using an unwired electric water heater for a storage tank, the thermostat in the tank can be used as Tw. Disconnect power leads from thermostat and power element and wire through terminals that open on temperature rise - set @ 140°F). Tw is field furnished (Honeywell L6006A1145 @ 140°F and differential set @ 10°F).

HUMIDIFIERS

Horizontally mounted type humidifiers are recommended. Locating the humidifier in a horizontal supply duct coming off of the auxiliary heating unit is ideal. Utilizing a sail-switch activated duct humidistat (similar to a Honeywell H49B) will simplify the wiring requirements of most installations.

DO NOT wire low voltage humidifiers or air cleaner relays in series with the thermostat wires (W₁ & W₂) as this can damage the Solaron controller. Sail or air pressure switches are recommended.

LOCATING THE THERMOSTAT

The Solaron multi-element thermostat should be located on an interior wall free from cold and warm drafts. Be sure adequate room air movement is present so the thermostat will provide a comfortable building temperature.

Do not locate the thermostat near lamps, heat outlets, stoves, refrigerators, television sets, etc. The heat given off by these appliances will not allow the thermostat to properly control the building temperature.

The thermostat heat anticipators should be set as follows: W_1 @ .10 amp, W_2 @ .10 amp. Cooling anticipators are non-adjustable.

SOLARON CONTROLLER AND THERMOSTAT LIST

The AU0400 and AU0500 air handlers can be used in various applications.

Application	Solaron Controller Controller	Thermostat & Sub-base	Additional Relays Needed
Heating Only	HC0115	HC0020 HC0040	(3)#SR0225 Relays 1-AU0400 Blower 1-Dom. Water Pump 1-Aux. Blower
Heating Only continuous fan option	HC0115	HC0020 HC0041	(3)#SR0225 Relays Same as Above *(1)Relay - Solaron
Heating/cooling continuous fan option	HC0115	HC0022 HC0041	(3)#SR0225 Relays Same as Above *(1)Relay - Solaron

*Insert optional Solaron relay into fourth base of HC0115 (Solaron relay part # is SR0157)

THERMISTOR TEMPERATURE/OHM RESISTANCE CHART

TEMP.		RESISTANCE OHMS	TEMP.		RESISTANCE OHMS
C ⁰	F ⁰		C ⁰	F ⁰	
0	32	105,310	90	194	2,312
5	41	80,725	95	203	1,962
10	50	62,354	100	212	1,671
15	59	48,519	105	221	1,428
20	68	38,022	110	230	1,225
25	77	30,000	115	239	1,054
30	86	23,827	120	248	910.0
35	95	19,044	125	257	787.9
40	104	15,314	130	266	684.3
45	113	12,388	135	275	595.9
50	122	10,077	140	284	520.3
55	131	8,242	145	293	455.4
60	140	6,777	150	302	399.6
65	149	5,600			
70	158	4,651			
75	167	3,880			
80	176	3,251			
85	185	2,736			

The above chart can be used by the Solaron service technician to determine temperatures at Tco and Tci sensor locations.

To measure the resistance of a thermistor sensor disconnect both of its wires from the control panel (Tco & Com. or Tci & Com.). Measure the resistance using a good, accurate OHM meter. Once the resistance has been read it can easily be located on the above chart as well as the corresponding temperature to the left of the resistance.

The temperature difference between Tci and Tco must be 40⁰F (+7⁰F) or greater to energize the "collector" relay. Should Tci & Tco leads be "crossed" the system will not operate under sunny conditions. Reversing the Tci & Tco leads will correct the problem. System will cease to collect solar energy when the differential drops to 25⁰F (+5⁰F) or less.

SOLARON CONTROL PANEL HCO115
WITH #HCO020 THERMOSTAT AND HCO040 SUB-BASE
- SEQUENCE OF OPERATION -

- I. SOLAR ENERGY AVAILABLE: When 40°F ($\pm 7^{\circ}\text{F}$) differential is achieved between sensors T_{co} (in collector) and T_{ci} (in return air duct - see specific plans), the following events take place:
- A. Storing Heat - Room thermostat not calling for heat.
 1. Differential thermostat in Solaron controller will activate "COLL" (collector) relay.
 - a. MD1 (motorized damper) - will be energized and powered open to allow air to flow to the inlet of the solar air handler blower (BWR) which is energized at this time.
 - b. HWP (hot water pump) is also energized at this time if the T_w sensor (aquastat on water storage tank) is not satisfied (i.e. sensor is less than 140°F).
 - c. MD2 (motorized damper) - will be energized and powered closed to prevent air from flowing to the auxiliary unit.
 - B. First Stage Heating is called for by room thermostat - W_1 & R_H .
 1. "H1" (first stage - solar heating) relay is energized.
 - a. "G" and "R" (fan-aux. furnace) are energized, bringing on the auxiliary blower.
 - b. MD2 opens as power through N.C. contacts in relay "HI" are interrupted.
 - c. Relay contacts close circuit to T_s sensor which is still an open circuit via the "COLL" relay contacts position.
 - C. Second Stage Heating is called for by room T-stat. First stage is still "made".
 1. "H2" (second stage - auxiliary heat) relay is energized completing circuit from "R" to "W" of auxiliary unit, bringing on back-up heat (gas, electricity, etc.)
- II. SOLAR ENERGY NOT AVAILABLE. When differential between T_{co} and T_{ci} drops to 25°F ($\pm 5^{\circ}\text{F}$) or less, the following takes place:
- A. "COLL" Relay - de-energized
 1. HWP de-energized-pump off.
 2. BWR de-energized-solar blower off.
 3. MD1 de-energized & closed.
 4. MD2 de-energized & open.
 - B. Circuit completed to T_s sensor through "H1" relay contacts (when "H1" relay is energized).

If T_s sensor is above 90°F set point, system will heat space from heat storage unit. If T_s sensor is below 90°F set point, the circuit will be completed to "H2" relay and bring on the auxiliary heating unit without the need for the second stage of the thermostat to make.

HEATING ONLY
W/FAN OPERATION

SOLARON CONTROL PANEL HC0115
WITH #HCO020 THERMOSTAT AND HCO041 SUB-BASE

HEATING AND STORAGE SEQUENCE
SAME AS "HEATING ONLY" CONTROL

FAN OPERATION

Solaron Relay #SR0157 must be installed in HC0115 Control Panel (#4 "FAN" relay socket) for this application.

I. Sub-base switch modes.

A. Fan - "on & auto"

1. "Auto" position will permit auxiliary heating unit blower to operate only when heating is required.
2. "On" position will allow the auxiliary heating unit blower to run constantly and the MD3 (by-pass) damper to open full. The solar heat may be stored in this manner while the auxiliary system fan circulates air when the "FAN" relay in the controller is activated.

The following circuits are completed.

- a. MD2 is powered closed to allow solar heat to be collected in the heat storage bin or by-passed directly to the inlet of the collectors when heating water during "summer" operation.
 - b. The auxiliary fan is turned on since "R" circuit is completed to the "G" terminal of the auxiliary unit, energizing the auxiliary fan relay mounted in that unit.
 - c. MD3 (by-pass damper) is still in an "open" position since it is not powered at this time.
3. When the space heating thermostat calls for heat and the sub-base is set in "Fan-on" position, the following will occur:
 - a. MD3 will be powered closed (closing by-pass to force air through solar loop).
 - b. MD2 will be allowed to open.
 - c. Fan in auxiliary furnace will continue to operate.

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HEATING AND COOLING
(NOT HEAT PUMP)

SOLARON CONTROL PANEL HC0115
WITH HCO022 THERMOSTAT AND HCO041 SUB-BASE

Additional Solaron relay #SR0157 is required in HC0115 control panel (#4 "FAN" relay socket).

Heating and Storing modes same as with "Heating Only" control.

I. COOLING MODE

Thermostat calling for cooling - sub-base system switch is on "auto" or "cool" and set point of T-stat is below space temperature.

- A. 24 volt power is supplied to the thermostat and sub-base from the HC0115 controller.
1. "R" (sub-base) has power - when thermostat contacts are "made" current flows to "Y" and "G" terminals of the sub-base.
 2. Current flows to the "compressor relay" mounted in the condensing unit and starts the cooling cycle.
 3. Current will also flow to the auxiliary unit "fan relay" via the "FAN" relay in the HC0115 controller.
 4. Power to MD2 closes damper. MD3 remains unpowered (full open).

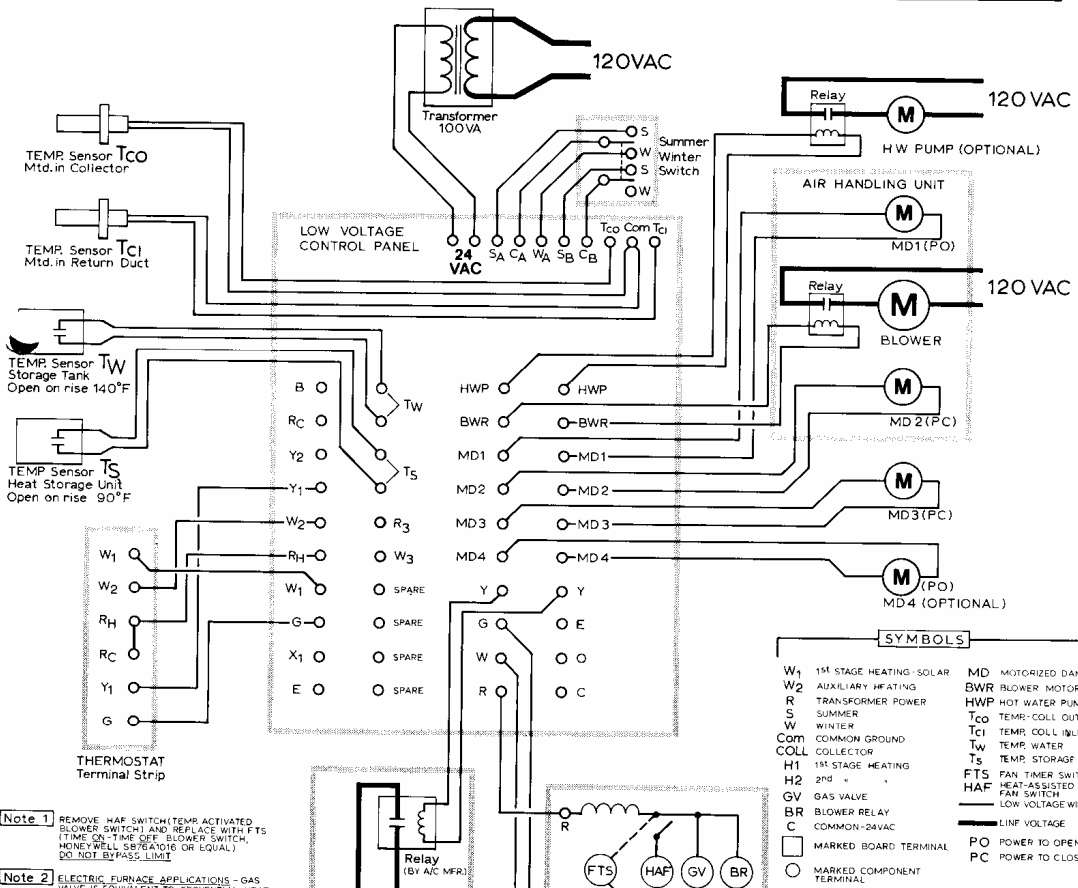
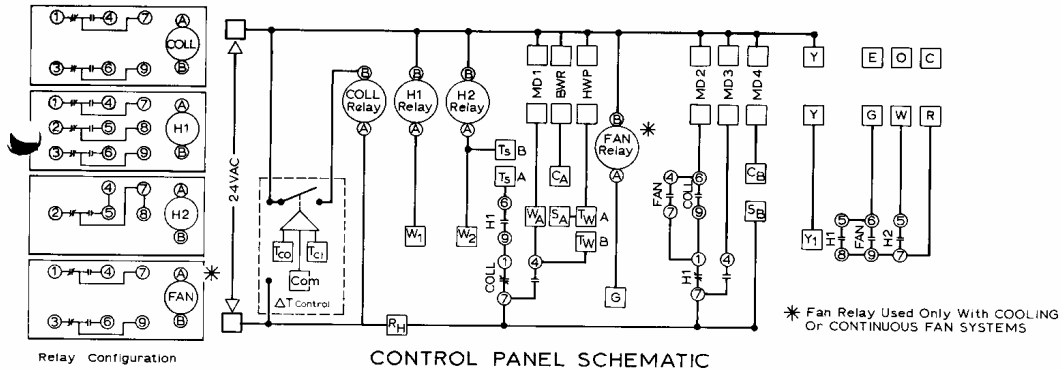
DOMESTIC WATER
HEATING

Switch "Winter" Position

Domestic water will be preheated anytime the system is storing heat or heating from collector.

Switch "Summer" Position

Domestic water will be preheated whenever enough solar energy is available to activate the system. When the stored water temperature reaches the set point of Tw sensor (about 140°F) the system will shut-down until the stored water temperature drops about 10°F.



Note 1 REMOVE HAF SWITCH (TEMP. ACTIVATED BLOWER SWITCH) AND REPLACE WITH FTS (TIME ON-TIME OFF, BLOWER SWITCH, HONEYWELL S874016 OR EQUAL). DO NOT BYPASS LIMIT.

Note 2 ELECTRIC FURNACE APPLICATIONS - GAS VALVE IS EQUIVALENT TO SEQUENTIAL HEAT RELAY. FTS NOT REQUIRED.

NOTE
Do Not Interface HUMIDIFIERS and/or ELECTRONIC AIR FILTERS With This PANEL. Consult SOLARON Representative.

SOLARON™
HEATING CONTROL UNIT
HC 0115
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