

**Aprilaire**<sup>®</sup>

# Humidification

Product and Application Guide



Products for Every Climate  
Every Application

# Welcome to Aprilaire

Aprilaire, the leader in humidification technology for more than 60 years, offers a complete line of whole-home humidifiers designed to meet the needs of today's consumer. This guide is designed to educate and assist you in selecting the correct humidifier based on the humidification needs of each residence and its existing HVAC equipment. Following these guidelines will help ensure your customers have a humidifier that operates reliably and efficiently for years to come.

If you have any questions or issues, the dedicated Aprilaire customer service department is ready to assist.



## In providing the best service available to our customers, we aspire to:

- + Answer all calls in thirty seconds or less
- + Respond to e-mails within twenty-four hours
- + Practice first call resolution
- + Follow up quickly with a definitive answer if a call cannot be resolved immediately

We welcome feedback as we continue to strive for improvement.

Customer service agents are available Monday through Friday from 7:00 am through 5:00 pm (CST) and can be reached by phone at 800.334.6011 or by e-mail at [techsupport@aprilair.com](mailto:techsupport@aprilair.com).



For product advice  
and co-op advertising visit  
[AprilairePartners.com](http://AprilairePartners.com)

# The importance of humidity control

Humidification—the process of adding moisture to the air—is one of the most important aspects of indoor comfort and health, yet it’s one of the least understood.

Humidity can’t be seen, touched or smelled. However, when properly controlled, humidity offers many proven benefits. Humidification during the heating season not only provides comfort, it helps protect the home and its furnishings from the harmful effects of air that’s too dry. In addition, physicians often recommend controlling humidity to guard against dry skin, dry hair, and scratchy throats. It also reduces undesirable winter-time static electricity.

Relative humidity (RH) indicates the amount of water vapor, in percent, actually in the air compared to the maximum amount that the air could hold under the same conditions. The warmer the air, the more moisture it can hold. Air in a home heated to 70°F can hold about eight grains of moisture per cubic foot. That is 100% RH. If there are only two grains per cubic foot in the home, this is ¼ of the air’s capacity to hold moisture. Therefore, the RH is 25%. The air could hold four times as much water.

But, the important thing is what happens to air when it’s heated. The outdoor-indoor RH conversion chart on the following page illustrates this.

Locate outdoor RH on the left of the chart and outdoor temperature at the bottom. Indoor RH is where the vertical and horizontal columns meet. The calculation assumes that outdoor air is brought into the home and heated to 70°F.

This substantial reduction of RH from outdoor to indoor air is taking place in every unhumidified or under-humidified home where the air in the home is heated.

To resolve this, we add artificial moisture so there’s more water available for that thirsty air. We humidify because there are a number of health, comfort and preservation benefits during the heating season.

## Outdoor-Indoor Relative Humidity conversion chart

### EXAMPLE

(See shaded figures)  
Outdoor RH is 70%; outdoor temperature is +10°F; when this air is brought into the home and heated to 70°F, the indoor RH drops to 6%.

OUTDOOR RELATIVE HUMIDITY	OUTDOOR TEMPERATURE (°F)													
	-20	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50
100%	2	4	5	6	7	9	12	17	19	23	29	36	43	52
95%	2	3	4	6	7	9	12	16	17	22	28	34	41	50
90%	2	3	4	5	6	8	11	15	16	21	26	31	39	48
85%	2	3	4	5	6	8	11	14	15	20	24	29	37	45
80%	2	3	4	5	6	7	10	13	15	19	23	27	35	42
75%	2	3	4	4	5	7	10	12	14	18	22	26	33	39
70%	1	2	3	4	5	6	9	11	13	17	20	24	31	36
65%	1	2	3	4	4	5	8	10	12	15	19	23	29	34
60%	1	2	3	3	4	5	7	9	11	14	17	21	26	31
55%	1	1	3	3	4	4	7	8	10	13	16	19	24	29
50%	1	1	2	3	3	4	6	8	9	12	14	18	22	26
45%	1	1	2	3	3	4	6	7	8	11	13	16	20	24
40%	1	1	2	2	3	4	5	7	7	10	12	14	18	21
35%	1	1	2	2	2	4	5	6	6	9	10	12	15	18
30%	0	1	2	2	2	3	4	5	6	7	9	11	13	15
25%	0	1	1	1	2	3	3	4	5	5	7	9	11	13
20%	0	1	1	1	2	2	3	3	4	5	5	7	9	10
15%	0	0	1	1	1	1	2	3	3	4	4	5	6	8
10%	0	0	0	1	1	1	2	2	2	3	3	3	4	6
5%	0	0	0	0	0	0	1	1	1	2	2	2	3	3
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0

## Consumer benefits

Aprilaire humidifiers provide an exciting revenue opportunity for your business because while consumers can’t see humidity directly, they can see and feel the many benefits provided by a whole-home solution. Ensure all your customers understand how dry air impacts their family’s health, comfort and the preservation of their home.

## Comfort

Most homeowners experience the effects of indoor RH every day, even if they don’t realize it. Anyone who has taken a hot shower in winter knows the feeling of stepping out into a muggy bathroom that’s 75 degrees with 70% humidity. It’s warm and cozy even though you’ve left the hot water. However, step out into the hallway and things feel drastically different! While the temperature is only a few degrees cooler, the RH is closer to 10%, making you feel like it’s frigid in the rest of the house. Turning up the heat won’t help if RH is not controlled, because the evaporative cooling

process will continue. No doubt your customers have also experienced painful static shock in the winter time. This is caused by the dry air that is in everyone’s house during the heating season. Improving comfort requires maintaining proper RH (35–45%) throughout the house.

## Health

Comfort and health are often related. If homeowners are experiencing symptoms of dry air, their family could be at risk for nosebleeds, dry skin, sore throats and even the flu. Without proper humidification, our bodies dry out and that makes us more susceptible to cold and flu viruses. The relationship between health and humidity is recognized by the medical community. Dr. Arthur W. Proetz, as quoted in the Annals of Otology, Rhinology, and Laryngology, explains that our bodies weren’t built to cope with the extreme dryness we encounter indoors in the wintertime. In regard to indoor RH levels, “35% would be regarded as a passing grade but 40% as something to shoot for.” Aprilaire has a whole-home humidifier to bring any customer’s home to this level.



*Increasing the humidity of the home helps eliminate the dry air that can irritate and inflame the respiratory passages in the nose and throat and can relieve the discomforts of colds and the flu.*

SOURCE: A.D.A.M. Health Encyclopedia

*There is as yet no cure for the common cold. The most important preventative measure would appear to be the proper regulation of the humidity.*

SOURCE: Joseph Lubart, MD New York State Journal of Medicine



## The importance of humidity control

### Preservation

Humidity levels in the home greatly affect the quality, dimensions and weights of the materials used in a building's construction. Building materials and home furnishings contain certain amounts of water by nature. Just as moisture is drawn out of human skin in dry air, so too it is drawn out of wood, leather, plaster, cloth and nearly every item in the home. It is also damaging to expensive electronics.

For many homeowners, the most significant sign of dry air will be damage to expensive wood floors. In winter, as moisture is pulled out of the wood, cracks and gaps will appear in the floor. In the summer the floors will expand again. The changes caused by these RH swings can ultimately lead to failure of the floor and the homeowner is stuck holding the bill. Make sure your customers know that wood flooring manufacturers expect consumers to keep indoor humidity levels between 30–60%. Damage caused by dry air is not covered by the manufacturer's warranty or the flooring installer.

### Energy conservation

Dry air robs moisture from skin, making homeowners colder, which means they turn up the heat. Dry air also shrinks the framing around doors and windows, resulting in gaps that let in cold air from the outside, making a home less energy efficient.

The preservation benefit describes the change in the dimension of wood with a change in the surrounding RH. Heated air dries out and shrinks wood framing around doors and windows. Outside air infiltrates the home at these and additional locations, as a result of wind and chimney or stack effect.

Infiltration of outside air usually occurs at a home's envelope (perimeter walls, windows and doors). Framing around windows and doors—common points of infiltration—will not shrink or crack as much when proper RH levels are maintained inside the home. This will reduce infiltration and in turn improve energy conservation.

## Selecting a humidifier

### Benefits

Aprilaire has whole-home humidifiers for every kind of home. Our humidifiers provide capacity, control, efficiency and maintenance benefits that are second-to-none.

### Capacity

The average-size home requires about eleven gallons of water per day. If the humidifier can't deliver at least this much water, it is undersized and not recommended for most installations. Aprilaire has evaporative humidifier models that can produce up to eighteen gallons per day and steam units that provide more than thirty-four gallons per day. Refer to the "Sizing" section on page 14 for detailed information.

### Control

There is a direct relationship between capacity and control. If the capacity is not there, you simply cannot reach the RH levels required for comfort. An Aprilaire humidifier gives you the ability to not only have the correct capacity, but to also control it both manually and automatically.

### Operational Efficiency

Aprilaire humidifiers operate efficiently with minimal maintenance required. They have the ability to maintain RH at the manually set humidistat level but can also do this automatically. Aprilaire humidifiers are engineered to give your consumers peace of mind when installed properly; making expensive, time-consuming call backs a thing of the past.

With precise operation, Aprilaire evaporative and steam humidifiers are designed to perform to your customers' expectations.

### Ease of Maintenance

Just as one would maintain their car, a humidifier should have a scheduled maintenance program. Typically, humidifiers should be checked once a year. Many contractors offer service contracts to help consumers perform this task.

Aprilaire humidifiers are designed for simple and easy maintenance. The components are easy to clean or can simply be replaced with new parts, saving time and money.

### Ease of Installation

A professional heating and air conditioning contractor can install an Aprilaire humidifier quickly, with little interruption to the customer's home. Whether it is a plenum-mounted evaporative unit or a steam unit, the installation process for all Aprilaire humidifiers is fast and easy. They are designed to ensure trouble-free operation and high-efficiency performance.



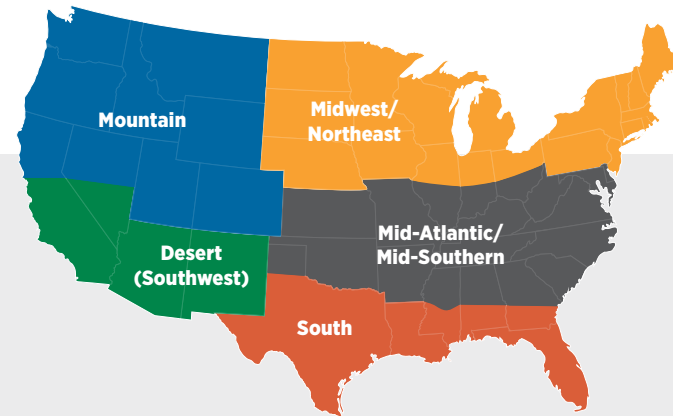
# Selecting a humidifier

## Regional applications

Aprilaire humidifiers can be installed on many different types of HVAC equipment and controlled to provide optimal humidity levels. This application guide is designed to assist in the selection of the appropriate Aprilaire product based upon geography and heating equipment.

Our humidifier product portfolio consists of evaporative flow through, fan-powered products and residential steam. It's important to consider the plenum temperature, air flow (fan speed) and run time (heat call primary, fan only call secondary) when selecting products.

Aprilaire's control strategy will maximize the humidifier run time/capacity. The automatic humidity controls have an integrated blower activation relay. This relay is factory set to "ON." It will turn on the humidifier and the HVAC blower for humidification without a heat call. This will dramatically increase the capacity of the humidifier. Installations with a manual humidifier control can increase capacity by turning the thermostat fan to "ON." When installing evaporative humidifiers, it's recommended they are plumbed to hot water.



## Application Map

This application map assists in the selection of the appropriate Aprilaire product based upon geography and heating equipment.

CLIMATE ZONE/RECOMMENDED SOLUTION BY MODEL					
Equipment	MIDWEST/NORTHEAST	MID-ATLANTIC/MID-SOUTHERN	MOUNTAIN	SOUTH	DESERT (SOUTHWEST)
Gas/Oil Furnace-Single Stage or Multi Stage*	400/500/600/700/800	400/500/600/700/800	400/500/600/700/800	500/600/700/800	800
Gas/Oil Modulating Furnace**	700/800	700/800	700/800	700/800	800
Heat Pump/Geo-Single Stage or Multi Stage*	400/500/600/700/800	400/500/600/700/800	400/500/600/700/800	500/600/700/800	800
Heat Pump/Geo-Modulating**	700/800	700/800	700/800	700/800	800
Boiler With AHU (No Heat Source)	800	800	800	800	800
Boiler With AHU and Hot Water Coil/ Hydro Air Unit	700/800	700/800	800	800	800
Boiler	865	865	865	865	865
Electric Baseboard Heating	865	865	865	865	865
Humidifying with A/C Unit	N/A	N/A	800	800	800

\*PSC, constant torque ECM

\*\*Variable speed ECM

\*Evaporative performance of bypass humidifiers decreases with lower airflow volume and lower air temperature. Bypass models can be used in these applications if the HVAC system pressure differential between supply and return ducts is at least 0.08 in. wg and air temperature, hot water and continuous fan in the supply duct is at least 100°F.

## Evaporative or steam technology

Evaporative and steam humidifiers are very different in their technologies. Evaporative humidifiers do not heat the water but use the HVAC system's heat draw through a water panel to turn the water to vapor. Steam humidifiers heat water to the boiling point, producing steam. Both technologies use the system blower to distribute humidity through the ductwork. Steam units can be mounted with a blower pack if a ducting system is not available.

Both technologies are effective at delivering the right levels of humidity throughout the home; however, it's important that the right product is selected to ensure consumer satisfaction.

Evaporative humidification is the best choice for applications where the unit can be mounted on the duct work. Evaporative products are easier to install, extremely reliable, last the life of the equipment and offer an attractive consumer price point. Steam products are ideal to fill application gaps where evaporative products cannot be installed or do not offer enough capacity. These gaps include lack of duct space on the plenum, attic or crawl space locations, in-floor heat, electric strip heat, boilers, hydronic heat and where systems experience short run times (typically in milder climates).



Evaporative Humidifier



Steam Humidifier

CHOOSING THE RIGHT PRODUCT FOR YOUR HOUSE			
	Application	Recommendation	
		Evaporative	Steam
Home Size	Up to 4,200 ft <sup>2</sup> tight home	✓	
	Up to 6,200 ft <sup>2</sup> tight home		✓
Other Variables	Space to mount on duct	✓	
	No freezing concerns	✓	
	Lowest cost to install	✓	
	Easiest to maintain	✓	✓
	Lowest cost to operate	✓	
	Low heating system run-time	✓	✓
	Heat pump installation	✓	✓
	Possibility of freezing		✓
	Cannot mount on duct		✓

# Evaporative humidification

Residential evaporative humidifiers are generally designed in one of two styles, bypass (1) or fan powered (2). The difference is how the air is delivered to the humidifier. In the bypass design, air is passed from the supply to the return. In the powered version, a fan is used to blow air through the unit.

### Easy to Maintain

It takes a couple of minutes to replace the water panel. For best performance, it's recommended the water panel be replaced annually.\*

### Long Life—Trouble Free

Trouble-free performance and minimum maintenance are ensured by the design features of the Aprilaire evaporative humidifier. All humidifier housing parts that come in contact with water are non-metal and will never rust or corrode. Neither heat nor water will affect them under normal operating conditions.

Periodic preventative maintenance should be conducted on the distribution tray directly on top of the water panel. It should be inspected annually and cleaned of excess mineral deposits. Yearly inspection of the feed tube and periodic cleaning of the orifice is all that's needed to extend the life of the humidifier. If properly maintained, an evaporative humidifier will last longer than the HVAC system on which it is installed.

### Ease of Installation

Evaporative humidifiers mount directly on the plenum of the HVAC system. Aprilaire offers NATE® certified classes to provide contractors with proper training.



### Convenience

The components that require significant cleaning can simply be replaced. Replacing a water panel is much easier and cost effective compared to hours of cleaning portable units. Many contractors will replace the water panel as part of a scheduled maintenance program for the HVAC system. This is a great way to grow revenue.

### Capacity

Evaporative humidifiers efficiently use the HVAC system to operate. The plenum temperature and blower from the furnace or air handler are used to produce humidity. The amount of time the plenum temperature is raised from a heat call is variable and so is the actual temperature; with heat pumps around 90°F and gas furnaces at 120°F. The HVAC blower is required to humidify, however, a raised plenum temperature from a heat call is not required if plumbed to hot water. These variables are all considered in the capacity chart on the specifications page (see page 17).

\*Twice per humidifier season for the Model 400

## Get green with greater comfort from Aprilaire

Whether your customer is updating a home to be more healthy, energy-efficient and sustainable or building a new green-certified home, Aprilaire offers a complete line of innovative products designed to improve the quality of indoor air.

# Sequence of operation

The water in evaporative humidifiers flows to the distribution tray located at the top of the humidifier. The water is uniformly distributed across the width of the tray and through a scientifically designed system of outlets. It flows by gravity over the water panel evaporator. Dry, hot air from the HVAC system is moved through the moisture-laden water panel evaporator. Natural evaporation takes place, and the now-humidified air carrying moisture in vapor form (nature's own way) is circulated throughout the home.

The correct water flow is determined by an orifice. When the humidifier is operating, the water that is not evaporated passes on to the drain (in the drain-equipped models). Trouble-causing minerals that are the inevitable result of water evaporation are either trapped by the water panel, contained in the scale control insert or flushed down the drain.

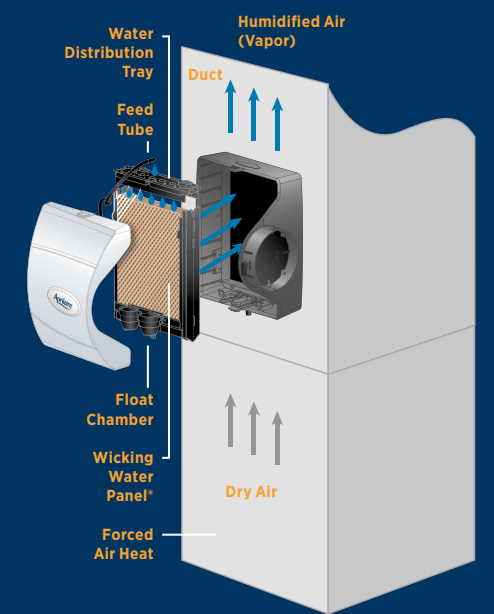
### Duct location

Fan-powered humidifiers are designed to be installed on the warm air supply plenum of forced air furnaces or heat pumps. If there is no space on the warm air supply plenum for the humidifier, the unit may be installed on the cold air return duct; however, you will need to supply the humidifier with hot water because the hot water will be the only heat source.

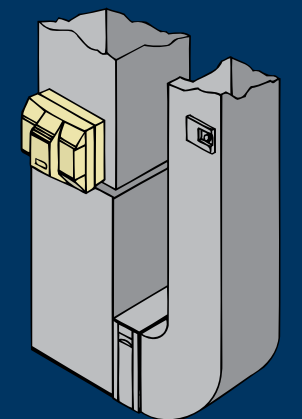
Bypass humidifiers are designed to be installed on the warm air supply plenum or cold air return of a forced air upflow, or downflow, horizontal furnace or heat pump. The humidifier is then ducted to the opposite side return or supply. The operation is the same regardless of which duct is used for the installation. Correct operation requires a minimum static pressure of 0.2" w.c.

### Water quality

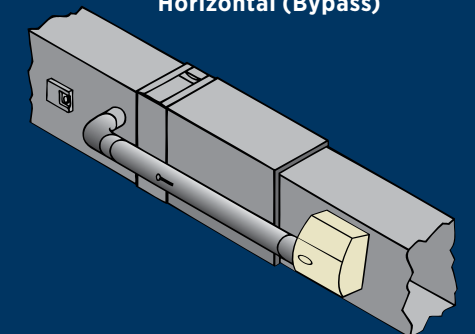
Evaporative humidifiers will perform with hard or soft water. It's recommended 140°F water be used for optimum performance; therefore, any time the humidifier will operate without a call for heat, you must plumb to hot water.



Upflow (Power)



Horizontal (Bypass)



# Steam maintenance

Residential steam humidifiers are generally designed using two fundamental technologies: electrode and resistive. While the end result of both technologies is the production of steam, Aprilaire utilizes electrode technology because of its benefits to the contractor and consumer. Aprilaire steam humidifiers are simple to install, operate and maintain.

Aprilaire steam units are offered with two operational technologies: on/off and modulation. With on/off control, the humidifier will operate at full capacity until the set point is reached. With modulating operation the humidifier’s output will vary depending on how close or far away indoor RH levels are from the desired set point.

## Simple to service and maintain

To create steam, water needs to be heated. With electrode technology, electrical current flows between submerged electrodes, resistance of the water to the electric current heats the water. The submerged electrodes are found in a replaceable canister. At the end of a humidifier season, the canister including the electrodes is replaced. No cleaning, no scrubbing, simply replace the canister and you’re ready for the next humidifier season.

Not only does the canister offer simple maintenance, it offers recurring revenue and a reason to interact with your consumer annually. For consumers, the opportunity to purchase a replacement item that eliminates the need to clean the unit is worth every penny. Aprilaire offers replacement canisters at reasonable prices to ensure the canister value exceeds the cost of cleaning.

## Limited water quality concerns

When water is heated, it boils and produces steam leaving behind deposits and minerals. Electrode technology requires impurities in the water to promote the transfer of electricity. For this reason, water filtration is not required

with electrode technology, minimizing the complexity of the installation and on-going operating costs. The unit will operate with water hardness between 3 and 36 grains—a very wide range. If reverse osmosis or deionized water is present, plumb unit to water line prior to those devices.

## Simple unit selection

The Aprilaire steam humidifier uses electricity to boil the water. The control algorithm in the unit manages the water level to ensure 11.5/16.0 amps of electricity is used when operating. The 11.5/16.0 amps is the same if it’s installed with 240v or 120v, leading to an increase in steam produced based on the voltage that is selected. This ability allows the same unit to be used for small and large homes.

## Easy to install

Included with every Aprilaire steam humidifier is a remote mounting kit, automatic digital humidifier control, dispersion tube, drain tube, saddle valve and mounting hardware. All parts required for a remote or duct install are included with the unit. Simply mount the unit, connect water feed and drain lines, and mount the dispersion tube in the duct and you’re done.

## Capacity

The Aprilaire Model 800 Steam Humidifier can add 11.5 to 34.6 gallons per day (GPD) of moisture to the air. Increased voltage leads to greater humidity capacity and 240 volts is recommend to achieve maximum potential.

## Sequence of operation

Aprilaire steam humidifiers deliver humidity to a home’s conditioned space through the use of the HVAC system ductwork. The humidifier operates utilizing electrode technology: current flowing between two electrodes in the disposable steam canister boils water to generate steam. Drain and fill valves in the humidifier work together to maintain the correct water level in the canister to satisfy the demand for humidity based on the electrical conductivity of the water.

## Dispersion technology

The proper speed and method of dispersing steam into the air stream is essential to avoid rusting ducts. Aprilaire steam humidifiers quickly deliver the hottest, driest steam to the air by utilizing “dispersion tubelets.” This technology prevents excess water from forming in the duct work when the dispersion tube is properly installed. Refer to the chart at the right for steam absorption distances within ductwork.

ABSORPTION DISTANCE (Minimum distance from dispersion tube downstream to any obstruction or bend in duct)					
Humidifier Output (gal/day)	Airflow Velocity*	75°F & 30% RH Setpoint	70°F & 45% RH Setpoint	65°F & 45% RH Setpoint	45°F & 45% RH Setpoint
Up to 16.0	300 fpm	13"	19"	23"	30"
	600 fpm	6"	10"	12"	18"
	1200 fpm	3"	5"	6"	13"
	1800 fpm	2"	3"	4"	10"
20.5-25.0	300 fpm	15"	23"	28"	45"
	600 fpm	6"	12"	13"	26"
	1200 fpm	5"	6"	7"	19"
	1800 fpm	3"	4"	5"	16"
25.0-35.0	300 fpm	24"	31"	36"	60"
	600 fpm	17"	22"	26"	48"
	1200 fpm	12"	15"	18"	25"
	1800 fpm	10"	13"	15"	20"

\*Velocity in feet per minute = Duct airflow volume in cubic feet per minute/duct area in square feet. Example: 1,200 cfm through 16" X 12" duct = 1,200/(12 X 16/144 sq. in./sq. ft.) = 1,200/1.333 = 900 fpm



# Steam maintenance

## Water Conductivity

Our steam humidifiers are optimized to work with the majority of water conditions and related conductivity and hardness—even artificially softened water. We also offer a low conductive (LC) canister for use in water that is by nature extremely soft—such as homes fed from a reservoir water source. The Model 800LC is also recommended in all 120VAC installations. The model 800LC canister should not be used in homes where the water is artificially softened with a water softener—use a model 800 canister in this application.



Replaceable Canister



Aprilaire Model 800

MODEL SELECTION BASED ON WATER CONDUCTIVITY			
Conductivity	Hardness	Water Characteristic	Recommended Model Installed at 208/240VAC
75-100	0-3	Naturally Soft	Model 800LC
100-300	3-9	Naturally Soft	Model 800LC
300-500	9-15	Slightly Hard	Model 800
500-650	15-20	Moderately Hard	Model 800
650-850	20-25	Hard	Model 800
850-1250	25-36	Very Hard	Model 800
Above 1250	Above 36	Extremely Hard	Installation Not Recommended

The Model 800LC will not work with water that has been artificially softened with a water softener. The Model 800LC is recommended for any installation regardless of water quality when installed at 120VAC.

## Canister replacement

Canister replacement is recommended every humidifier season and our steam humidifiers also have a service light that will turn on when the canister should be replaced due to low conductivity.

### Simple canister replacement:

1. Turn off power at the unit — unit will automatically drain.
2. When drain is finished, turn off electrical power to unit.
3. Remove front panel.
4. Disconnect electrodes, water sensor and hose clamp at top of canister.
5. Replace with correct canister (see “Model Selection” chart above) and provided O-ring.

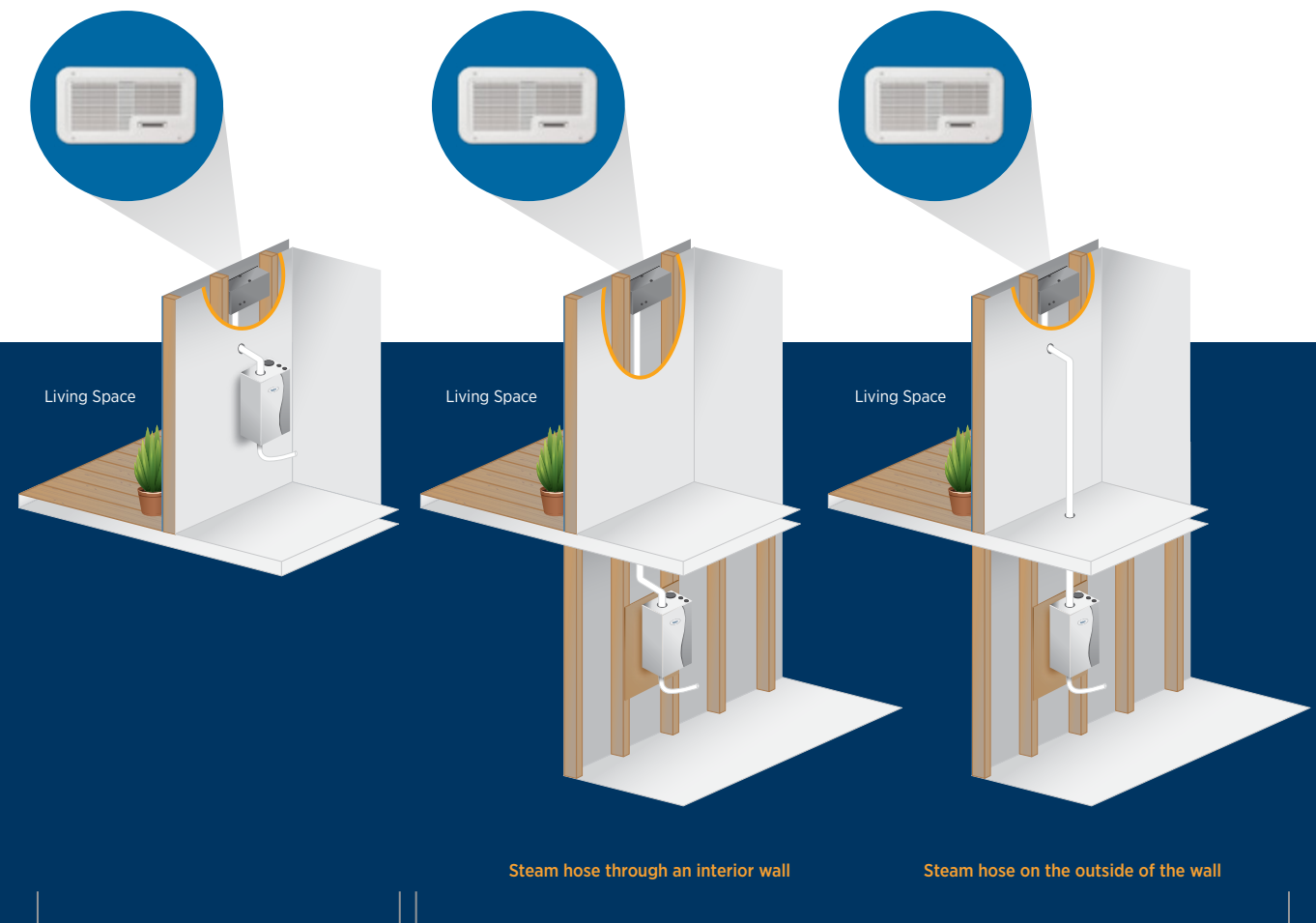
## Fan Pack

For homes without duct work or where duct work is not accessible, we offer a Fan Pack. The Fan Pack marries with the Aprilaire steam humidifier to provide humidity.

Applications that do not have forced air through a duct system to distribute air into the home are typically installed with the Aprilaire Model 865 ductless humidifier with Fan Pack. The Fan Pack is mounted in the conditioned space and distributes the humidity into the air. Humidity levels are adjusted in the living space by the Model 65 Humidifier control.



### Easy Installs, Versatile Applications



Steam Unit in Mechanical Room/Closet

Steam Unit in Basement



# Sizing

Sizing a humidifier is similar to sizing a heating and cooling system. The humidifier capacity required will be determined by various factors, including: the volume of area being humidified, the air change rate (infiltration or ventilation) and humidification load.

## Volume of humidified area

The volume can be determined from a floor plan or from measurements taken within the home. It's important to determine the volume, not just the square feet. Care should be taken to determine ceiling height or any open space such as vaulted ceilings. If the basement is heated and ventilated, its volume should also be included.



## Air change rate (Infiltration or Ventilation)

The amount of infiltration is usually calculated when computing the heating and cooling load.

### AHRI defines structure types as follows:

- + **Tight construction:** ½ air changes per hour of air infiltration, well insulated with vapor retarders, tight storm doors, windows with weather stripping.
- + **Average construction:** 1 air change per hour of air infiltration, insulated with vapor retarders, loose storm doors and windows, dampered fireplace.
- + **Loose construction:** 1½ air changes per hour of air infiltration, usually built before 1930 with little or no insulation, no storm doors, no insulated windows, no weather stripping, no vapor retarders, undampered fireplace.

AHRI has also established a standard guideline for determining capacity ratings, which provides a means of comparing product specifications. Capacity is determined by the output of the device as if it operated 24 hours per day (AHRI Guideline F 2008).

## Other considerations

The typical family of four will generate two gallons per day of moisture from internal sources such as cooking, showering and breathing. This amount can be subtracted when sizing a humidifier.

HUMIDIFIER SIZING CHART GPD Needed Per Square Foot <sup>†</sup> Based on Building Structure Tightness							
Structure Tightness (8 Ft Ceilings)	1000 Ft <sup>2</sup>	1500 Ft <sup>2</sup>	2000 Ft <sup>2</sup>	2500 Ft <sup>2</sup>	3000 Ft <sup>2</sup>	4000 Ft <sup>2</sup>	5000 Ft <sup>2</sup>
Tight	4.3 GPD	6.4 GPD	8.5 GPD	10.6 GPD	12.7 GPD	17.0 GPD	21.2 GPD
Average	8.6 GPD	12.8 GPD	17.0 GPD	21.3 GPD	25.4 GPD	34.0 GPD	42.6 GPD
Loose	12.7 GPD	19.1 GPD	25.5 GPD	31.8 GPD	38.1 GPD	51.0 GPD	63.6 GPD

<sup>†</sup>AHRI Air Conditioning, Heating, and Refrigeration Institute GPD = Gallons Per Day Guideline F  
 A family of 4 will add 2 gallons of humidity per day through everyday activities like breathing, cooking, bathing and washing. Evaporative capacities assume blower is active 100% of the time, plenum temperature is at 120°F and water is cold.

# Controlling humidity

Determining the correct level of indoor relative humidity requires consideration of more than one variable. Humidity conditions that are ideal for comfort may be less ideal for other reasons. For instance, an indoor RH of 60% may be comfortable for a home's residents, but could also damage walls and furnishings. Condensation or fogging on windows is usually a sign that indoor RH levels are too high. This same condensation could also be taking place inside walls and other areas vulnerable to damage from excessive moisture.

The best humidity control plan will set safe limits for indoor RH that achieve maximum benefits without damage or condensation. The table below shows the recommended indoor RH based on outdoor temperature.

RECOMMENDED INDOOR HUMIDITY LEVELS	
Outdoor Temperature (°F)	Recommended Humidity (%)
+40	45%
+30	40%
+20	35%
+10	30%
0	25%
-10	20%
-20	15%

## Continuous automatic control

Aprilaire humidifiers feature Automatic Humidifier Control. This system monitors the outdoor temperature and automatically adjusts the humidifier so that it provides the optimum RH level to the home. This set-it-and-forget-it control allows the humidifier to always provide the optimal humidity level and can provide up to 50% more moisture than other humidifiers.

The optimal levels of relative humidity in the home fluctuate with the change in outdoor temperature. An Aprilaire automatic humidifier, evaporative or steam, continually monitors and responds to both outdoor temperatures and indoor relative humidity, delivering optimum levels of humidity throughout the home. There is no need to monitor the settings.



# Humidifier controls

## Digital control

Our digital humidistats are simple to read and keep the homeowner informed on the status of the humidifier. The control has lights to indicate when the water panel should be replaced and when to contact you for service.



## Wi-Fi control of humidity

Aprilaire Wi-Fi Thermostats with IAQ Control provide the most convenient and accurate control of humidity and temperature. Automatic Humidity Control is integrated into the thermostat, and the app allows homeowners to easily control temperature and humidity levels anywhere from a mobile device. The app also provides control for other installed Aprilaire IAQ products for optimum fresh air ventilation and air purity and keeps users up-to-date about changing climate conditions in their homes.

### Wi-Fi Thermostats from Aprilaire have many benefits, including:

- + Event-Based™ Air Cleaning and Fresh Air Ventilation.
- + Temperature overrides for instant comfort (“Heat Blast”) and maximum energy savings (“Away”).
- + Differentiates your business from the big-box stores.
- + 3-Day weather forecast with pollen and mold levels.
- + “Product not installed” screens suggest IAQ upgrades, promoting additional revenue.
- + Can send service, maintenance, temperature and indoor RH alerts to customers.
- + Easy-to-access navigation: in-app navigation bar shows all control options and status of equipment.

## Modulating humidifier control operation

To modulate the steam output of the Model 801, a modulating control must be used.

When the modulating control detects RH below the set point, the humidifier energizes the electrodes in the canister to provide steam. Humidification may be required when there is no need for heating or cooling. For this to occur, the HVAC system’s blower must be activated before steam is introduced to the duct. If the modulating control does

not activate the HVAC system on a call for humidity we recommend using a blower activation relay. The modulating control will vary the modulating steam humidifier’s output based on the difference between the set point and actual RH. The modulating control sends a proportional signal to the modulating steam humidifier providing precise control of the living space humidity. Humidity can also be distributed directly into the living space via the Fan Pack. Refer to the Model 866 operation and specifications for more detail.

	Humidifiers	Type of Humidification	Unit Size Width x Height x Depth	Plenum Opening	Capacity GPD = Gallons Per Day	Electrical Data	Water Panel/ Canister
800 Series	#800** #801***	<b>Steam Humidifier</b> For applications when evaporative units are less practical (attics, crawl spaces, closets, milder winter climates, non-forced-air heating source).	10 <sup>1</sup> / <sub>8</sub> " x 20 <sup>7</sup> / <sub>8</sub> " x 7 <sup>1</sup> / <sub>8</sub> "	-	11.5 GPD 16.0 GPD 20.5 GPD	120V 60Hz 11.5 AMP 120V 60Hz 16 AMP 208V 60Hz 11.5 AMP	80**
	#865 #866***	<b>Ductless Humidification System</b> Includes the Model 800, Fan Pack, Model 65 Control and Model 4028 Drain Trap. For homes without forced-air heating systems.	<b>Fan Pack:</b> 14" x 6 <sup>2</sup> / <sub>32</sub> " x 3 <sup>1</sup> / <sub>16</sub> " <b>Finished Grille:</b> 16 <sup>3</sup> / <sub>16</sub> " x 9" x 1 <sup>3</sup> / <sub>32</sub> "	-	30.0 GPD 23.3 GPD 34.6 GPD	208V 60Hz 16 AMP 240V 60Hz 11.5 AMP 240V 60Hz 16 AMP	
700 Series	#700* #700M**	<b>Powered Unit</b> Built-in fan that pulls heated air directly from the furnace.	15 <sup>29</sup> / <sub>32</sub> " x 18" x 10 <sup>1</sup> / <sub>32</sub> "	W: 14 <sup>3</sup> / <sub>4</sub> " H: 14 <sup>1</sup> / <sub>16</sub> "	18 GPD	120V 60Hz 0.8 AMP	35
600 Series	#600* #600M**	<b>Bypass Unit</b> Uses the furnace blower to move air through a Water Panel®.	15 <sup>3</sup> / <sub>8</sub> " x 15 <sup>3</sup> / <sub>4</sub> " x 10 <sup>3</sup> / <sub>4</sub> " 6" dia. round opening	W: 10" H: 12 <sup>3</sup> / <sub>4</sub> "	17 GPD	24V 60Hz 0.5 AMP	35
500 Series	#500* #500M**	<b>Bypass Unit</b> Designed for smaller homes.	15 <sup>5</sup> / <sub>8</sub> " x 13" x 10 <sup>3</sup> / <sub>4</sub> " 6" dia. round opening	W: 9 <sup>1</sup> / <sub>2</sub> " H: 9 <sup>1</sup> / <sub>2</sub> "	12 GPD	24V 60Hz 0.5 AMP	10
400 Series	#400* #400M**	<b>Bypass Unit</b> Uses 100% of water and evaporative technology that eliminates the need for a drain. <b>Conserves Water.</b>	15 <sup>3</sup> / <sub>8</sub> " x 15 <sup>3</sup> / <sub>4</sub> " x 10 <sup>3</sup> / <sub>4</sub> "** 6" dia. round opening <small>See note on heat pumps†</small>	W: 10" H: 12 <sup>3</sup> / <sub>4</sub> "	17 GPD	24V 60Hz 0.5 AMP	45
300 Series	#360, #350	<b>Self-contained</b> Designed for homes with radiators or baseboard heat.	<b>Model 360:</b> 13 <sup>3</sup> / <sub>4</sub> " x 12 <sup>3</sup> / <sub>4</sub> " x 12 <sup>1</sup> / <sub>2</sub> " <b>Model 350:</b> 13 <sup>3</sup> / <sub>4</sub> " x 12 <sup>3</sup> / <sub>4</sub> " x 15"	-	12 GPD	<b>Model 360:</b> 120V 60Hz 0.7 AMP <b>Model 350:</b> 120V 60Hz 0.9 AMP	35

HUMIDIFIER SIZING GUIDELINES GPD Needed Per Square Foot† Based on Building Structure Tightness							
Structure Tightness (8 Ft Ceilings)	1000 Ft²	1500 Ft²	2000 Ft²	2500 Ft²	3000 Ft²	4000 Ft²	5000 Ft²
<b>Tight</b>	4.3 GPD	6.4 GPD	8.5 GPD	10.6 GPD	12.7 GPD	17 GPD	21.2 GPD
<b>Average</b>	8.6 GPD	12.8 GPD	17 GPD	21.3 GPD	25.4 GPD	34 GPD	42.6 GPD
<b>Loose</b>	12.7 GPD	19.1 GPD	25.5 GPD	31.8 GPD	38.1 GPD	51 GPD	63.6 GPD

\*Automatic Digital Control (shown)

\*\*Manual Control - For those rare occurrences where an automatic control is not practical, Aprilaire offers the same great humidifiers with a mechanical control.

\*\*\*801 & 866 Modulating Steam Humidifier - For precise RH control. Controls are sold separately.

† Heat Pumps - Model 400 can be installed in heat pump applications. However, due to the fact that heat pumps deliver lower temperature air to the home than gas furnaces, evaporation will be approximately 60% of rated capacity. (With other Aprilaire models, hot water can be used instead of cold to maximize evaporation. However, due to the nature of the wicking water panel in the Model 400, hot water provides less benefit). As such, your dealer will need to take the size and age of your home into consideration to ensure the Model 400 will provide satisfactory comfort and protection through adequate humidification.

\*\*Model 800LC available with 80LC canister for less conductive water 75-300µS/cm and 120VAC applications.

†AHRI Air Conditioning, Heating, and Refrigeration Institute GPD = Gallons Per Day Guideline F

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Bypass Humidifiers - Can be installed on the supply or return plenum.

Water Usage Rate - Models 350, 360 and 700 are 6 gph (gph=gallons per hour); Models 500 and 600 are 3 gph; Model 400 is 0.7 gph; Model 800 is 0.6 to 1.8 gph depending on voltage, amp draw and water quality.



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