Bulletin 537-G

# HumidiClean™
# Series HC-4100/4145/4300/4500 Humidifiers

# Installation, Operation and Maintenance Instructions

## Table of Contents



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## Installation

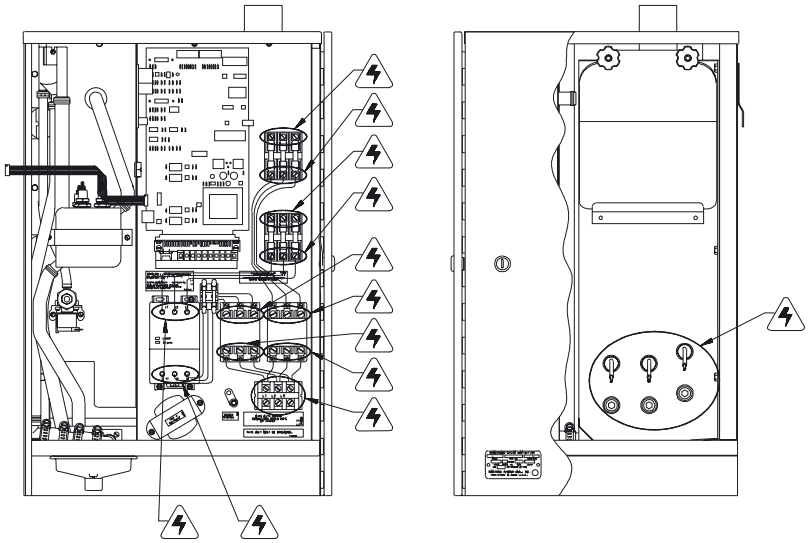
Please read and save these instructions.

The Armstrong HumidiClean humidifier converts ordinary tap water or purified water to steam for distribution to raise the relative humidity level.

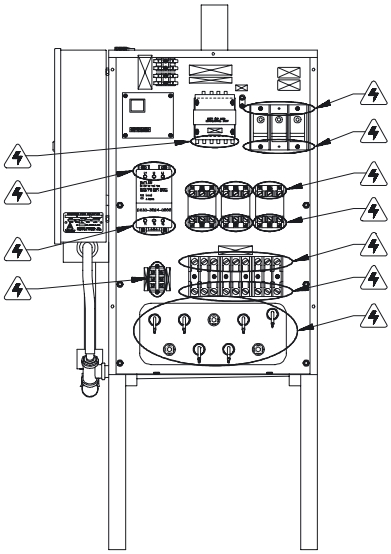
To allow HumidiClean to function to its full capability, be certain to install in accordance with Armstrong recommendations.

# Danger!

## Electrical Shock Hazard High Voltages Exist Inside the Humidifier!



**HC-4100 & HC-4300**
**(HC-4145 similar)**



**HC-4500**

**To protect yourself and others from accidental shocks:**

1. Keep the humidifier locked during normal operation and store the key in a safe location away from the humidifier.

2. **Always disconnect the power supply at the circuit breaker or safety switch before opening any covers or doors.**

3. Before servicing the humidifier, learn where the high voltage parts are. The contactor terminals and high voltage fuse blocks, along with the power module and heating elements have shock potential. **Keep hands and metal tools away from these areas when power to the unit is on.**

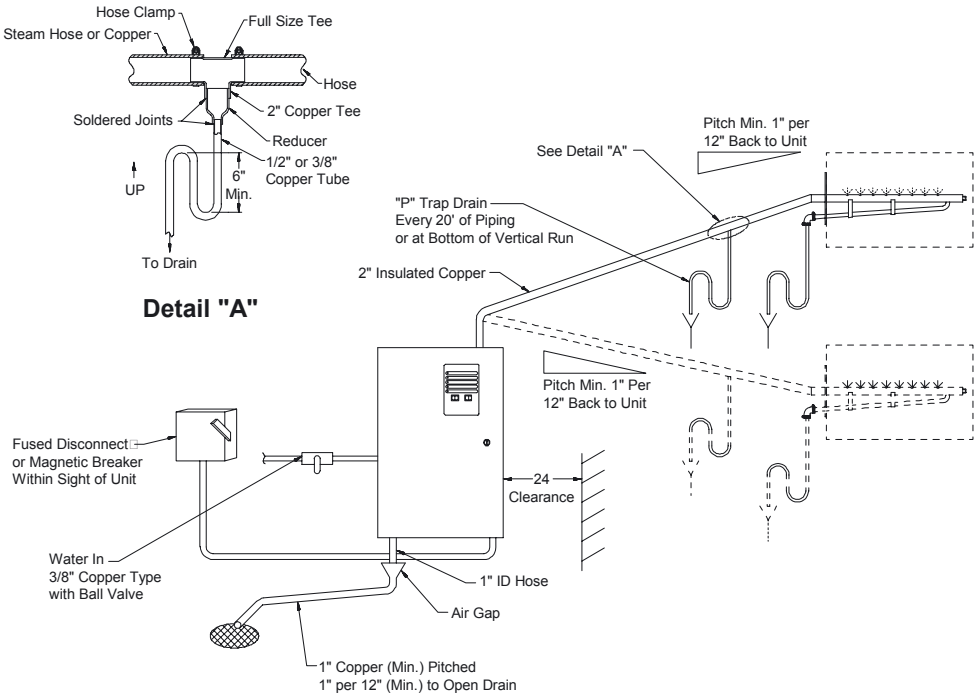
### Pre-Installation

1. **Check Shipment.** A claim should be filed with the transportation company, (and reported to Armstrong), if any items are missing or damaged.

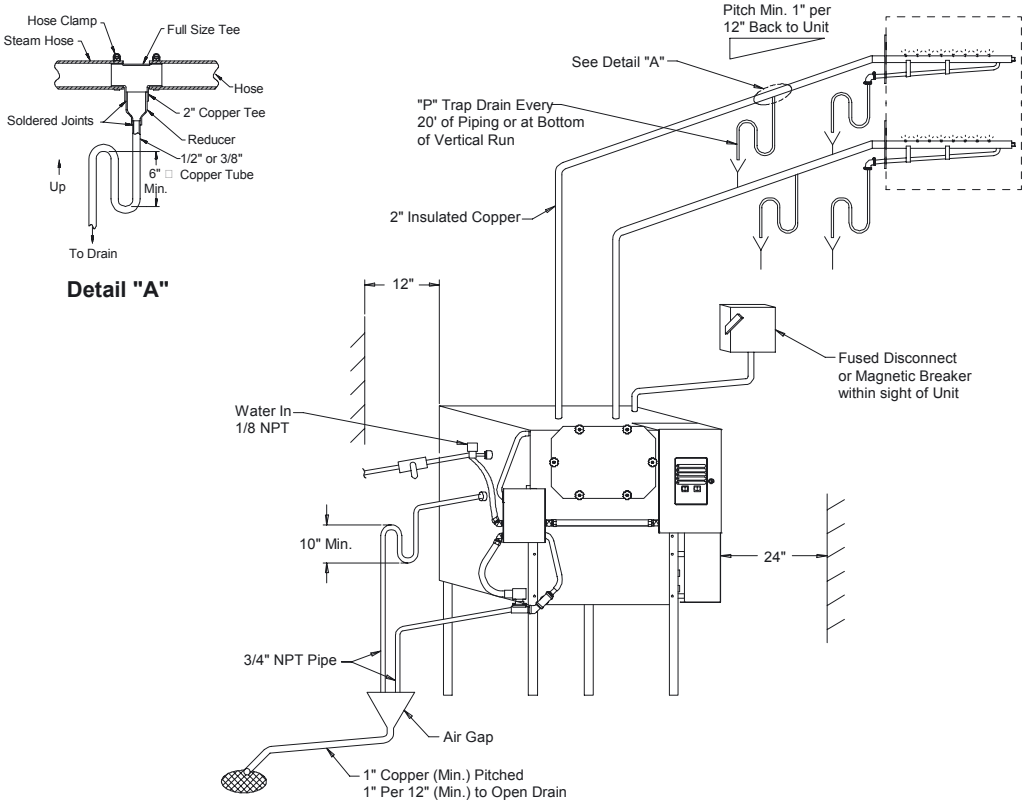
2. **Check Local Codes.** The installation of HumidiClean should be in accordance with all applicable building, plumbing, and electrical codes.

3. **Site Selection.** The humidifier should be installed in an easily accessible location. **Do not install the unit where malfunction of the humidifier might cause damage to non-repairable, unreplaceable or priceless property.** Refer to Installation section for other details regarding site selection.

### Figure 3-1 HC-4100/4145/4300 Installation




### Figure 3-2 HC-4500 Installation



## HC-4100/4145/4300 Mounting

The HumidiClean models HC-4100/4145/4300 are designed to be wall mounted. A wall mounting bracket and lag screws are provided for mounting on 16" (41 cm) centers. The operating weight of the unit is 186 lb. (84 kg). A clearance of 24" (61 cm) on the right side and in front of the cabinet is required for servicing.

1. Position wall mounting bracket level on wall and mark hole pattern. Make sure holes line up with studs or other sturdy structure.

2. Use 3/8" x 1 1/2" lag screws provided to secure the bracket.

3. Hang the humidifier on the wall mounting bracket. The weight of the unit is 112 lb. (51 kg).

The HC-4500 HumidiClean is designed to be floor mounted on a level surface. The operating weight is 370 lb., a clearance of 24" is required for the front and sides, 12" minimum for the back.

## Water Fill Supply

The humidifier can use any potable or purified water supply. Water pressure must be 25-125 psi (1.7 - 8.6 bar). Water temperature must be less than 140°F (60°C).

1. Install a shut-off valve near the unit.

2. Connect the water supply to the 3/8" compression fitting on the fill water solenoid valve on models HC-4100/4300, 1/8" NPT on HC-4500. The knock-out for the water supply tubing is to the left of the fill valve in the side wall. (HC-4100/4145/4300)

## Electrical Service Wiring

1. Connect main power supply wiring to high voltage terminals in unit. Read breaker size required on humidifier's nameplate and refer to Table 6-1 and 6-2 for HC-4100/4145/4300 wire (gage) required; Table 6-1 and 6-3 for HC-4500. Make sure an interlocking circuit breaker or safety switch (not furnished) is accessible and within sight of the unit.

2. The humidifier cabinet must be grounded. A ground lug is provided in the cabinet.

3. Use only wire with copper conductors rated 194°F (90°C) or higher for power supply and grounding.

**Table 5-1**

| Recommended Branch Circuts | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nominal Amp Rating** | 1-12 | 13-15 | 16-20 | 21-24 | 25-32 | 33-40 | 41-48 | 49-64 | 65-80 | 81-100 | 101-120 | 121-140 | 141-160 |
| **Wire (Gage)** | 14 | 12 | 10 | 10 | 8 | 8 | 6 | 4 | 3 | 1 | 0 | 00 | 000 |
| **Circuit Breaker** | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 80 | 100 | 125 | 150 | 175 | 200 |

**Table 5-2**

| Steam Capacities and Nominal Amperage Ratings | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model HC-4100 | | | | Model HC-4100 / HC-4100 DI | | | | | | Model HC-4300 / HC-4300 DI | | | |
| HC-4100 DI | | | | HC-4145 / HC-4145 DI | | | | | | | | | |
| Voltage (Vac) | 3 kW Unit | | | 9 kW Unit | | | 15 kW Unit | | | 18 kW Unit | | 30 kW Unit | |
| | Nominal Amps | | Steam Output | Nominal Amps | | Steam Output | Nominal Amps | Steam Output | | Nominal Amps | Steam Output | Nominal Amps | Steam Output |
| | Single Phase | Three Phase | lbs [kg] hr | Single Phase | Three Phase | lbs [kg] hr | Three Phase | lbs [kg] hr | | Three Phase | lbs [kg] hr | Three Phase | lbs [kg] hr |
| 208 | 13.3 | 7.7 | 8.3 [3.8] | 39 | 22 | 24 [11] | 37 | 40 [18] | | 44 | 48 [22] | 74 | 80 [36] |
| 240 | 12.9 | 7.5 | | 38 | 22 | | 36 | | | 44 | | 72 | |
| 380 | - | 4.7 | 9.0 [4.1] | - | 14 | 27 [12] | 23 | 45 [20] | | 28 | 54 [25] | 46 | 90 [41] |
| 480 | - | 3.8 | | - | 11 | | 18 | | | 22 | | 36 | |
| 600 | - | 3 | | - | 9 | | 15 | | | 18 | | 30 | |

**Table 5-3**

| Steam Capacities and Nominal Amperage Ratings | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HC-4500 / HC-4500 DI | | | | | | | | | | | | | | | | |
| Volts | 30 kW Unit | | 33.5 kW Unit | | 40 kW Unit | | 45 kW Unit | | 48 kW Unit | | 50.3 kW Unit | | 60 kW Unit | | 72 kW Unit | |
| | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] | Nom. Amps Three Phase | Steam Output lb/hr [kg/hr] |
| 208 | 84 | 90 [41] | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 208 | — | — | — | — | — | — | 125 | 135 | — | — | — | — | — | — | — | — |
| 240 | — | — | — | — | 96 | 120 [54] | — | — | — | — | — | — | — | — | — | — |
| 240 | — | — | — | — | — | — | — | — | — | — | — | — | 144 | 180 [82] | — | — |
| 380 | — | — | 51 | 100 [45] | — | — | — | — | — | — | — | — | — | — | — | — |
| 380 | — | — | — | — | — | — | — | — | — | — | 77 | 150 [68] | — | — | — | — |
| 380 | — | — | — | — | — | — | — | — | 73 | 144 [65] | — | — | — | — | — | — |
| 380 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 110 | 216 [98] |
| 480 | — | — | — | — | — | — | — | — | 58 | 144 [65] | — | — | — | — | — | — |
| 480 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 87 | 216 [98] |
| 600 | — | — | — | — | — | — | — | — | 47 | 144 [65] | — | — | — | — | — | — |
| 600 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 70 | 216 [98] |

## Drainage

1. Connect HC-4100/4145/4300 drain to suitable waste drainage system. HC-4100/4145/4300 drain water may be as hot as 160°F (71°C) HC-4500 (212° F [100° C] ). Use clear drain hose provided and 1" (2.5 cm) copper pipe pitched away from unit at 1" (2.5 cm) inch per foot. An air gap to prevent back flow is required. See Figure 6-1.
2. Connect HC-4500 3/4" NPT fitting to a suitable waste drainage system. Note: drain water may be as hot as 212°F (100°C) if this is unacceptable, Armstrong offers a condensate cooler (Temp-R-Drain) which will temper the drain water to 140°F (60°C). See Figure 6-2. Use 1" (2.5cm) copper pipe pitched away from the unit at 1" (2.5 cm) per foot. An air gap to prevent backflow is required. A P-trap (10" minimum) is required for the tank overflow, use 3/4" copper pipe connected to the 3/4” NPT tank overflow connection.

**Figure 6-1 HC-4100/4300**

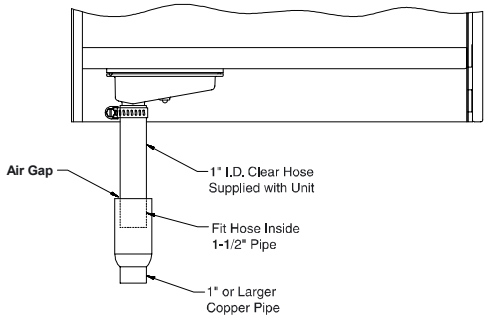
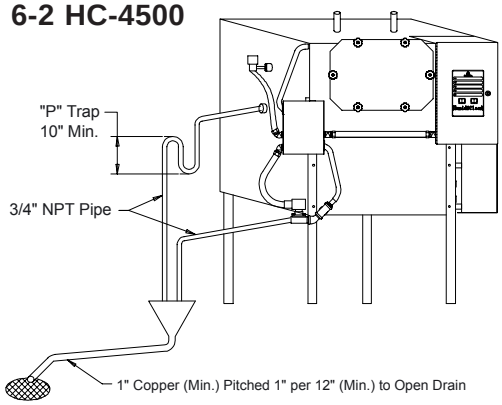



**Figure 6-2 HC-4500**




## Duct Steam Distribution

1. The dispersion tube should be proper length . Verify correct size from Table 8-1.
2. Install dispersion tube(s) horizontally in duct so holes face upward. Air flow must be vertical up or horizontal. Do not restrict duct with a height of 8" (20 cm) or less. Installations over 2000 FPM (10 m/s) air velocity are not recommended. Consult factory if air flow is vertical down or air velocity is over 2000 FPM (10 m/s). Do not install in ducted systems with static pressure exceeding 6" WC (15 cm).
3. The dispersion tube(s) should be located upstream of a straight duct run, without obstructions, 10 feet (3 m) or more in length. Consult the factory if this distance is not available.
4. Use the template provided to cut dispersion tube installation holes. Fasten the mounting plate to duct with sheet metal screws. If the dispersion tube is 36" (91 cm) or longer, support the far end with threaded rod or similar means.
5. **Note: For steam being generated from a deionized (DI) or reverse osmosis (RO) water source, the use of 2" insulated stainless steel piping in lieu of copper is required. Contact the factory with questions.** Connect dispersion tube(s) to HumidiClean tank using 2" (5 cm) nominal insulated copper pipe and hose cuffs provided. We do not suggest steam distribution piping of field supplied rubber based compounds to be used for any HumidiClean application. Pitch pipe back to unit 1" (2.5 cm) per foot. The steam pipe must be free of kinks and sags to allow for gravity drainage of condensate. Maximum pipe run distance from tank to dispersion tube is 40 feet (12 m) equivalent piping length. Avoid excessive use of elbows or 45° changes in direction. A "P" trap drain should be installed every 20 feet (6 m), of piping run or at the bottom of vertical runs that cannot drain back to the tank. See Fig. 4-1 for "P" trap detail.
6. If duct static pressure plus piping back pressure is greater than 6" WC, please consult the factory.

| | Nominal Pipe Size | | |
|---|---|---|---|
| Fitting Style | 1 1/4 | 1 1/2 | 2 |
| 45 Deg Elbow | 1.0 | 2.2 | 2.8 |
| 90 Deg Elbow | 2.5 | 4.3 | 5.5 |
| 90 Deg Long Elbow | 1.5 | 2.7 | 3.5 |
| Tee | 5.0 | 9.0 | 12.0 |

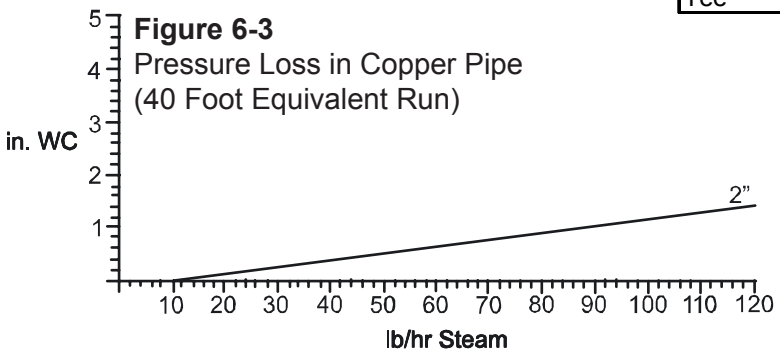
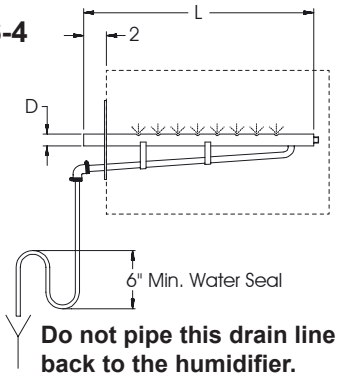



**Figure 6-3**
Pressure Loss in Copper Pipe
(40 Foot Equivalent Run)

**Figure 6-4**




**Do not pipe this drain line back to the humidifier.**

**Table 7-1** **Steam Dispersion Tube Selection**

| HC-4100, HC-4100 DI, HC-4145 and HC-4145 DI Model | HC-4100, HC-4100 DI, HC-4145 and HC-4145 DI Model "D" Dia. | HC-4300, HC-4300 DI, HC-4500 and HC-4500 DI Model | HC-4300, HC-4300 DI, HC-4500 and HC-4500 DI Model "D" Dia. | Steam Dispersion Tube Length (L) [cm] | Duct Width | |
|---|---|---|---|---|---|---|
| | | | | | Min. [cm] | Max. [cm] |
| D-1 | 1-1/2" | DL-1 | 2-3/8" | 12" [30] | 11" [28] | 16" [41] |
| D-1.5 | | DL-1.5 | | 18" [46] | 17" [43] | 22" [56] |
| D-2 | | DL-2 | | 24" [61] | 23" [58] | 34" [86] |
| D-3 | | DL-3 | | 36" [91] | 35" [89] | 46" [117] |
| D-4 | | DL-4 | | 48" [122] | 47" [119] | 58" [147] |
| D-5 | | DL-5 | | 60" [152] | 59" [150] | 70" [178] |
| D-6 | | DL-6 | | 72" [183] | 71" [180] | 82" [208] |
| D-7 | | DL-7 | | 84" [213] | 83" [211] | 94" [239] |
| D-8 | | DL-8 | | 96" [244] | 95" [241] | 106" [269] |
| D-9 | | DL-9 | | 108" [274] | 107" [272] | 118" [300] |
| D-10 | | DL-10 | | 120" [305] | 119" [302] | 130" [330] |

## Area Steam Distribution

The EHF-3 fan package (minimum of 2 required for HC-4500) is designed to be hung on a wall to operate as a remote mounted, direct area discharge option. It incorporates a blower rated at 120v-2.90 amps. CFM rating is 465 @ 1530 RPM. The fan package requires a separate 120 volt power supply (optional stepdown transformer available). Consult Armstrong Installation Bulletin IB-95 for more information.

## Alternative for shortened non-wettable vapor trail

For applications with particularly limited downstream absorption distance, Armstrong HumidiPack may be considered. HumidiPack is a prefabricated separator/header and multiple dispersion tube assembly. It provides uniform distribution and shortened non-wetting vapor trail. Consult Armstrong Installation Bulletin No. 560 for more information.

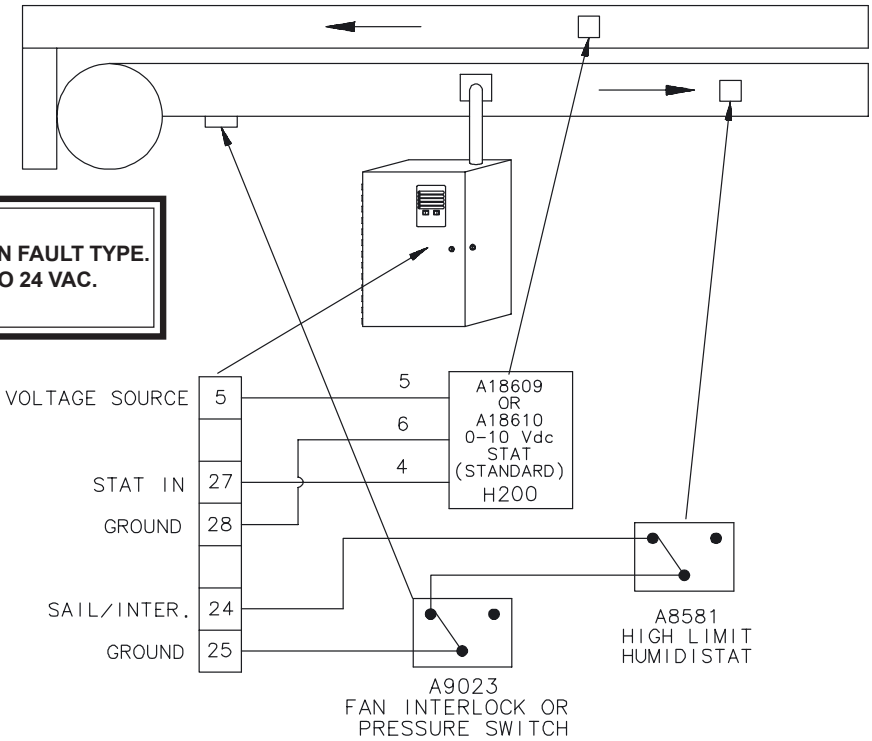
## Control Wiring

Wiring for low voltage controls should not be run in same conduit as the power supply. Use of shielded wire or a separate dedicated metal conduit is required. When shielded cable is used, shield is to be grounded at the humidifier only. Refer to Figures 8-1 and 8-2 for wiring schematics.

## Control Humidistat

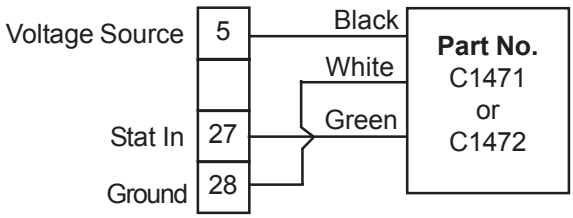
1. Locate control humidistat where it will sense the average air condition of the space to be humidified. Avoid areas of restricted circulation or locations where the sensor will be subjected to drafts, localized heat or moisture sources.
2. Optional duct mounted humidistats are available to sense return or exhaust air, if preferred.
3. Set DIP switch S-3 in upper left portion of the PC board to proper range for the humidistat control signal to be used. See Figure 9-1 and 22-1. Also set voltage source jumper (J3) to proper range. See Fig. 9-1 for location of switches plus Figure 22-1 and applicable wiring diagram on Page 8 for correct switch setting.
4. Wire standard Armstrong 0-10 Vdc humidistat as shown in Figure 8-1. For use of alternative humidistats, please refer to Figure 8-2.

**Figure 8-1**
**Standard Humidistat**
**H200-XX-XX-XX**



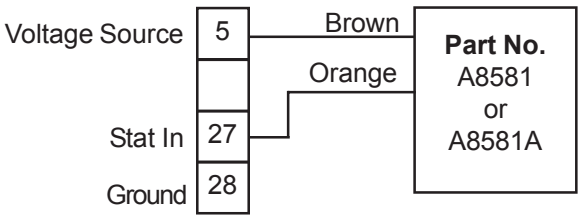

## Figure 8-2 Alternate Humidistats

**Armstrong Stat C-1471 & C-1472**
**1.9 - 3.9 Vdc**



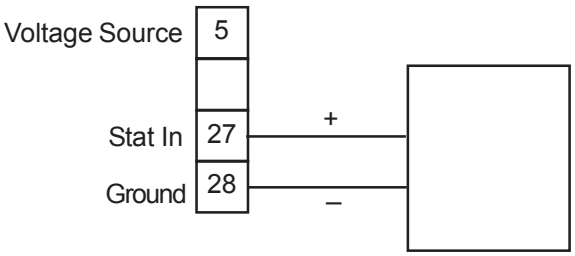

**Set S3 DIP Switch to 1.9 - 3.9 Vdc**
**Set Voltage Source (J3) Jumper to 12 Vac**

**On-Off Humidistat**
**Switch opens on RH rise**




Set S3 DIP Switch to 0 - 5 Vdc
Set Voltage Source (J3) Jumper to +5 Vdc

4 - 20 mA & 0 - 10 Vdc Setting
See above for Armstrong 0 - 10 Vdc Humidistat Connections




Set S3 DIP Switch to 0 - 10 Vdc or 4-20 mA (For use of standard Armstrong Humidistat please see Fig. 9-1 note regarding voltage source jumper)

## High Limit Humidistat

Remove the jumper tab from terminals 24 & 25 and wire the high limit stat between these terminals. Refer to Figure 8-1 (the overall wiring diagram) for more information. A duct mounted high limit humidistat is recommended to prevent over-saturation of the duct air. Use an on-off controller that opens on fault (high humidity). Humidistat should be set for a maximum of 90% RH. Alternately, a modulating high limit humidistat may be used on applications such as variable air volume (VAV). Locate the high limit humidistat approximately 10' (3m) downstream of the dispersion manifold. If 10' (3m) is not available, consult the factory. **Note:** High limit humidistat will be wired in series with duct pressure switch, if used, see Figure 8-1.

## Airflow/Pressure Switch

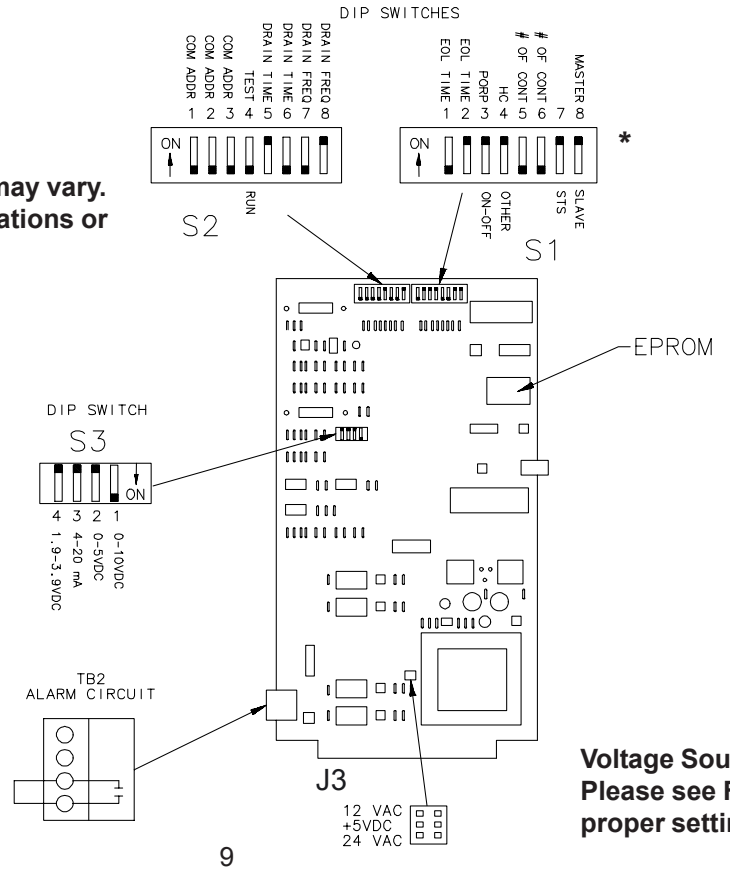
An airflow switch is recommended to deactivate the humidifier when there is insufficient air flow in a duct system. A duct pressure switch is preferred as an airflow sensor. The pressure switch should open on insufficient airflow (opens on fault). Airflow switch should be mounted in supply air duct upstream of humidifier dispersion. Remove the jumper tab between terminals 24 and 25 and wire the airflow sensor between these terminals. See Figure 8-1 (the overall wiring diagram) for more information. Complete installation and wiring instructions are contained in the duct pressure switch package. **Note:** Duct pressure switch will be wired in series with high limit humidistat, if used, see Figure 8-1.

## Alarm Circuit

The bottom 2 terminals on the TB2 connector on PC board, see PC Board drawing Fig. 9-1 on Page 9, are connections for a class II NEC alarm circuit (switch closure only, 1 amp. maximum @ 24 Vdc or 0.5 amp. @ 125 Vac). The switch will close when the error or service LED's are energized except when high humidity/sail switch circuit is open.

**Figure 9-1**
**PC Board**

*** Actual switch settings may vary. See Fig. 23-1 for explanations or consult factory.**




**Actual switch setting may vary. Please see page 8, item 3.**

**Voltage Source Jumper Please see Fig. 8-2 for proper setting.**

## Start-Up Procedure

### Before turning on the power:

1. Examine the electrical compartment for any loose or disconnected component wiring. Check all high voltage screw terminal connections at contactor, terminal strip, fuse block & power module for tightness.

2. Open side door (HC-4100, 4145, 4300). Remove tank access panel by unscrewing two black knobs. Make sure all beds are fastened securely to mounting pins. Position access panel on tank making sure the gasket is in place and tighten two black knobs (seven on HC-4500).
   **Note: Ionic beds not used on DI/RO units.**

3. Check and recheck incoming voltage source and control wiring for proper connections and tightness of connections.

4. Turn on water supply and check for leaks.

5. Make sure access doors and panels are secure.

## Principle of Operation

The HumidiClean humidifier converts ordinary tap water or purified water to steam for distribution to raise the relative humidity level. The demand for humidity is sensed by a humidistat which sends a control signal to HumidiClean. HumidiClean is connected to the power supply (either 208, 240, 380, 480 or 600 Vac) through a separate circuit breaker supplied by the customer. When power is initially supplied to the unit from the circuit breaker, all LEDs will illuminate for 5 seconds. The "POWER" LED will remain on and the unit's fill valve solenoid is energized to allow water to enter the tank at a rate of .31 gal/min (HC4500 fill rate is 2 gallons per minute). Note: If the water level in the tank is above the low water level when power is applied, the drain valve will be energized to drain the water below the low water level. Once the water level in the tank has reached the low water switch, assuming the air proving switch is closed, the steam generator switch is on, and the high limit humidity switch is closed, the heating elements will be activated and the "STEAM GENERATION" LED will be turned on.
The water fill solenoid continues to be activated until the water level in the tank has energized the high water switch. Note: If fill or drain valves are not energized when power is first applied, check display LEDs for diagnostic code. See DIAGNOSTICS section. The heating elements will remain on for 3 minutes to preheat the water inside the tank. During this preheat cycle the amperage draw of the tank can be checked with a clamp on amp meter. The amperage draw on all high voltage wires connected to the main power supply terminal block should correspond to the value on the nameplate.

After the 3 minute heat-up time, the HumidiClean will continue to produce steam based on the demand signal from the humidistat. If the demand signal drops below 2% or the high limit/sail switch circuit opens, the contactor(s) will open and the "STEAM GENERATION" LED will turn off. Note: If the humidifier shut off due to low humidistat demand, a demand signal of 10% or greater is needed to re-close the contactor and turn on the "STEAM GENERATION" LED. If all the signals are consistent as stated above, HumidiClean will produce steam continuously and refill the tank with water when the low water level is reached. These fill intervals will be started as defined in the software of the printed circuit.

Power to the heating elements is switched on and off by the triacs in the power module to achieve a modulating output based on the signal demand from the humidistat. The triac utilizes a 1/2 second cycle time. For example, with a 50% humidistat demand signal the triacs would be on for 1/4 second and off for 1/4 second. If the triacs are fully on, the green "LOAD" LED on the power module will be on constantly. When the triacs start to modulate (switch power to the heating elements on and off) the LED will show the triac on condition and will appear to flicker or blink.

As HumidiClean continues to produce steam, the unit will accumulate and memorize the heating element active time for the purpose of defining a drain cycle and service life (this memory is not affected by power outages). When the HumidiClean heating elements have been on for the dip switch drain **frequency** setting, the unit activates the drain and fill solenoids and begins draining the tank. The tank will drain with the water being tempered (HC4100/4145/4300 only) from an activated water fill solenoid. The drainage from the tank will pass the low water switch, opening the switch and shutting off power to the heating elements. The drainage from the tank (HC-4100/4145/4300 only) should not exceed 160°F (71°C) (HC-4500 212°F [100°C]). The drain cycle is controlled by the printed circuit board. The drain cycle can be modified. See DIP Switch Settings Section. Once the unit has timed out of the drain cycle and all of the switches are still in position to generate steam, the water fill solenoid switch is activated to fill the tank and the cycle starts over again.

## Completing a Service Life Cycle

When 90% of the selected service time has accumulated, the **"Service Life"** LED on the control panel will begin to flash. (Refer to dip switch settings, for bed life duration settings). If the HumidiClean is not serviced at this time, the unit will continue to operate for the remaining 10% of the service life setting. When 100% of the bed life setting has been reached, the **"Service Life"** LED will be on constant. The unit will drain the tank and not respond to a call for humidity.

### A. Servicing the Unit

1) **Record Current DIP Switch Settings**
2) **Accessing the Tank**
   a) Drain tank by flipping steam generation switch from "ON" to the "STEAM OFF & TANK DRAIN" position.

   b) Once the tank is drained, shut power off to unit and allow the tank to cool.

   c) Open the cabinet access doors, and slowly open tank access panel.

3) **Ionic Bed Inspection**

   Remove and inspect one of the ionic beds and inspect the drain screen at the bottom of the tank. If it does not appear to be saturated with mineral deposit (a full bed will weigh 2.5 pounds dry) and if the drain screen is clear, you have two options.

   a) **Reset the existing service life counter.** In which case the unit will need to be thoroughly checked at the next service life. To reset the service life: hold the "RESET" button in (to the left) for 20 seconds until the front panel LED's illuminate than all go off (except the power LED). Proceed with Step 4.

   b) **Change the service life settings** (see bed life adjustment procedure at the end of this document).

4) **Ionic Bed Replacement**

   If the beds are saturated (a full bed will weigh 2.5 pounds dry) remove all of them. Remove any large pieces of scale from the tank. Scraping the tank is advised.

   a) Chemically clean the unit with Rite-Qwik.
      i) Pour one gallon of Rite-Qwik into tank followed by one gallon of fresh water. The HC-4500 model requires 2 gallons of Rite-Qwik and 2 gallons of water.

ii) Allow the solution to work until the boiling action ceases.

iii) Clean the water level electrodes, using an emery cloth. See Page 15 for complete instructions.

iv) Check water level canister for debris.

v) Replace the electrodes.

vi) Ensure drain lines are free of leaks and secure.

vii) Fill the tank with water and drain. (Perform this step several times.)

b) Install the new Ionic Beds.

5) **Restoring the Unit to Operation**

c) Put "STEAM GENERATION" switch on the "ON" position.

d) Turn power on at breaker, the LED's will illuminate for 5 seconds, then go off except for the "POWER ON" LED.

e) Unit should begin to fill. Fill time is approximately 23 minutes before "STEAM GENERATION LED" will come on.

f) If this does not take place, reset the unit by holding the "RESET" button "ON" (to the left) for 20 seconds until the front panel LED's illuminate and than all go off (except for the "POWER ON" LED).

## B. Modifying the Bed Life Setting

1) Complete the steps for servicing the unit as outlined above.

2) The unit must run for at least one hour.

3) Power the unit down.

4) Set the dip switches to the desired EOL settings. See Page 22 for table of dip switch settings.

5) Power the unit up. The new Bed Life Settings will be set.

**Note:** If the dip switches are reset prior to the completion of step two, the unit could lock up. The power on LED will be lit, but the unit will not respond to any input. If this is the case, the following steps must be taken to restore the unit to proper operation.

a) Power the unit down.

b) Reset the dip switches to the previous settings as recorded (**Factory Defaults** are HC-4100 = 1000 hours, HC-4300 & HC-4500 = 500 hours).

c) Power the unit up at breaker.

d) Press and hold the "RESET" button to reset the EOL time. This must be held for at least 20 seconds.

e) Allow the unit to run for at least one hour.

f) Power the unit down at breaker.

g) Set the dip switches to the desired settings. See Page 22 for the dip switch settings.

h) Power the unit up at breaker.

## End of Season Drain

If at any time during normal operation there is not a demand for a continuous 72 hour period, HumidiClean drains the tank and the PC Board initiates a drying cycle by cycling the heating elements for short intervals in order to dry the ionic beds.

## Maintenance

The HumidiClean is designed to minimize maintenance. As stated in the PRINCIPLE OF OPERATION section, after the HumidiClean has accumulated 90% of the selected Service Life, in hours of heater on time, the “SERVICE LIFE” LED will flash (blink). At this time the ionic beds in the tank should be replaced. If service is not performed, the unit will continue to operate for the remaining hours before shutting down completely.

**Note:** Service Life can be adjusted based on water quality. If Ionic Beds are relatively free of scale deposits or scale is forming on tank walls and elements because beds are saturated with scale, Please consult the factory for Service Life adjustment procedures.

## Replacing the Ionic Beds

1. Turn off steam generation switch and allow unit to completely drain.

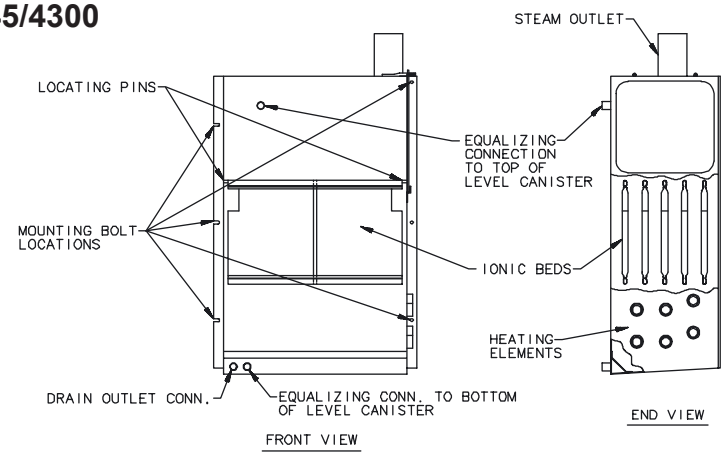
2. **Cut power at circuit breaker.**

3. Unlock and open front and side doors (HC-4100/4145/4300).

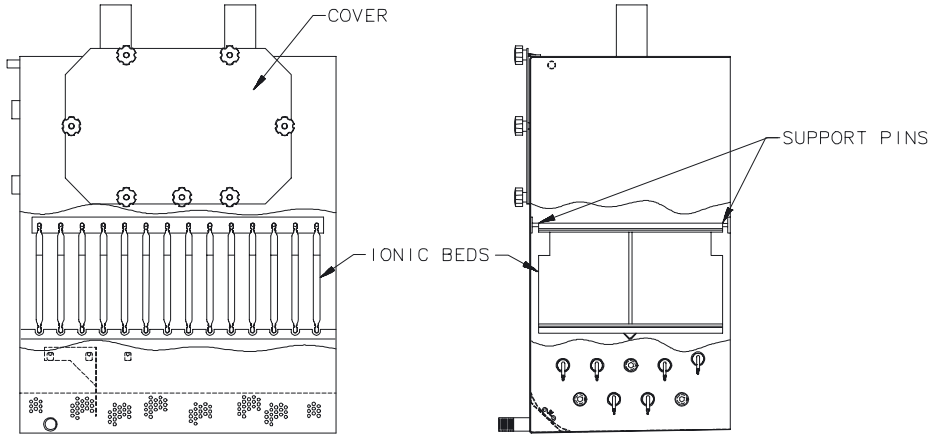
4. (**Caution:** Tank will still be quite warm and should be allowed to cool.)
   Unscrew two black knobs (6 knobs HC-4500) holding access panel and remove.

5. Unsnap ionic beds from support pins and slide them out through the access opening.

### HC-4100/4145/4300




### HC-4500




6. Inspect tank drain screen and elements inside the tank. The elements should appear to be flaking off scale. If the drain screen appears to building deposits in the screen holes it should be cleaned. Remove any flakes that appear in the bottom of the tank.

7. Install five (5) new ionic beds (14 for the HC-4500), snapping them into place on the support pins.

8. Be sure access panel gasket is lapped over all edges of tank access opening. Replace and secure tank access panel.

9. Make sure both access doors/panels are secure.

10. Turn on power at circuit breaker.

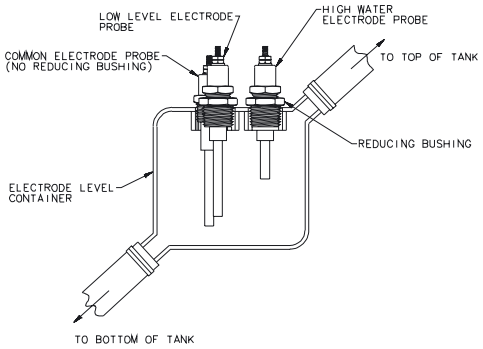
11. Depress and hold in the reset button **to the left** for 20 seconds. All the LED's will blink together indicating the accumulated hours memory has been reset to zero. The unit should now be heard filling. NOTE: The accumulated time memory can only be reset to zero when the service LED is blinking or on solid.

12. The following step should be performed after the unit has started heating and is making steam. Turn main power off and double check tank access panel gasket for steam leakage. Hand tighten black knobs or reposition gasket if necessary.

## Cleaning the Water Level Electrodes

1. If there is water in the steam generating tank, turn the Steam Generation switch to off. The drain valve should energize, and the unit should completely drain.

2. After the tank has drained, turn off the main power at the disconnect.




3. Unclamp and remove the 5/8" ID Silicone tubing from the top outlet of the level canister.

4. Disconnect wires #20 (high level probe), #21 (low level probe) and #29 (common probe) from the probes, noting the probe and wire locations. **Note: Level control float switches are used for DI, RO, or very pure water. Cleaning should not typically be required.**

5. Unscrew the probes from the level canister using the hex nut fitting on the probe (Note: Level canister bushings may be removed with the probes, if necessary).

6. Use a wire brush, wire wheel, or similar means to clean scale deposits off the stainless steel tip of the probe. Cleaning of the teflon insulating jacket (white portion) should not be needed.

7. Wipe probes with a clean dry cloth.

8. Inspect the interior of the level canister. If large amounts of scale or debris are present, remove the canister from the cabinet by removing the two clamping bracket screws and disconnecting the 5/8" ID Silicone hose at the bottom of the canister. Flush the canister with water to remove debris and reinstall.

9. Reinstall the probes and probe wires in their proper locations. The high water probe(shortest) goes in the right hole of the canister. The low water probe (medium length) goes in the left front hole of the canister. The common probe (longest) goes in the left, rear hole of the canister.

10. Reconnect the 5/8" ID Silicone hose(s).

## Removing The Tank HC-4100/4145/4300 Only

1. Turn steam generation switch to off and allow unit to complete a deep drain. (**Caution:** Tank will still be quite warm).

2. Turn off circuit breaker.

3. Unlock and open front and side doors.

4. Disconnect 3 hoses from front of tank; rubber hose cuff at steam outlet; heating element leads at contactor, fuses, or power module; and thermocouple wires.

5. Loosen 3 mounting bolts on left side of tank, do not remove. Remove the three mounting bolts on the right side of the tank. Slide tank out right side of cabinet (be sure tank had time to cool after operation).

## Troubleshooting

**Notice:** This troubleshooting guide is offered to aid in servicing the HC-4000 humidifiers. It is intended for use by electricians and technical service personnel familiar with electrical and electronic equipment. Many steps in the troubleshooting procedures require measurements of high voltages and involve working near exposed live parts. **KNOW WHERE THE HIGH VOLTAGE PARTS ARE, AND KEEP HANDS AND METAL TOOLS AWAY FROM THEM.** If unsure concerning any of the following procedures, PLEASE consult the factory, Armstrong Humidification Department at (269) 273-1415. All resistance checks should be made with main power OFF and the component disconnected from wiring. All continuity checks should be made with main power OFF.

### Humidifier will not fill with water when power is applied.

1. Make sure Steam Generation Switch is on and verify continuity at terminal block TB1 on display circuit board (between center common and right most terminals).

2. Make sure “SERVICE LIFE” and/or “ERROR” LEDs are not on. If so, refer to MAINTENANCE or DIAGNOSTICS section of this manual.

3. Make sure “POWER” LED is lit. If not, check voltage at secondary side of the main power transformer. Voltage should be 24-28 VAC. No or low voltage is an indication of a problem with the supply voltage or transformer. Verify supply voltage and make sure it is the same as voltage rating on humidifier nameplate. Check secondary power fuses.

4. Check the voltage to the fill valve. Voltage should be 24-28VAC. If voltage is present, fill valve solenoid coil is probably defective. Coil resistance should be 18Ω (8.8Ω HC-4500) with wires disconnected.

5. Check for water in cabinet bottom or in fill cup overflow line. If present, see “Water in bottom of cabinet” on page 20 (HC-4100/4145/4300 only).

6. If no voltage to fill valve, check water level. If it is above 1/3 full in electrode level canister (float canister for DI units), the drain valve has to open to drain water below low water level before the fill valve is energized.

7. Check for 24-28 Vac power to drain valve. If power to drain valve is OK, check drain valve coil resistance with wires disconnected. It should be approximately 10 Ω (4.1Ω HC-4500).

8. If drain valve and fill valve are both energized and water is below the 1/3 full level in the electrode canister (float canister for DI units), make sure Steam Generation Switch is **ON**. Perform continuity check to be sure.

9. If drain valve only is energized and water level is below the 1/3 full level in electrode canister (float canister for DI units), there may be excessive debris in electrode canister (float canister for DI units). Inspect and clean if needed. See page 15 for Cleaning Procedure for Electrodes.

10. PC board may be defective. Consult the factory.

**Humidifier fills with water, but does not turn "STEAM GENERATION" LED on for 3 minutes after reaching low water level.**

1. Perform steps 1 through 3 from above "Humidifier will not fill..."

2a. **For Tap Water:** Check AC voltage across the ground electrode (longest) and the low level electrode (medium length). The voltage will be approximately 17-20 VAC if the circuit is open. When the water level closes the circuit the voltage should drop to <5 volts.

(a) If voltage is not 17-20 VAC with circuit open, check continuity of wires from electrodes to PC board. If continuity is OK, the PC board is likely defective.

(b) If voltage is 17-20 VAC with circuit open, but does not drop when water contacts the two electrodes, the water may be too pure (consult factory) or if the voltage drops very slowly to about 5 volts then the electrodes need cleaning. See page 15 for cleaning procedure for electrodes.

2b. **For DI Water:** Check continuity across the two wires to the low water float switch. If no continuity, switch may be defective or "hung up". Make sure axis of switch is vertical so the float arm swings freely.

3. If high limit/sail circuit is closed, low water level circuit is closed, and humidistat is calling for humidity, the "STEAM GENERATION" LED should be illuminated. If "STEAM GENERATION" LED is not lit, PC board or wiring harness is defective.

**"STEAM GENERATION" LED turns on after initial fill to low water level, but amperage draw check shows low or no amperage draw.**

1. Check for line voltage to heating elements at secondary side of contactor and/or power module. Verify power supply is same as voltage rating on humidifier nameplate.

2. If voltage is correct, the heating elements are likely defective. Turn off main power, disconnect all elements and check element resistances (see resistance chart on Page 26 and 28). Look for open circuits or elements with high resistance.

3. If voltage is not present at elements, check primary voltage fusing.

4. If fuses are OK, check voltage to contactor coil.
   (a) If voltage is 24-28VAC at contactor coil, check coil resistance. It should be 8W with wires disconnected. If resistance is OK, check voltage drops across the contactor.

(b) If no voltage to contactor coil, check continuity of wires from PC board to contactor. If continuity is OK, PC board is likely defective.

5. Check voltage signal to power module. The voltage across EC1-10 and EC1-18 (low voltage signal to power module) should be 11-12 Vdc.
   (a) If no or low voltage, the PC board is likely defective.

   (b) If voltage is OK, but green "LOAD" LED on the power module is not on, power module is defective.

6. If green "LOAD" LED on power module is on, check voltage drops across power module.

### Humidifier overfills with water on initial fill.

1. Check electrode canister (float canister for DI units) and level electrodes for debris or scale build up. Clean as needed. See Page 16 for cleaning procedure for electrodes. On DI Units, the high water float switch may be defective or "hung up". Check continuity across wires to the switch. Make sure switch axis is vertical so float lever arm swings freely.

2. The fill valve may be stuck open. Turn off power to the humidifier. If fill valve does not close, clean or replace valve.

3. If the high water circuit is closed and the fill valve shuts off when the power is turned off, the PC board is defective.

### Humidifier runs continuously, %RH is well over set-point.

1. Verify humidistat is wired correctly and stat selector jumpers (S3 & J3, See Fig. 9-1 and 22-1) on the PC board are set correctly for the humidistat signal.

2. Disconnect humidistat wiring to humidifier. If humidifier shuts off, the problem is with the humidistat. Consult humidistat manufacturer or Armstrong for proper troubleshooting/ calibration procedures.

3. If humidifier generates steam with the humidistat disconnected.
   (a) Check for power at the contactor coil. If 24-28 VAC, PC board is defective.

   (b) Check voltage drop across contactor. If voltage drop is low (it should be line voltage), remove, disassemble and inspect contactor.

   (c) Check green "LOAD" LED on power module. If it is On or blinking, PC board is likely defective.

   (d) Check voltage drop across power module. If voltage drop is low (it should be line voltage), power module triacs may be failed closed. Shut off main power and perform continuity check across high voltage input and output terminals. Continuity indicates a shorted triac. **Note:** Some power modules have two triacs rather than three. Check schematic on power module to verify.

### Humidifier runs continuously, %RH is well under set-point.

1. Verify humidistat is wired correctly and stat selector jumpers (S3 & J3, See Fig. 9-1 and 22-1) on the PC board are set correctly for the humidistat signal.

2. Check humidistat demand signal at low voltage terminal strip. It should be close or at 100%.

3. If humidifier is a three phase model, verify all three phases of power are present and equal.

4. Check amperage draw on all high voltage power lines with a clamp on amp meter. They should be same or very close to amperage rating on the humidifier's nameplate if the humidistat demand is 100%.

5. Turn off power. Disconnect heating elements and check resistances – see Table on Pages 26 and 28. If an open circuit or abnormally high resistance is measured, the heating element(s) is defective. Also, check to see if heating element leads have shorted to ground.

6. If heating elements are OK, check voltages at secondary side of the power module and contactor. If no or low voltage, check primary fusing.

7. If fuses are OK, check voltage to contactor coil.
   (a) If voltage is 24-28VAC at contactor coil, check coil resistance. It should be approximately 8Ω with wires disconnected. If resistance is OK, check voltage drops across the contactor.

   (b) If no voltage to contactor coil, check continuity of wires from PC board to contactor. If continuity is OK, PC board is likely defective.

8. Check voltage signal to power module. The voltage across EC1-10 and EC1-18 (low voltage signal to power module) should be 11-12 Vdc at 100% power.
   (a) If no or low voltage, the PC board is likely defective.

   (b) If voltage is OK, but green "LOAD" LED on the power module is not on, power module is defective.

9. If green "LOAD" LED on power module is on, check voltage drops across power module.

10. If supply voltage and amperage draws are correct and elements appear OK, unit is probably undersized (not enough capacity for the application). Check sizing or consult factory.

### Humidifier does not drain when Steam Generation is switched OFF.

1. Disconnect and check resistance of drain valve coil. Resistance should be approximately 10Ω (4.1Ω HC-4500).

2. Make sure drain line is pitched and sized correctly. Check for blockage or obstructions in the drain line. An air gap or funnel may be needed – See Figures 6-1 and 6-2.

3. If humidifier does not drain at specified interval or when service is to be performed and drain valve and piping appear OK, there is blockage of the tank drain screen or the PC board may be defective.

### Dispersion tube spits water or water is present in duct

**Hint:** It is very helpful to cut a small observation window in the duct and cover it with plexiglass so the steam discharge from the manifold can be observed. This way the problem can be narrowed down to piping/steam quality (steps 1 and 2) or a condensation problem (steps 3 and 4).

1. Check distribution piping for proper pitch and size. Make sure there are no loops, dips or sags where pockets of water can collect. If such conditions exist and are unavoidable, a 'P' trap is needed to drain the low spots.
2. Make sure any drains are piped correctly and pitched to a floor drain.
3. Check duct downstream of manifold. If any obstructions (coils, elbows, fans) are within 10', the vapor (condensed steam) discharged from the manifold may be impinging on the obstacle before it has a chance to adsorb into air. This is especially true if the duct air is cold (<60°F), duct air velocity is high (>1000 FPM), or duct %RH is high (>90%). If these conditions exist and impingement is suspected, consult factory.
4. The duct air may be saturated with moisture (100% RH). A high limit humidistat is recommended to prevent this. See Installation section.

### Water in bottom of cabinet HC-4100/4145/4300 Only

1. Verify that pressure equalizing tubing is hooked up from top of electrode level canister to the tank.
2. Check steam distribution piping for obstructions.
3. Verify duct air velocity is less than 2000 FPM and manifold is not in a vertical down air flow.
4. Check for leaks at fittings and clamps in water supply lines.
5. Verify that tank access panel gasket is on lip of access hole and the access panel is secured tightly.
6. Make sure the duct pressure and steam distribution back pressure don't total more than 6" WC.

### Diagnostics

There are some diagnostic routines programmed into the PC board. If these routines detect a problem the unit will shut down and flash the "ERROR" LED a certain number of times, followed by a long pause.

**1 Blink - -** The low level switch has not closed after 35 minutes of fill valve on time. This is only on initial start-up or after a complete drain down.
**Check:** defective fill valve, debris in fill valve inlet screen or on tank drain screen, water leakage from tank or inlet tubing, no water flow or low water pressure, drain valve stuck open or leaking, defective low water level switch (electrodes need to be cleaned).

**2 Blinks - -** The low level switch has not closed after 3 minutes (7 minutes HC-4500) of fill valve on time. This is only after initial start-up fill and boil-down sequence.
**Check:** debris in water switch canister, defective fill valve, no water flow or low water pressure, drain valve stuck open, defective low water level switch (electrodes need to be cleaned).

**3 Blinks - -** The high level switch has not closed after 56 minutes of fill on time. This is only on initial start-up or after a complete drain down.
**Check:** debris in fill valve inlet screen or in tank drain screen, water leaking from tank or inlet tubing, low water pressure, defective high water level switch (electrodes need to be cleaned).

**4 Blinks - -** The high water switch is still closed 5 minutes after the fill valve has turned off upon hitting the high water level and a 30 second drain does not drop the water below the high water level.
**Check:** defective high water level switch, debris in level canister, fill valve stuck open, drain valve is defective or scale buildup in drain line.

**5 Blinks - -** The high level switch is closed and the low level switch is open.
**Check:** defective level switch(es), debris in electrode level canister, scale on electrodes or in float switch cannister, improper wiring of electrodes or float switches.

**6 Blinks - -** Overheating
**Check:** defective over temp board, low water in tank, scale buildup on Thermocouple heating element surface, defective Thermocouple. See NOTE in “Clearing ERROR codes section below.

**7 Blinks - -** The low water level switch has not opened after complete drain. Unit drains at frequency set by DIP switches S2-7 and S2-8 (heater on time) duration is set by DIP switch S2-5 and S2-6.
**Check:** defective low water level switch or electrodes, defective drain valve, debris on low water level float switch or electrodes, tank drain screen, or in drain valve

### Clearing “ERROR” codes

After correcting the problem, the error state must be cleared by depressing the reset button for 5 seconds. All the LEDs will then flash. Release the reset button and the unit should resume normal operation (If the water level is above the low water, the unit will drain below the low water level and refill before energizing the contactor). Turning the power on and off will not clear the error condition. **NOTE**: In the 6 Blink error condition, the power to the unit must be turned off and back on to reset the over-temperature switch. Then clear the error code as above.

**Chart 21-1** **LED Status Legend**

| Power | Steam Generator | Error | Service Life | Definition |
|---|---|---|---|---|
| S | | | | Unit is operational and is filling, draining or has no demand |
| S | S | | | Unit is operating and elements are on |
| S | | B | S | High humidity/sail switch circuit is open |
| S | | | B | Unit has reached 90% of bed life |
| S | | | S | Unit has reached 100% of bed life and needs to be inspected and reset |
| S | | 1B | | Fill time out to low level |
| S | | 2B | | Water level dropped below level during normal operation |
| S | | 3B | | Fill time out from low to high level |
| S | | 4B | | Water level above high level time out |
| S | | 5B | | Illegal level switch state |
| S | | 6B | | Over temperature sensor has tripped |
| S | | 7B | | Water level has not dropped below low level during an empty drain |
| S = Solid LED B = Blinking LED | | | | |

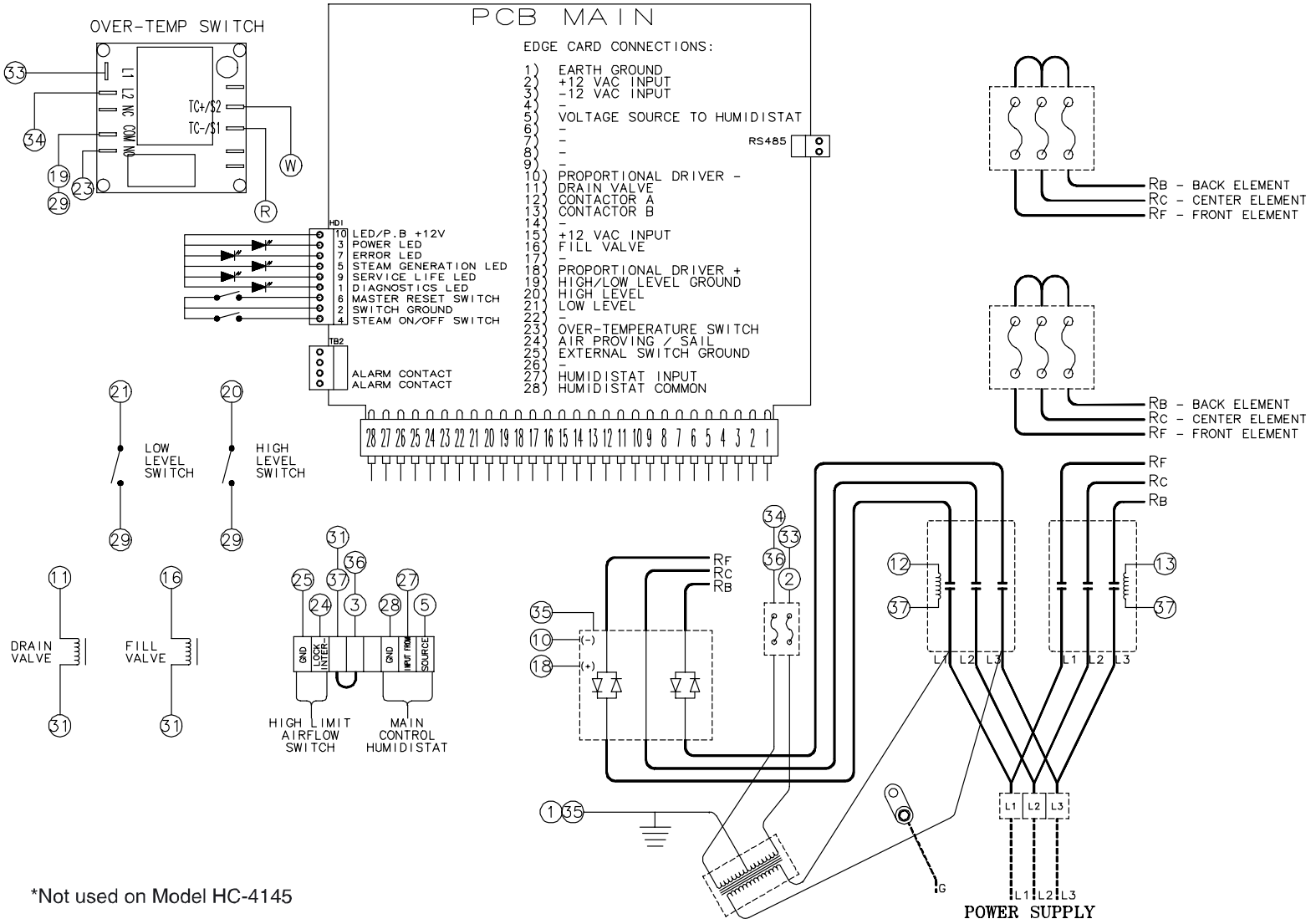
### DIP Switch Settings

There is a bank of DIP switches on the top edge of the PC board. The drain frequency and duration (drain time) and the Service Life time setting can be modified (please consult factory prior to changing Service Life time). Several other parameters are also adjustable. The main power must be turned off before the DIP switches are changed. See chart below for a complete listing of DIP switch settings. Please consult factory if unsure regarding any DIP switch setting. See Fig. 9-1 for locations.

## Figure 23-1 PC Board Switch Data

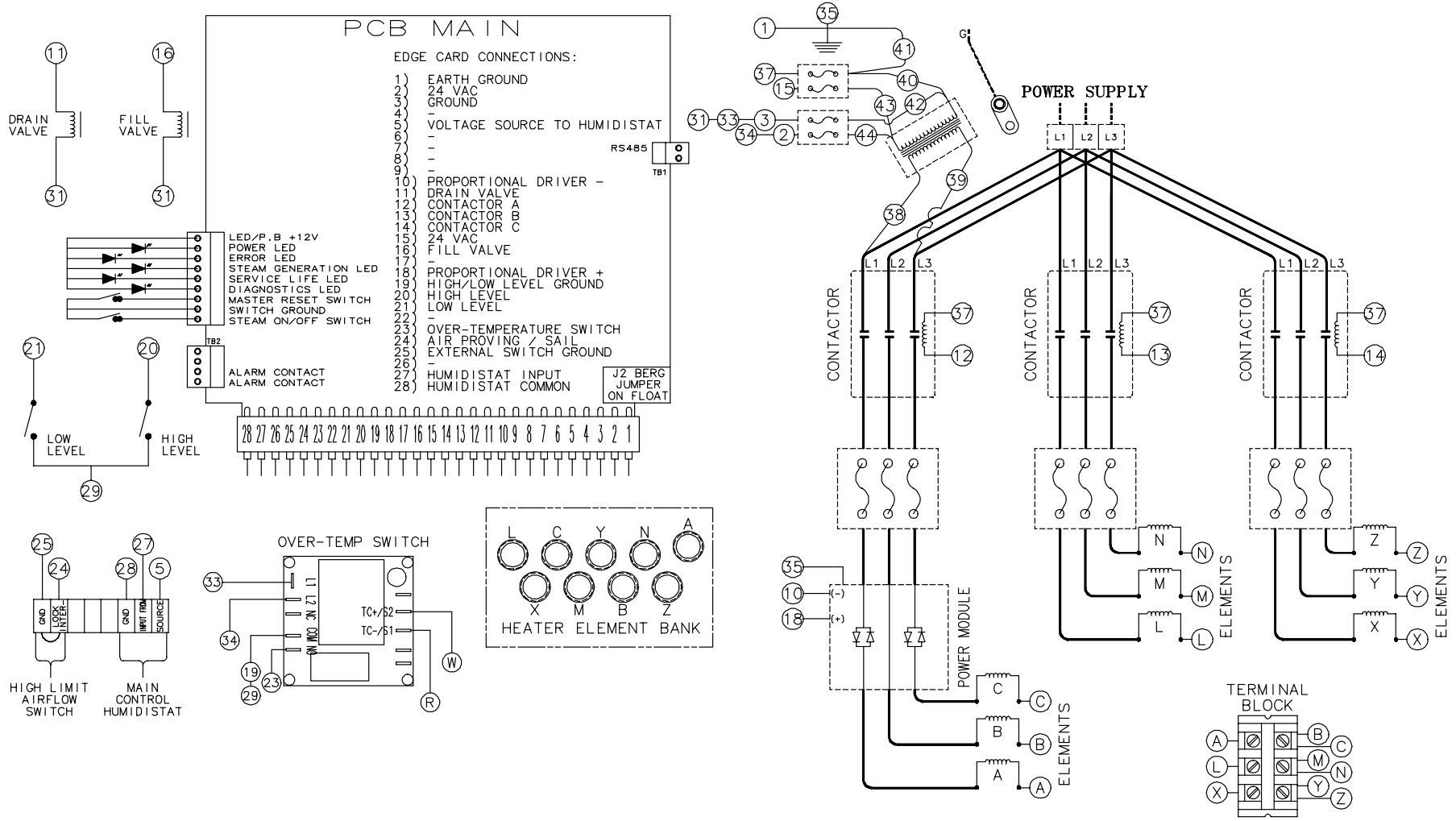
| Circuit Board DIP Switch Settings | | | | | |
|---|---|---|---|---|---|
| **DIP Switch 1** | | **Parameter** | | | |
| **Marking** | | **500 hrs.** | **1000 hrs.** | **2000 hrs.** | **3000 hrs.** |
| S1-1 | EOL Time | Off | Off | On | On |
| S1-2 | Service Life | Off | On | Off | On |
| S1-3 | Prop. | On = Proportional Control | | | |
| | On/Off | Off = On/Off Control | | | |
| S1-4 | HC | On = HumidiClean (Standard) | | | |
| | Other | Off = PC Board for other H-Fier | | | |
| S1-5 | # of cont. | Both switches Off = 1 contactor | | | |
| S1-6 | | Either switches On = 2 contactors | | | |
| | | Both switches On = 3 contactors | | | |
| S1-7 | GF | On = PC Board for gas fired unit | | | |
| | STS | Off = PC Board for steam to steam | | | |
| S1-8 | Master | On = Master unit (Standard) | | | |
| | Slave | Off = Slave to Master unit | | | |
| | | | | | |
| **DIP Switch 2** | | **Parameter** | | | |
| S2-1 | Comm. Addr. | These DIP switches give the unit an addressable number when using the RS485 computer link hookup | | | |
| S2-2 | | | | | |
| S2-3 | Comm. | **Off Always** | | | |
| S2-4 | Test | On = Heater warmup time is 30 seconds | | | |
| | Run | Off = Heater warmup time is 3 minutes | | | |
| **Drain on Time** | | **1 Min.** | **2 Mins.** | **5 Mins.** | **10 Mins.** |
| S2-5 | Drain Time | Off | Off | On | On |
| S2-6 | | Off | On | Off | On |
| **Drain Frequency** | | **12 Hrs.** | **24 Hrs.** | **48 Hrs.** | **96 Hrs.** |
| S2-7 | Drain Freq. | Off | Off | On | On |
| S2-8 | | Off | On | Off | On |
| | | | | | |
| **DIP Switch 3** | | **Parameter** | | | |
| S3-1 | 0-10 Vdc | Sets humidistat input type to 0-10 Vdc | | | |
| S3-2 | 0-5 Vdc | Sets humidistat input type to 0-5 Vdc for on-off and potentiometer stats | | | |
| S3-3 | 4-20 mA | Sets humidistat input type to 4-20 mA | | | |
| S3-4 | 1.9 - 3.9 Vdc | Sets humidistat input type to 1.9-3.9 Vdc for Armstrong C1472 and C1471 stats | | | |
| | | | | | |
| **Voltage Source (J3)** | | **Parameter** | | | |
| 24 Vac | | Supplies 24 Vac to terminal 5 on low voltage terminal strip. (Voltage Source) | | | |
| 5 Vdc | | Supplies 5 Vdc to terminal 5 on low voltage terminal strip. (Voltage Source) | | | |
| 12 Vac | | Supplies 12 Vac to terminal 5 on low voltage terminal strip. (Voltage Source) | | | |

# HC-4100/4145/4300 Series HumidiClean Typical Wiring Schematic




*Not used on Model HC-4145

# HC-4500 Wiring Schematic

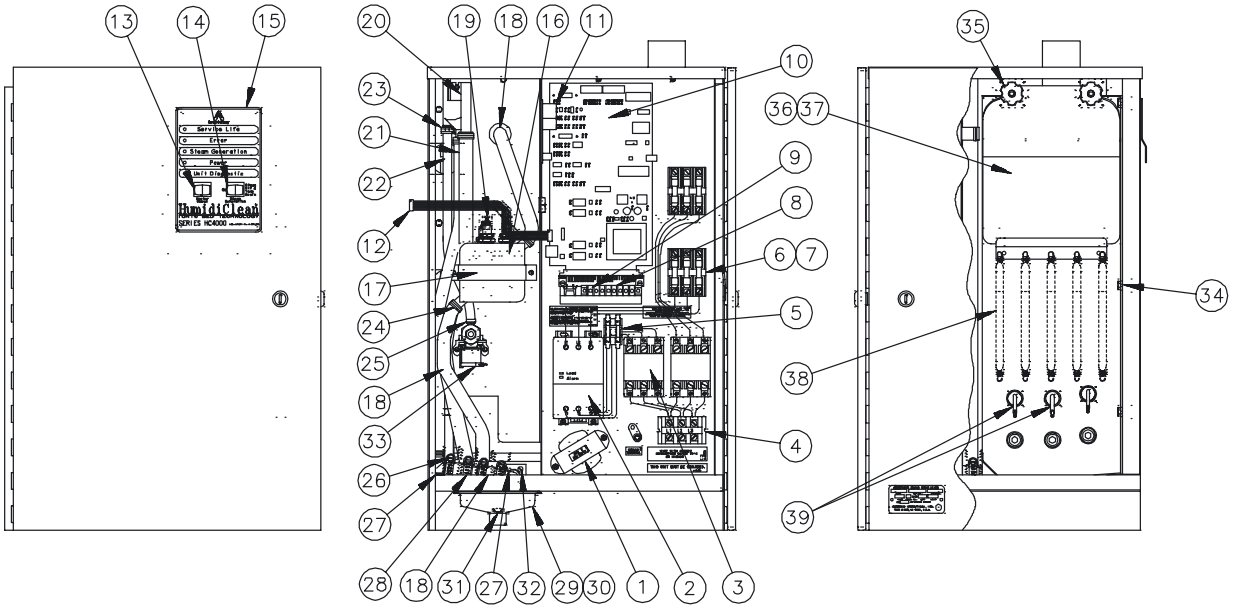


# Series HC-4000 HumidiClean
# Repair Parts

| Item No. | Electrical Compartment and Front Panel | Part No. |
|---|---|---|
| 1a | 240 Vac Power Transformer | C1833 |
| 1b | 600 Vac Power Transformer | C1833A |
| 1c | 480 Vac Power Transformer | C1833B |
| 1d | 208 Vac Power Transformer | C1833F |
| 1e | 380 Vac Power Transformer | C1833D |
| 2a | 208/240 9KW 1/3 Phase Power Module | B5091 |
| 2b | 208/240 15KW 3 Phase Power Module | B5092 |
| 2c | 480/600 9/15KW 3 Phase Power Module | B5093 |
| 2d | 380 15/30KW 3 Phase Power Module | B5151 |
| 3 | Contactor, 50 Amp. Resistive | B2721 |
| 4a | High Voltage Terminal Section | A8548 |
| 4b | High Voltage Terminal End | A8549 |
| 5 | 3 Amp. Fuses | A10718 |
| 6 | 30 Amp. Fuses | B4040 |
| 7 | 30 Amp. Fuse Holder | B4039 |
| 8 | Low Voltage Terminal Strip and Wiring Harness | D2159 |
| 9 | Low Voltage Terminal Strip Jumper | A9029 |
| 10 | PC Board | B5072 |
| 11 | Over Temperature PC Board | B7115 |
| 12 | Ribbon Cable | B5150 |
| 13 | Reset Rocker Switch (Momentary) | A9012 |
| 14 | On-Off Rocker Switch | A9104 |
| 15 | LED Display Board | B5140 |
| **Item No.** | **Water Compartment** | **Part No.** |
| 16 | Level Canister | C4559 |
| 17 | Level Canister Bracket | B5135 |
| 18 | 5/8" ID x 10" Silicone Tubing | A19699 |
| | Bushing (not included) | A21391 |
| 19a | Water Level Electrode Set (3 electrodes) | A21191 |
| 19b | Float Switch for DI Water | B5139 |
| 19c | Float Level Assembly - RO Water | C4560 |
| 20 | Fill Cup | C1838A |
| 21 | 5/8" ID x 23" Tygon Tubing | A7618 |
| 22 | 3/8" ID x 13-1/2" Tygon Tubing | A7618A |
| 23 | Spring Clamp (Olive) | B2716-11 |
| 24 | Spring Clamp (Black) | B2716-18 |
| 25 | Spring Clamp (Silver) | B2716-15 |
| 26 | Worm Screw Clamp | B2911-8 |
| 27 | 5/8" 90∞Barbed Elbow | A10579 |
| 28 | 5/8" Barbed Tee | A12233 |
| 29 | Drain Cup | D248 |
| 30 | Drain Cup Gasket | B2859 |
| 31 | Drain Cup Screw | A9571 |
| 32 | Drain Valve | B2004C |
| 33 | Fill Valve | B5146 |
| 33 | Fill Valve RO | B5274 |

## HC-4100 / HC-4145 / HC-4300

(See page 28 for HC-4500)




## HC-4100/4145/4300

| Resistance Values of Components | | |
|---|---|---|
| **Component** | **Voltage** | **Resistance** |
| Fill Valve | 24 vac | 18 Ω |
| Drain Valve | 24 vac | 10 Ω |
| Contactor | 24 vac | 7-9 Ω |
| Thermocouple in Heating Element | — | 0.51 Ω |
| **Heating Elements** | | |
| 208 & 380 vac 15/30 kW | 220 vac | 9.2 - 10.7 Ω |
| 240 vac 15/30 kW | 240 vac | 10.9 - 12.6 Ω |
| 480 vac 15/30 kW | 277 vac | 14.5 - 16.8 Ω |
| 600 vac 15/30 kW | 346 vac | 22.7 - 26.3 Ω |
| 208 & 380 vac 9/18 kW | 220 vac | 15.3 - 17.7 Ω |
| 240 vac 9/18 kW | 240 vac | 18.2 - 21.1 Ω |
| 480 vac 9/18 kW | 277 vac | 24.3 - 28.2 Ω |
| 600 vac 9/18 kW | 346 vac | 37.9 - 43.9 Ω |
| Power Tansformer | 120 vac | 13.6 Ω across H1 - H2<br>15.1 Ω across H3 - H4 |
| | 208 vac | 22 Ω across H1 - H2 |
| | 240 vac | 29 Ω across H1 - H2 |
| | 380 vac | 77 Ω across H1 - H2 |
| | 480 vac | 125 Ω across H1 - H2 |
| | 600 vac | 194 Ω across H1 - H2 |
| Power Tansformer (secondary) | All Voltages | 0.6 Ω across X1 - X3<br>0.4 Ω across X1 - X2 |
| **Note: All measurements should be made with the main power off and the wires to the component being tested** | | |

| Item No. | Steam Generator | Part No. |
|---|---|---|
| 34 | Tank | D2041 |
| 35 | Access Cover Hold Down Knobs (Qty 2) | A19697 |
| 36 | Tank Access Cover | D4244 |
| 37 | Tank Access Cover Gasket | A21909 |
| 38 | Ionic Beds (5 required) | B5213 |
| **Item No.** | **Miscellaneous** | **Part No.** |
| 41 | Lock and (2) Keys for Cabinet | A10789 |
| 43 | 2-3/8" ID x 12" EPDM Hose Cuff (not shown) | B2851A |
| 43 | 2" ID x 12" EPDM Hose Cuff (not shown) | B2851 |
| 44 | 1-1/2" ID x 9-5/8" EPDM Hose Cuff (not shown) | B2250 |
| 45 | 1" ID x 18" Tygon Drain Tube (not shown) | A9620-1 |
| 46 | Hardware Kit | B5287 |
| — | Annealed Tank | D2171 |

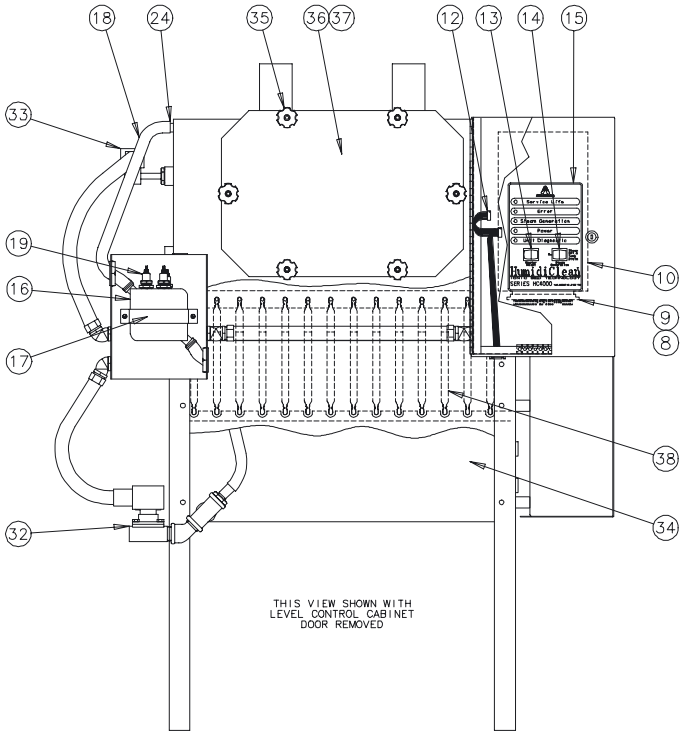
## HC-4500 Repair Parts

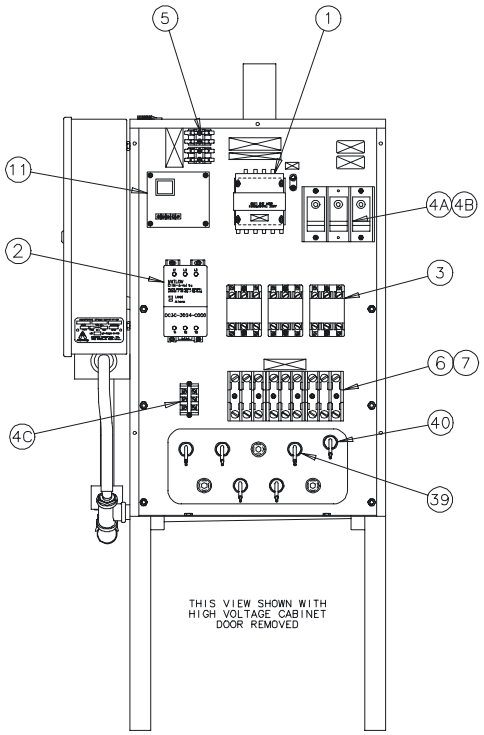
| Item No. | Electrical Compartment and Front Panel | Part No. |
|---|---|---|
| 1 | Power Transformer | — |
| 1a | Input - 208/240/277/380/480vac - Output/24vac | B5605 |
| 1b | Input/600vac - Output/24vac | B5604 |
| 2 | Power Module | — |
| 2a | 208/240 15KW 3 Phase 20amp (For 208/240/277vac) | B5092 |
| 2b | 380 15/30KW 3 Phase 40amp (For 380/480/600vac) | B5151 |
| 3 | Contactor, 50amp Resistive | B2721 |
| 4a | High voltage terminal block (208/240/277vac) | B5622 |
| 4b | High voltage terminal block (380/480/600vac) | B5607 |
| 4c | (for WYE config. Terminal block A6818A & End A6819A) | — |
| 5 | 3 Amp Fuse | A10718 |
| 6a | 30 Amp Fuse | B4040 |
| 6b | 40 Amp Fuse | A21883 |
| 6c | 50 Amp Fuse | A21884 |
| 7a | Fuse Holder 40/50 amp | A21882 |
| 7b | Fuse Holder 30 amp | B4039 |
| 8 | Wire Lead Assembly | A21299 |
| 9 | Wire Harness | D2875 |
| 10 | PC Board | B5630 |
| 11 | Over Temperature Board | B7116 |
| 12 | Ribbon Cable | B2856 |
| 13 | Reset Rocker Switch (Momentary) | A9012 |
| 14 | On-Off Rocker Switch | A9104 |
| 15 | LED Display Board | B5140 |
| **Item No.** | **Water Compartment** | **Part No.** |
| 16a | Probe Level Assembly | C4935 |
| 16b | Float Level Assembly | C4936 |
| 16c | Level Canister (Used on both probes and floats) | C4559 |
| 17 | Electrode Level Canister Bracket | B5135 |
| 18 | 5/8 in. ID Silicone Tubing x 18 in. | A19699 |
| 19a | Water level electrode set | A21191 |
| 19b | (Float Switches for DI/RO Unit B5139) (Float assy C4936) | — |
| 32a | Drain Valve | A21583 |
| 32b | Drain Valve DI/RO | A21899 |
| 33 | Fill Valve | A21889 |
| 33A | Fill Valve DI/RO | A21890 |
| **Item No.** | **Steam Generator** | **Part No.** |
| 35 | Access Cover Hold Down Knobs (Qty 6) | A19697 |
| 36 | Tank Gasket | A22017 |
| 38 | Ionic Beds (14 Required) | B5213 |
| **Item No.** | **Heating Element - Tap Water** | **Part No.** |
| 39a | 6.65KW 240vac | B5433-1 |
| 39b | 8KW 220vac | B5437-1 |
| 39c | 8KW 277vac (480vac) | B5437-2 |
| 39d | 8KW 346vac (600vac) | B5437-3 |
| **Item No.** | **Heating Element - DI/RO** | **Part No.** |
| 39e | 6.65KW 240vac | B5435-1 |
| 39f | 8KW 220vac | B5439-1 |
| 39g | 8KW 277vac (480vac) | B5439-2 |
| 39h | 8KW 346vac (600vac) | B5439-3 |

# HC-4500 Repair Parts

| Item No. | Heating Element w/TC Tap Water | Part No. |
|---|---|---|
| 40a | 6.65KW 240vac | B5434-1 |
| 40b | 8KW 220vac | B5438-1 |
| 40c | 8KW 277vac (480vac) | B5438-2 |
| 40d | 8KW 346vac (600vac) | B5438-3 |
| **Item No.** | **Heating Element w/TC DI/RO** | **Part No.** |
| 40e | 6.65KW 240vac | B5436-1 |
| 40f | 8KW 220vac | B5440-1 |
| 40g | 8KW 277vac (480vac) | B5440-2 |
| 40h | 8KW 346vac (600vac) | B5440-3 |
| **Item No.** | **Miscellaneous** | **Part No.** |
| a | Hardware Kit (not shown) | A21912 |
| b | Hose Cuff (not shown) | B2851A |
| c | Insulation Kit (not shown) | D3351 |

| Resistance Values of Components | | |
|---|---|---|
| **Component** | **Voltage** | **Resistance** |
| Fill Valve | 24 vac | 8.8 Ω |
| Drain Valve | 24 vac | 4.1 Ω |
| Thermocouple in Heating Element | — | 0.51 Ω |
| **Heating Elements** | | |
| 208, 240, 380 Volt 30/33.5/40/45/50.3/60 kW | 240 V | 7.4 - 9.1 Ω |
| 380 Volt 72 kW | 220 V | 5.2 - 6.3 Ω |
| 480 Volt 72 kW | 277 V | 8.1 - 10.0 Ω |
| 600 Volt 48/72 kW | 346 V | 12.8 - 15.7 Ω |
| **Power Transformer** | | |
| Primary Winding | 208 vac | 18 Ω across H1-H2 |
| | 240 vac | 21 Ω across H1-H3 |
| | 277 vac | 24 Ω across H1-H4 |
| | 380 vac | 40 Ω across H1-H5 |
| | 480 vac | 53 Ω across H1-H6 |
| | 600 vac | 97 Ω across H1-H2 |
| Secondary Wiring | 208 vac | 1 Ω across X1-X2 |
| | 240 vac | 1 Ω across X1-X2 |
| | 277 vac | 1 Ω across X1-X2 |
| | 380 vac | 1 Ω across X1-X2 |
| | 480 vac | 1 Ω across X1-X2 |
| | 600 vac | 1 Ω across X1-X4 |



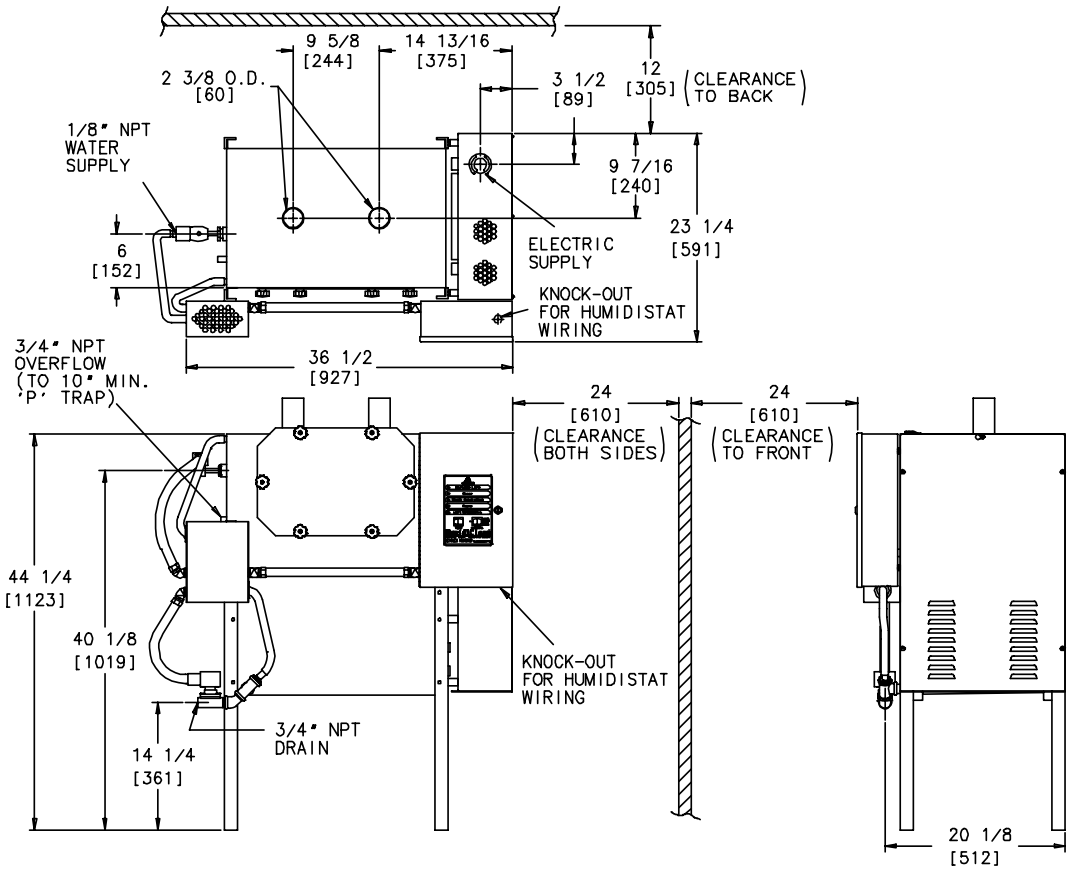



## Heating Elements

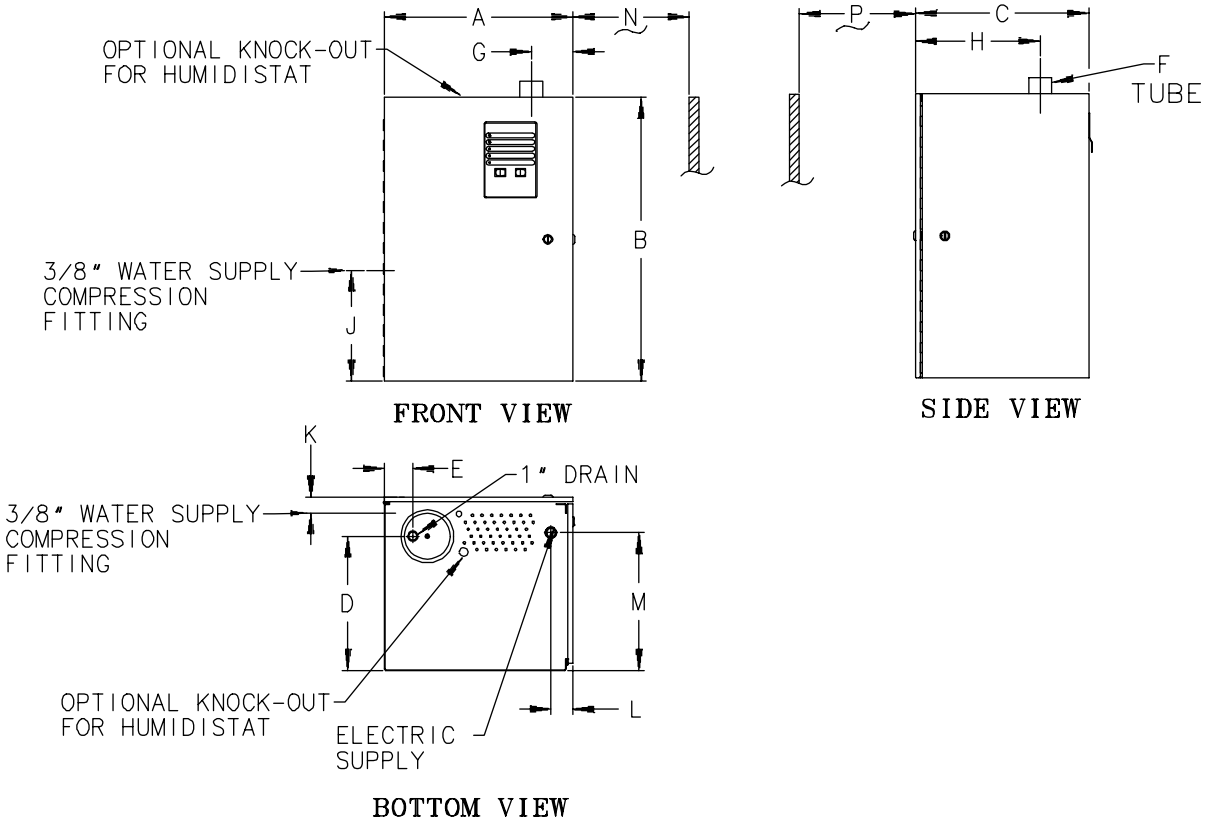
| HC4100 | | | | |
|---|---|---|---|---|
| Supply Voltage | 3 kW | | 3 kW DI | |
| | without TC (2 per unit) | with TC (1 per unit) | without TC (2 per unit) | with TC (1 per unit) |
| 208 | B5808-1 | B5809-1 | B5810-1 | B5811-1 |
| 240 | B5808-2 | B5809-2 | B5810-2 | B5811-2 |
| 380 | B5808-1 | B5809-1 | B5810-1 | B5811-1 |
| 480 | B5808-3 | B5809-3 | B5810-3 | B5811-3 |
| 600 | B5808-4 | B5809-4 | B5810-4 | B5811-4 |
| **HC4100 / HC4145** | | | | |
| Supply Voltage | 9 kW | | 15 kW | |
| | without TC (2 per unit) | with TC (1 per unit) | without TC (2 per unit) | with TC (1 per unit) |
| 208 | B5047-1 | B5048-1 | B5043-1 | B5044-1 |
| 240 | B5047-2 | B5048-2 | B5043-2 | B5044-2 |
| 380 | B5047-1 | B5048-1 | B5043-1 | B5044-1 |
| 480 | B5047-3 | B5048-3 | B5043-3 | B5044-3 |
| 600 | B5047-4 | B5048-4 | B5043-4 | B5044-4 |
| **HC4300** | | | | |
| Supply Voltage | 18 kW | | 30 kW | |
| | without TC (5 per unit) | with TC (1 per unit) | without TC (5 per unit) | with TC (1 per unit) |
| 208 | B5047-1 | B5048-1 | B5043-1 | B5044-1 |
| 240 | B5047-2 | B5048-2 | B5043-2 | B5044-2 |
| 380 | B5047-1 | B5048-1 | B5043-1 | B5044-1 |
| 480 | B5047-3 | B5048-3 | B5043-3 | B5044-3 |
| 600 | B5047-4 | B5048-4 | B5043-4 | B5044-4 |
| **HC4100DI / HC4145DI** | | | | |
| | 9 kW | | 15 kW | |
| Supply Voltage | without TC (2 per unit) | with TC (1 per unit) | without TC (2 per unit) | with TC (1 per unit) |
| 208 | B5049-1 | B5050-1 | B5045-1 | B5046-1 |
| 240 | B5049-2 | B5050-2 | B5045-2 | B5046-2 |
| 380 | B5049-1 | B5050-1 | B5045-1 | B5046-1 |
| 480 | B5049-3 | B5050-3 | B5045-3 | B5046-3 |
| 600 | B5049-4 | B5050-4 | B5045-4 | B5046-4 |
| **HC4300DI** | | | | |
| Supply Voltage | 18 kW | | 30 kW | |
| | without TC (5 per unit) | with TC (1 per unit) | without TC (5 per unit) | with TC (1 per unit) |
| 208 | B5049-1 | B5050-1 | B5045-1 | B5046-1 |
| 240 | B5049-2 | B5050-2 | B5045-2 | B5046-2 |
| 380 | B5049-1 | B5050-1 | B5045-1 | B5046-1 |
| 480 | B5049-3 | B5050-3 | B5045-3 | B5046-3 |
| 600 | B5049-4 | B5050-4 | B5045-4 | B5046-4 |

**TC = Thermocouple**

## HumidiClean Series 4500




Approximate Shipping Weight: 175 lb (80 kg)
Maximum Operating Weight (full): 370 lb (172 kg)
EHF III Fan Package: 33 lb (15 kg)




| Dimensions and Weights | | |
|---|---|---|
| Model HC4100, HC4145 and HC4300 | | |
| Item | Dimension | |
| | in | mm |
| "A" Width | 19-7/16 | 494 |
| "B" Height | 29-1/4 | 743 |
| "C" Depth | 17-7/8 | 454 |
| "D" Drain/Back | 13-13/16 | 351 |
| "E" Drain/Side | 2-29/32 | 74 |
| "F" Steam Discharge Tube (OD) | 2-3/8 | 60 |
| "G" Steam Outlet - Side | 4-5/16 | 109 |
| "H" Steam Outlet - Front | 12-7/8 | 327 |
| "J" Water Supply - Bottom | 11-7/16 | 290 |
| "K" Water Supply - Front | 1-21/32 | 42 |
| "L" Electric Supply - Side | 2-1/4 | 57 |
| "M" Electric Supply - Back | 14-7/32 | 361 |
| "N" Clearance - Side | 24 | 645 |
| "P" Clearance - Front | | |
| **Weights** | **lb** | **kg** |
| Approximate Shipping Weight | 112 | 51 |
| Tank (Dry) | 28 | 13 |
| Cabinet | 84 | 38 |
| Maximum Operating Weight (Full) | 186 | 84 |
| EHF-III Fan Package | 33 | 15 |

## Humidistat Data

### Autocal Procedure

1. Measure the room humidity near the humidistat with an accurate hygrometer.
2. Turn the humidistat set point dial to match the reading of the hygrometer.
3. Push and hold the Autocal button for more than 3 seconds or until the internal red light turns On and Off.

### Sensor Failure Protection

The sensor is the most sensitive part of the humidistat and also the most exposed. In the case of a sensor failure in humidification mode, the humidistat will automatically assume a failsafe output of 0%.

### Specifications

Operating Conditions: 5°C to 50°C (32°F to 122°F)
- Control: 0% to 95% R.H. non-condensing
- Sensor: 0% to 100% R.H. (see Note 1.)

Resolution: ± 0.1 %

Repeatability: 0.5 %

Accuracy and sensor interchangeability:
± 2% R.H. from 0 to 100% R.H.

Range: 10% to 90% R.H. for 5 to 50°C
(41°F to 122°F)

Temperature effect: 0.05% / °F

Outputs: Isolated Triac: 30 Vac at ½ A max.*
0 to 5 VDC into 1 KW resistance min.
0 to 10 VDC into 2 KW resistance min.
0/5 VDC at 20 mA max. for both outputs.

Power: 24 VAC -15%, +10%; 50/60 Hz; 2 VA

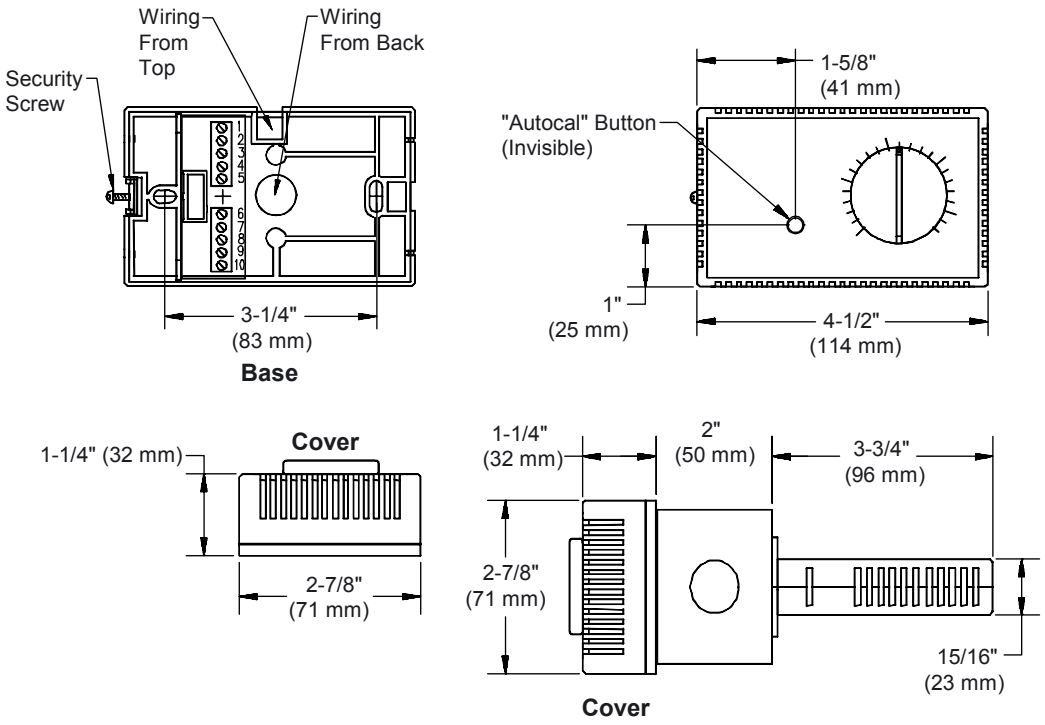
Base and casing: Off-white; self extinguishing ABS plastic

* Triac outputs can only switch AC loads. Use relays when switching dc loads.

**Note 1.** Humidity sensor: Solid stae humidity sensor. Suitable for normal, clean air. Not to be used in corrosive or harmful environment.

## Dimensions

Figure 33-1. Dimension drawing. Duct Humidistat




**Note:** Specifications and equipment are subject to change without prior notice.

**Table 33-1.** Sensor Characteristics
Voltage between black and white wire, terminals #6 and #7.

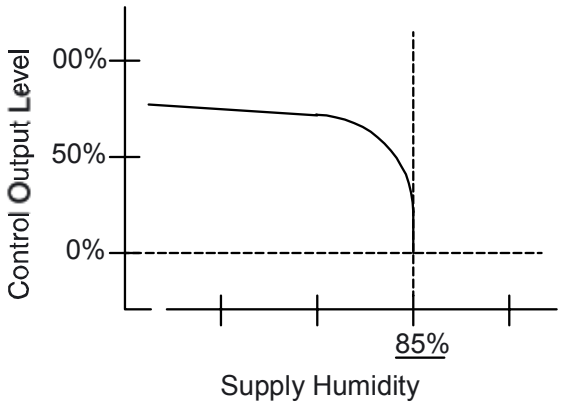
| HUMIDITY | SENSOR OUTPUT |
|---|---|
| 0% | 1.05 V |
| 5% | 1.19 V |
| 10% | 1.34 V |
| 15% | 1.48 V |
| 20% | 1.63 V |
| 25% | 1.77 V |
| 30% | 1.92 V |
| 35% | 2.06 V |
| 40% | 2.20 V |
| 45% | 2.35 V |
| 50% | 2.49 V |
| 55% | 2.64 V |
| 60% | 2.78 V |
| 65% | 2.93 V |
| 70% | 3.07 V |
| 75% | 3.21 V |
| 80% | 3.36 V |
| 85% | 3.50 V |
| 90% | 3.65 V |
| 95% | 3.79 V |
| 100% | 3.94 V |

## Air Supply High Limit Humidity Sensor

The A 17898 (H270) includes a high limit circuit. This allows the use of a second humidity in the supply air. Input signal goes to terminals #8 on the humidistat. High limit setpoint is preprogrammed at 85%. It can be readjusted using the A19517 service tool. If you don't use the high limit feature, connect a 1 MegW, ¼ watt resistor between terminals 8 and 10 (supplied with the humidistat).

**Remember:** this high limit function is not a safety device. For critical situations, provide installation with normal protections required to ensure a safe operation.

**Table 34-1.**
Example showing proportional high limit override signal in supply duct.

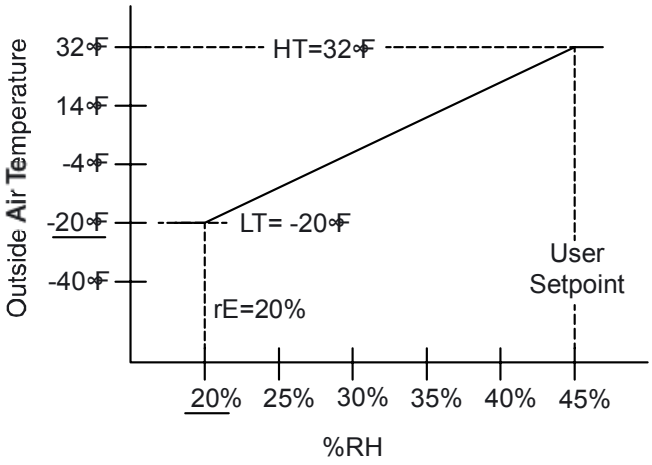



## Humidity Setpoint Reset by Outside Temperature

The A17898 (H270) humidistat has an optional outdoor temperature sensor. This sensor is used to reset the humidity setpoint during the cold season to minimize condensation on windows and building structures.

When the outdoor temperature falls below the selected high temperature, parameter **HT** (32°F in the example Table 34-2), the humidity setpoint will start to decrease. The lowest humidity setpoint will be reached at selected low temperature, parameter **LT** (-20°F).

**Table 34-2.**




The setpoint decrease from original setpoint down to the lowest setpoint detremined by the parameter **rE**. In the example, Table 34-2, **rE** was set to 20%, therefore the humidity setpoint dropped from 45% to 20%.

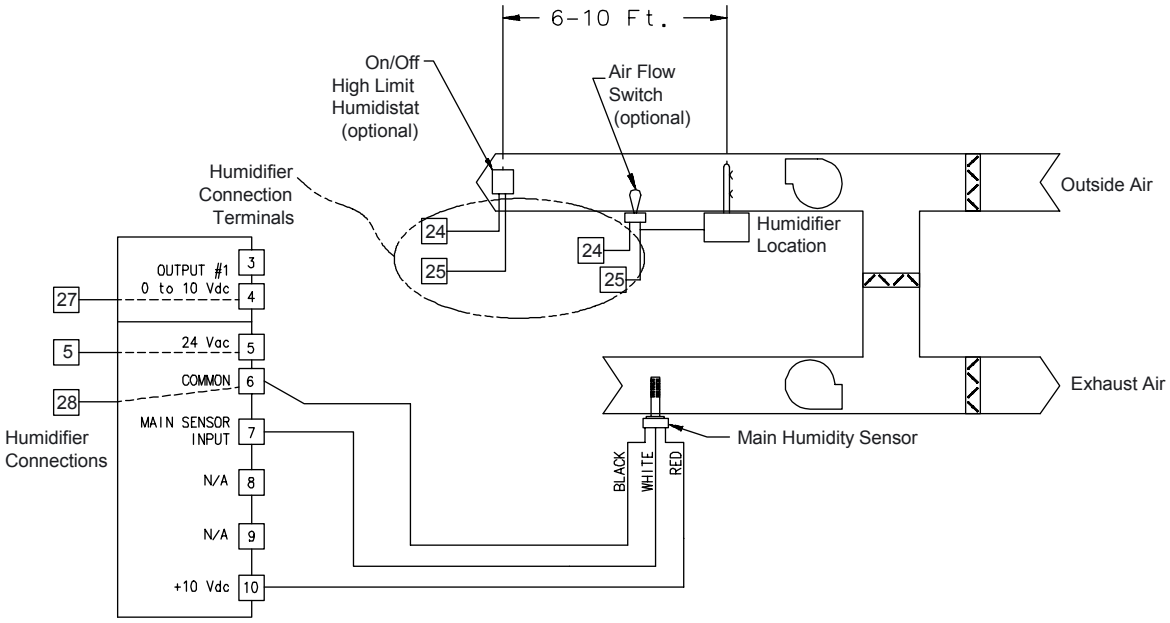
**If you don't use the outdoor reset feature, put a jumper between terminals 6 and 9 (supplied with the humidistat).**

## Application Example

Steam humidification system controlled by a 0 to 10 Vdc valve wired to output #1. The humidity sensor is located in the return air duct. A proportional high limit humidity sensor is installed in the supply duct. An outdoor temperature sensor is installed in the fresh air duct.

Humidistat model number: H270-69-13-10-31

**Figure 35-1.** Alternative humidistat wiring A17898 (H270)



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Special Warranty Periods are as follows:

**Series EHU-700 Electric Steam Humidifier, Series HC-4000 HumidiClean Humidifier and GFH Gas Fired Humidifier with Ionic Beds:**
Two (2) years after installation, but not longer than 27 months after shipment from Armstrong's factory.

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