

Humidification for Unico Heating Systems

Unico, Inc. has solicited recommendations from residential size humidifier manufacturers as to their models that would be compatible with the Unico System recognizing the factors listed above. These recommendations are shown in Tables 1 through 3 for the responding manufacturers for the specific applications that are discussed in the following paragraphs.

While Unico, Inc. is passing these recommendations on to the installers and users, Unico, Inc. assumes no responsibility for the selections and recommends that the individual humidifier manufacturers be consulted for their detailed installation procedures. It is not intended that this list is complete, as there are some manufacturers that did not respond and some new to the market place that may have applicable equipment. There are also two manufacturer's models that may be applicable to the Unico System that requires further testing as listed in Table 4.

Introduction

To consider humidification with the *Unico System* heating system the following factors must be taken into consideration:

- 1.) **Higher operating static pressure.** typically, 373 Pa [1.5 inches water column] on the supply side compared to conventional systems at 37 to 125 Pa [0.15 to 0.50 inches of water].
- 2.) **Small ductwork system.** The plenum (main duct) is either 228 or 178 mm [9 or 7-inch] diameter, or 165 × 165 mm [6.5 x 6.5-inch] square.
- 3.) **Reduced airflow.** Based on cooling capacity, it may be in the range of 32-40 L/s per kW [20-25 cfm per 1000 Btuh]. For hot water coils, and especially where cooling capacity may not dictate airflow, the airflow may be between 12-48 L/s per kW [8-30 cfm per 1000 Btuh], depending on the water temperature.
- 4.) **Installed in un-conditioned spaces.** The *Unico System* is often installed in attics, garages, or crawl-spaces, which may be subject to freezing temperatures.
- 5.) **High duct velocity.** The supply duct velocity ranges between 7-13 m/s [1500-2500 fpm].

Unconditioned Spaces

Free-standing Humidifiers. For systems located in un-conditioned spaces, such as attics, unheated garages or basements, the humidification systems which require wa-

ter feed lines can not be located in the potentially freezing ambient. In these cases the safest choice for a humidifier is one that is self-contained and independent of the heating system. See Table 1 for recommended models. Moisture from a centrally located humidifier does a good job of migrating to all areas of a structure where rooms are kept open enough to communicate with the location of the humidifier. However, locating the self-contained unit immediately below or in the vicinity of the central return air for the Unico System can enhance the distribution of humidified air throughout a building.

Conditioned Spaces

Where the Unico System is located in conditioned spaces and where there is no danger of freezing of water lines there are additional choices. These are listed in the following paragraphs from highest to lowest recommended.

- 1.) **Heated Pan or Steam Type Humidifiers.** One of the more viable choices is the heated pan or steam type humidifier that can be mounted in the supply or return plenum. See Fig. 1 for detail of placement. In such cases the plenum should be insulated sheet metal. Because of the small plenum size and high pressure of the *Unico System*, the return location would be a better choice. A plenum box can be fabricated to match the end of the *Unico System* coil module and the humidifier mounted through the side or

Table 1. Self-Contained, Independent of the Heating System

Manufacturer	Model	Capacity *
Aprilaire Division Research Products P.O. Box 1367 Madison, WI 53701 (800) 334-6011	350-For Basement Installation	45 L/day [12 gpd]
	360-Installed through the wall	45 L/day [12 gpd]
Nortec Industries, Inc P.O Box 698 Ogdensburg, NY 13669 (717)665-9271	N200 @240v (1.64 kW) RES Electrode Steam Type	48 L/day [12.8 gpd]
Skuttle Route 10, Box 51 Marietta, OH 45750 (800)848-9786	60-BC1, Free standing unit with cabinet	49 L/day [13 gpd]
Walton Laboratories 90 Dayton Ave. Passaic, NJ 07055 (973)815-1001	ELC 1.1/8A (120v, 1 phase)	30 L/day [8 gpd]
	ELC 3.1/14A (120v, 1 phase)	49 L/day [13 gpd]
	ELC 2.1/4A (208-230v, 1 phase)	30 L/day [8 gpd]
	ELC 2.1/8A (208-230v, 1 phase)	60 L/day [16 gpd]
	Electrovap Compact Models	

*Capacity is the maximum rating in gallons per day (gpd)

on the bottom of this box that should be insulated. When mounting through the side, keep the humidifier as low as possible so obstruction of the airflow is minimized and permit the air to flow across the top of the humidifier-evaporating pan.

Table 2. Steam Humidifiers – Duct Mounted

Manufacturer	Model	Capacity *
Honeywell, Inc 1985 Douglas Drive North Golden Valley, MN 55422 (800)345-6770, ext.7204	HE 420	49 L/day [13 gpd]
	HE 460	64 L/day [17 gpd]
Skuttle Route 10, Box 51 Marietta, OH 45750 (800)848-9786	60-1	49 L/day [13 gpd]
	60-2	64 L/day [17 gpd]
	Use optional flush timer	
Autoflo, EWC Controls, Inc. 385 Hwy 33 Englishtown, NJ 07726 (800)446-3110	S2000**	60 L/day [16 gpd]
	S2020**	83 L/day [22 gpd]
	Have built in flush timers	

*Capacity is the maximum rating in gallons per day (gpd)
**These models are not recommended for installation on the *Unico System* return duct and require a minimum of 500 CFM for proper operation.

To minimize mineral build-up be sure to use a humidifier that has a flush timer that replaces the water in the pan periodically. If not built in, it should be available as an optional accessory (e.g. Skuttle). Be sure to follow the manufacturer’s instructions for periodic cleaning to remove any mineral build-up. See Table 2 for model listings.

- Power Humidifiers.** Several manufacturers make a humidifier that mounts on the supply plenum and pulls air into the unit past a wetted pad and discharges the moistened air back into the supply air stream at the same location. These humidifiers depend on the heated air to evaporate the moisture so installation on the return where air is about room temperature would significantly degrade performance. While some manufacturers have indicated using hot water will increase the evaporation rate, other manufacturers that indicate their testing shows that

Table 3. Power Humidifiers

Manufacturer	Model	Capacity *
Aprilaire Division P.O Box 1367 Madison, WI 53701 (800)334-6011	760A**	68 L/day @ 49°C [18 gpd @ 120°F] Air Temp
Honeywell Inc. 1985 Douglas Drive North Golden Valley, MN 55422 (800)345-6770, ext. 7204	HE 360**	68 L/day @ 49°C [18 gpd @ 120°F] Air Temp
Trion, Inc 101 McNeill Rd Sanford, NC 27331 (800)227-3917	G-100	72 L/day @ 49°C [19 gpd @ 120°F] Air Temp

*Capacity is the maximum rating in gallons per day (gpd)
**These models are not recommended for installation on the *Unico System* supply plenum.

using hot water does very little to boost evaporation rates contest this. Having this information Unico, Inc. is recommending that power humidifiers be installed on the return side only when there is no other viable option because of the likelihood of capacity reduction. No power humidifier manufacturer had any performance data for normal return air temperatures, such as 21°C [70°F] but capacity was estimated at 50% of the rated performance at 49°C [120°F] air temperature.

Since the static pressure in the *Unico System* supply plenum is typically 373 Pa [1.50 I.W.C.] the power humidifier must withstand this static pressure to operate properly. The first two power humidifiers listed in Table 3 are not recommended for installation on the supply plenum of the *Unico System*; the manufac-

Table 4. Humidifiers Requiring Testing

Manufacturer	Model	Capacity *
Walton Laboratories 90 Dayton Ave. Passaic, NJ 07055 (973)815-1001	WF-HP-226	30 L/day [8 gpd]
Nortec Industries P.O Box 698 Ogdensburg, NY 13669 (717)665-9271	D200 @240v, 1.64kW RES Electrode Steam Type	48 L/day [12.8 gpd]

*Capacity is the maximum rating in gallons per day (gpd)

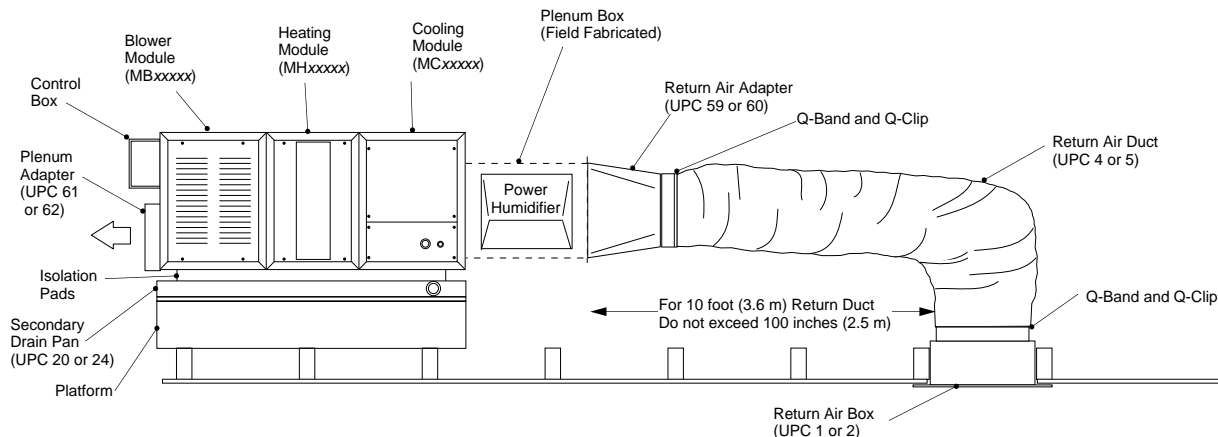


Fig 1. Typical Humidifier placement within the *Unico System*

turers have indicated these units should not be operated at static pressures over 75-100 Pa [0.30 to .40 I.W.C.]. The manufacturer of the third power humidifier listed, Trion Model G100, has indicated that their unit will operate satisfactorily at the higher static pressure. To mount the humidifier in the supply plenum, it would be necessary to fabricate a rectangular plenum box and mount the humidifier on the side of the plenum box.

- 3.) **Atomizing Humidifiers.** We do not recommend this type of humidifier with the Unico System after consulting with several manufacturers. There is a potential for moisture collecting on the inside surfaces of the duct. This is compounded by the high velocity air which would require too great a distance to properly mix.
- 4.) **Bypass Humidifiers.** Some humidifiers use a wetted pad and bypass a small amount of supply air through the pad and into the return. The unit normally is mounted on the return duct. These humidifiers are generally not designed for the higher static pressures of the Unico System; therefore, they may leak air. Also, the amount of bypass air is usually about 100 CFM (4.7 L/s) which poses a problem if allowed to bypass for any type of refrigerant system. The Unico System is a low-airflow system and bypassing air can reduce performance and create freeze-up problems for refrigeration systems.

For chilled water or hot water systems, a bypass humidifier is acceptable provided it does not leak or degrade performance to an unacceptable level.

- 5.) **Other humidifiers.** The survey of humidifier manufacturers has uncovered two manufacturer's models that may have applicability to the *Unico System* but are not being recommended at this time. Further testing must be undertaken to establish the appropriate installation parameters and performance criteria. These models are shown in Table 4.

The Walton Model WF-HP-226 is an atomizing type that should be mounted on the supply side only. Because of the smaller size of the Unico plenum, tubing must be used to connect between the intake and discharge tubes on the humidifier and the plenum. Testing is necessary to determine placement of these tubes, establish length limitations and routing. When using this atomizing type of humidifier it must be recognized that any minerals in the water can be deposited inside the humidifier and also carried into the living space. To prevent this the manufacturer recommends installing an optional De-mineralizing cartridge on the water line.

The Nortec D200 has a steam-generating unit that feeds steam through a hose to a nozzle that is

mounted in the side or on the bottom of the duct. Testing is necessary to determine nozzle placement and length of hose limitations. Nortec has designed their units (this includes the Model N200 in Table 1) with a disposable cylinder where mineral deposits are collected. This cylinder is replaced after about 2000 hours of operation.

Cooling Only

Where the *Unico System* is used only for cooling and a separate central heating system is being used, it is possible to use the *Unico System* blower to distribute humidified air to the house if certain precautions are taken. Depending on the location of the system (i.e. un-conditioned or conditioned space) the appropriate system can be selected from the tables. However, since the cooling-only air-handling unit would not normally be circulating air during the heating season, it must be energized whenever humidification is required. If the *Unico System* is located in un-conditioned space, additional precautions are necessary to prevent condensation in the ductwork and continuous air circulation (CAC) should be used. Also recognize that air is flowing through ductwork in an unheated space and air discharging into the conditioned space will be cold. Adding a small amount of heat with a 5kW electric duct heater is one way to overcome this problem.

Winter Shut-off Plugs

When a *Unico System* for cooling only is installed in an unconditioned space and used in conjunction with other heating systems, such as in-floor heating, baseboard hydronic or electric ceiling cable or baseboard, and adequate humidification is being provided then it is imperative that the winter shut-off plugs be inserted into the *Unico System* outlets to prevent condensation inside the duct work (See Fig. 2). All return air openings must also be blocked off.

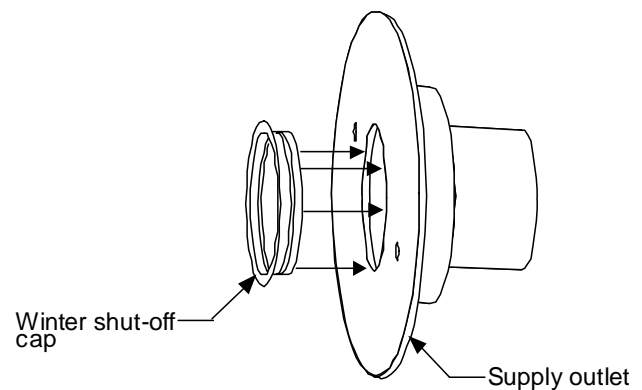


Fig 2. Winter shut-off cap placement