READ AND SAVE THESE INSTRUCTIONS

CARNES®

ELECTRONICALLY CONTROLLED STEAM HUMIDIFIER
DESIGN SERIES HB

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

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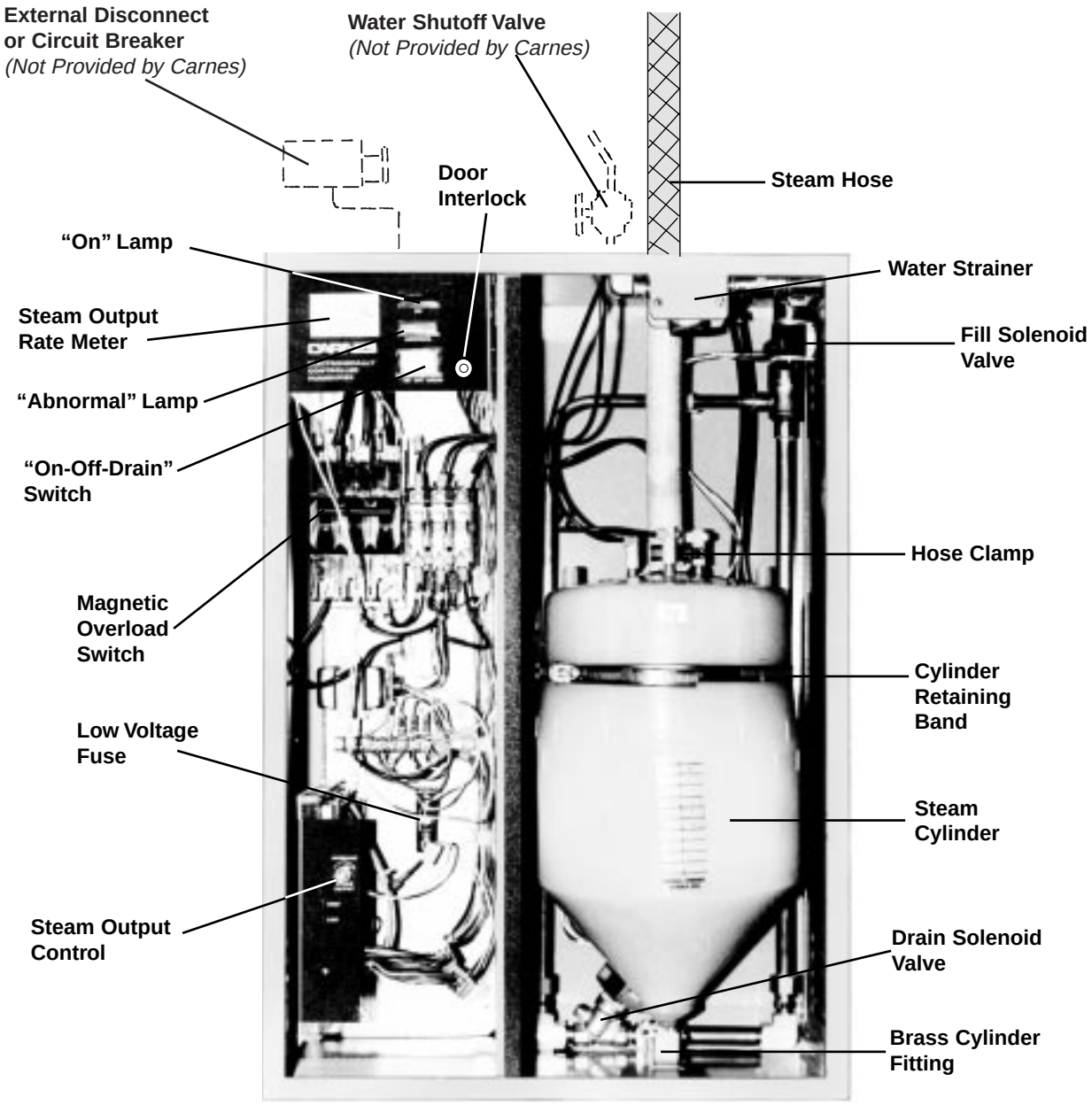


Photo A

MODEL HBDA SHOWN

INSTALLATION

UNPACKING AND INSPECTION

1. A manila envelope attached to the outside of the cabinet contains the following items:
   A. Installation instructions
   B. One cabinet key

2. Open the cabinet and check for concealed shipping damage. Report any damage immediately to the carrier who delivered shipment.

3. The following components are packed in a shipping carton for connection when installing humidifiers:
   A. Distributor pipe
   B. Steam hose
   C. Condensate return line

4. Optional accessories may be packed with the cabinet or in the same shipping carton. Large accessories ship in separate cartons.

5. Inside the cabinet are the following items:
   A. Steam hose clamps
   B. Condensate return line clamps
   C. Air gap drain fitting

MOUNTING THE HUMIDIFIER

Mount the humidifier cabinet securely on a level and plumb surface near the ductwork. Allow 6" or more on each side for proper ventilation and a minimum of 16" from the bottom of th cabinet to the floor to allow space for the drain connection. The humidifier must never be mounted outside or where it may be exposed to freezing temperatures. Maximum operating weights for the humidifier are shown below.

TABLE 1

MAXIMUM OPERATING WEIGHT

MODEL	WEIGHT (Pounds)
HBDA	85
HBEA	130
HBFA	175
HBGA	105
HBHA	185
HBJA	260

WATER SUPPLY CONNECTION

Use ordinary tap water (20 to 120 psi) — **DO NOT use hot or deionized water.** A 3/8" FPT fitting is provided at the top of the humidifier for connection to tap water supply. A shut-off valve, not provided by Carnes, must be installed just ahead of this fitting.

DRAIN LINE CONNECTION

1. Remove the large nut and plastic gasket located on the fitting on the bottom of the cabinet (**Photo B**). The nut and gasket may be used with standard type drain fitting if an air gap drain fitting is not required by local codes.

2. Connect the air gap drain fitting to the cabinet drain connection. Drop plastic insert into the top of the air gap drain fitting before connecting. It may be necessary to cut off some of the air gap fitting depending on available space.

3. Connect the drain or air gap fitting to S or P Trap. **Note**: If the drain water pump accessory package is used, follow instructions included with the drain water pump package.

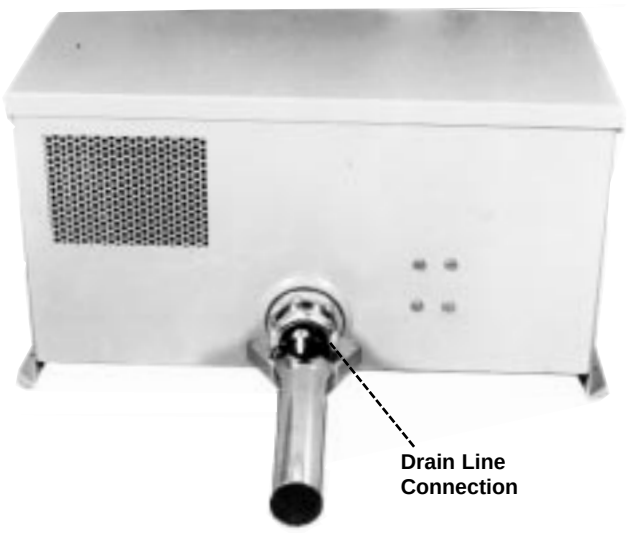


Photo B

MODEL HBDA SHOWN

FASTENER RECOMMENDATION

TYPE OF WALL	6 FASTENERS REQUIRED (Models HBDA, HBEA & HBFA) 8 FASTENERS REQUIRED (Models HBGA, HBHA, & HBJA)
Wood Studs or Solid Wood	1/4" Lag Screws
Hollow Plaster	1/4" Molly Bolts or Toggle Bolts
Sheet Metal	1/4" Thread Forming Screws
Cement or Masonery	1/4" Lead Type Anchor and Bolts

INSTALL STEAM DISTRIBUTOR PIPE

1. Steam distributor pipe must be mounted on a plumb surface. When mounted on a plumb surface the standard distributor pipe for Models HBDA, HBEA and HBFA pitches downward and is inclined upward for Models HBGA, HBHA and HBJA. This is required so the condensate which forms in the distributor pipe will drain to the return line and back to the unit.
2. Steam distributor pipe should be mounted in the duct to insure even distribution of steam across the center portion of the duct (**Figure A**). The condensate return line must always be kept on the bottom. A minimum clearance of 4" must be maintained between the duct and distributor pipe. The steam distributor pipes are designed with a steam outlet hole pattern which gives even distribution, yet keeps steam away from the sides of the duct.

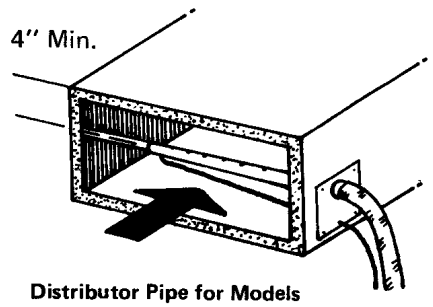
   The standard humidifier steam distributor pipe must never be installed vertically. If air flows are vertical, the steam distributor pipe should be installed horizontally (**Figure B**).

   The steam distributor pipes should be installed in the supply air stream, downstream of the fan (**Figure C**). When installed in packaged units (central station air handlers, multizone units, make-up air units, etc.) the distributor pipe should be mounted just downstream of the fan discharge in the primary air stream.

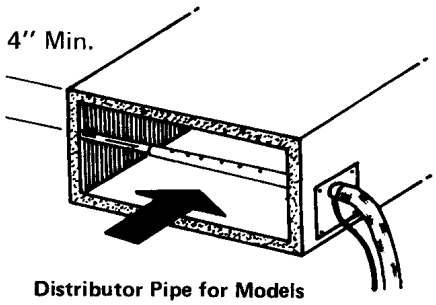
   In multizone applications it is preferable to have a separate humidifier serving each zone. However, steam can be introduced into the hot deck upstream of the zone dampers. In this case, good distribution of steam across **the entire hot deck is very important**.

   It is preferable to locate the steam distributor pipes downstream from any obstructions in the ductwork so that air can absorb moisture before it impinges on a surface and accumulates. There must be a **minimum** of three feet between the steam distributor pipes and any fans, coils, filters, zone dampers, elbows or outlets which may be installed downstream of the distributor pipe. However, in all cases, the steam distributor pipes should be located as far upstream from any such obstruction as possible.
3. An adhesive backed template is provided for each distributor pipe. This provides the hole pattern for mounting each steam distributor pipe. Using the template(s), cut necessary holes in ductwork at desired location of distributor pipe.
4. Inset any distributor pipe into duct and secure tightly with four sheet metal screws, not provided by Carnes.
5. Special distributor pipes are shipped with specific instructions on how to mount them.
6. If the accessory fan distribution unit is to be used, follow the instructions included with the unit.

Figure A

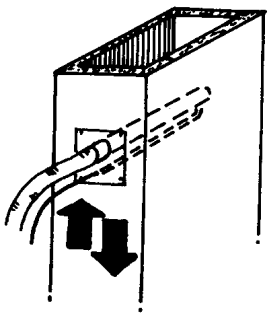


Distributor Pipe for Models HBDA, HBEA & HBFA Shown

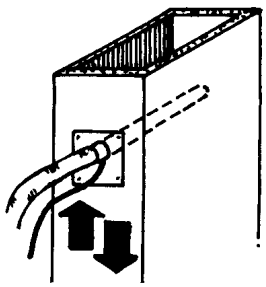


Distributor Pipe for Models HBGA, HBHA & HBJA Shown

Figure B

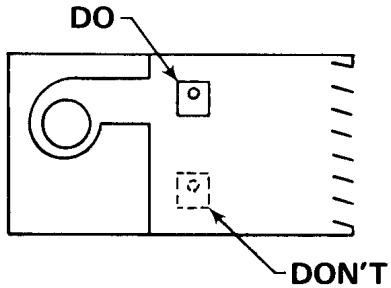


Distributor Pipe for Models HBDA, HBEA & HBFA Shown



Distributor Pipe for Models HBGA, HBHA & HBJA Shown

Figure C



INSTALLATION

CONNECTING THE STEAM HOSE
Refer to Figures D, E and F

EACH CYLINDER REQUIRES SEPARATE STEAM HOSE, CONDENSATE RETURN LINE, AND STEAM DISTRIBUTOR PIPE.

COPPER OR BRASS TUBE IS THE ONLY ACCEPTABLE SUBSTITUTE FOR CARNES STEAM HOSE OR CONDENSATE HOSE

1. The steam hose should be installed so there is a continuous rise from the humidifier to the distributor pipe. Support the steam hose at intermediate points to prevent dips or pockets. If it is necessary to mount the distributor pipe below the top of the humidifier, a "T" fitting must be installed at the lowest point in the steam hose to drain any condensate from the steam hose.
2. Any turns should have a minimum radius of 8" to prevent the hose from kinking.
3. Fasten the steam hose to the distributor pipe with one of the hose clamps provided.
2. Push the steam hose through the opening on the top of the humidifier cabinet and slip over the outlet stub on the top of the cylinder, or over the copper fitting in 2 or 3 cylinder models. Fasten with the hose clamp provided.

CONDENSATE RETURN LINE
Refer to Figures E, F and G

1. Fasten the condensate return line to the distributor pipe with the hose clamp provided.
2. Follow the steam hose to the humidifier cabinet and secure the return line to the steam hose.
3. Connect the return line to the condensate return inlet with hose clamp provided (**Photo C**).
4. If it is impossible to maintain a drop to the top of the cabinet, it is permissible to run the condensate line directly to the air gap drain fitting or some other drain.

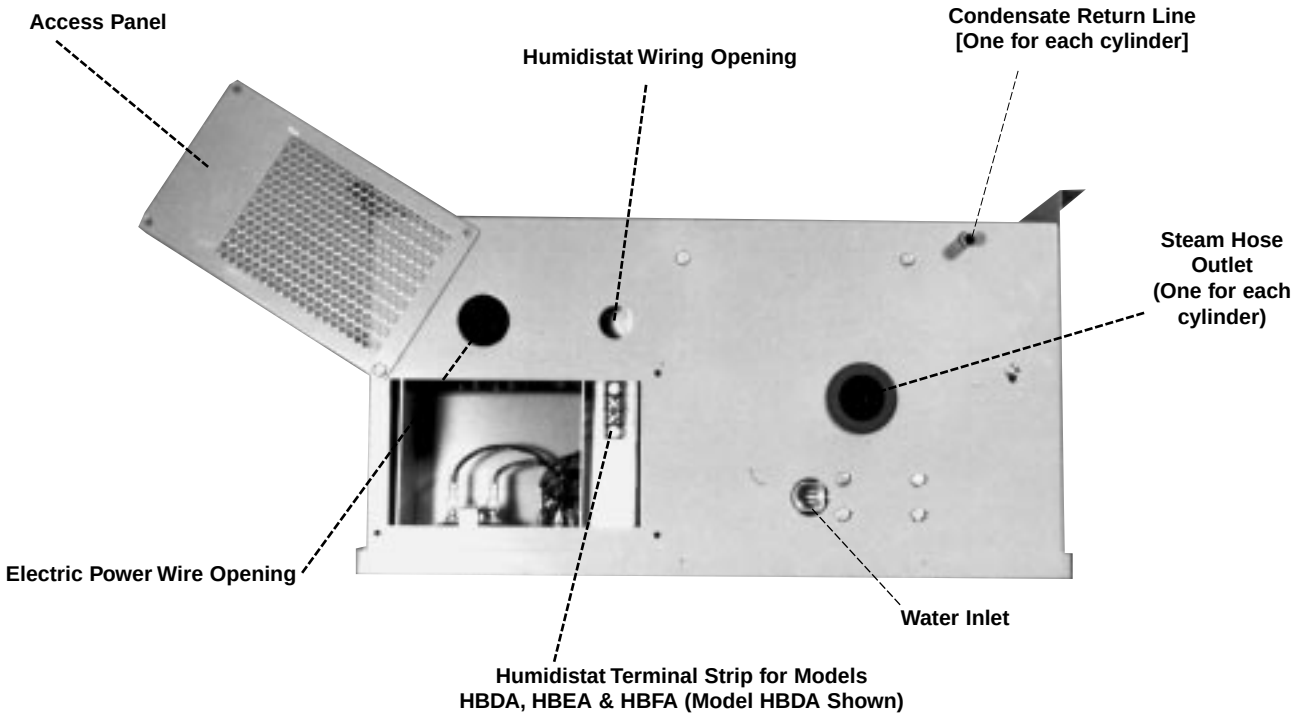


Photo C

Humidistat Terminal Strip Slightly Different for Models HBGA, HBHA & HBJA

TYPICAL HOSE LOCATION FOR LENGTHS UP TO 12 FEET

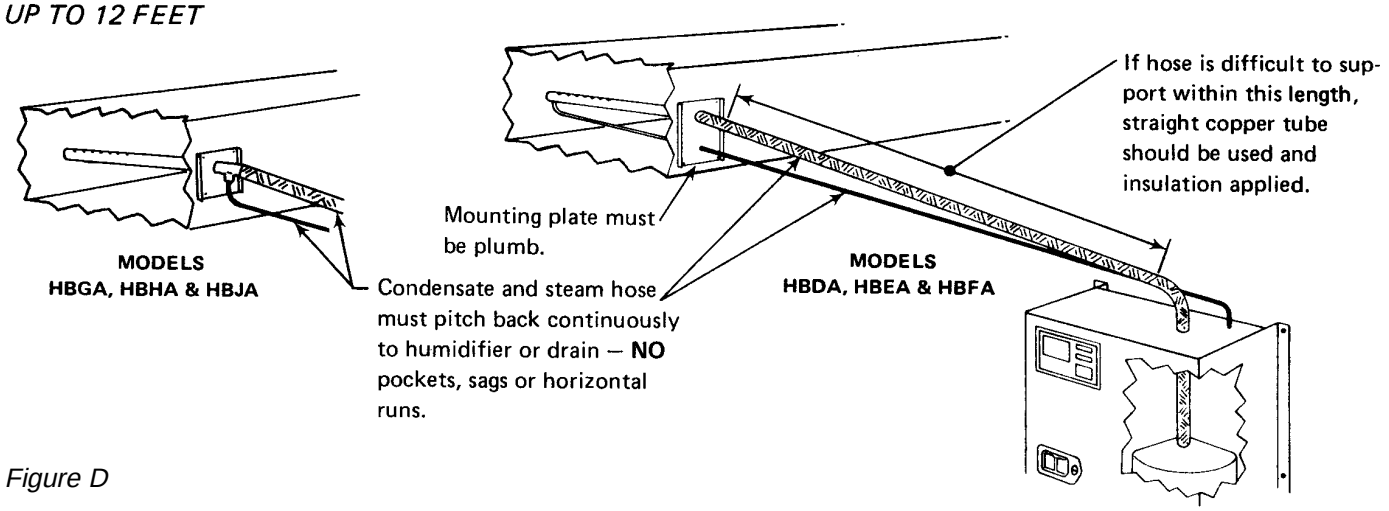


Figure D

HOSE LOCATION FOR RUNS FROM 12 FEET TO 40 FEET

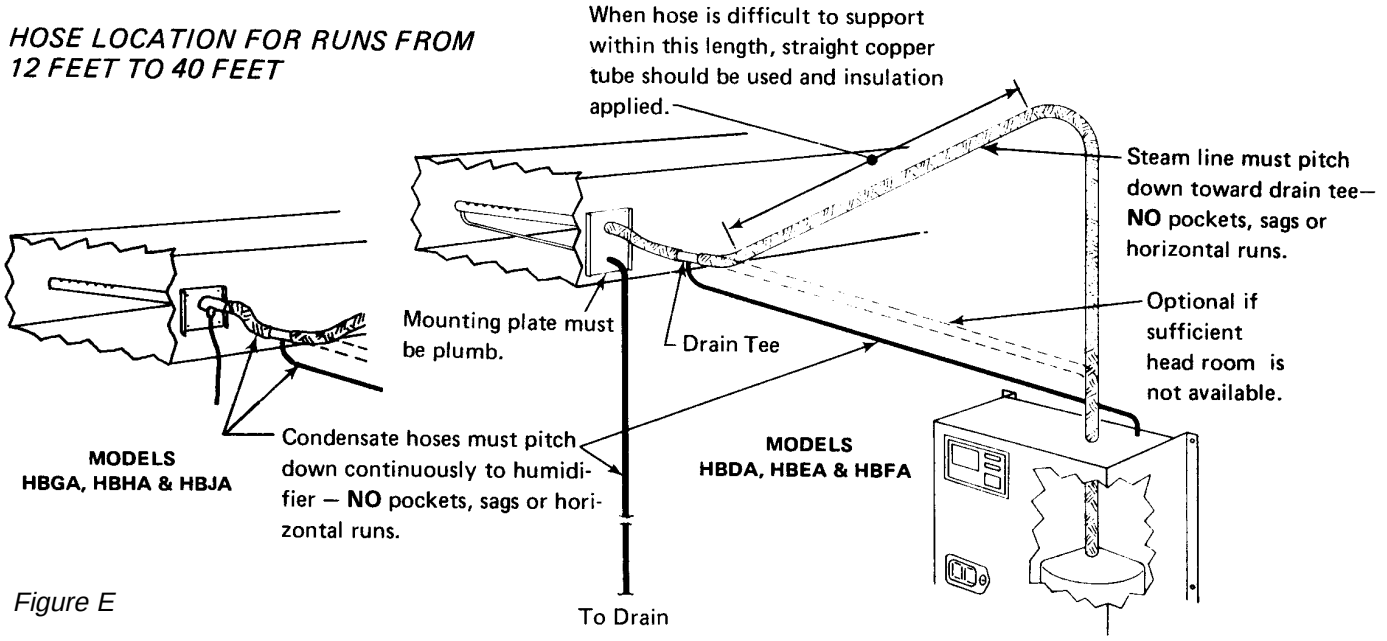


Figure E

HOSE LOCATION WHEN DUCT IS LOWER THAN HUMIDIFIER

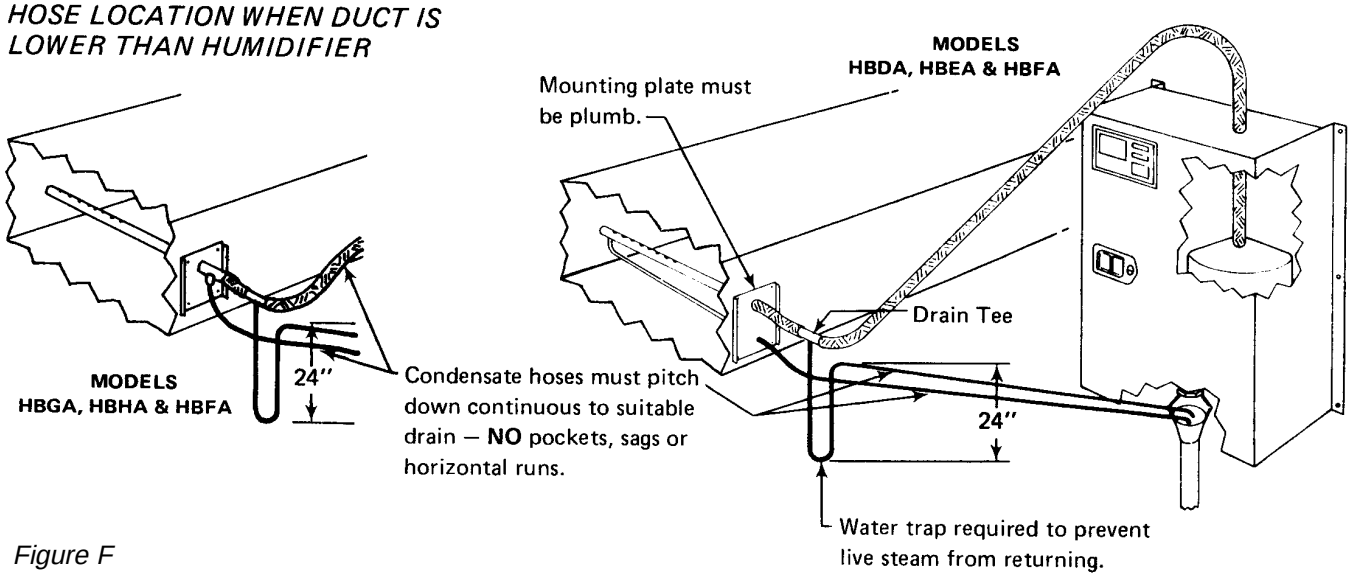


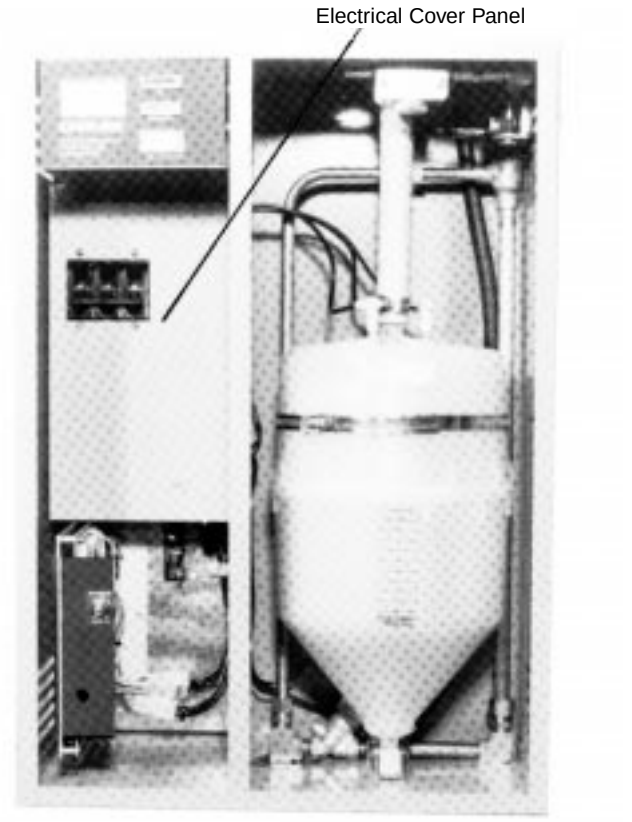
Figure F

ELECTRICAL CONNECTIONS

POWER MUST BE OFF BEFORE MAKING ANY ELECTRICAL CONNECTIONS

Check unit electrical characteristics on label on outside of cabinet. It must agree with the power provided to the unit. If it does not, contact your Carnes Representative.

1. Remove screws securing electrical cover panel for access to wiring (**Photo D**).
2. Remove perforated access panel on top of unit (**Photo C**).



Model HBDA Shown

Photo D

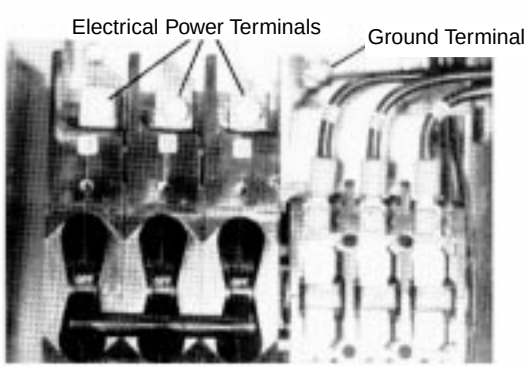
TABLE 2

RECOMMENDED CIRCUIT RATINGS IN AMPERES

	VOLTAGE				
Model	**208**	**230**	**460**	**550**	**600**
HBDA	35	35	20	15	15
HBEA	70	70	35	30	25
HBFA	110	100	50	45	40
HBGA	90	80	40	35	35
HBHA	150	150	70	60	60
HBJA	225	200	100	90	80

3. Connect cabinet ground terminal to an independent ground (**Photos E** or **F**). *DO NOT* use the neutral of a four-wire power supply.
4. A fused disconnect or circuit breaker not provided by Carnes, **MUST** be installed per local and national electrical codes. See **Table 2** for recommended circuit ratings. The magnetic overload switch in the humidifier is **NOT** for use as a disconnect switch.
5. An opening is provided on the top of the electrical section (**Photo C**). Bring electric power wire thru this opening and connect to electric terminals (**Photos E** and **F**).
6. Replace electrical cover panel.

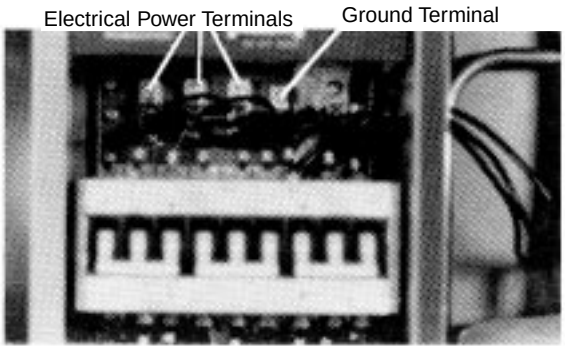
MODELS WITHOUT SEPARATE TERMINAL BOARD



Model HBDA Shown

Photo E

MODELS WITH SEPARATE TERMINAL BOARD



Model HBFA Shown

Photo F

CONTROL CONNECTIONS

1. A 7/8" opening is provided on the top of the cabinet. The control wiring should pass through the opening to the terminal strip (**Photo C**). **Note:** A built-in transformer provides 24-volt power for the control circuit. No outside power supply is required for the control circuit.
2. When the humidistat completes the circuit between the humidifier terminal strip, the humidifier will operate. Wire any auxiliary controls such as high limit humidistat or air flow switch in series with the humidistat.
3. Replace perforated access panel.

While the external disconnect switch is off, be sure terminal connectors are firmly secured to the top of the cylinder.

1. Open all water supply valves external to unit.
2. Turn external disconnect switch to “On” position.
3. Turn magnetic overload switch(es) to “On” position.
4. For safety, door interlock disconnects power to cylinder(s) when door is open. Humidifier may be operated for service purposes when door is open by pulling out white button located next to “ON-OFF-DRAIN” switch. **CAUTION: HIGH VOLTAGES ARE PRESENT**.
5. Turn “On-Off-Drain” switch to “On” position. Green “On” light should now be on.
6. Unit will now be in operation if humidistat is calling for humidity. If humidistat is not calling for humidity, adjust humidistat control upward to check operation.
7. When humidistat is calling for humidity water will slowly flow into cylinder. Steam output meter will slowly rise as water enters cylinder.
8. The “Abnormal” light will remain on until sufficient water has entered cylinder to provide 50% to 75% of set output.

   NOTE: Unit has been preset at factory for maximum output as shown by red line on steam output meter.
9. When full output is reached the fill solenoid valve will close.

   NOTE: When starting unit with new cylinder the “Abnormal” light may come back on and the drain solenoid valve and contactor may open for brief periods until water has come to full boil.

Models HBDA, HBEA & HBFA Shown

Photo G

10. Humidifier will now cycle ON and OFF in response to humidistat. Drain solenoid valve will periodically open to drain small quantity of mineral enriched water from cylinder.

ADJUSTING STEAM OUTPUT RATE

Steam output is regulated by adjusting steam output control (**Photo H**).

To change steam output:

1. Drain water from cylinder by turning “On-Off-Drain” switch to “Drain” position.
2. Loosen lock nut on steam output control.
3. Turn steam output rate control fully clockwise.
4. Turn “On-Off-Drain” switch to “On” position. Steam output rate will gradually increase as shown on steam output rate meter. When desired output is reached, slowly adjust until inlet water valve closes and stops incoming water.
5. Tighten lock nut on steam output control.

If water boils above line 10 (on cylinder) several hours after startup of humidifier or installation of new cylinder, order next lower size model cylinder when replacing. If water boils below line 3 on Models HBDA, HBEA or HBFA or below line 0 on Models HBGA, HBHA or HBJA order one higher size model cylinder when replacing.

Steam Output Control

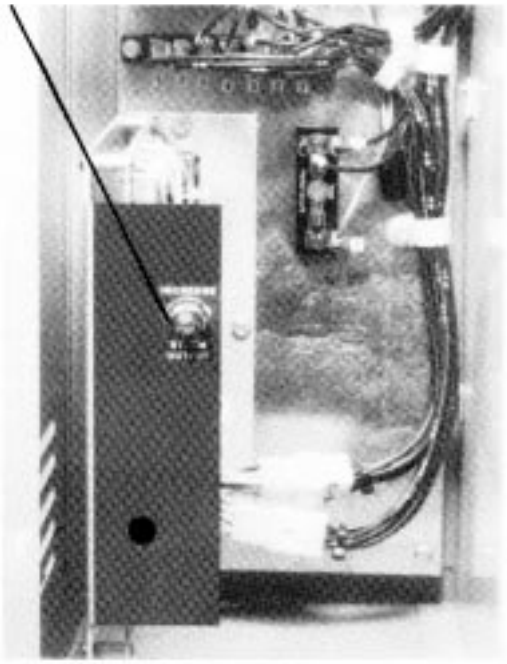


Photo H

MAINTENANCE

NOTE: It is advisable to inspect the humidifier visually at approximately two week intervals.

1. For safety, door interlock disconnect power to cylinder(s) when door is open. Humidifier may be operated when door is open by pulling out white button located next to "ON-OFF-DRAIN" switch. **CAUTION: HIGH VOLTAGES ARE PRESENT**.
2. Green "On" light should be on whenever power is supplied to the humidifier, and "On-Off-Drain" switch is in "On" or "Drain" position. If green light is **not** on, check the following items:
   a. Overload switch(es) must be in "On" position.
   b. Check glass fuse near circuit board. Replace with proper size as shown on wiring diagram.
   c. Check each incoming power wire for proper voltage as shown on humidifier rating plate. **CAUTION: HIGH VOLTAGES ARE PRESENT.**
   d. Check green "On" light bulb (24 volt) using voltmeter.
3. When amber "Abnormal" light is continually on check the following items: (**NOTE: Abnormal light will occasionally be on for short periods during operation such as start-up and whenever switch is in "Drain" position**).
   a. Clean water strainer.
   b. All valves in water supply must be open and water pressure above 20 psi.
   c. Check drain to be sure water is not constantly draining. Disassemble and clean drain valve if necessary.
   d. Replace cylinder if incoming water is flowing continually but desired output cannot be reached.
   e. Check incoming power wire for proper voltage as shown on humidifier rating plate. **CAUTION: HIGH VOLTAGES ARE PRESENT.**
   f. Check voltage at fill solenoid valve. Replace valve is 24 volts are present but valve is not open.
   g. Check steam hose for any restriction.

CLEANING WATER STRAINER

1. Turn "ON-OFF-DRAIN" switch to "Off."
2. Turn magnetic overload switch(es) to "Off".
3. Shut off water supply valve ahead of unit.
4. Remove brass nut by turning counter-clockwise. (A small amount of water will drain when nut is removed. Use a small container to catch this water).
5. Rinse strainer screen to remove deposits.
6. Replace screen, nut, and gasket in strainer housing.
7. Turn water supply on — check for leakage.
8. Turn magnetic overload switch(es) to "On".
9. Turn "On-Off-Drain" switch to "On".

CHANGING STEAM CYLINDER

NOTE: On two and three cylinder models all cylinders must be replaced at the same time.

1. Turn "ON-OFF-DRAIN" switch to "Drain". Completely drain cylinder.
2. Turn magnetic overload switch(es) to "Off".
3. Slip off cylinder terminal connectors.
4. Remove steam hose.
5 Loosen cylinder retaining band.
6. For Models HBDA, HBEA & HBFA remove cylinder by turning cylinder counter clockwise. For Models HBGA, HBHA & HBJA remove cylinder by lifting it from the cylinder holder.
7. Models HBDA, HBEA & HBFA apply teflon tape or pipe dope to the threaded portion of new cylinder. Models HBGA, HBHA & HBJA remove the "O" ring which may have remained in the holder and clean the "O" ring seat in the holder.
8. Models HBDA, HBEA & HBFA screw cylinder into brass cylinder fitting. Models HBGA, HBHA & HBJA make sure new "O" ring is on cylinder base and insert cylinder into holder with enough pressure to seat "O" ring in holder.
9. Tighten cylinder retaining band.
10. Replace steam hose and tighten clamp.
11. Replace terminal connectors on Models HBDA, HBEA & HBFA in any sequence. On Models HBGA, HBHA & HBJA match the numbers on the terminal connectors with the numbers on the cylinders.
12. Turn magnetic overload switch(es) to "On".
13. Turn "On-Off-Drain" switch to "On".
14. "Abnormal" light will remain on until water fills cylinder.

After replacing humidifier cylinder, order a replacement immediately. This will insure having a spare cylinder on hand when the next change is required.

MISCELLANEOUS

If humidification is not going to be required for a long period of time, e.g. during summer cooling cycle in a comfort application, it is recommended the steam cylinders be completely drained before switching off power and closing water supply valve.

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