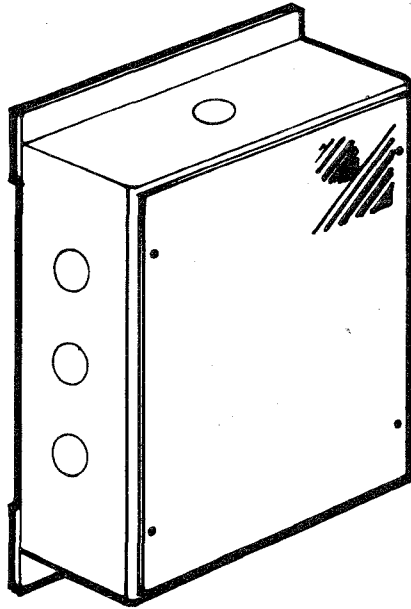


INSTALLATION

S.O.L.A.R. 1500.00.155

6-1977



SOLARONTM
Controller
HC0116

FOR USE WITH AU0400 &
AU0500 AIR HANDLER

CONTAINS OPERATION &
MAINTENANCE DETAILS

Applications:

HEAT PUMP

SolaronTM Corporation reserves the right to make changes at any time, without notice, in materials, equipment, specifications, prices, models and design criteria, and to discontinue models.



ION MANUAL

SOLARON CORPORATIONTM

300 GALLERIA TOWER
720 SO. COLORADO BLVD.
DENVER, CO. 80222 (303) 759-0101

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

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

Application	Solaron Controller Controller	Thermostat & Sub-base	Additional Relays Needed
Heat pump reversing valve energized for <u>heating</u>	HC0116	HC0022 HC0043	(2)#SR0225 Relays 1-AU0400 Blower 1-Dom. Water Pump
Heat pump reversing valve energized for <u>cooling</u>	HC0116	HC0023 HC0043	(2)#SR0225 Relays 1-AU0400 Blower 1-Dom. Water Pump

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.

HEAT PUMP
ENERGIZE F/HEATING OR COOLING

SOLARON CONTROL PANEL HC0116
WITH HC0022 OR HC0023 THERMOSTAT AND HC004 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 the same 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. tank is less than 140°F).
 - c. MD2 (motorized damper) will be energized and powered closed to prevent air from flowing to the auxiliary heating unit.
 - B. First Stage Heating is called for by room thermostat - W_1 & R_H and sub-base system switch is set on "Auto" or "Heat".
 1. "H1" (first stage solar heating) relay is energized.
 - a. "G" and "R" (fan auxiliary furnace) are energized, bringing on the heat pump indoor fan.
 - b. MD3 circuit is energized, closing the damper from its fully open position to its partially open or fully closed position (field balancing required).
 - c. MD2 opens as power through N.C. contacts in relay "HI" are interrupted.
 - d. Relay contacts close circuit to T_s sensor which is still in 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". If solar heat is available (i.e. "COLL" relay energized) when "H2" relay is energized, solar system will store heat while heat pump provides space heat.
 1. "H2" (second stage auxiliary heat) relay is energized, completing the following circuits:

- a. MD2 is powered closed.
 - b. MD3 is unpowered - opens full.
 - c. "R_C" circuit is completed to "Y" bringing on compressor in heat pump.
 - d. "R_C" circuit to "G" is still made keeping on auxiliary indoor unit blower.
 - e. "R_C" circuit to "R3" is completed. No additional auxiliary relays are energized at this time.
- D. Third Stage Heating is called for by second room T-stat (or outdoor thermostat). "R3" circuit to "W3" is completed, bringing on resistance electric heating elements in the indoor auxiliary unit ("R" to "W₁" circuit and "R" to W₂ circuit in HC0116 are "made").
- E. "Emergency Heat" (to be used only if directed to do so by your service repairman, in the unlikely event of a heat pump malfunction). When the sub-base switch is put in this position the "Emergency Heat" relay will be energized.

The "EA" relay will complete the circuit between "R" and "E" allowing the indoor auxiliary unit to bring on the electric resistance heat when there is a call for heat from the heat pump (H2 energized).

II. SOLAR ENERGY NOT AVAILABLE. When differential between T_{co} and T_{ci} drops to 25^oF (-5^oF) 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 and closed.
 - 4. MD2 de-energized and open.
- B. Circuit completed to Ts sensor if "H1" relay is still energized. If Ts sensor is above 90^oF set point, system will heat space from heat storage unit. If Ts sensor is below 90^oF set point circuit will be completed to "H2" relay and bring on the auxiliary heating unit without the need for the second stage of the T-stat to make.

III. Sub-base Switch Modes.

- A. Fan - "On-Auto".
 - 1. "Auto" position will permit auxiliary indoor unit fan to cycle on and off to meet the heating demands of the system.

2. "On" position will allow the auxiliary indoor unit fan to run constantly and allow MD3 (by-pass) damper to open fully, except when first stage heating is required.

B. Thermostat calling for Cooling (Summer Operation) System switch on "Auto" or "Cool".

**1. First stage cooling:

- a. "R_C" circuit to "Y₁" is "made", on heating/cooling thermostat energizing reversing valve in outdoor unit (for units with reversing valve energized for cooling).
- b. "R_C" to "G" made; "R" to "G" made in HC0116 panel, brings on heat pump indoor unit fan.

2. Second stage cooling.

"R" to "Y" contacts close. Compressor circuit is energized to provide cooling.

NOTES

- * Heat Pump Systems with reversing valve energized for heating can generally be wired as follows:

HC0116 Terminal Strip

Y
W
O

Heat Pump Terminal Strip Equivalent

W₁
W₂
Y

- **Heat pumps where the reversing valve is not energized for cooling use only one stage of cooling.

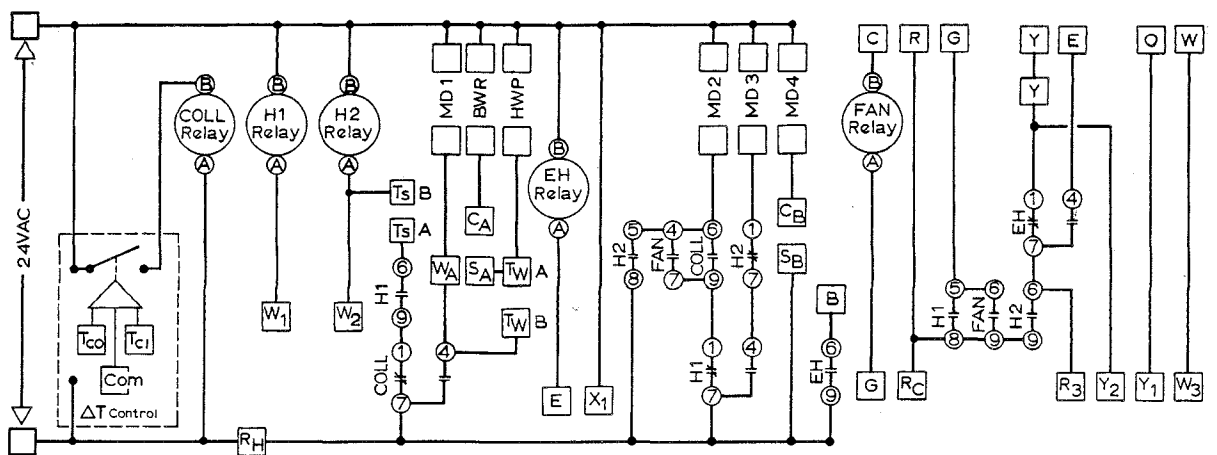
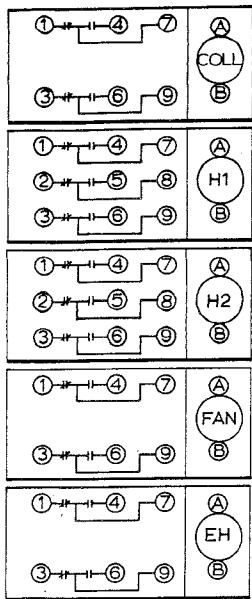
DOMESTIC WATER
HEATING

Switch "Winter" Position

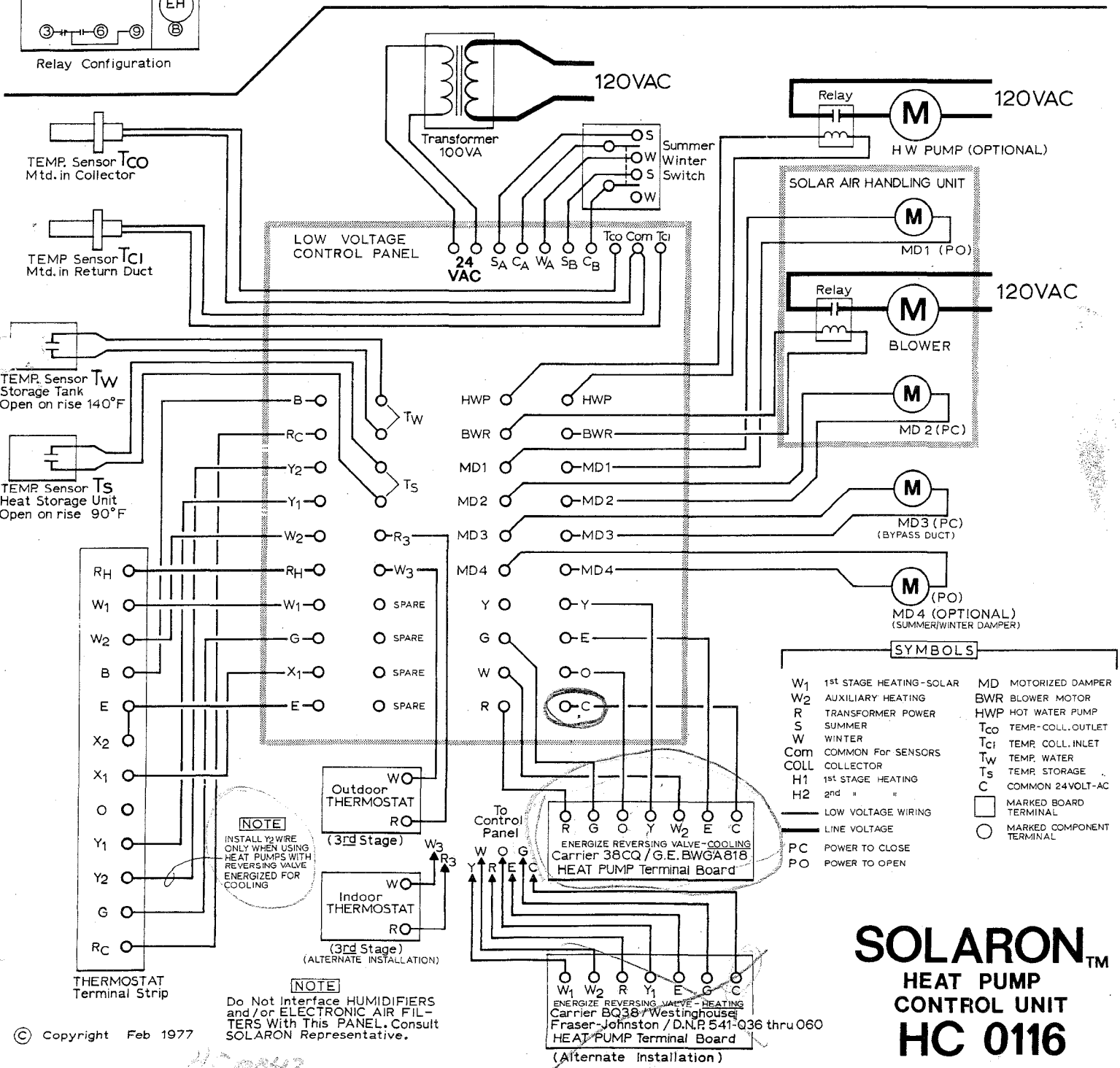
Domestic water will be preheated anytime the system is storing heat or heating from collector.

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 T_w sensor (about 140°F) the system will shut-down until the stored water temperature drops about 10°F.



CONTROL PANEL SCHEMATIC



SOLARON™
HEAT PUMP
CONTROL UNIT
HC 0116

11C 0043
 11C 0022

GENERAL OPERATING PROCEDURE
FOR THE SYSTEM OWNER

SOLARON AU0400 AND AU0500 AIR HANDLERS

By simply adjusting the wall mounted thermostat you will be able to maintain a comfortably living or working environment.

By setting the switches located directly under the thermostat, and the sliding levers on top, you can select the type of operation you desire.

For winter heating set the top lever at the desired temperature that you wish to maintain. The thermostat will automatically operate the solar portion of your heating system as well as the auxiliary heating unit if conditions warrant its operation. Please do not "jiggle" the levers.

Should your space conditioning system feature cooling as well as heating, you merely move the switch underneath the thermostat to any desired position ("System Switch - Off - Heat - Auto - Cool). Locating the switch in the "Auto" position will permit the thermostat to automatically place the system in a heating or cooling mode of operation without further adjustment.

Space conditioning systems incorporating a heat pump heating and cooling auxiliary unit will have a thermostat switch position marked "Emerg. Heat". The only function of this switch is to provide emergency electric heat should the heat pump malfunction during a period of time when a serviceman is not readily available.

Nominal maintenance is required with this system. Please refer to "Maintenance Instructions" provided in the Installation Manual.

Please call your qualified Soloron serviceman should problems develop.

Installing Soloron Solar System Contractor

Name: _____

Address: _____

Phone: _____

The Soloron controller requires that its "Summer-Winter" switch be placed in the appropriate season position. When switching seasons it may be necessary to move some system dampers. Please have your installing contractor indicate these dampers to you.

Maintenance Instruction

The AU0400 and AU0500 require minimal upkeep for economical and long lasting operation.

Blower Type 1 - Permanently sealed bearings - no oil required.

Motor Type 2 - Blower Motor - Oil twice a year (#20 S.A.E. non-detergent oil).

Blower bearings - Permanently sealed - no oiling required.

V-Belt - Check wear and tension, replace if necessary.

Damper Motors - Oil with #10 S.A.E. non-detergent oil (similar to #465 Anderol or Goodlight #10 oil.) Twice a year.

Water Pump - The Grundfos circulator pump requires no oiling as it is water lubricated during normal operation.

DO NOT RUN PUMP DRY