

**CARNES STEAM HUMIDIFIERS** are ideal for light commercial applications and premier home or condominium installations.

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Status display visible with door closed and locked.



Hinged door provides full access for service.



Steam cylinder easily removed for replacement.

## *Pure, Clean Steam!*

### **Two Sizes Available**

Size 005 satisfies areas up through 1400 square feet. Size 010 will humidify areas up through 2800 square feet under normal conditions. If multiple furnaces are used a separate humidifier should be used for each.

### **Pure, Clean Steam vs. Evaporative**

Because of their purity steam humidifiers have been used in critical applications such as hospital operating rooms, computer rooms, and electronic manufacturing for years. Evaporative humidifiers do not boil water and provide a place for organisms to accumulate and grow.

### **Sealed Cylinder vs. Pad**

The sealed disposable plastic cylinder captures the hard mineral deposits that are left behind by boiling water. Only pure steam vapor leaves the steam cylinder and the mineral residue is completely harmless. Since the water is sterilized each time the cylinder operates there is no possibility of slimy residue that is objectionable to handle.

### **Maintenance**

Typical maintenance consists of changing the plastic steam cylinder after 500 to 2000 hours of operation. A "Service" light on the humidifier conveniently indicates the need for service. Changing the plastic cylinder usually takes ten minutes. Typical evaporative humidifiers do not have any indication of their need for service and no warning is given until humidity drops below the desired levels.

### **Modulating Control vs. On-Off**

A highly desirable feature of Carnes humidifiers is the ability to modulate the output to meet humidity requirements. This option allows the humidifier to automatically adjust its output to match the amount of humidity required. Evaporative humidifiers are either on or off, allowing humidity levels to fluctuate which can provide spikes of low and high humidity.

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Electronic  
Steam  
Humidifiers

HRAA

**CARNES STEAM HUMIDIFIERS** use a microprocessor, digital display, and LED's to provide superior operating and diagnostic functions to simplify troubleshooting and reduce maintenance costs.

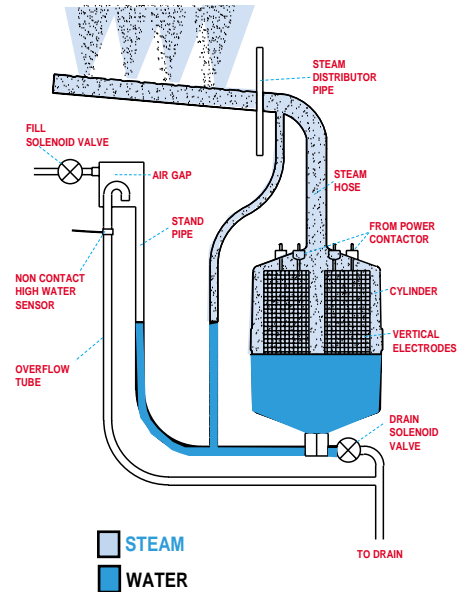
## OPERATION

Upon a signal from a humidistat the circuit board opens a **fill solenoid valve**, allowing water to flow across a 1" **air gap** into a **standpipe**. The air gap prevents back flow to the water supply and prevents the cylinder from becoming a pressure vessel.

The circuit board also closes a **power contactor** allowing current to flow to **vertical electrodes** sealed inside the cylinder. Current flows between the electrodes using minerals in the water as a conductor. The water is heated to boiling and converted to steam, which leaves the cylinder through the flexible **steam hose**.

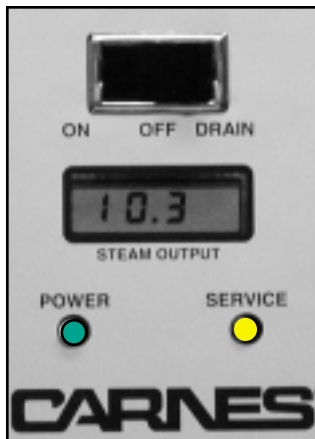
The circuit board automatically opens the fill solenoid valve when more water is required to maintain the desired output rate. The operation of the **drain solenoid valve** is also controlled by the circuit board, to provide stable operation and long cylinder life.

As mineral deposits build up in the cylinder the water level will slowly rise to cover more electrode surface to maintain the desired steam output rate. When mineral deposits have covered all available electrode surface areas, current flow will be reduced so that the desired steam output cannot be reached. The service light will signal the need for maintenance.

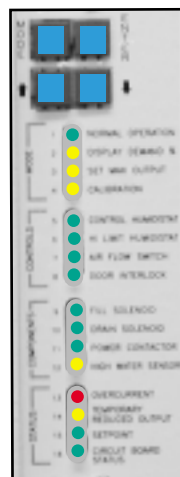


## DISPLAY AND DIAGNOSTIC INFORMATION

**Front Panel Display**



**Internal Diagnostic Display**



The front panel "On-Off-Drain" switch is used to control the basic functions of the humidifier. The "Drain" position is used to drain water from the steam cylinder. The LED display shows the actual steam output rate. The "Service" LED is on whenever steam output is less than 50%.

"Mode" button switches between "Normal Operation", "Display Demand%", "Set Max Output" and "Calibration" functions.

Separate LED's for "Control Humidistat", "Hi Limit Humidistat" and "Air Flow Switch" light if controls are allowing the humidifier to operate.

"Fill Solenoid", "Drain Solenoid", and "Power Contactor" LED's light when the circuit board is operating those components. "High Water Sensor" LED lights when water has been detected by the sensor located on the overflow tube.

"Overcurrent" LED lights when the circuit board has detected an over current situation in the steam cylinder and the humidifier is placed in a standby mode to prevent unsafe operation. "Temporary Reduced Output" LED may be on at the end of steam cylinder life. "Setpoint" LED lights whenever the actual steam output is at or above the setpoint of the humidifier. "Circuit Board" LED pulsing is normal.

## ELECTRICAL DATA

Max. Sq. Ft. Humidified Area*	Carnes Model	Maximum Lb./Hr.	kW	Voltage	Phase	Line Amp Rating	Recommended Disconnect Size (Amps)	Cylinder
1400	HRAAA U 005	5	1.7	120	1	14.4	20	HXCBAX220
1400	HRAAD U 005	5	1.7	230	1	7.5	15	HXCBAX380
2800	HRAAD U 010	10	3.4	230	1	15.0	20	HXCBAX380

U = UL

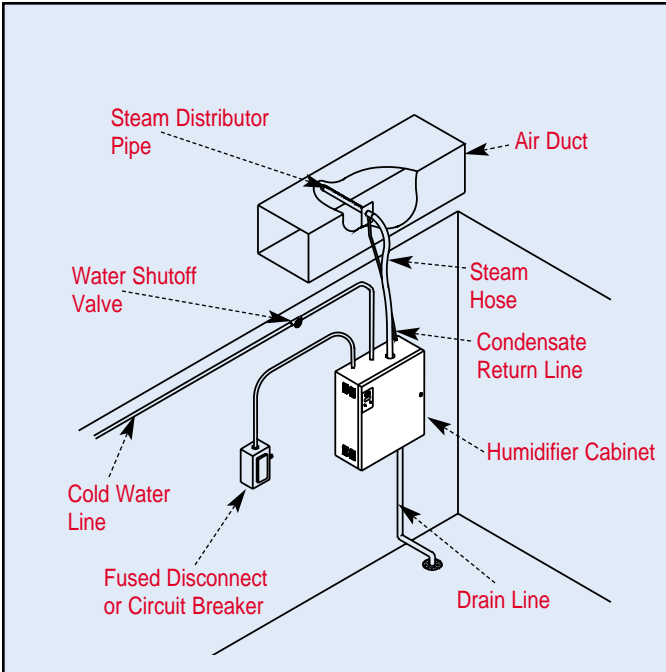
C = cUL



\*Based on average conditions. For complete load calculation see Carnes Mega Catalog or visit Carnes website at [www.carnes.com](http://www.carnes.com).

**CARNES STEAM HUMIDIFIERS** are designed for quiet, efficient operation and are easy to install.

### TYPICAL INSTALLATION



The **humidifier cabinet** with key locked door is usually located in area where other mechanical equipment such as a furnace or water heater is installed.

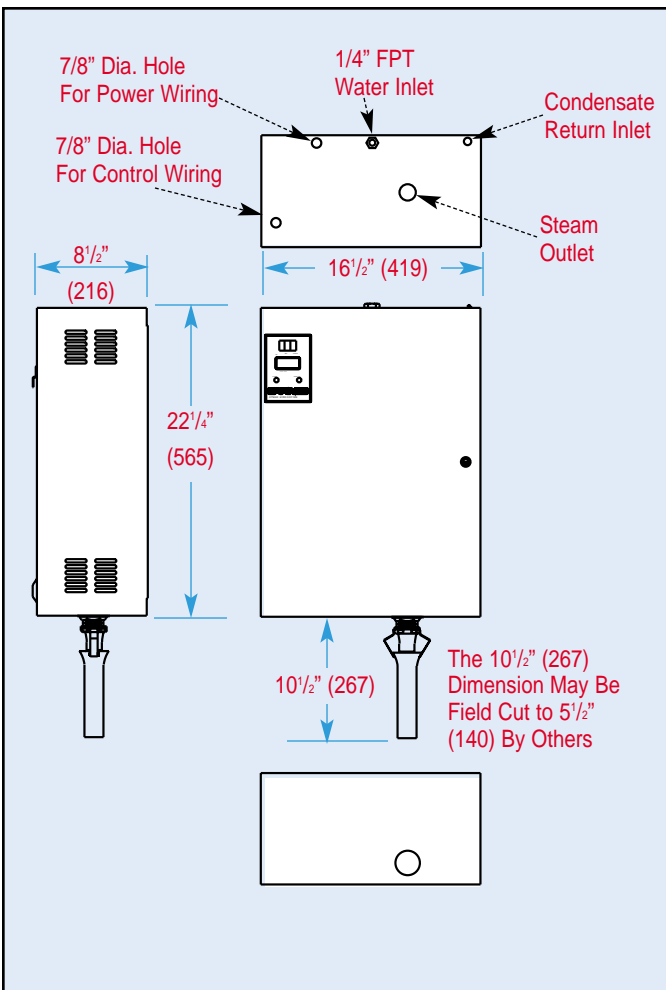
The unit must be connected through a **water shutoff valve** to a **cold water line** that is not treated by a water softener. Connections must be made to a 120 or 230 volt **fused disconnect** or **circuit breaker**. A **drain line** must be installed from the bottom of the humidifier to a convenient floor drain.

Steam is generated in the disposable plastic steam cylinder and transferred to the **steam distributor pipe** which must be located within 10 feet of the humidifier cabinet. Special **steam hose** is used to make the connection.

The steam is injected into the **air duct** to be distributed throughout the desired area. Any water that condenses within the distributor pipe is returned by a **condensate return line**.

The humidifier is controlled by a humidistat that can be located either in the humidified space or the return air duct. An airflow switch should be used to turn the humidifier off if there is no air moving in the duct where the steam is injected. A high limit humidistat may be used to prevent air in the duct from becoming too moist.

### HUMIDIFIER DIMENSIONS

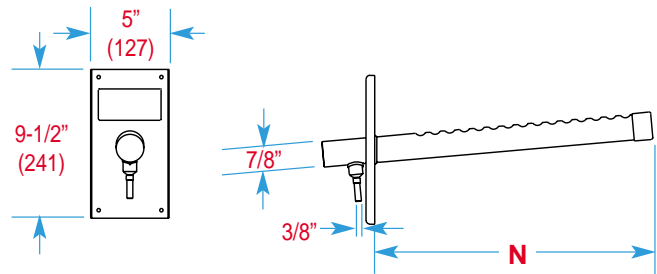


### DISTRIBUTOR PIPE & HOSE DIMENSIONS

Carnes steam distributor pipes are fabricated from copper with a brass mounting plate.

Select the longest pipe that will fit into the duct.

DISTRIBUTOR PIPE MODEL	"N" DIMENSION
HXPBB012	11-13/16" (300mm)
HXPBB018	17-13/16" (452mm)
HXPBB024	23-13/16" (605mm)



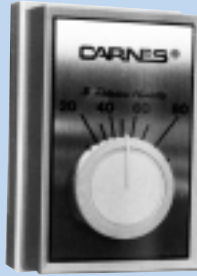
Carnes steam hose and condensate return line are available in either 5 or 10 foot lengths and may be field cut to the exact length needed. Both hoses are made from EPDM compound.

HOSE TYPE	MODEL	ID (Inches)	OD (Inches)
STEAM	HXSAB	7/8"	1-3/16"
CONDENSATE	HXRA	3/8"	5/8"

**CARNES STEAM HUMIDIFIERS** are available with a complete selection of accessories to provide accurate humidity control.

### WALL HUMIDISTAT, ON-OFF CONTROL

Model HXHAA



Mount this humidistat four or five feet above the floor in freely circulating air of the temperature and humidity about average for the entire space to be controlled. Avoid locations near hot or cold air ducts and discharge air from the humidifier. Scale range is from 10-90% RH. Differential is 5% non-adjustable. Case dimensions are 4-3/8" high, 2-7/8" wide and 1-5/8" deep including control knob.

### DUCT HUMIDISTAT, ON-OFF CONTROL

Model HXHAB



This duct mounted humidistat is installed in the return air duct to sense the humidity level in the area being served. Scale range is 15-50% RH. Differential is 4-6% non-adjustable. Case dimensions are 3-3/4" high and 2-3/8" wide. The humidistat projects 2-1/2" outside of the duct and extends 7-1/2" into the duct.

### WALL HUMIDISTAT, PROPORTIONAL CONTROL

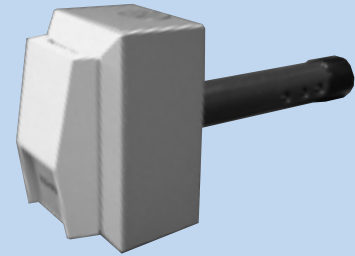
Model HXHCG



The wall mounted HXHCG humidistat uses a special sensor and electronic circuitry to modulate the output of the humidifier. The humidistat automatically adjusts the humidifier output to match the humidity requirements. This humidistat has a concealed setpoint adjustment with a locking cover. Setpoint range is from 10-90% RH. Case dimensions are 4-1/2" high, 2-13/16" wide and 1-1/4" deep.

### DUCT HUMIDISTAT, PROPORTIONAL CONTROL

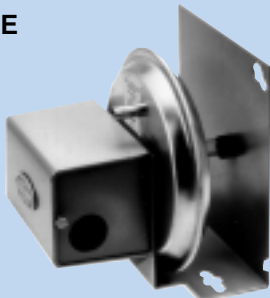
Model HXHCH



The model HXHCH can be mounted in either the return air duct when used to sense the humidity in the area being served or in the supply duct a minimum of 10 feet downstream of the steam distributor pipe when used as a high limit control. Setpoint range is 10-90% RH. Case dimensions are 4-1/2" high and 2-13/16" wide. The humidistat projects 3-1/2" outside of the duct and extends 5-3/4" into the duct.

### AIR FLOW SWITCH, PRESSURE DIFFERENTIAL TYPE

Model HXAEE



Air flow in the duct may be sensed by using this pressure differential switch. The differential in pressure between the interior and exterior of the duct closes a switch when air is moving. Air pressure differential as low as .07 w.g. may be sensed with this switch. Mounting plate dimensions are 4-3/4" wide, 5-1/8" high. The switch projects 4-3/8" outside the duct.

### HIGH LIMIT HUMIDISTAT

Model HXHAD



The model HXHAD is available to reduce the potential of condensation occurring in the supply duct. The control must be mounted a minimum of 10 feet downstream of the steam distributor pipe. Setpoint range is 15-95% RH. Differential is 5% non-adjustable. Mounting plate dimensions are 6-1/2" wide, 4-3/4" high. The humidistat projects 2-1/4" outside the duct and extends 1-1/4" into the duct.

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