

# LIGHT COMMERCIAL & PREMIER HOME OR CONDOMINIUM STEAM HUMIDIFIERS



Status display visible with door closed and locked.



Hinged door provides full access for service.



Steam cylinder easily removed for replacement.

## 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.

**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.

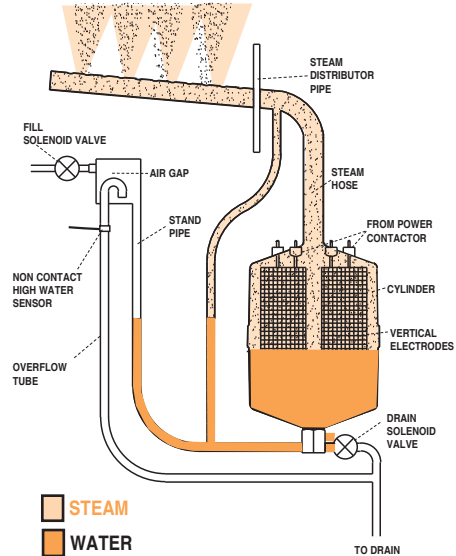
## OPERATION

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.

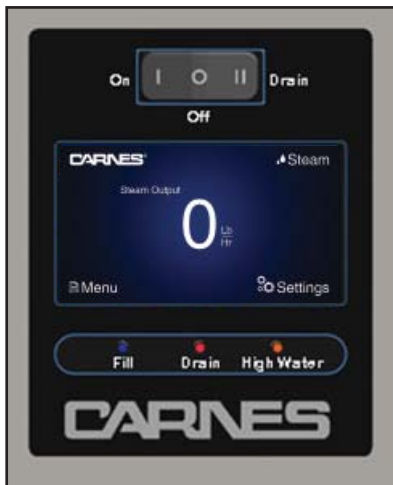
As mineral deposits build up in the cylinder the water level will slowly rise to cover more electrode surface to maintain the desired steam output rate. When mineral deposits have covered all available electrode surface areas, current flow will be reduced so that the desired steam output cannot be reached.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



## DISPLAY AND DIAGNOSTIC INFORMATION

### FRONT PANEL DISPLAYS & CONTROLS

The display on the front panel of the humidifier cabinet contains the "On-Off-Drain" switch, the LCD True Touchscreen display and the "Fill", "Drain", and "High Water" LED's.



### "ON-OFF-DRAIN" SWITCH

In the "On" position the humidifier will operate if all controls are calling for humidity. The "Off" position is used for seasonal shutdown if desired. The "Drain" position is used to drain water from the steam cylinder for maintenance. The fill solenoid valve will be on whenever the drain is activated to reduce the drain water temperature.

### LCD TRUE TOUCHSCREEN DISPLAY

The LCD True Touchscreen display offers a user friendly interface to control and monitor many aspects of the humidifier. The screen uses pressure sensitive technology. Depressing on the labeled buttons on the designated area of the screen will allow you to navigate through the different menu pages.

### HOME SCREEN

The "Home Screen" page is the main screen through which most other pages can be accessed. The "Home Screen" displays the current steam output in Lb./Hr. (or Kg/Hr., selected in "Settings"). The main "Home Screen" features four navigation buttons, Carnes logo (providing contact information to the factory

and the company website), Steam Menu, Menu and Settings. The "Home Screen" will also display a "Service Required" indicator when a current service issue is indicated. The "Service Required" and Steam Output number will illuminate in red. Tap on "Service Required" to access the service required page which indicates what service issue is being detected.

### "FILL" LED:

The FILL LED is a blue light illuminated when the Fill Valve is activated. An activated Fill Valve allows water to flow into the cylinder of the humidifier.

### "DRAIN" LED

The DRAIN LED is a red light illuminated when the Drain Valve is activated. An activated Drain Valve allows water to drain from the humidifier.

### "HIGH WATER" LED

The HIGH WATER LED is an orange light illuminated when the High Water Sensor is activated. An activated High Water Sensor indicates that the water has risen to the maximum allowable level in the cylinder.

## ELECTRICAL DATA

Max. Sq. Ft. Humidified Area*	Carnes Model	Maximum Lb./Hr.	kW	Voltage	Phase	Line Amp Rating	Recommended Disconnect Size (Amps)	Cylinder
1400	HRABA U 005	5	1.7	120	1	14.4	20	HXCBA220
1400	HRABD U 005	5	1.7	230	1	7.5	15	HXCBA380
2800	HRABD U 010	10	3.4	230	1	15.0	20	HXCBA380

U = UL

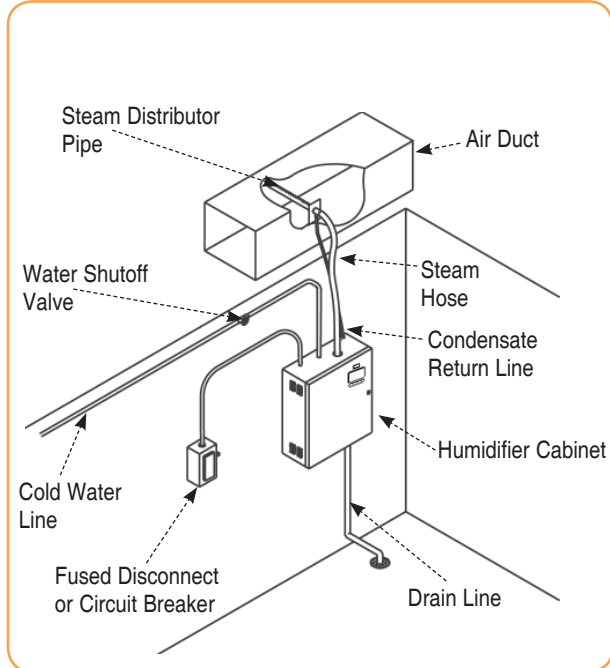
C = cUL

\*Based on average conditions. For complete load calculation, use our humidifier selection program.



**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 an area where other mechanical equipment such as a furnace or water heater is installed.

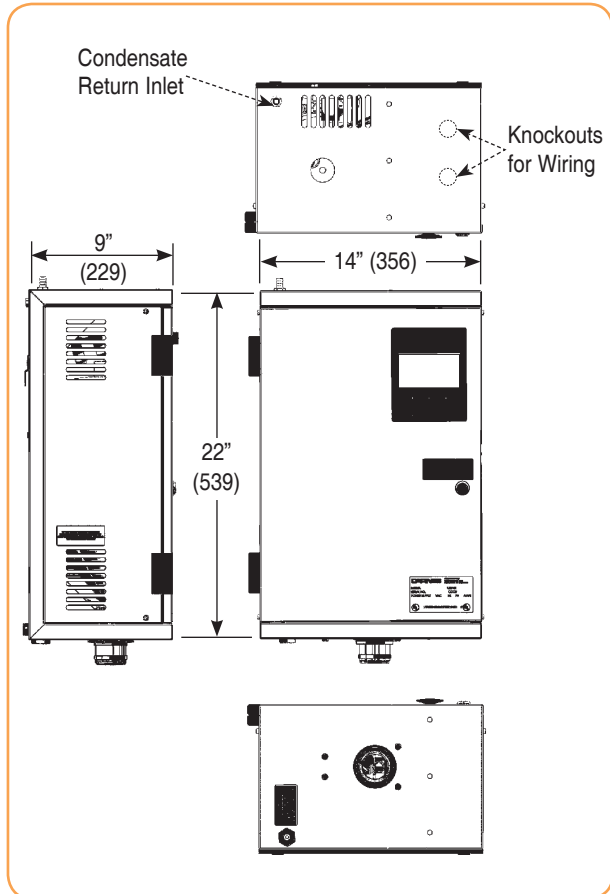
The unit must be connected through a **water shutoff valve** to a **cold water line** that is not treated by a water softener. Connections must be made to a 120 or 230 volt **fused disconnect** or **circuit breaker**. A **drain line** must be installed from the bottom of the humidifier to a convenient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

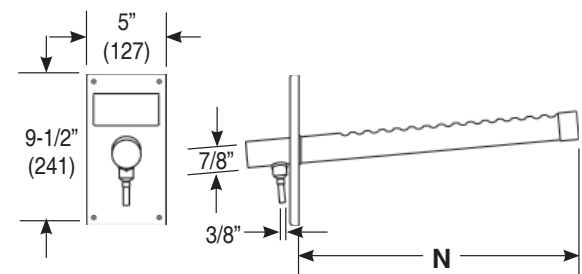


**DISTRIBUTOR PIPE & HOSE DIMENSIONS**

Carnes steam distributor pipes are fabricated from stainless steel.

Select the longest pipe that will fit into the duct.

DISTRIBUTOR PIPE MODEL	"N" DIMENSION
HXPBB012S	11-13/16" (300mm)
HXPBB018S	17-13/16" (452mm)
HXPBB024S	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, PROPORTIONAL CONTROL

##### Model HXHAM



The Model HXHAM is a wall-mounted, microprocessor-controlled humidistat solution for cutting edge humidity control. The HXHAM employs a backlit LCD module, which displays both the ambient temperature and humidity of the surrounding air. The embedded software allows user navigation between temperature/humidity viewing mode, setpoint adjustment mode, and also outdoor temperature and humidity viewing mode. Setpoint range is 0 to 100%. An optional outdoor temperature compensation sensor can be added (HXHAMT).

#### 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.

#### WALL HUMIDISTAT, PROPORTIONAL CONTROL

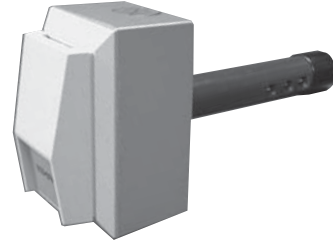
##### Model HXHCG



The wall mounted HXHCG humidistat uses a monolithic sensor and electronic circuitry to provide accurate and reliable humidity sensing. Setpoint range is 0 to 100%. The HXHCG has a concealed setpoint adjustment with a locking cover to prevent tampering. Ambient operating conditions are from 0° to 85°C. Case dimensions are 2-13/16" x 4-1/2" x 1-1/4".

#### DUCT HUMIDISTAT, PROPORTIONAL CONTROL

##### Model HXHAN



The Model HXHAN is an intelligent humidistat solution used exclusively for duct mounted installations. The humidistat is capable of providing both humidity and temperature measurements from inside the duct. The microprocessor control takes the temperature into consideration when calculating the humidity to provide an extra degree of precision. 0 to 100% setpoint range.

#### DUCT HUMIDISTAT, ON-OFF CONTROL

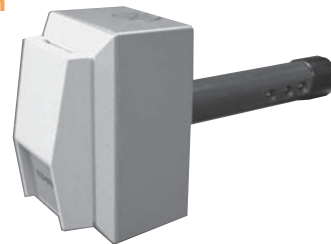
##### Model HXHAB



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.

#### DUCT HUMIDISTAT OR HIGH LIMIT, PROPORTIONAL CONTROL

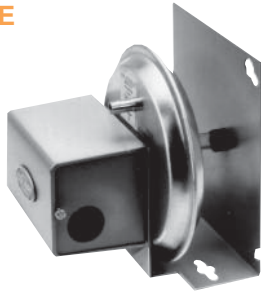
##### Model HXHCH



The Model HXHCH is designed to be mounted in a duct to provide a means of sensing relative humidity. Setpoint range is from 0 to 100% RH. Ambient operating conditions are from 0° to 85°C. The humidistat may be mounted in a return duct to provide a mean of sensing and controlling relative humidity. The humidistat may be mounted in a supply duct a minimum of 10 feet downstream from the distributor pipe when used as a high limit humidistat. Case dimensions are 2-13/16" x 4-1/2" x 2-1/4". The probe 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 differential pressure switch. The differential in pressure between the interior of the duct and ambient when air is moving in the duct closes a micro switch allowing the humidifier to operate. Air pressure differential as low as .07 w.g. and as high as 12.0 w.g. may be sensed with one model. The switch may be mounted with tubing connecting to the duct. Switch is UL listed.

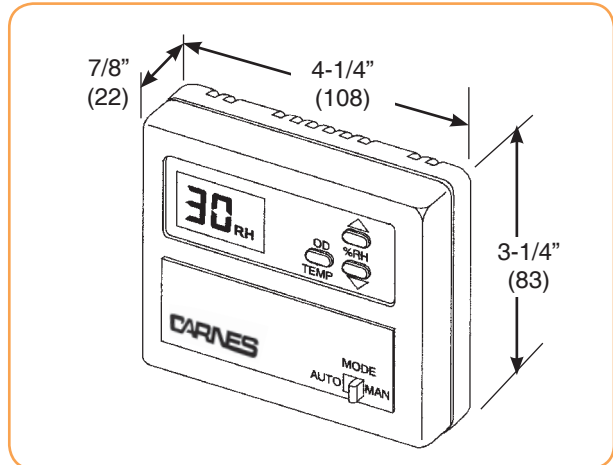
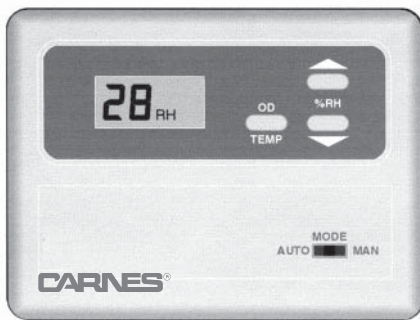
**HIGH LIMIT HUMIDISTAT**

**Model HXHAD**



The Model HXHAD humidistat is available for use as a safety precaution to prevent air in the duct from exceeding a preset level. Do not use the humidistat in air that is over 125°F or in locations where the unit could become wet. The control must be mounted a minimum of 10 feet downstream of the distributor pipe. Scale range is from 15%-95% RH. Differential is 5% non-adjustable. Mounting plate dimensions are 6-1/2" wide, 4-3/4" high. Humidistat extends 1-1/4" into duct and projects 2-1/4" outside the duct.

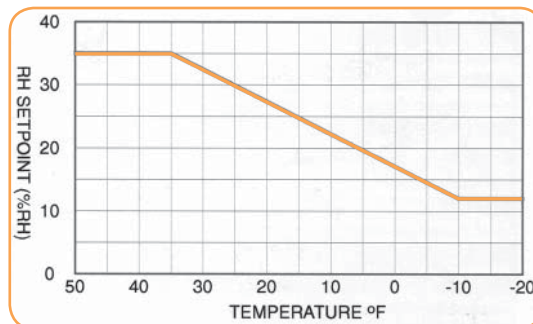
**OUTDOOR AIR TEMPERATURE COMPENSATED DIGITAL HUMIDISTAT, ON-OFF CONTROL**



**Model HXHAT**

The HXHAT humidistat can be either wall or duct mounted and includes a remote outdoor temperature sensor for exterior wall or intake duct mounting. The humidistat can automatically change the setpoint in response to changes in outdoor temperature or be set to maintain a setpoint regardless of temperature changes. The LCD display shows setpoint RH%, actual RH% or outdoor temperature (from -9 to 98°F). Relay contacts provide an on/off signal to the humidifier. Setpoint range is from 30-65% RH. Default setpoint is 40% RH.

The HXHAT will automatically reduce the RH setpoint as the temperature drops below 35°F. The graph below shows the RH setting of 35° RH and as the temperature drops the RH setpoint is adjusted by the computer as shown. Below -10° there is no adjustment.



# SHORT ABSORPTION MANIFOLDS FOR STEAM HUMIDIFIERS



Carnes Steam Manifolds are designed to provide dry steam with rapid absorption in the duct air stream. It achieves this by distributing steam evenly across the face of the duct. The distance needed for absorption is dependent on a number of factors, some of which are air velocity, steam volume, air temperature, and characteristics of air flow in the duct. For minimum absorption distance, the manifold should be located in the warmest air stream of the duct and where fully developed laminar air flow occurs.

- **Stainless steel steam distribution tubes on three inch centers provide extremely short absorption distances**
- **Stainless steel manifold with flexible EPDM connections for thermal expansion without use of O-rings**
- **Strong galvanized flanged frame for easy and fast connection to duct**
- **Factory assembled for reduced installation costs**

**CARNES STEAM MANIFOLDS** are available in standard sizes from 18" x 12" through 72" x 48" in two inch increments. Additional special sizes are available.

Table 1  
Air Pressure Loss, "w.g."

500 fpm	.02
750 fpm	.07

Table 2 Model Numbering System

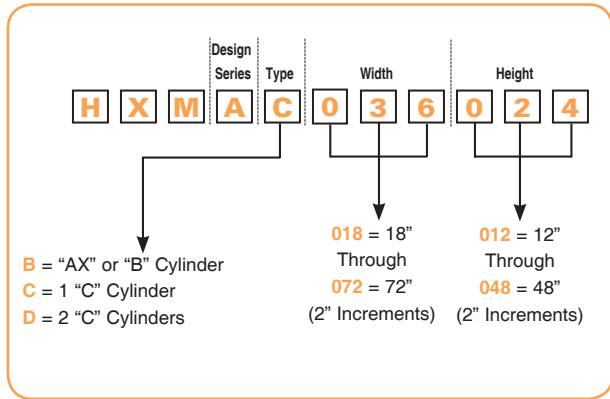
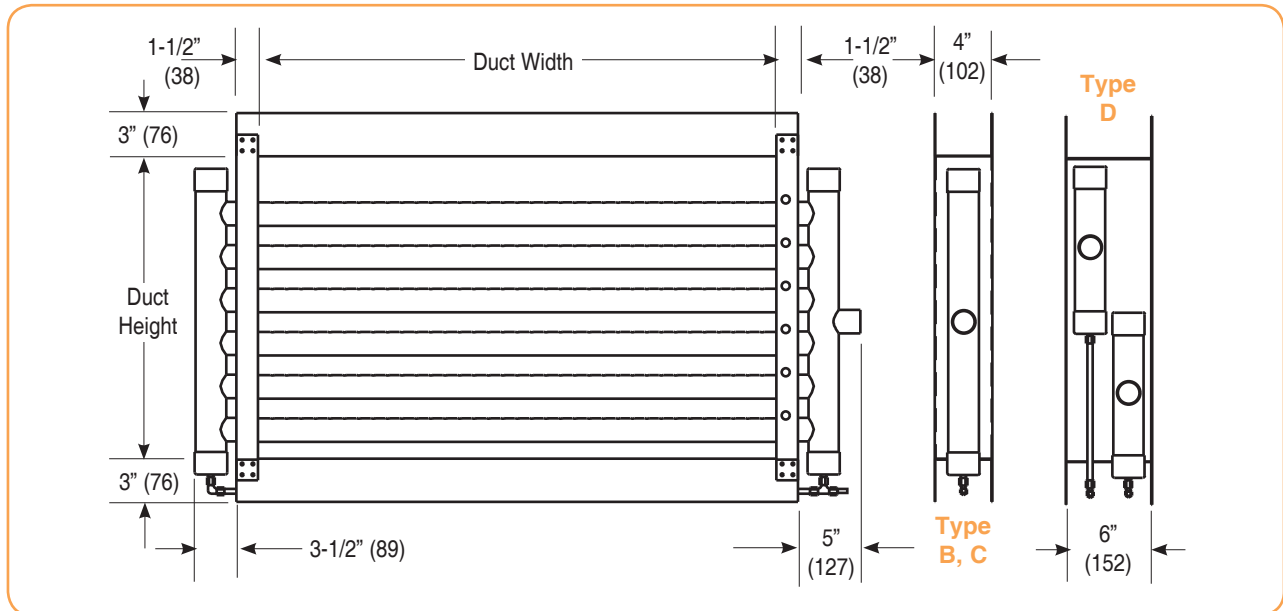


Table 3

Duct Height	Tubes
012	3
014	3
016	4
018	5
022	6
024	6
026	7
028	8
030	9
032	9
034	10
036	11
038	11
040	12
042	13
044	13
046	14
048	15

Dimensions



**CARNES STEAM MANIFOLDS** with strong galvanized flanged frames are factory assembled to reduce installation costs.

#### ▼ LOCATION OF MANIFOLD

The manifold is usually located in the supply duct downstream of the fan, heating coil, cooling coil, and/or filter. When installed in packaged units, the manifold is to be mounted just downstream of the fan discharge.

The non-wetting dimension is the distance necessary to prevent condensation on any obstruction downstream from the manifold. Condensation could occur on a cooling coil because of lower temperatures. Steam plumes may be visible beyond the non-wetting dimension and may moisten high efficiency filters. Additional distance is required for installation upstream of high efficiency filters.

Carnes humidifiers operate at .5 psi or less so there are limitation on the length between the humidifier cabinet and the steam manifold. The maximum distance depends on the static pressure in the duct and is shown in Table 8.

Table 8 - Maximum Steam Hose Length

Duct Static Pressure "w.g."	0	1	2	3	4	5
Maximum Steam Hose Length (Ft.)	40	35	30	25	15	10

Figure A

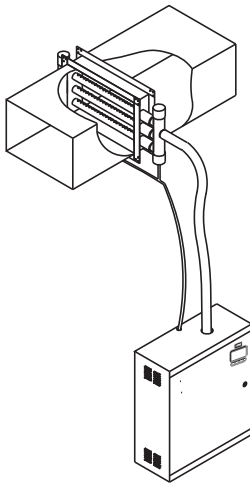


Figure B

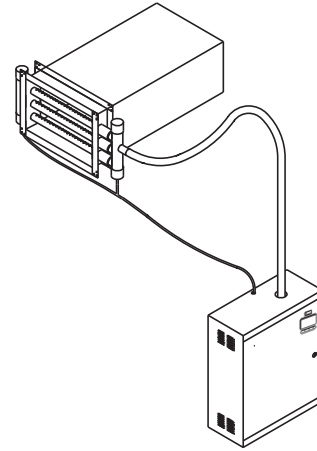


Figure C

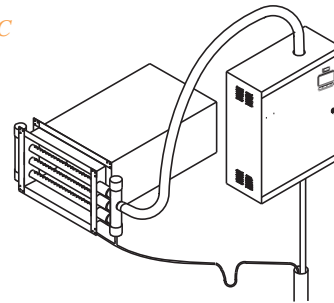


Figure D

