

# CARNES®

## Humidifier Products



Hospitals/Clinics



Laboratories



Printing Facilities



Museums



Computer Rooms



# Steam Humidifiers

CARNES ELECTRONICALLY CONTROLLED STEAM HUMIDIFIERS use ordinary untreated tap water and convert it to mineral free steam for humidity control in commercial, industrial, institutional and residential applications.

## ECONOMICAL

- Disposable Cylinders Eliminate Periodic Maintenance for Reduced Maintenance Costs
- Fast and Easy Installation
- Reliable Electronic Components for Long Life

## EFFICIENT

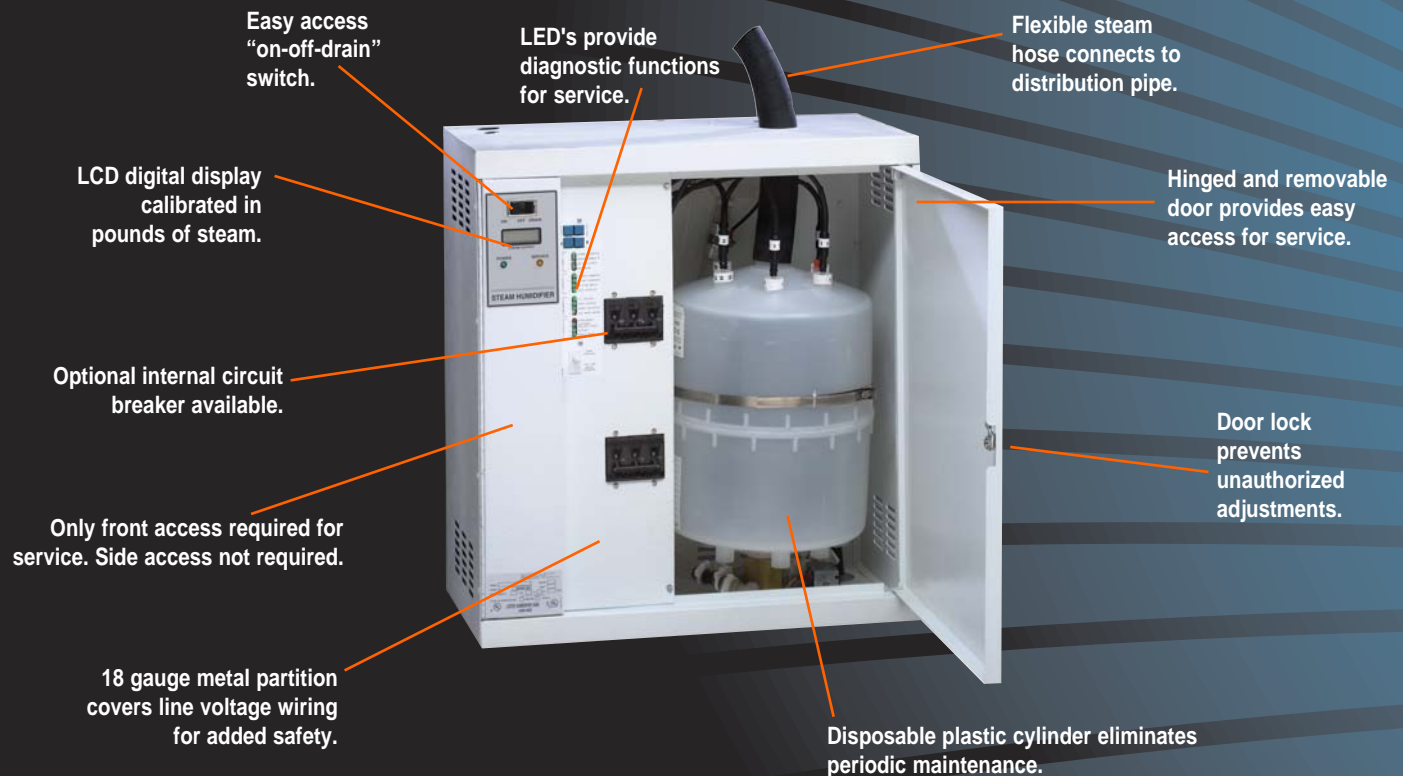
- Circuit Board Utilizes Microprocessor to Maximize Energy Conservation
- Exclusive Circuit Board Design Eliminates Need for Internal Fusing

*U. S. Patents #4,692,591 & #4,792,660*

*Canadian Patents #1,260,996 & #1,263,163*

## VERSATILE

- Standard Digital Display and Diagnostic Functions to Simplify Maintenance
- Capacities up to 200 Pounds of Steam Per Hour
- Utilize any On-Off Humidistat, Carnes Proportional Humidistat or External Signal from DDC Controls
- Optional Internal Circuit Breaker Protection



The simplicity and unique advantages of humidity from directly boiling water in disposable cylinders has been well known since Carnes pioneered the concept in North America in 1969. Pan type humidifiers require messy, time consuming cleaning that may require the use of acids. Electric heating elements in pan type units may also require replacement. Easily changeable steam cylinders containing electrodes can be replaced in less than five minutes.

*Cut-away used steam cylinder showing mineral deposits.*



# Applications

## COMFORT

Temperature and relative humidity affect the comfort and well being of all living things. High temperatures require low humidity to maintain comfort conditions, while low temperatures can more easily be tolerated at high relative humidity. Humidification occurs when air is moisturized by a humidification unit or when hygroscopic materials (materials containing moisture) lose moisture to drier air. Proper humidification is widely accepted as healthy, minimizing employee illness and lost work time.

## MATERIALS STORAGE

Paper, fabrics, wood, plastic, chemicals and most other materials are hygroscopic. Their water content depends on the humidity of the air around them. If air is too dry, these substances lose moisture until an equilibrium is reached between hygroscopic materials and the air.

## PROCESS

Process operations, such as data processing areas, are affected by two major humidity factors: hygroscopic material and generation of static electricity.

Hygroscopic material used in the process influences material weights, dimensions and workability.

Static electricity can totally disrupt high speed process operations as found in a data processing center, paper or film handling business. Created by friction between two substances, static electricity can be prevented by proper humidification of the process environment.

## RECOMMENDED TEMPERATURE AND HUMIDITY RANGE

APPLICATION	TEMP F°	R.H. %
Computer Rooms	72±2	50±5
Office Buildings	70-74	20-30
Libraries & Museums	68-72	40-55
Archival Libraries & Museums	55-65	35
Art Storage	60-72	50±2
Stuffed Animals	40-50	50
Bowling Centers	70-74	20-30
Health Facilities		
Full Term Nursery	75	30min.-60max.
Special Care Nursery	75-80	30min.-60max.
Patient Rooms	75	30
Intensive Care	75-80	30min.-60max.
Operating Rooms	68-76	50min.-60max.
Recovery Rooms	75	50min.-60max.
Electrical Instrument Mfg.	70	50-55
Fur Storage	40-50	55-65
Photo Film Darkroom	70-72	45-55
Photo Print Darkroom	70-72	45-55
Photo Drying Room	90-100	35-45
Photo Finishing Room	72-75	40-55
Cellophane Wrapping	75-80	45-65
Animal Laboratories		
Mouse, Rat	64-79	40-70
Cat	65-85	30-70
Dog	65-85	30-70
Primate	65-84	30-70
Clean Rooms	67-77	40-55
Printing Plants		
Lithography	76-80	43-47±2
Rotogravure		45-50±2
Collotype	80±2	85±2
Platemaking	75-80±2	45±2
Telephone Terminal Rooms	72-78	30-40
Radio and TV Studios	74-78	30-40

± = plus or minus

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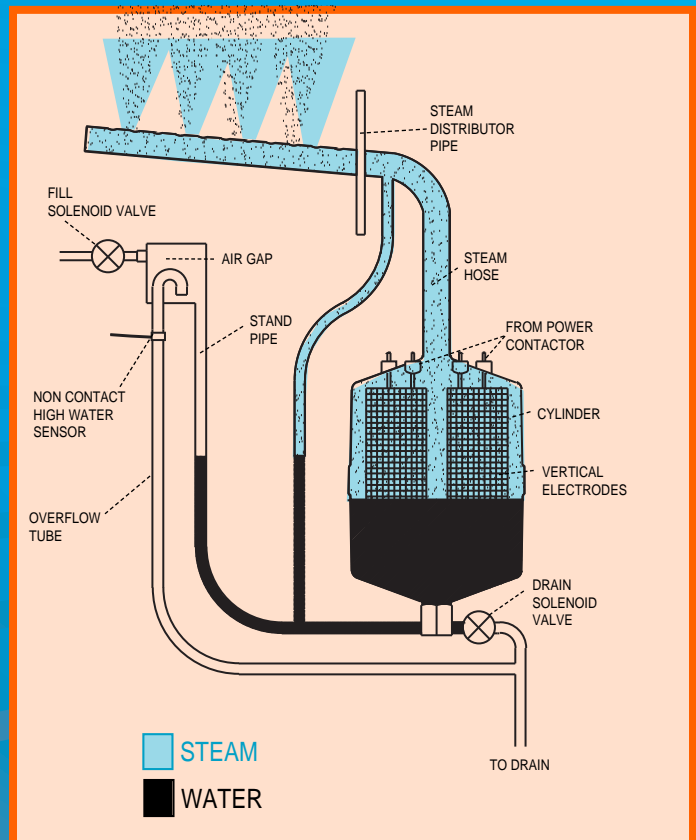
# Operation

Upon a signal from external controls the circuit board opens a fill solenoid valve, allowing water to flow across an air gap into a standpipe. The standpipe provides a column of water to be fed into the cylinder using gravity. The air gap prevents back flow into the water supply and prevents the cylinder from becoming a pressure vessel. The steam cylinder operates at a pressure of approximately 1/2 psi.

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 which is connected to the steam distributor pipe.

The circuit board reacts to current flow between the electrodes and automatically opens the fill solenoid valve when more water is required to maintain the desired output rate, and closes when the desired rate is reached. The operation of the drain solenoid valve is automatically controlled by the circuit board which responds to any changes in water conditions and drains the required quantity of water to provide stable operation and long cylinder life.

As mineral deposits build up within the cylinder the water level will slowly rise to uncovered electrode surfaces to maintain the desired steam output rate. When mineral deposits have covered all available electrode surface areas, current flow will be reduced to a level where the desired steam output cannot be reached and the service light will signal the need for maintenance. When the cylinder is filled with minerals it is easily changed in less than five minutes.



# UNIT AVAILABILITY

## MODELS AVAILABLE AND ELECTRICAL DATA

Model	Maximum Lb/Hr.	kW	Phase	Voltage	Line Amp	Disc. Size	Optional Circuit Breaker	Steam Cylinder
HCG	5	1.7	1	120	14.4	20	1-20	1-AX220
				208	8.3	15	1-15	1-AX380
				230	7.5	15	1-15	1-AX380
				277	6.2	15	1-15	1-AX380
				460	3.7	15	1-15	1-AX700
	575	3.0	15	1-15	1-AX700			
	10	3.4	1	120	28.7	40	1-40	1-AX220
				208	16.6	25	1-25	1-AX380
				230	15.0	20	1-20	1-AX380
				277	12.4	20	1-20	1-AX380
460				7.5	15	1-15	1-AX700	
575	6.0	15	1-15	1-AX700				
HCDG	20	6.9	1	208	33.1	45	1-45	1-B500
				230	29.9	40	1-40	1-B500
				277	24.9	35	1-35	1-B500
				460	15.0	20	1-20	1-B700
				575	12.0	15	1-15	1-B700
	20	6.9	3	208	19.1	25	1-25	1-B500
				230	17.3	25	1-25	1-B500
				460	8.6	15	1-15	1-B700
				575	6.9	15	1-15	1-B700
				208	28.7	40	1-40	1-B500
30	10.3	3	230	25.9	35	1-35	1-B500	
			460	13.0	20	1-20	1-B700	
			575	10.4	15	1-15	1-B700	
			208	49.7	70	2-35	1-C62	
			230	44.9	60	1-60	1-C62	
HCGG	30	10.3	1	277	37.3	50	1-50	1-C62
				460	22.5	30	1-30	1-C65
				575	18.0	25	1-25	1-C65
				208	38.2	50	1-60	1-C62
				230	34.6	45	1-50	1-C62
	40	13.8	3	460	17.3	25	1-25	1-C65
				575	13.8	20	1-20	1-C65
				208	47.8	70	2-35	1-C62
				230	43.2	60	1-60	1-C62
				460	21.6	30	1-30	1-C65
50	17.2	3	575	17.3	25	1-25	1-C65	
			208	57.4	80	2-40	1-C62	
			230	51.9	70	2-40	1-C62	
			460	26.0	35	1-40	1-C65	
			575	20.8	30	1-30	1-C65	
60	20.7	3	208	76.5	100	2-60	1-C62	
			230	69.2	90	2-50	1-C62	
			460	34.6	50	1-50	1-C12	
			575	27.7	40	1-40	1-C12	
			208	95.6	125	2-60	1-C62	
80	27.5	3	230	86.4	125	2-60	1-C62	
			460	43.2	60	1-60	1-C12	
			575	34.6	45	1-50	1-C12	
			208	119.5	175	4-40	2-C62	
			230	108.0	150	4-40	2-C62	
HCHG	125	43.0	3	460	54.0	75	2-40	2-C12
				575	43.2	60	2-30	2-C12
				208	143.4	200	4-50	2-C62
				230	129.7	200	4-50	2-C62
				460	64.8	90	2-50	2-C12
	150	51.7	3	575	51.9	75	2-35	2-C12
				208	167.3	250	4-60	2-C62
				230	151.3	225	4-60	2-C62
				460	75.6	110	2-60	2-C12
				575	60.5	90	2-50	2-C12
175	60.3	3	208	191.2	300	4-60	2-C62	
			230	172.9	250	4-60	2-C62	
			460	86.4	125	2-60	2-C12	
			575	69.2	100	2-50	2-C12	
			208	191.2	300	4-60	2-C62	
200	68.9	3	230	172.9	250	4-60	2-C62	
			460	86.4	125	2-60	2-C12	
			575	69.2	100	2-50	2-C12	

### NOTES:

**“Model”** and **“Optional Circuit Breaker”** columns designate presence, quantity and amp rating of optional circuit breakers. All models have overload protection provided by the electronic circuit board. In addition, as an option, internally mounted, switchable on-off, circuit breakers are available in models preceded by **“HB”**.

**“Maximum Lb./Hr.”** designates maximum capacity of humidifier. Units are shipped from the factory preset at the maximum rate. The output rate may be easily reset after installation anywhere between 100% and 25% of maximum capacity.

**“kW”** ratings shown is at maximum output rate. If a unit is reset for less than maximum output, the kW is reduced proportionally.

**“Phase”** and **“Voltage”** designate available phase and nominal voltages. Single phase units may be operated from two legs of a three phase supply but the load will be unbalanced.

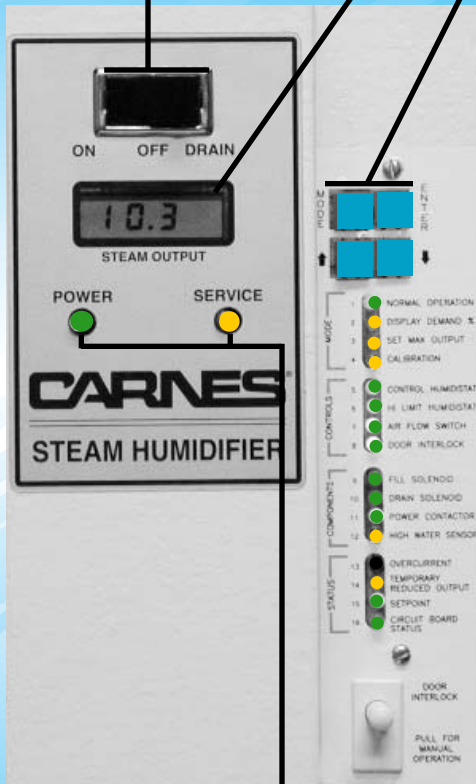
**“Line Amp”** and **“Disc. Size”** are amp ratings shown for use in selecting electrical service requirements.

**“Steam Cylinder”** column shows the quantity and the model of steam generating cylinders mounted in the humidifier. Each cylinder requires its own steam distribution pipe, steam hose and condensate return line.

# Steam Humidifiers

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

"On-Off-Drain" switch is accessible with cabinet door closed and locked.



Long life LED's provide indication of operation including power "On" and "Service". Service LED is on whenever actual steam output is less than 50% of setpoint. Terminals are provided for remote monitoring of these two indicators.

Standard digital display shows steam output rate in pounds per hour (or kilograms per hour). By using "Mode" button the humidistat demand, maximum output setting and unit model code can be shown.

"Mode" button switches unit program between normal operation, humidistat demand, setting maximum output, and unit calibration functions. "Enter" button is used with "Mode" button to reset maximum steam output values and modify calibration function values based on water condition for better efficiency. UP and DOWN buttons are used to increase or decrease maximum steam output rates and allow for adjustment of calibration function values.

**"MODE":**  
In the "Normal Operation" function the digital displays shows steam output rate in pounds per hour (or kilograms per hour). When switched to "Display Demand %" position by using the "Mode" button the display indicates the demand from the control humidistat and high limit humidistat. The "Set Max Output" function is used to limit the steam output rate to less than maximum capacity if desired. In the "Calibration" mode a code is shown to indicate voltage and maximum output capacity of the humidifier.

**"CONTROLS":**  
Separate LED's indicate whether a signal is being received by the humidifier from the control humidistat, high limit humidistat and airflow switch to operate. If the LED is not on it indicates that the specific control is not calling for humidity. This feature greatly simplifies troubleshooting. An LED also indicates manual or automatic door interlock signal.

**"COMPONENTS":**  
Separate LED's show operation of internal components. "Fill Solenoid" indicates valve should be open with water flowing. The fill solenoid is always open whenever the drain solenoid is activated (whether manual or automatic operation) to temper the drain water temperature to code acceptable levels. Drain LED indicates need for drain cycle. "Power Contactors" indicates that primary voltage is being supplied to the cylinder electrodes. "High Water Sensor" shows that water has been detected in the overflow tube and the Carnes exclusive capacitance proximity sensor has been activated. This unique device senses the presence of water by measuring a change in capacitance thereby eliminating problems caused by foaming, corrosion or mineral build up that are common in other humidifiers.

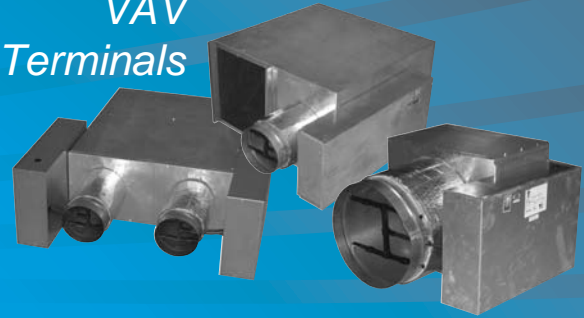
**"STATUS":**  
If a red "Overcurrent" LED is on it indicates that a series of overcurrents has occurred and that the humidifier has placed itself in a standby mode to prevent blowing fuses or circuit breakers. This condition is usually caused by a restricted drain solenoid valve. The "Temporary Reduced Output" LED shows that the High Water Sensor has been activated and that the steam output has temporarily been reduced until minerals can build up in the water and full output reached. This process is completely automatic and usually occurs only when starting with completely fresh water, or low conductivity water, in the steam cylinder. Setpoint indicates when unit is at determined max output. A pulsing "Circuit Board Status" LED is normal and indicates that the microprocessor is functioning.

# Quality Built Products Since 1939

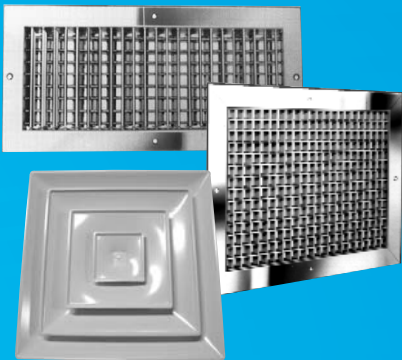
*Vents & Fans*



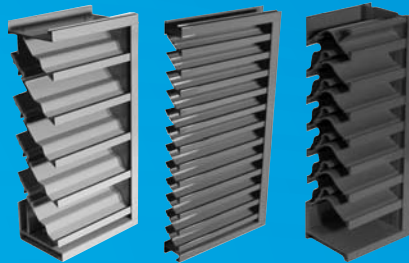
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