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# **INSTALLATION AND OPERATION**

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**FOR: RAH–SAU Series**

**VS.7.14**



1. **Equipment provided:** Locate all equipment provided with your order. The following equipment may be provided – make sure to look at your packing slips and purchase orders to determine exactly what is included in your system.

- a. Generator Control Panel
- b. Reverse Osmosis system including 4 gal. storage tank (if applicable)
- c. Governing humidity sensor
- d. Installation and Maintenance Manual

2. **Humidifier location:** Location of the humidifier is the preference of the End User or Installer. The following rules should be followed:

- A. Place the Control Panel in a place where the outlet fog will not impinge on any surfaces. Make sure to verify the air patterns in the room to preclude any adverse flows that would cause the fog to impinge upon any walls, the control cabinet or other surfaces.
- B. If the unit is feeding a test chamber or room then try and keep the control cabinet as close as possible to the dispersion point of the fog and no greater than 10' ft. if possible. The longer the run of discharge tubing the more your losses of fog will be. (Consult with the Factory if this is a problem)

## **INSTALLATION:**

### **I) Control Panel Location and Piping:**

- A. As stated above locate the Control Panel within 10' ft of equivalent piping distance from the dispersion point.
- B. Make sure the Control Panel is installed LEVEL! VERY IMPORTANT!
- C. When attaching tubing to the inlet and outlet stubs on the Control Panel make sure they are water tight.
- D. Sealant can be used on the stubs if desired for complete seal. But not adhesive because these tubes will need to be loosened during maintenance.

**CAUTION:** When piping try to avoid creating water “traps” or low points in the piping. If you cannot avoid doing so then be sure to plumb a mini-drain from such trap locations. (see Fig. 1 )



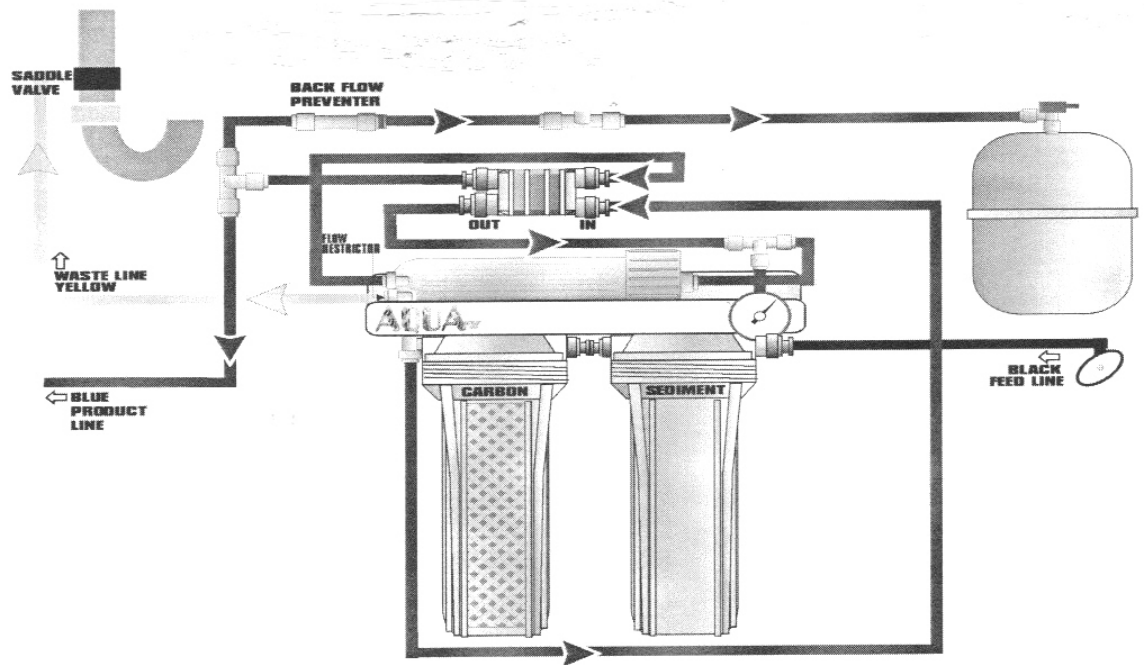
E. Pipe the drain line from the Control Panel to an appropriate drain location. Again be sure not to trap water. If necessary employ a condensate pump/drain to elevate the drain water and evacuate it during drain cycles.

## II) RO System Location and Piping:

- A. Now install the Reverse Osmosis (RO) Water system. These systems are wall mountable with simply two screws and can be hung as self supporting. Follow the instructions outlined below for connecting the colored tubes to their respective connections. All connections are simple quick connects. It is recommended that a shut off valve be placed in line after tapping the domestic water line for the RO System supply.
- 1) Locate and connect the domestic water supply side of the equipment. This will be the right side as you face the system. The supply side will consist of Black ¼" tubing.
  - 2) Locate the Yellow drain line, and place in an appropriate area for drainage. **NOTE: DRAIN MUST BE OPERABLE! EVEN IF THE HUMIDIFICATION SEASON IS MONTHS AWAY. IF PIPED TO A CONDENSATE PUMP – IT MUST BE ON LINE!**
  - 3) Locate the blue product water line that will provide RO water to the humidifiers. Utilize a "T" connector (provided and taped to the RO system metal frame) to hook up the product water (blue line) to the storage tank. Locate the 2.5 gallon storage/bladder tank in close proximity to the RO System.
  - 4) Make sure to open the valve at the top of the storage tank.
  - 5) Once installed, allow the system to run for approximately 15 minutes to flush completely. Make sure there are no leaks, parts can come loose in shipping. Hand tightening may be necessary.
  - 6) The RO System will run until all the humidifier supply lines and storage tank are filled and charged to the pressure of the building. This may take several hours to happen.
  - 7) **PLEASE NOTE: 35 PSI MINIMUM REQUIRED ON INCOMING WATER SUPPLY TO THE RO SYSTEM.** (Consult with the Factory if this is a problem)
- B. Pipe supply piping from the RO System to the fitting on the side of the Control Panel/Generator or STS Box labeled **"water in"**.
- C. Open the inline water valve off of the building domestic water supply to begin the filling of water to the RO System. You should notice water immediately filling the clear water filter housings on the RO System.
- D. Check for leaks. As stated above The RO System will run until all the humidifier supply lines and storage tank are filled and charged to the pressure of the building. This may take several hours to happen. Again, make sure that the drain is working – if the drain line is fed to a condensate pump the pump **MUST BE OPERABLE!** The RO System has an automatic shut off valve (ASO) that



is completely mechanical and will only open and pass water to drain when the pressures are not equalized between the domestic water supply and the humidifier supply lines. If there are any questions or issues please contact your Factory Representative.



### III) Accessories:

- A. If the system was provided with a controlling humidity sensor then install it and wire it from the Generator panel at the appropriately labeled locations on the terminals. Refer to the Wiring Diagram provided with your unit for proper landing locations and line sizes. Shielded control wire is recommended but not required.
- B. Do the same as the above with both the High Limit humidistat and the Air Flow switch if provided. Terminal locations are again labeled in the Wiring Diagram provided with your Unit. **CAUTION:** locate AFS before any zone dampers.
- C. If a BAS signal is being provided then connect it to the proper terminal locations in the Generator as labeled in the Wiring Diagram provided with the Unit. In this case a separate 24VAC signal is required to turn on the humidifier.

## IV) Start Up Procedure:

### A. Verify Piping connections:

1. double check the inlet and outlet water connections to the system – either at the generator panel or at the STS box. Connections should be tight.
2. open up any shut off valves up stream to the water inlet and make sure that, with the water charged, there are no leaks while the System is off.
3. now check the fogging inlet and outlet connections from the UPC tank (these are typically 3” or 2” connections). Make sure that the hose couplings are tightened.
4. evaluate the installing contractor’s piping from the fogging outlet connection to the DTA and make sure it isn’t excessively long (in excess of 10’) and that no ‘traps’ have been created in the piping where condensate can accumulate without a drain. (please note – typical steam piping practices should be utilized when piping a fogging supply line; i.e. don’t create traps and do use the manufacturers recommended pipe size)
5. if a vertical header DTA was used make sure the drain connection at the bottom of the header has been connected to a drain.

### B. Turning the System On:

1. go to the control panel and make sure the panel on/off switch is off.
2. open up the control panel and make sure the circuit breaker (CB) is off – if CB is showing green then the CB is in the ‘off’ position. If it is showing ‘red’ it is in the ‘on’ position and power will pass through the CB.
3. now remove the fuse on the 48VAC transformer and hold on to it or place it nearby.
4. verify that the 120V line to the panel is connected and live.
5. verify that the Air Flow switch is installed and wired appropriately to the proper terminals in the control panel (see wiring diagram that came with the panel and/or was submitted for that job)
6. verify that the Hi-Limit switch is installed and has been wired back to the proper terminals in the control panel (see wiring diagram that came with the panel and/or was submitted for that job)
7. verify that the controlling humidity sensor (if supplied by GAS) has been installed and has been wired back to the proper terminals in the control panel (see wiring diagram that came with the panel and/or was submitted for that job)
8. verify that the AC System to which the humidifier is connected to is on and running. Make sure it is running at the expected speed and volume as scheduled in the Submittals and on the Humidifier Schedule. If the volume (CFM) is more than 20% different than what was planned for during the design and sizing of the humidifier please

call the Factory. Also make sure that the Cooling Cycle/Coil is off and not operating when the humidifier is on. Remember – the humidifier will be running in the winter time/heating season so in most cases the cooling coil would not be on. For some applications and facilities there are year around cooling loads – if this is the case then care must be taken to turn off the cooling coil or control it differently than normal when integrating a humidifier into the System.

9. Take the wet switch safety and place it temporarily off the floor of the Panel or STS Box. There should be enough of a tether on the wire harness to allow you to hang it outside the panel/STS box or to hang it at a higher position temporarily. Some models now come with a ¼” thick small section of plexiglass as a permanent resting plate for the wet switch. If this is present then none of the above is required and the Wet Switch can remain in it’s normal position.
10. now turn the CB into the ‘on’ position.
11. now turn on the panel door on/off switch. It is a lighted switch so it should light up when in the ‘on’ position.
12. with the panel turned on, if there is a controller provided with the system it should become active and show figures on it’s display. The figures should correspond to both the actual humidity level and the target set point humidity level. Make sure their respective readings make sense and seem accurate for the time of year you are conducting this start up. For more details and specifics on the Controller go to the section in this Manual titled Controller.
13. Assuming you have relevant readings on the controller raise the Set Point humidity level to above what the actual humidity level is reading. This is especially important when starting up the System during warmer or summer time conditions. For example – if the controller is reading 58%Rh in the target space and your humidity winter time/heating season target is 35%Rh then the Controller will not energize the System to produce fog because the actual space relative humidity is 23 points above target. In this scenario you must adjust the set point to an artificially high set point in order for the controller to energize system.
14. Once the controller is in a ‘call for humidification’ mode and the target humidity set point is higher than the actual humidity level then the system should begin preparing to humidify.
15. Verify that water has begun to flow into the UPC tank. You should have heard the solenoid valves energize. You can also check by opening up the top latches of the UPC tank if it is a side inlet and outlet model type.
16. Verify that the Wet Switch is showing a ‘green’ lite.
17. Verify that there are no leaks in the tubing within the Panel or STS box as the water fills. (tubing may have gotten loosened during shipping or installation – all Systems are live tested before they ship from the Factory)

18. Depending on what kind of water pressure is available in the Facility, the System should take about 3 – 7 minutes to fill the tank to the proper level for fog generation. When it does reach the proper level the green panel lite labeled 'Fog On' will lite up.
19. When the green 'Fog On' lite come on – turn off the System at both the On/Off Switch on the panel door and at the CB. Now re-insert the fuse into it's holder on the 48VAC transformer. Go ahead and turn on the CB and On/Off switch on the Panel Door.
20. You should now hear, when standing very close to the UPC Tank, the System operating. It should sound like water bubbling within the tank. If this is the case then you are generating fog and the system is operating properly.
21. Re-check the Panel or STS Box for any leaks – there should be none.
22. Now go to an air diffuser on the AC System being humidified and take a humidity reading. It should read several points above what the space RH is.
23. Now several additional tests need to be done prior to completion of the Start Up.
  - (a) Have the AC System turned off and verify that the Humidifier turns off as well as air flow stops.
  - (b) With the AC System back on, if possible, locate the HiLimit switch and lower its setting to as low as it can go. The switch should open and cause the humidifier to shut down. Verify that this is the case. Then raise it back up to 75%Rh setting. The System should come back on.
  - (c) When the System is turned off the water from the UPC tank should slowly drain out of the tank. Verify that this is indeed happening with the System off.
  - (d) If an artificially higher target humidity set point was used for the controller then lower the target humidity set point back to it's normal setting and verify that the humidifier de-energizes appropriately.
  - (e) When the system is off and draining and has been doing so for several minutes, verify that there no continuity between terminal 15 and 10. (for earlier models you can measure this right at the coil connections on Relay 3). If there is – wait awhile longer before measuring the continuity again. When the tank has largely emptied then 15 and 10 should have no continuity. If there is still continuity call the Factory and do NOT turn the system on again.
24. Allow the System to run for a while. Anywhere from 30 minutes to 1.5 hours when starting it up. Or if it is during the heating season and there is currently a need for humidification then leave the system on.
25. Finally, make sure the Wet Switch is back in it's location and showing a 'green' lite.





## V) Sequence of Operation:

**A. Building Automation Control (BAS) Control:** With BAS Control a 24VAC signal is sent to the RAH-1000 to generate output. Once the 24VAC signal is sent to the system for output the humidifier will first look to the air flow switch (AFS) safety and the high limit switch (HL) safety before coming on. Be sure these are installed and operating properly before leaving the RAH in an On-Line state. Assuming the two above safeties are good control logic will energize the normally closed water fill solenoid valve. At the same time the normally opened drain solenoid valve will be closed. The system will fill with water and when the low water safety float switch(es) are satisfied the system will begin to generate fog (early generations of the RAH had two low water safeties in series) for humidification. A timer relay may be installed for prevention of excessive continuous run time when humidifier is undersized or the space really needs more humidifiers but the customer elected not to furnish and install them. If your model has a timer delay relay go to that section in this Manual for more info.

**B. Local Control:** In this configuration the Digital Controller governs the humidifier. The electronic humidity sensor is wired back to the Control Panel per the wiring diagram and the Controller will operate the system to maintain the set point. Control logic will energize the normally closed water fill solenoid valve. At the same time the normally opened drain solenoid valve will be closed. The system will fill with water and when the low water safety float switch(es) are satisfied the system will begin to generate fog (early generations of the RAH had two low water safeties in series) for humidification. A timer relay may be installed for prevention of excessive continuous run time when humidifier is undersized or the space really needs more humidifiers but the customer elected not to furnish and install them. If your model has a timer delay relay go to that section in this Manual for more information.





## **TROUBLE SHOOTING SECTION**

1. No Power or Lites When Unit is turned on: There are fuses and an overall circuit breaker in the wiring circuitry. Make sure the breaker is turned on and there are fuses located at each of the transformers in the Control Panel.
2. Power is on but no fog is produced:
  - a. Verify that the water valves are open.
  - b. Verify that the digital controller, if the Humidifier has one, has a higher green lite value (target humidity set point) than the red, process value lite (actual humidity level being read by the sensor). If the red value is above your target then the required humidity levels have been satisfied and there is no need for the humidifier to operate. To verify that the system is properly working temporarily raise the set point to a higher value and make sure that the humidifier comes on.
  - c. Verify that the air flow switch has closed after properly sensing that air is moving in the duct. Verify that the HiLimit switch circuit is closed.
  - d. Check the Wet Switch and verify that the green LED on the switch is lit. If it is red that means that moisture was sensed by the switch and there is a leak that must be fixed.
3. Water is not filling into the Tank:
  - a. Verify that the RO System is on line, i.e. the water valve is open and the water filter housings have filled up and the unit is draining water as it makes RO Water.
  - b. Make sure the shut off valve on top of the water tank is open. This will fill and then pressurize the system.
  - c. Verify that you have at least 30 - 35PSI of water pressure to work with. If you do not then a small booster pump may be required to supply adequate pressure.
  - d. Check the temperature of the incoming water supply. If it is real cold, near or below 40F, then the RO system may not make sufficient water.
  - e. Check the pre-filters and make sure they are not clogged and filled with dirt and debris. It is not uncommon with new construction sites to have very dirty water initially as the domestic water supplies come on line. This dirt and suspended solids can sometimes prematurely clog the filters. If this is the case call the factory for replacement filters.
4. Verifying that the Unit is Humidifying:
  - a. Keep track of the Panel mounted controller readings to see if the humidity is rising.

- b. Open up the Control Panel and observe the tank and if you see a cloudy, wet tank along with the gurgling noise of water then the unit is definitely making fog. If the tank is clear and you can see to the bottom of it then it is not working.
- c. For verifying the amount of moisture being produced measure the air conditions before the DTA and then downstream of it. You should measure both a decrease in dry bulb temperature and an increase in relative humidity. Plot these on a Psychometric chart or call the Factory for further interpolation.

5. Low Humidity conditions continue to persist:

- a. Moisture migrates very quickly. Make sure all windows and doors to the humidified zone are closed or not opened long. Make sure no new or unforeseen sources of outside air have been introduced to the space being humidified as this will increase the load on the humidifier.
- b. Verify that the blower fan is turning on when there is a call for humidification and not just when there is a call for heat. There is a dry contact relay in the panel for exactly this purpose. Contact the Installer to verify that he utilized this relay and that the control sequence on the blower system or heat pump has been set up to run the fan only when there is a call for humidification. Also make sure that the necessary zone dampers are also opening to allow moisture to be delivered to the appropriate spaces.
- c. Make sure the air filters to the furnace/blower/heat pump are not completely clogged and restricting air flow.
- d. Verify that the amperage draw for the 120VAC and 48VAC side of the circuits are at or near the rated amount for that system. If it is below the labeled ratings then some of the UPC circuits are not functioning. Call the Factory if this is the case.

6. Unit is Cycling – the fill solenoid valve is going on and off too frequently as well as the 'Fog On' lite.

- a. Check water supply – this situation happens when there is not enough water to fill the tank. Open the tank and observe the rate of fill – it will be very slow.
- b. Verify that the RO System has had ample time to charge the system (this can take several hours depending on the quantity and distance of pipe in the RO supply piping to the humidifiers).
- c. Ensure that there is enough 'house' pressure in the domestic water supply that feeds the RO System. A minimum of 35 PSI is required.



## **PREVENTATIVE MAINTENANCE:**

### **I. Humidifier Control Panel:**

#### **A) Every 2 – 3 years:**

1. at the end or beginning of the season take the tank lid off and wipe down the inside of the tank with a clean and non-abrasive rag. Make sure to wipe down each of the discs as well. To take the tank lid off disconnect the supply pipe coupling (and inlet supply if the unit is a supply side unit) then loosen all the wing nuts and disconnect the fan wires at either the terminal or at the fan.

Total time estimated:        30 Minutes

#### **B) Every 5 years:**

1. verify the output is adequate by observing the unit under operation and making sure all the UPC discs that should be running are indeed doing so. You may do this by observing the operation with a flash light and peering through the plastic lid or taking the lid off (see above instructions) and turning the unit on briefly (for 3 – 5 seconds) **WATER MUST BE IN THE TANK – DO NOT EVER JUMP OUT THE LOW WATER FLOAT SWITCHES.**
2. remember that the 1000 series can have multiple output levels possible. To determine whether how many are on line for your particular unit simply see how many pairs of #6 and #7 wires are attached to the terminal switch. You may have one or two spare banks (each bank has a capacity of approximately 3 lbs/hr of gross fog production) depending on the required load for your unit. If you observe any non-performing UPCs then you may add one of the spare banks by attaching their #6 & #7 lines to the terminals.
3. replace the float switch tank. Call the Factory for a replacement.

### **II. RO System:**

#### **A) Annually:**

1. Replace the filters and the membrane on the RO Plant.

Total time estimated:        15 minutes



## SINGLE SWITCH INSTALLATION/INSTALLATION D'UNE WET SWITCH SIMPLE/INSTALACIÓN DE UN SOLO INTERRUPTOR

1. Turn off power to the system./1. Éteignez l'appareil./1. Desconecte el suministro eléctrico del sistema.

2. Cut red and black common wires between transformer and t-stat (circuit board or controls)./2. Coupez les fils rouges et noirs situés entre le transformateur et le thermostat (la carte de circuits imprimés ou le tableau de contrôle)./2. Corte los cables comunes rojos y negros entre el transformador y el termostato (tablero de circuito o controles).

3. Connect wires as shown in diagram A./3. Branchez les fils comme indiqué dans le schéma A./3. Conecte los cables como se muestra en el diagrama A.

Note: White wire does not get connected./Remarque: Le fil blanc ne doit pas être branché./Nota: El cable blanco no se conecta.

4. Position the Wet Switch (padded side down) on the surface to be monitored./4. Placez la Wet Switch (tampon vers le bas) sur la surface à surveiller./4. Coloque el interruptor de humedad Wet Switch (con la superficie de detección hacia abajo) en la superficie que desea monitorear.

5. Restore power to the system./5. Remettez l'appareil en marche./5. Restablezca el suministro eléctrico al sistema.

6. Press test button to assure proper function of the Wet Switch./6. Appuyez sur le bouton de test pour vous assurer du bon fonctionnement de la Wet Switch./6. Oprima el botón de prueba para asegurarse de que el interruptor de humedad Wet Switch funcione correctamente.

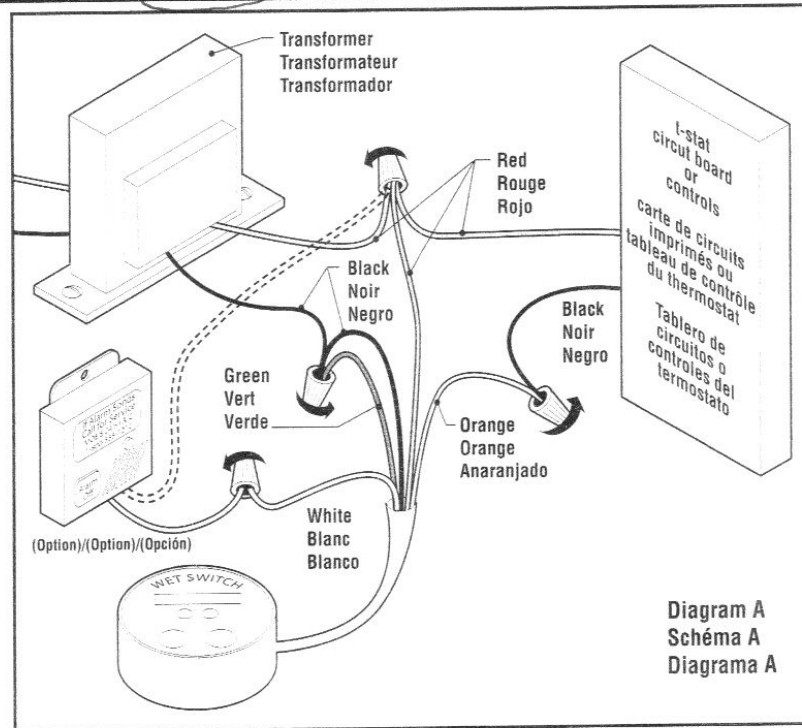


Diagram A  
Schéma A  
Diagrama A

## MULTIPLE SWITCH INSTALLATION/INSTALLATION DE PLUSIEURS WET SWITCH/INSTALACIÓN DE INTERRUPTORES MÚLTIPLES

1. Turn off power to the system./1. Éteignez l'appareil./1. Desconecte el suministro eléctrico del sistema.

2. Cut red and black common wires between transformer and t-stat (circuit board or controls)./2. Coupez les fils rouges et noirs situés entre le transformateur et le thermostat (la carte de circuits imprimés ou le tableau de contrôle)./2. Corte los cables comunes rojos y negros entre el transformador y el termostato (tablero de circuito o controles).

3. Connect wires as shown in diagram B./3. Branchez les fils comme indiqué dans le schéma B./3. Conecte los cables como se muestra en el diagrama B.

Note: White wire does not get connected./Remarque: Le fil blanc ne doit pas être branché./Nota: El cable blanco no se conecta.

4. Position the Wet Switch (padded side down) on the surface to be monitored./4. Placez la Wet Switch (tampon vers le bas) sur la surface à surveiller./4. Coloque el interruptor de humedad Wet Switch (con la superficie de detección hacia abajo) en la superficie que desea monitorear.

5. Restore power to the system./5. Remettez l'appareil en marche./5. Restablezca el suministro eléctrico al sistema.

6. Press test button to assure proper function of the Wet Switch./6. Appuyez sur le bouton de test pour vous assurer du bon fonctionnement de la Wet Switch./6. Oprima el botón de prueba para asegurarse de que el interruptor de humedad Wet Switch funcione correctamente.

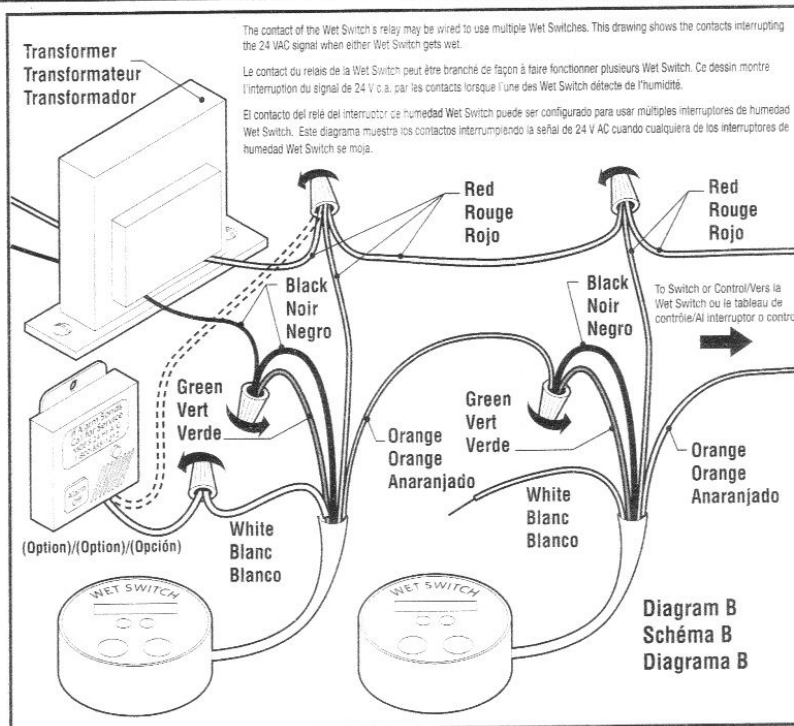
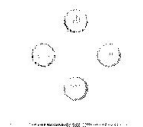
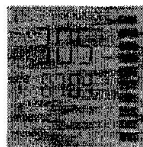


Diagram B  
Schéma B  
Diagrama B



## TCI-W-U Series Wall Mounted Universal Controller



### Features

- Universal PID and/or binary control for any analog input/output signal and range.
- Multiple auxiliary functions: heat-cool auto changeover, automatic enable, set point compensation.
- Averaging, min and max functions
- Cascading of control loops (-W22 type).
- Alarm monitoring of low and high limits on all inputs.
- Programmable reaction in case of alarm.
- Feedback function for inputs and set points.
- Functions for dehumidifying, set point shift, cascade control.
- Password protected programmable user and control parameters.

### TCI-W22-U also includes

- Power Cap protected real-time clock with 48hr power backup.
- 7-day programmable schedules, with options including change of setpoints and direct position of manual outputs.
- Blue backlight.

### Applications

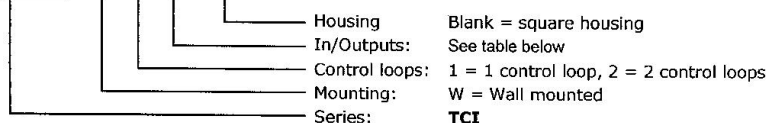
- Fan coil units
- Heat exchangers
- Zoning
- VAV
- Air handlers
- Fan, Pump control
- Humidifiers
- Dehumidifiers
- Ventilation
- Radiant heating
- Radiant cooling
- Pressurization

### General

- TCI-W11-U: 1 independent control loop, 1 internal temperature sensor, 1 universal input (analog/binary/temp), 2 binary outputs, 1 analog output
- TCI-W22-U: 2 independent control loops, 1 internal temperature sensor, 2 universal inputs, 2 binary outputs, 1 analog output.
- Internal temperature sensor standard. Add replaceable humidity element as required: AES-HT-A2 (2%), AES-HT-A3 (3%), or AES-HT-A5 (5%)
- Flexible application configuration is made with a parameter-setting routine using the standard operation terminal.

### Name

TCI-W22-U



### Ordering

Model	Stock code	Loop	Temperature Input	Humidity Input	Universal Input	Binary Output	Analog Output	Option
TCI-W11-U	40-11 0074	1	1	0	1	2	1	Standard
TCI-W11-U-H	40-11 0163	1	1	1	1	2	1	rH Sensor 3% acc.
TCI-W22-U	40-11 0076	2	1	0	2	2	1	Clock schedules
TCI-W22-U-H	40-11 0078	2	1	1	2	2	1	rH Sensor 3% acc.
AES-HT-A2	40-50 0031-2			1				rH Sensor 2% acc.
AES-HT-A3	40-50 0031-3			1				rH Sensor 3% acc.
AES-HT-A5	40-50 0031-5			1				rH Sensor 5% acc.

**Temperature sensors:** Use Vector Controls NTC sensors to achieve maximum accuracy: SDB-Tn10-20 (duct), SRA-Tn10 (room), SDB-Tn10-20 + AMI-S10 as immersion sensor.

**Actuators:** Choose modulating actuators with an input signal type of 0-10 V DC or 4-20 mA (Min. and max. signal limitations may be set with parameters. 3-point point actuators with constant running time are recommended.

**Binary auxiliary devices** (e.g. pumps, fans, on/off valves, humidifiers, etc): Do not directly connect devices that exceed specified limits in technical specifications – observe startup current on inductive loads.




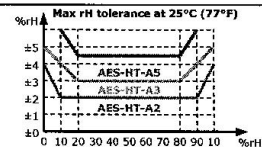
## VECTOR

## TCI-W-U Universal Controller ENGINEERING MANUAL

### Technical specifications

**Warning!** This device is intended to be used for comfort applications. Where a device failure endangers human life and/or property, it is the responsibility of the owner, designer and installer to add additional safety devices to prevent or detect a system failure caused by such a device failure. The manufacturer of this device cannot be held liable for any damage caused by such a failure. Failure to follow specifications and local regulations may endanger life, cause equipment damage and void warranty.

<b>Power Supply</b>	Power Requirements	24 VAC $\pm 10\%$ , 50/60 Hz, Class 2, 2.0 A, 48 VA max. 24 VDC $\pm 10\%$
	Power Consumption	Max. 3 VA
	Electrical Connection	Terminal Connectors 0.34...2.5 mm <sup>2</sup> wire (AWG 24...12)
	Clock backup	Min. 48 hours
<b>Signal Inputs</b>	Universal Input	Setting for Voltage or Current
	Input Signal	0-10 V or 0-20 mA
	Resolution	9.76 mV or 0.019 mA (10 bit)
	Impedance	Voltage: 98k $\Omega$ Current: 240 $\Omega$
	Universal Input	Input configured to remote temperature (RT) or digital input (DI)
	Range	NTC (Sxx-Tn10 sensor): -40...140 °C (-40...284 °F)
	Accuracy	-40...0 °C (-40...32 °F): 0.5 K 0...50 °C (32...122 °F): 0.2 K 50...100 °C (122...212 °F): 0.5 K > 100 °C (> 212 °F): 1 K
	Humidity Sensor AES-HT-Ax:	Capacity sensor
	Range	0...100 % rH
	Measuring Accuracy	See Figure to the right
<b>Signal outputs</b>	Analog Output	DC 0-10 V / 0-20 mA
	Output Signal	9.76 mV / 0.019 mA
	Resolution	Voltage: $\geq 1k\Omega$ Current: $\leq 500\Omega$
	Output Load	
	Relays Outputs	
	Type of disconnection	Micro-interruption
	AC Voltage	0...48 VAC, 2(1.2)A max. (Observe local regulation)
	DC Voltage	0...30 VDC, 2A max.
	Insulation strength between relays contacts and system electronics:	2000V AC to EN 60 730-1
	between neighboring contacts:	1250V AC to EN 60 730-1
<b>Environment</b>	Operation	To IEC 721-3-3
	Climatic Conditions	class 3 K5
	Temperature	0...50 °C (32...122 °F)
	Humidity	<95 % r.H. non-condensing
	Transport & Storage	To IEC 721-3-2 and IEC 721-3-1
	Climatic Conditions	class 3 K3 and class 1 K3
<b>Standards</b>	Temperature	-25...70 °C (-13...158 °F)
	Humidity	<95 % r.H. non-condensing
	Mechanical Conditions	class 2M2
	 conforms to EMC Standard 89/336/EEC EMEI Standard 73/23/EEC	EN 61 000-6-1/ EN 61 000-6-3
	Product standards	
	Automatic electrical controls for household and similar use	EN 60 730 -1
	Special requirement on temperature dependent controls	EN 60 730 - 2 - 9
	Degree of Protection	IP30 to EN 60 529
	Pollution Class	II (EN 60 730-1)
	Safety Class	III (IEC 60536)
	Overvoltage Category	I (EN 60 730-1)
<b>General</b>	Material:	Cover, back part Mounting Plate
		Fire proof ABS plastic (UL94 class V-0) Galvanized Steel
	Dimensions (H x W x D)	Front part: 112 x 73 x 15 mm (4.4" x 2.9" x 0.6") Power case: $\varnothing$ 58 x 32 mm ( $\varnothing$ 2.3" x 1.3")
	Weight (including package)	TCI-W11-U = 255g (9.0 oz), TCI-W22-U = 265g (9.3 oz)

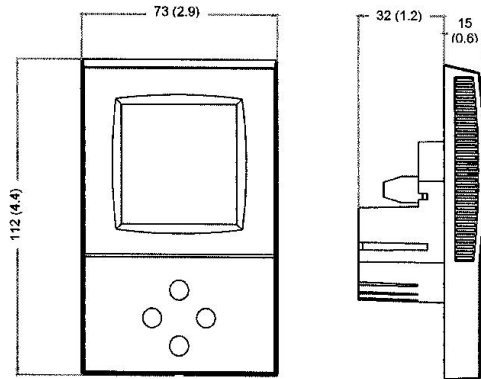




## VECTOR

## TCI-W-U Universal Controller ENGINEERING MANUAL

### Dimensions, mm(inch)

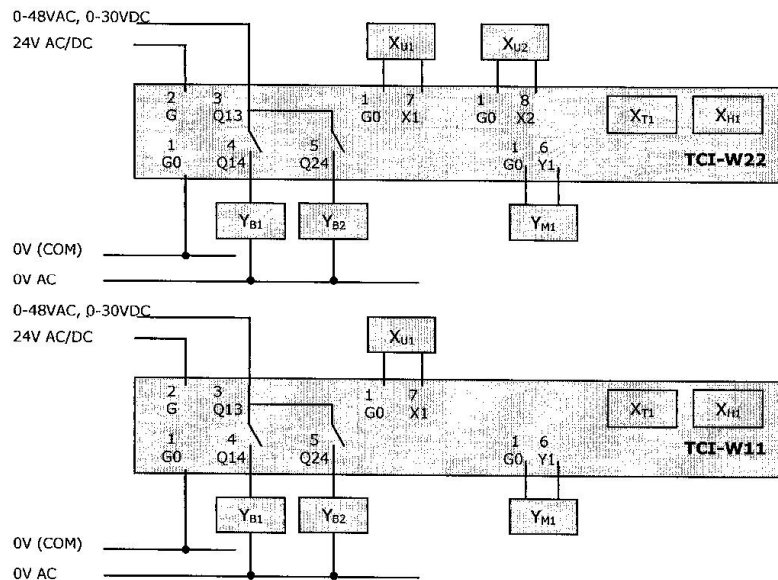


### Installation

- Install the controller on an easy accessible interior wall, approx. 1.5 m above the floor in an area of average temperature.
- Avoid direct sunlight or other heat sources, e.g. the area above radiators and heat emitting equipment.
- Avoid locations behind doors, outside walls and below or above air discharge grills and diffusers.
- Location of mounting is less critical if external temperature sensors are used.
- Ensure adequate air circulation to dissipate heat generated during operation.
- Observe local regulations.

Do not mount in a wet or condensation prone environments.

### Connection



### Warning:

#### Live Electrical Components!

During installation, testing, servicing and troubleshooting of Vector Controls products, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

### Terminal Description

<b>G0</b>	Power supply:	0V, -24VDC; common for power supply, analog in- and outputs
<b>G</b>	Power supply:	24VAC, +24VDC
<b>Q..</b>	Binary outputs:	Potential free relays contacts (see technical specification)
<b>X01, 02</b>	Universal input:	<b>Yb1, b2</b> Binary output common
<b>Ym1</b>	Analog output:	NTC 10kΩ @ 25°C (77°F), 0...10 V or 0...20 mA (selectable by jumper)
<b>XT1</b>	Internal temperature input	0...10 V or 0...20 mA*
<b>XH1</b>	Internal humidity input if AES-HT is inserted	

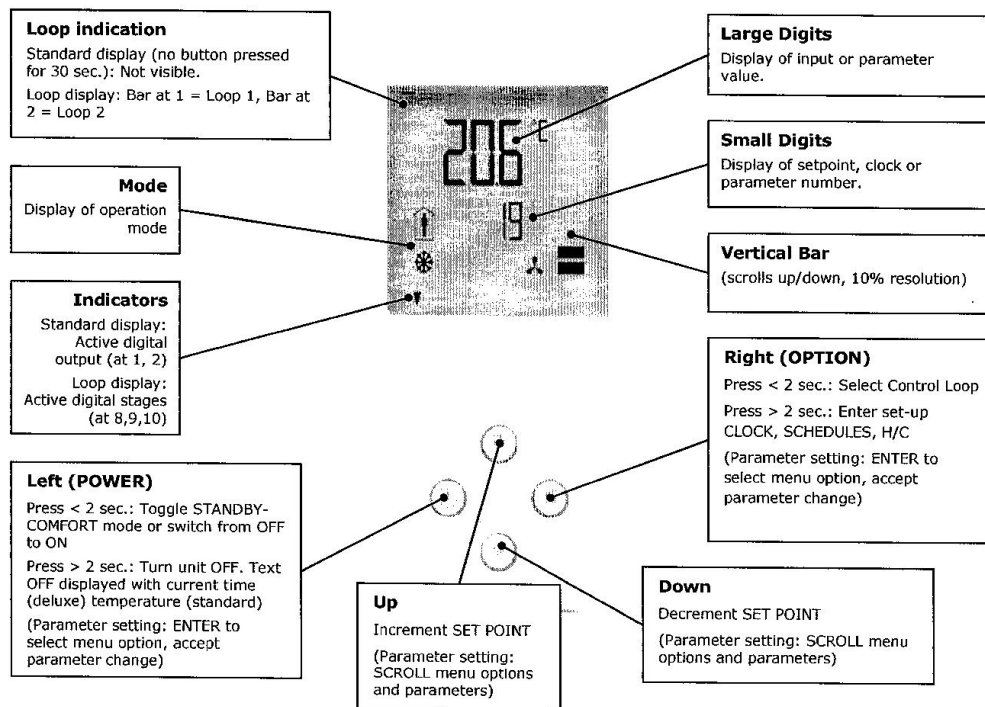
Use copper, twisted pair, conductors only. The operating voltage must comply with the requirements for safety extra-low voltage (SELV) as per EN 60 730. Use safety insulating transformers class II with double insulation as per EN 60 742; they must be designed for 100% ON-time. When using several transformers in one system, the connection terminal 1 must be galvanic connected. TCI is designed for operation of AC 24 V safety extra-low voltage and is short-circuit-proof. Supplying voltages above AC 24 V to low voltage connections may damage the controller or other devices. Connection to voltages exceeding 42 V endangers personnel safety.










## VECTOR

## TCI-W-U Universal Controller ENGINEERING MANUAL

### Display and Operation



Operation mode symbols		Control symbols	
	Comfort (occupied): All control functions operating per set points		Heating (Reverse) Active
	Economy (unoccupied): Set points shifted according to 1L07, 2L07		Cooling (Direct) Active
OFF	Energy Hold Off: Outputs are off, inputs monitored for alarms		Schedule Set
			Manual Override
			Fan Active

#### Standard display (Parameters UP08, UP09, UP10)

- Active when no key has been pressed for 30 seconds.
- Contents may be chosen with parameters.

#### Loop display

- Active when changing set points. Large digits show input value. Small digits show set point. Vertical bars show analog output value. Arrows in position 1, 2 and/or 3 show active binary (digital) output stages

#### Override of secondary set point in cascade control

- If cascade control is active, with variable air volume (VAV) for example, the user can override the primary loop and manually select the set point of the secondary loop -the loop is now changed to constant air volume (CAV). Typically for tuning the VAV system. This feature may be disabled with UP02.
- While the secondary loop is displayed change the set point with UP/DOWN. Override Cascade symbol appears.
- Press OPTION to move back to the temperature loop and cancel cascade override.



### Power Failure

- All parameters and set points are memorized and do not need to be re-entered.
- Upon return of power: Set *Parameter UP05* to keep the unit off, switch on, or operation mode before power failure.
- Clock and time schedule settings retained for 48 hours (after powered for at least 10 hours).

### Error messages



**Err1:** An assigned input is not enabled or missing. All control loops, functions and outputs tied to this input will be disabled. Verify input connections, jumper settings and parameter settings for the input involved.

**Err3:** A function refers to a disabled input. Disable the function or enable the input.

**Err4:** Internal failure. Product must be replaced.

### Manual heat – cool change

To manually change heating or cooling mode press the **OPTION** key for more than 2 seconds. Access to manual heat – cool change may be disabled with parameter **UP03**.

For TCI-W11-U: Press <b>OPTION</b> > 2 sec. SEL and H-C is displayed. For TCI-W22-U: Press <b>OPTION</b> > 2 sec. SEL and current time is displayed. Press <b>UP</b> key twice. SEL and H-C is displayed. Press <b>OPTION</b> again to toggle H or C.	SEL H-C  
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### Display input values

For TCI-W11-U: Press <b>OPTION</b> > 2 sec. SEL and H-C is displayed. Press <b>UP</b> key once: UI1 and its value are displayed For TCI-W22-U: Press <b>OPTION</b> > 2 sec. SEL and current time is shown. Press <b>UP</b> key three times. UI1 and value are displayed.  Press <b>UP</b> key again to step through the next active input  Note: disabled inputs will not be shown.	75% UI 1
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## VECTOR

SDC-H1

### SDC-H1 Duct Humidity Transmitter

#### Features

- Replaceable sensor element.
- Humidity measurement for air ducts.
- Minimum and maximum value memory.
- 0...10V, 0...20mA or 2...10V, 4...20mA measuring signals selectable with jumpers.
- Optional alternative signal ranges programmable.
- Selectable averaging signal.
- Optional LCD display or external display (OPA-S)
- Status LED

#### Applications

- Humidity measurement for supply and return air ducts in heating, ventilation and air conditioning applications.
- Recording of minimum and maximum values for critical environments.
- Supervision of critical humidity.

#### Humidity Transmitter

A unique capacitive sensor element is used for measuring relative humidity. The applied measuring technology guarantees excellent reliability and long term stability. The microprocessor samples the humidity once per second. It calculates an averaging signal over a preset number of seconds and generates the output signal.

The output signal range and type may be customized by jumpers and if required by a programming tool. Standard signal ranges are 0-10VDC, 2-10VDC, 4-20mA and 0-20mA. These ranges can be set by jumpers. Other ranges can be set by using a programming tool (OPA-S or OPC-S).

A version with display is possible by ordering the integrated display accessory OPC-S.

#### Minimum and Maximum Values:

Using a display & programming accessory, the user has the option to read out and reset minimum and maximum values. The minimum and maximum values may as well be used as output signals. The minimum and maximum values are saved into the EEPROM and are available after a power interruption.

#### Ordering

In order to receive an operational unit, the signal converter, the sensor element and the conduit connector or cable gland need to be ordered. Optionally a display module may be added.

#### Signal converter

Item Name	Item Code	Description/Option
SDC-H1-08	40-30 0060	Signal converter for duct mounting: probe length 77mm (3")
SDC-H1-16	40-30 0061	Signal converter for duct mounting: probe length 157mm (6.2")

#### Sensor element

Item Name	Item Code	Humidity Accuracy [%rH]	Temperature Accuracy [K] @25°C (77°F)	Description/Option
AES-HT-A2	40-50 0031-2	2%	± 0.5°	Humidity - temperature sensor element
AES-HT-A3	40-50 0031-3	3%	± 0.4°	
AES-HT-A5	40-50 0031-5	4.5%	± 0.3°	

#### Accessories

Item Name	Item Code	Description/Option
OPC-S	40-50 0029	Built in display & programming module
OPA-S	40-50 0006	External display module
AMS-1	20-10 0116	Weather shield to protect the sensor element
AMC-1	20-10 0035	Cable gland PG9 for cables Ø 4 – 8 mm (AWG 6 – 1)
AMC-2	20-10 0067	Conduit connector NPT 1/2

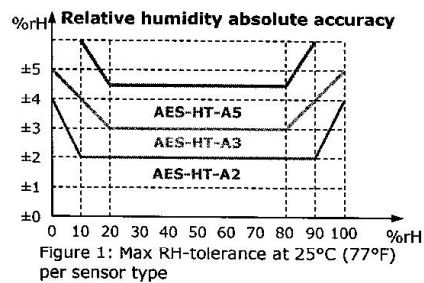


**VECTOR**

**SDC-H1**

## Technical Specification

Power Supply	Operating Voltage	24 V AC 50/60 Hz $\pm$ 10%, 24VDC $\pm$ 10%
	Power Consumption	Max 2 VA
Connection	Terminal Connectors	For wire 0.34...2.5 mm <sup>2</sup> (AWG 24...12)
Sensing Probe	Humidity Sensor:	Capacity sensor element
	Range	0...100 % rH
	Measuring Accuracy	See Figure 1
	Hysteresis	$\pm$ 1%
	Repeatability	$\pm$ 0.1%
Signal Outputs	Stability	< 0.5% / year
	Analog Outputs	
	Output Signal	DC 0-10V or 0...20mA
	Resolution	10 Bit, 9.7 mV, 0.019.5 mA
	Maximum Load	20 mA, 500 $\Omega$
Environment	Operation	To IEC 721-3-3
	Climatic Conditions	class 3 K5
	Temperature	-40...70°C (-40...158°F)
	Humidity	<95% R.H. non-condensing
	Transport & Storage	To IEC 721-3-2 and IEC 721-3-1
Standards	Climatic Conditions	class 3 K3 and class 1 K3
	Temperature	-40...80°C (-40...176°F)
	Humidity	<95% R.H. non-condensing
	Mechanical Conditions	class 2M2
	conform according to	
	EMC Standard 89/336/EEC	EN 61 000-6-1/ EN 61 000-6-3
	EMEI Standard 73/23/EEC	
	Product standards	
	Automatic electrical controls for household and similar use	EN 60 730 -1
	Special requirement on temperature dependent controls	EN 60 730 - 2 - 9
Housing Materials	Degree of Protection to EN 60529	IP60
	Mounted probe down with AMS-1	IP63
	Safety Class	III (IEC 60536)
	Cover, back part	PC+ABS (UL94 class V-0)
General	Filter material	PTFE coated 1 $\mu$ m pores
	Dimensions (H x W x D):	
	Transmitter case:	68 x 91 x 47mm (2.7" x 3.7" x 1.9")
	Probe:	$\varnothing$ 14 x 77/157 mm ( $\varnothing$ 0.55 x 3/6.2")
	Weight (including package)	
SDC-H1-08		225g (7.9 oz)
	SDC-H1-16	260g (9.2 oz)



**L1** 120V/1PH



**GREENAIR**  
SYSTEM

Remote Control Wiring
RAU - LAB UNIT
Issue: 02 Rev: 01
Date: 07/7/14
Scale: 1" = 3"



## PARTS LIST

Part No.	Item Description	Sales Price
6001	2.4 MHz Nebulizer Board	31.00
6002	UPC Tank - Model#579R3 304SS with welds, stand brackets, top flange w/ PEMS and bottom hole w/PE...	144.00
6003	Gasket for UPC Tank - Model#:579R3	10.00
6004	Polypropylene Float Switch	28.52
6005	2-Way NC Stainless Stl Sol.Valve	35.60
6006	2-Way NO Stainless Stl. Sol.Valve	66.36
6007	Wall Metal Enclosure (20x20x12)	332.00
6008	Terminal connector blocks	0.94
6009	Terminal Connector End Blocks	1.40
6010	Jumpers - 2 Pole	0.64
6011	120VAC to 48VAC Transformer. Rated for 500VA. Open.	89.00
6012	120VAC to 24VAC Transformer. Rated for 250VA. Open.	64.80
6013	Hobo Data Logger	250.00
6014	Hobo Data Logger - 2 channels	240.00
6015	50 GPD RO System	258.00
6016	Redington Hour Meter - 24V	54.52
6017	Control Panel for the RAH 2000 & 3000	1,350.00
6019	1.65 MHz PC Board	27.28
6020	Relay 24VAC, 15 Amp, Dpdt, 8 terminal	16.26
6021	Relay Socket - 8 terminal	11.24
6024	Lexan Clear Poly Sheet .22"thk, 24"x24" sheet	69.44
6025	PLC Controller for Humidity	160.00
6026	Humidity Sensor - Duct HMD50U	250.00
6027	Humidity Sensor - Wall HMW50U	270.00
6028	Humidity Switch / simple controller	80.00
6029	Humidity Sensor - Duct 10-35VDC input required. 0 - 10 VDC output.	148.00
6030	Nema 1 Control Panel 12x12z6	170.00
6031	Gen Purpose Relay 24VAC 10Amp	32.00
6032	Screw 18-8 SS Pan Head Phillips Machine Screw 8-32 Trhread, 1/2" Length, Pack of 100	0.00
6033	Nut 18-8 SS Machine Screw Hex Nut. 8-32, 5/16 width 100 per pack	0.00
6034	Washer - EPDM Rubber cushioning and sealing washer #8 screw size, .150 ID, 5/16 OD, .062 thick, ...	0.00
6035	Screw 18-8 Pan Head Phillips Machine Screw 8-32, 3/4" long, 100 per pack	0.00
6036	Nat.Rubber Sheet - 12" x 24" x 1/4"	0.00
6037	EPDM O Ring size: 4.5" OD	25.00
6038	15 Amp Littlefuse	19.75
6039	Idec Pilot Lite - Red - 24VAC	25.00
6040	Switch - 2 pos., lited - red 120V	52.00
6041	Circuit Breaker - 6 Amp 120V	36.00
6043	Idec Pilot Lite - Green - 24VAC	25.00
6045	Idec Double Pole Relay - 24V	13.40
6046	Idec Double Pole Socket	8.46
6047	Idec Single Pole Relay - 24VAC	12.60
6048	Idec Single Pole Socket	7.00
6050	EMI/RFI Fan Guard	10.00



6051	Plastic Fan Guard for 4.69" Fan	2.00
6052	Bulkhead Conn. 1/4T x 1/8MPT Brass Part#: B-400-11-2	9.00
6053	.5" Acrylic Sheet - clear w/ paper back in square ft units	22.00
6055	10 Amp fuse, 12/32" dia. time delay, 250 VAC,	7.00
6056	5 Amp Fuse, 13/32" dia., 250VAC time delay type	7.00
6057	Little Giant Condensate pump. 120HP, 1/50 HP, 1.1 amps, 40 GPH at 8' head	75.00
6058	Miniature Pressure Switch. Sensitive to .5" H2O <. Quick connect electrical connections. SPST...	55.00
6124	Timer On/Off Relay	146.00

**PLEASE NOTE:**

- 1) All above prices are subject to change. Please call Factory or Factory Representative for current pricing.**