

VERI-DRY FAQ

For homes, offices and factories, a low cost effective humidity control system

HOW DOES IT WORK?

Typical air conditioning systems do mostly cooling and some moisture removal. A major problem is most cooling systems are oversized and therefore have short run times bringing the space temperature down but leaving the relative humidity at an undesired level. VERI-DRY is a low cost conversion device that converts any existing air cooling system into a dual functioning dehumidifier-cooling combination unit. If the humidity exceeds the desired set point in the space, the VERI-DRY controller switches the cooling system into a super high capacity dehumidification mode. The latent capacity (moisture removal rate) of any DX evaporator coil is based on surface area, air velocity (dwell time) and coil temperature.

Recent industry answers to humidity control have been to slow down the blowers to reduce coil temperature. This does slightly lower evaporator coil temperatures but exacerbates a bigger problem, space air flow. Most engineers who specialize in humidity control live by an unwritten rule: ***“You can never have too much air movement when drying out a building.”***

How important is air flow? Looking at ASHRAE recommendations for indoor swimming pools illustrates a good example. For residential applications, the minimum recommend air turnover rates are 4 -6 per hour and for commercial applications, 6-8 turnovers per hour. Most homes have much lower turnover rates for various reasons one of which are badly designed and installed delivery systems. Basements, where most mold, mildew and moisture are very problematic almost never have adequate air flow for good space temperature and humidity control.

What’s wrong with slowing the fan speed down? One of the most important features of VERI-DRY is not sacrificing the space air flow when dehumidifying. It is vitally important NOT to slow the fan speed when trying to control humidity in fact doubling it would be very advantageous. Good air movement is essential to keep hot humid air from stratifying and more important when trying to eliminate moisture and mildew in basement areas that are cool where mold and mildew can thrive.

How does a Veri-Dry solve the air flow issue? The VERI-DRY converter accomplishes this by allowing air to by-pass the evaporator bringing the coil temperature to just above the freezing point. As the coil approaches 33 degrees, the AP009 proprietary controller constantly monitors coil temperature and sends an analog signal to the 0-10 volt modulating actuator to began modulating to maintain this super cold coil maximizing its moisture removing capacity. The cold evaporator coil removes 4 to 5 times more moisture than a conventional air cooling system in its normal cooling mode without compromising air flow throughout the space.

If space temperature drops 2 degrees, the controller automatically switches the system to the heating mode which will also lower relative humidity. The system cycles in this matter until the RH set point is achieved.

VERI-DRY comparison data vs. other products available

	Veri-Dry	Lennox Humiditrol	Carrier Infinity	April Aire	Comfort Aire	Gen Filter	Thermastor
Type of system							
* Conversion type	Yes	No	No	No	No	No	No
** Integrated	No	Yes	Yes	No	No	No	No
*** Add-on	No	No	No	Yes	Yes	Yes	Yes
Compressor Tonnage	Unlimited 11.3 PPH per ton	2 thru 5	2 thru 6	1 ton max 5.3 PPH per ton	1 ton max 5.3 PPH per ton	1 ton max 5.3 PPH per ton	1 ton max 5.3 PPH per ton
AHAM capacity		3.2 PPH per ton	Not rated				
Tested evap coil temp	33F Avg.	Not available	Not available	Not available	Not available	Not available	Not available
Coil temp control	Yes	No	No	No	No	No	No
Coil temp display	Optional	No	No	No	No	No	No
Humidity displayed	Optional	Standard	Standard	Extra	No	No	No
1. Malfunction alert	Yes	Yes	No	No	No	No	No
2. Duct work required	Minimal 24 volts .3 amps	Major	Major	Major	Major	Major	Major
Power requirements		240 Volts	240 Volts	120V 11A	120V 11A	120V 11A	120V 11A
Approx installed cost	2.5K	10K	8K	3.5K to 5K	3.5K to 5K	3.5K to 5K	3.5K to 5K
Air flow compromised	Never	Always	Always	No	No	No	No
Install space required	3 cubic feet avg.	96 CF approx	96 CF approx	64 CF approx	64 CF approx	64 CF approx	64 CF approx
System Components							
3. H/C/D Controller	Yes	Yes	Yes	No	No	No	No
Blower	No	Yes	Yes	Yes	Yes	Yes	Yes
Compressor	No	Yes	Yes	Yes	Yes	Yes	Yes
Condensate pump	No	No	No	Yes	Yes	Yes	Yes
Fan cycling device	No	No	No	Yes	Yes	Yes	Yes
Evaporator	No	Yes	Yes	Yes	Yes	Yes	Yes
Condenser	No	Yes	Yes	Yes	Yes	Yes	Yes
Expansion valve	No	Yes	Yes	Yes	Yes	Yes	Yes
Hi Limit	No	Yes	Yes	Yes	Yes	Yes	Yes
Lo Limit	No	Yes	Yes	Yes	Yes	Yes	Yes
Blower	No	Yes	Yes	Yes	Yes	Yes	Yes
Defrost controller	No	No	No	Yes	Yes	Yes	No
Variable speed fan	No	Yes	Yes	No	No	No	No
Hot gas coil	No	Yes	Yes	Yes	Yes	Yes	Yes
Condensate pump	No	No	No	Yes	Yes	Yes	Yes
Motorized refig valves	No	Yes	No	No	No	No	No

** Integrated systems are defined as typical conventional heating, cooling devices that include an indoor air handler or furnace with an air conditioning package connected All current integrated systems including air source, water source, geothermal heat pumps utilize DC variable speed fans to slow the air flow down to lower coil temperature for dehumidification

* Conversion describes a device that uses all existing components of any integrated system regardless of size and changes its cooling operation without adding any external refrigeration

*** Add-on devices are small refrigeration base dehumidifiers equivalent to a secondary air conditioning unit with added complexities.

1. The add-on units can be inoperative with a compressor failure without any indication to the home owner. The two blowers could run for months without any work being done.

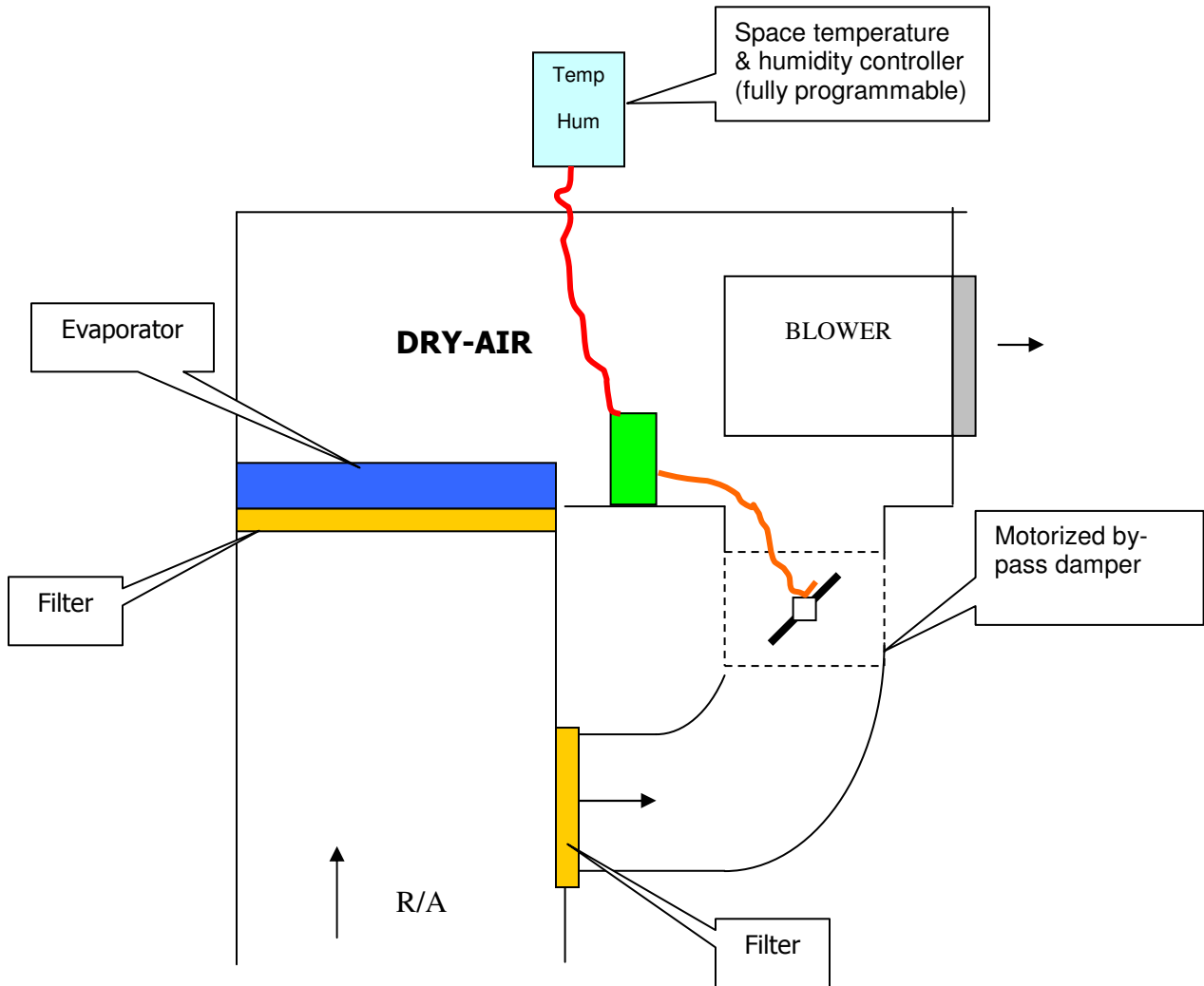
2. Duct work is a major undertaking with all add-on units plus requiring a great deal of space. The add on units would not fit on a good majority of Florida systems because of

3. H/C/D denotes Heating, Cooling and Dehumidification controller mounted in the conditioned space.



TOP VIEW

VERI-DRY DAMPER CONFIGURATION FOR HORIZONTAL pull UNIT BY-PASS WITH RETURN DUCT PLENUM

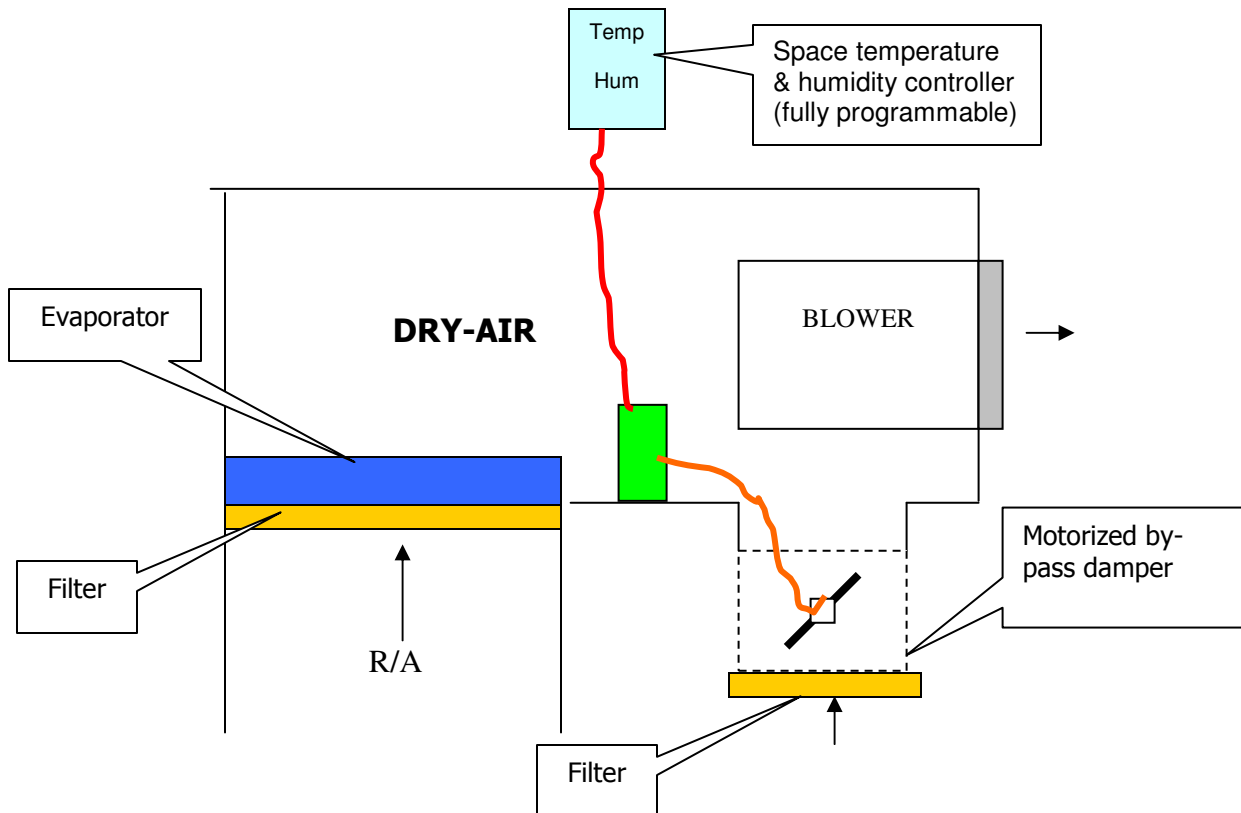




TOP VIEW

VERI-DRY DAMPER CONFIGURATION FOR HORIZONTAL pull UNIT

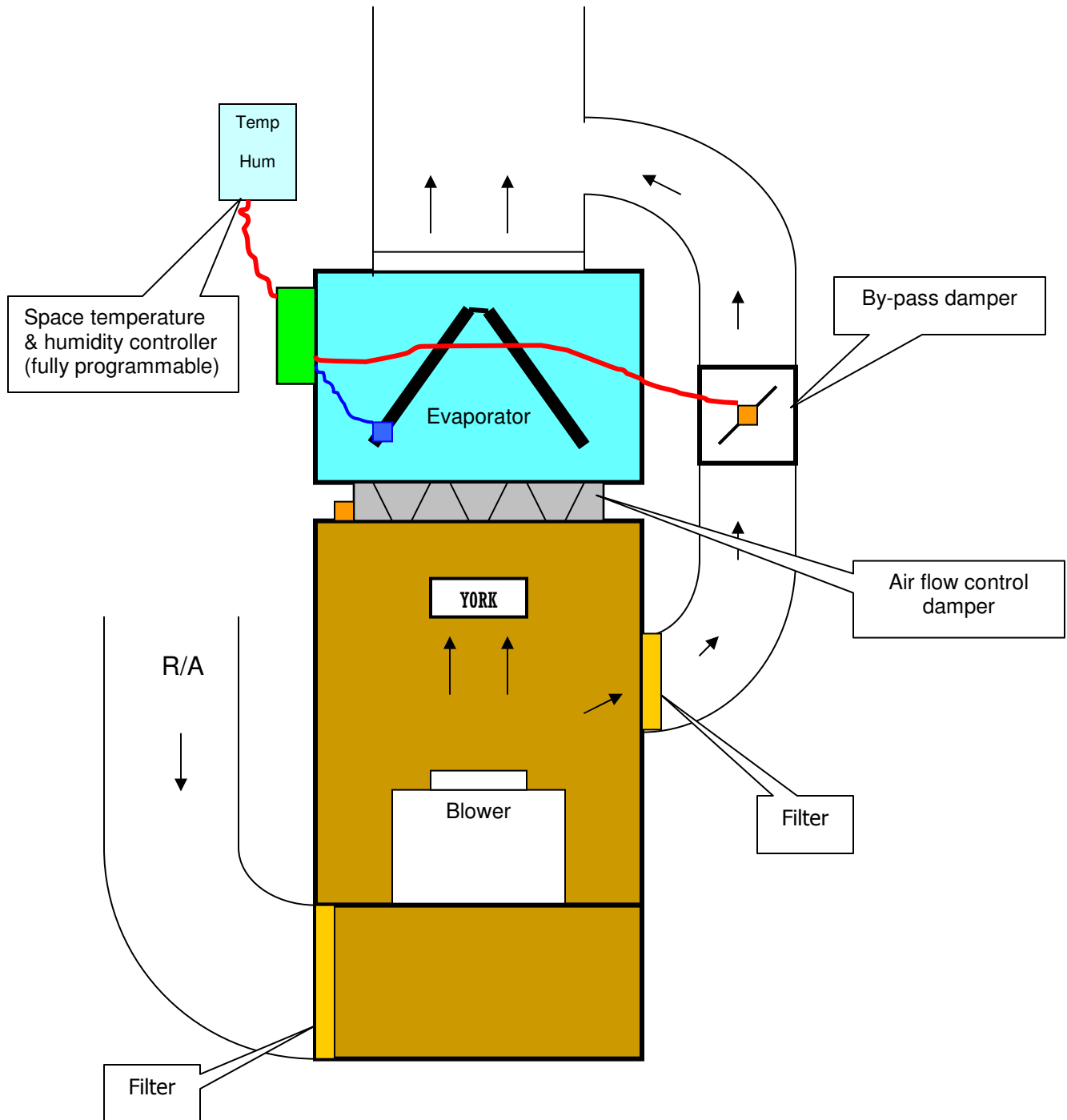
BY-PASS WITH RETURN DUCT PLENUM





SIDE VIEW

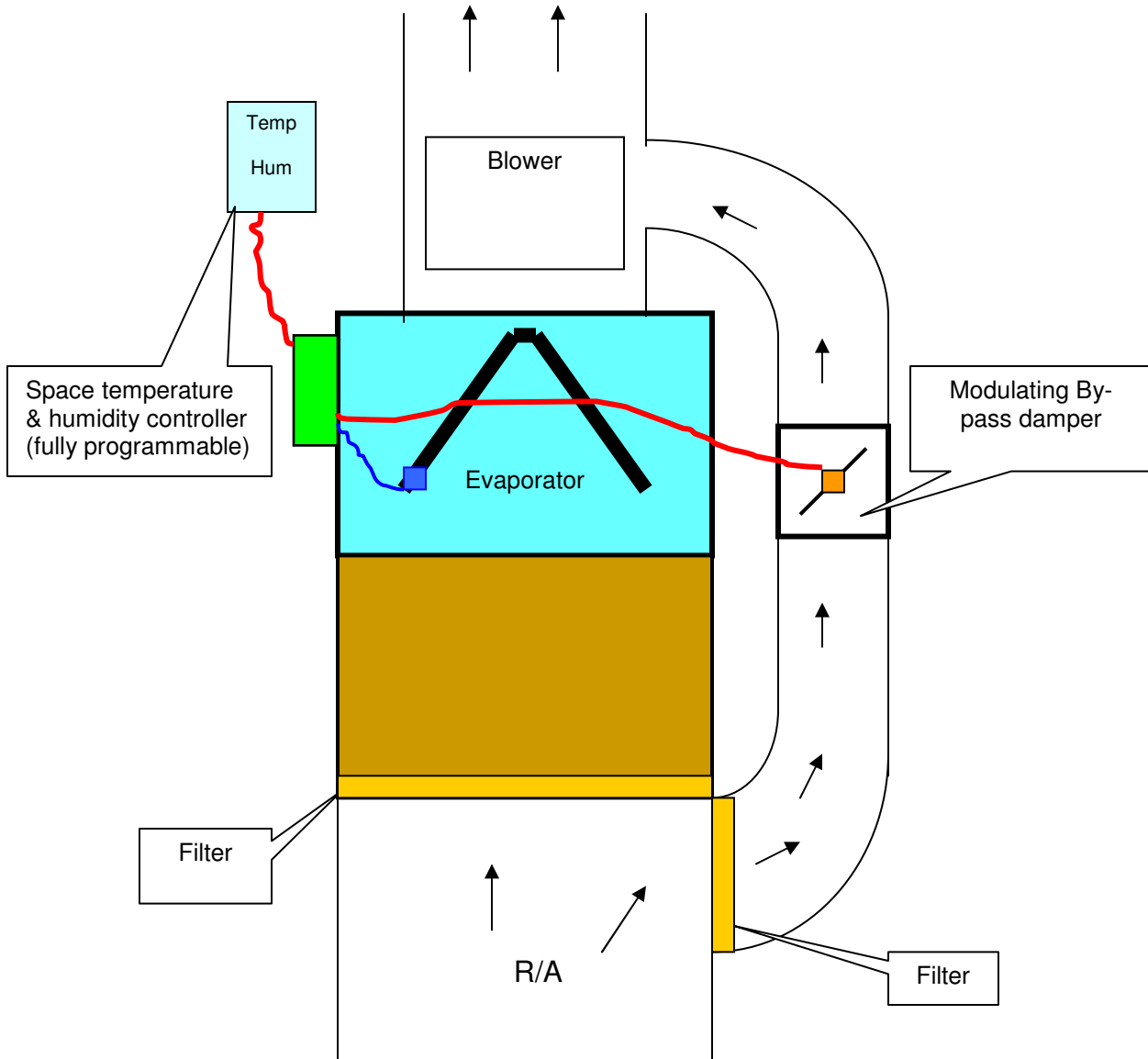
VERI-DRY DAMPER CONFIGURATION FOR VERTICAL push UNITS





SIDE VIEW

VERI-DRY DAMPER CONFIGURATION FOR VERTICAL pull SYSTEM





THE VERI-DRY ADVANTAGES

VERI-DRY is a simple add on device that can be installed on any new or existing air conditioner or heat pump that converts it into a dedicated highly efficient moisture-removing dehumidifier.

LOWER MAINTENANCE: Current whole house dehumidifiers available today have compressors, fans, refrigeration coils, filters and valves, resembling a secondary miniature air conditioning system. **VERI-DRY** utilizes the existing cooling system thereby eliminating costly installation and maintenance.

LOWER FIRST COST: Since there is no refrigeration system to buy, the **VERI-DRY** add on package is the most cost effective.

HIGHER CAPACITY: Typical whole house dehumidifiers have a maximum capacity of 130 pints per day. The **VERI-DRY** system installed on a 4 ton air conditioner has a capacity of 520 pints per day or 21 pounds per hour.

WON'T FREEZE THE COIL. Coil freezing is common on dehumidifiers and require de-frost circuitry. **VERI-DRY**'s unique **Coil-Temp** controller allows the system to operate at any space temperature while maintaining a 34 degree coil, maximizing its moisture removing capabilities.

HIGHER EFFICIENCIES. **VERI-DRY** requires no 120 volt power supply to operate it nor does it require inefficient defrost cycles. An advertised 130 pint per day whole house dehumidifier uses 10.6 amps @ 120 volts of electricity to operate. **VERI-DRY** uses .2 amps @ 24 volts.

AIR-FLOW ADVANTAGE: Slowing down the fan speed has been implemented by most manufactures in an attempt to reduce humidity levels. This causes stratification and reduces comfort levels even further. With **VERI-DRY**, the blower speed is maintained at it's maximum level creating dry air currents that remove moisture fast and economically.

INHIBITS MOLD GROWTH: Moisture and dampness are essential for mold and mildew to flourish. Controlling the humidity and moisture practically eliminates the possibility of any toxic or non-toxic mold to develop inside a building.

EXISTING AIR CONDITIONER: The air conditioner will continue to operate exactly as before. If the air conditioner is operating and the humidity controller tells the system there is a need to take extra moisture out of the air, the air conditioner continues to run and the **VERI-DRY** quietly switches into the dehumidification mode. When the humidity controller is satisfied, the air conditioner is returned to normal.

SIZING: The **VERI-DRY** dehumidification system is can be retro-fitted to any size cooling system including large roof top equipment.

RELIABILITY: Since the **VERI-DRY** has no secondary compressor, fans, relays, valves or refrigeration devices, it's life cycle far exceeds any other product on the market. A small 24 volt motor actuator is the only moving part regardless of system size.

CONTROLS: The **VERI-DRY** system comes with a state of the art pc based programmable thermostat-humidistat humidity controller that mounts in place of the existing thermostat.

COMPARE: The **VERI-DRY** has one moving part, the damper control. No compressor, no evaporator coil, no reheat coil, no expansion valve, no hi & low pressure switches, no blower motor, virtually no maintenance and capacities to match the system size in tonnage.

WARRANTY: **VERI-DRY** comes with a 5 year warranty on all parts and free labor the first year.



10 Common facts about moisture, mold and humidity control.

- 1 Turning your air conditioner may NOT lower the relative humidity.
- 2 Turning your air conditioner can INCREASE the relative humidity.
- 3 Running an air conditioner excessively can ENCOURAGE the growth of dust mites, fungi, bacteria, mold and mildew.
- 4 Running an air conditioner excessively can cause moisture to condense (form tiny water droplets) on walls inside the duct work, & duct outlets.
- 5 Running an air conditioner excessively can cause people to feel cold and clammy.
- 6 Air conditioners lose efficiencies as the temperature in the space gets colder.
- 7 Small portable 120 volt dehumidifiers in many cases will not control humidity in large areas such as basements.
- 8 Typical small portable dehumidifiers are more suitable for smaller spaces.
- 9 Good air movement is essential to control humidity mold and mildew.
- 10 Current Whole house add on dehumidifiers are costly to operate and maintain.



Independent Lab 2 Hour Veri-Dry run test

Performance test on May 5, 2007 at Millbrook Industries Certified ARI Laboratory test booth, Mitchell SD

The test was conducted under the **AHAM** standard of 80F dry bulb temperature and 60% relative humidity. The unit was a 3 ton packaged system with a scroll compressor and R-22 refrigerant. A 3 ton unit was chosen to replicate the Lennox infinity system for comparison purposes.

Measuring began after 30 minutes run time to stabilize the unit. Condensate was measured every 10 minutes, 12 in total with the results averaged out.

Results:

PPH = Pounds Per Hour

8 ounces of condensate was collected every 105 seconds.

3600 seconds in one hour divided by 105 = 34.3 (8 ounces) pints per hour = 4.3 gallons per hour.

@ 8.33 pounds per gallon X 4.3 gallons = 35.7 PPH

35.7 divided by 3 = **11.9 PPH per Ton.**

Comparison:

Integrated systems i.e. Lennox Humiditrol and Carrier Infinity.

Lennox **AHAM** published moisture removal rate = **2.8 PPH**

Veri-Dry @ 11.9 has 77% more removal capacity without compromising air movement within the space.

Add on Systems i.e. April-Aire, General Filter, Comfort Aire, Thermastor.

Comparing their units, all rated at 125 to 135 pints per day. These are 115 Volt plug in units @ 11 amps which equates to a 1 ton compressor with added blower wattage. Most publish 130 pints per day = **5.6 PPH**

Veri-Dry @ 11.9 has 53% more removal capacity.



VERI-DRY 5 Hour run test:

UNIT:	Water Source heat pump
MODEL:	GT-048
COMPRESSOR SIZE:	3.5 Ton
EWT 52 F	
GPM 5	
CONDITIONS:	84 DB 68% RH
MEASURED CONDENSATE:	10.8 OZ PER MINUTE (consistent)
	652 OZ PER HOUR
	40.75 PPH (pounds per hour)
	4.89 GALLONS PER HOUR
	186 OZ PER TON PER HOUR
	11.64 PPH-PT (pounds per hour per ton)

Lennox HUMIDITROL run test

The test data shown on their web site is using their Super High Efficiency Dave Lennox Signature Collection XC21-036 air handler/evaporator and a CBX32MV-036 high SEER outdoor condenser.

It was tested to, but not certified to the ANSI/AHAM DH-1 dehumidifier test standard 80F @ 60% RH.. (see attached)

Results: 47.9 Liters per day.

Break down:

1.056 Liters = 1 Quart/4 pints

1.056 X 47.9 = 50.6 quarts per day

50.6 X 4 = 202.3 pints (pounds) per day

202.3 divided by 24 hours = 8.43 PPH (pounds per hour)

8.43 divided by 3 tons = 2.8 PPH per ton.

Summary: The comparison with a 5 hour run test is a little skewed because the test conditions are slightly different. Page three shows the 3 ton heat pump tested to the AHAM for very accurate comparison data.

Negatives:

1. EQUIPMENT COST: This Lennox unit is similar to the Carrier Infinity system but more expensive. A survey of Carrier dealers gave an average installed cost of around \$10,000.00 for a 3 ton system.

2. COMPROMISED AIR FLOW: Both the Carrier Infinity and the Lennox Humiditrol systems slow the fan speed down to reduce the evaporator temperature.

3. UNCONTROLLABLE EVAPORATOR TEMPERATURE: Since both units do not sense the evaporator coil temperature, they cannot control it, they can only slow the fan speed minimally to avoid coil freeze up in the event the home owner tries to dehumidify when the space is below 65 degrees. Therefore their coil temp is much higher than veri-dry resulting in only 2.8 PPH per ton moisture removal rate.

4. OPERATING COSTS: Removing roughly 65% less humidity per ton translates into a much longer run time to achieve the same results.



AHAM DEHUMIDIFICATION SELECTION GUIDE					
Values in table indicate dehumidification required in Pints per 24 Hours, based on the area of the space to be dehumidified and the conditions that would exist in that space when a dehumidifier is not in use.					
CONDITION WITHOUT DEHUMIDIFICATION During warm and humid outdoor conditions.	AREA -- SQ. FT.				
	500	1000	1500	2000	2500
Moderately damp -- Space feels damp and has musty odor only in humid weather.	10	14	18	22	26
Very damp -- Space always feels damp and has musty odor. Damp spots show on walls and floor.	12	17	22	27	32
Wet -- Space feels and smells wet. Walls or floor sweat, or seepage is present.	14	20	26	32	38
Extremely wet -- Laundry drying, wet floor, high load conditions.	16	23	30	37	44
Dehumidification variables also include such other factors as climate, laundry equipment, number of family members, number of doors and windows, and degree and intensity of area activity.					

The AHAM Certification Program for Dehumidifiers

The Dehumidifier Certification Program is sponsored by the **Association of Home Appliance Manufacturers (AHAM)**.

The program's purpose is to assure the end user that the water removal capacity and energy factor claimed for a dehumidifier which carries the AHAM Certification Seal is accurate.

The water removal capacity and energy factor of a dehumidifier are certified by the manufacturer under the terms of the program, and the testing organization checks the performance of random samples taken from factory, warehouse and/or dealer showrooms throughout the nation.

The terms of the program require that the manufacturer advertise, promote, or otherwise claim only the number of pints of water the dehumidifier can remove from room air in 24 hours at 80°F and 60% relative humidity – when tested in accordance with ANSI/AHAM DH-1 Standard (AHAM's Dehumidifier Standard).

The program is open to all manufacturers, both members and non-members of AHAM, as well as to entities that market private brand models. Participation is voluntary. As the sponsor and the verifying authority of the program, AHAM retains a laboratory (Intertek - ETL SEMKO) to administer the testing of sample units and verification of data.



Defining What is Being Certified

Only the water removal capacity and energy factor are certified. No implication should ever be made that the seal certifies any other feature or performance factor.

Test Procedures Verify Accuracy of Ratings

The laboratory under contract to AHAM schedules the testing of representative units to determine compliance with the applicable requirements of ANSI/AHAM DH-1 and the AHAM Procedural Guide for this program.

Rated Capacity Test

The rated capacity test of the dehumidifier shall be based upon tests outlined in ANSI/AHAM DH-1, Section 7, under the following rated conditions:

Dry-bulb Temperature 80°F
Wet-bulb Temperature 69.6°F
Relative Humidity 60%

Tolerances

The water removal capacity and the energy factor of any dehumidifier under certification must not be less than 95% of its claimed rating.

The tolerance is included in the AHAM Dehumidifier

Certification Program to allow for slight variations in (1) the manufacture of component parts and (2) laboratory measurements.

Definition of the Seal

The AHAM Dehumidifier Certification Seal is the mark issued by AHAM to all manufacturers and private brand sellers of dehumidifiers who are licensees in a program under which the manufacturer certifies that the water removal capacity ratings and the energy factor of all dehumidifiers bearing this mark are determined and accurately stated in accordance with the requirements of ANSI/AHAM DH-1 and the AHAM Procedural Guide for this program.

Application of the Seal to Units

Participants are required to affix, or have affixed, the certification seal to all their certified dehumidifiers only at the time and place of manufacture of the dehumidifier.

Directories

AHAM's Directory of Certified Dehumidifiers is a listing of current program models of each participating licensee in AHAM's Dehumidifier Certification Program. Upon receipt of complete information for new or updated certified models from the AHAM certification program participants, the data contained in this on-line Directory is normally updated within 7 business days. A PDF downloadable copy of the directory is posted to the on-line directory website www.cooloff.org.

For information on any certified model not listed in this directory, please contact:

AHAM Dehumidifier Certification Program
Association of Home Appliance Manufacturers
1111 19th Street, N.W., Suite 402
Washington, DC 20036
Telephone: 202/872-5955
www.cooloff.org



YOU CAN NEVER OVERSIZE AN AIR CONDITIONER OR HEAT PUMP WITH A **VERI-DRY** HUMIDITY CONTROLLER

- 100% Humidity control
- Inhibits Mold growth
- Reduces cooling costs substantially
- Fits any size heat pump or air conditioner
- Eliminates air conditioner over sizing problems
- No refrigeration work involved
- Controls humidity first, space cooling second.

BY-PASS DUCT SIZING CHART

1 & 2 ton: 80 square inches	10" round 8X10 rectangular.
3 ton: 120 square inches	12" round 10X12 rectangular.
4 & 5 ton: 170 square inches	14" round 12X14 rectangular.
6 & 8 ton: 210 square inches	16" round 14X16 rectangular.
10 ton: 280 square inches	18" round 16X18 rectangular.
12 ton: 320 square inches	20" round 16X20 rectangular.
15 ton: 396 square inches	22" round 18X22 rectangular.

NOTE: When in doubt, go to the next size larger.

For sizes over 15 tons, consult EPS INC. 800/671-9629
www.dry-air.com