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## ***HUMIDIFICATION***

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### **Installation and Maintenance of Armstrong EHU-600 Series Humidifiers**

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The Armstrong EHU-600 Series humidifier is an electronically controlled, non-pressurized, electric steam-generating humidifier, with its vapor discharged into a duct of an air-handling system or through a fan package.

To allow the EHU-600 Series humidifier to function to its full capability, be certain to install in accordance with Armstrong recommendations.

These installation and maintenance guidelines should be used by experienced personnel as a guide to ensure that the Armstrong EHU Humidifier functions correctly. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact your local representative or Armstrong if further information is required.





READ AND SAVE THESE INSTRUCTIONS

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## Installation and Maintenance EHU-600 Series Humidifiers

### 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. Your shipment may consist of as many as four cartons which contain:

- a. Humidifier
- b. Steam generator(s) (two cartons on Model EHU-602)
- c. Steam dispersion tube, Fan Package or HumidiPack Dispersion Panel.

All controls (control humidistat, high limit stat, etc.) if ordered, are shipped in a marked package inside the humidifier.

#### 2. Check Local Codes

EHU-600 Series humidifiers should be installed in accordance with all applicable building, plumbing, and electrical codes.

#### 3. Site Selection (See Fig. 3-1)

***Electronic steam humidifiers should be installed in locations that allow routine inspection and accessibility for maintenance operations. Armstrong recommends that electronic steam humidifiers not be placed in false ceilings or in locations where unusual instances of malfunction of the humidifier or the system might cause damage to non-repairable, unreplaceable, or priceless property.***

Note: Please contact factory for duct applications offering high static pressure (>4" WC).

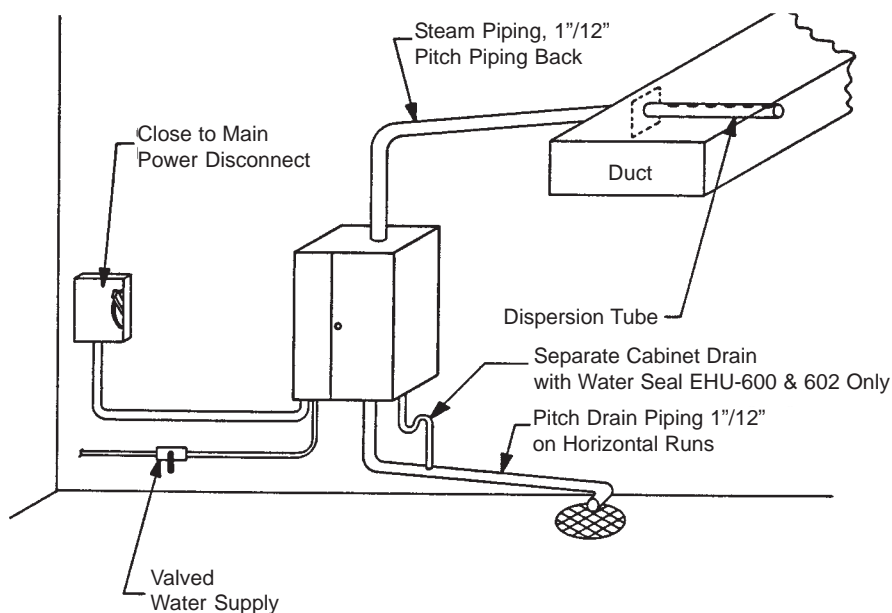
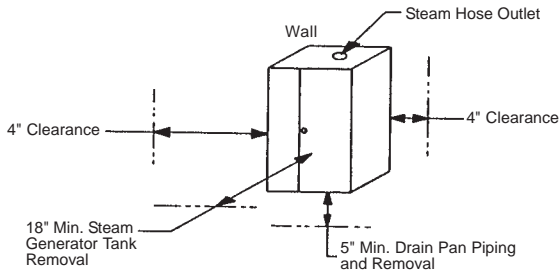


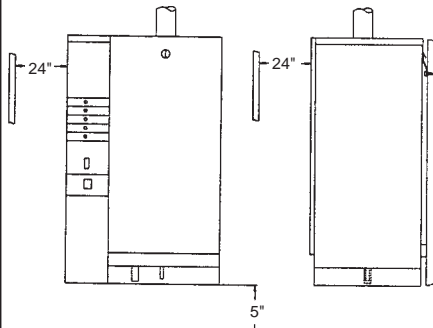
Figure 3-1: Site Selection - General Installation Concept



## Installation and Maintenance EHU-600 Series Humidifiers



**Figure 4-1: Model EHU-600 Access Space**



**Figure 4-2: Access Space for EHU-601 and EHU-602**

The mounting surface should be a wall of ordinary studded construction or other construction of equivalent strength, capable of supporting the maximum humidifier weight. Maximum operating weights are:

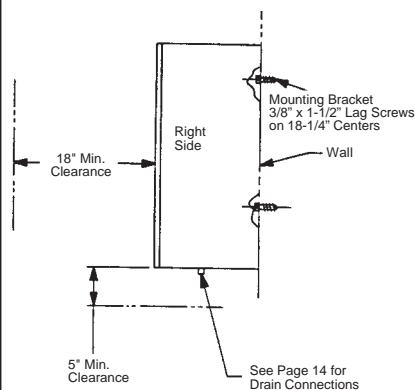
Model No.	Maximum Operating Weight	
	lb.	Kg
<b>EHU-600</b>	80	36
<b>EHU-601</b>	104	47
<b>EHU-602</b>	145	66
<b>EHF-2</b>	32	14.6
<b>EHF-3</b>	33	15

The location should be close enough to the air duct so that the length of steam hose or pipe is as short as feasible. A length of 10 ft. or less is ideal; the maximum recommended length for running copper tube is 40 feet. See Page 6, Item 6 of the Installation Section for more details on steam dispersion tube location.

See Figures 4-1 and 4-2 for access space.

The location chosen should be inside with a minimum ambient temperature of 40°F. and a maximum of 100°F. The unit should have access to electrical service, a supply of ordinary tap water, and a drain line for waste water to sewer. The humidifier should not be mounted on hot surfaces.

## Installation



**Figure 4-3: Mounting Clearances**

### 1. Mounting The Humidifier

The EHU-600 Series is intended to be mounted on a wall by means of 3/8" diameter lag screws or other suitable fasteners capable of supporting the maximum operating weight of the humidifier.

**Model EHU-600:** Making sure the humidifier is level, hold it against the mounting surface to mark the hole pattern. Make sure the screws will go into studs or other sturdy structure. Fasten the humidifier to the wall using the four 3/8" x 1 1/2" lag screws provided (See Fig. 4-3).

**Models EHU-601 and EHU-602:** Fasten the mounting bracket (see Fig. 4-2 and 5-1) to the wall with the two 3/8" x 1 1/2" lag screws provided. Make sure the screws will go into studs or other sturdy structure. Hang the humidifier cabinet on the mounting bracket. Install the #8 x 1/2" self tapping screw from inside the humidifier cabinet so that it goes through the holes in the cabinet and the mounting bracket. (Model EHU-602 has two screws). This locks the cabinet to the mounting bracket.

### 2. Electrical Wiring

All wiring installations must be made in accordance with local codes. Refer to the capacity chart or the name plate on the unit for



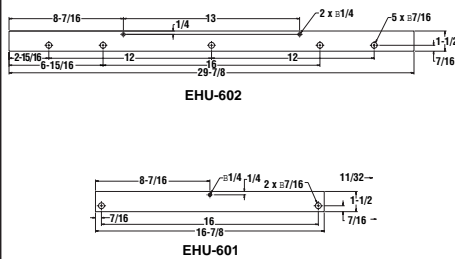
## Installation and Maintenance EHU-600 Series Humidifiers

recommended branch wire and fuse. See Sections 7, 8 and 9 for control wiring information. A complete wiring diagram as shown in Section 11 is located inside the door of the humidifier.

Wiring to the low-voltage controls should not run in the same conduit as the power supply wiring because faulty signals could result. Shielded cable is recommended.

**Important:** Please observe the following:

- Make certain there is a manually operated interlocking circuit breaker or safety switch (not furnished) in the electric power supply **Located close to and within sight of the humidifier.**
- Disconnect the electric power supply at this circuit breaker or switch whenever the unit is inspected or serviced. **Do not use the switch on the humidifier because this switch disconnects the steam generator tank only.**
- The voltage and phase of the unit must correspond to the available voltage and phase.
- The fuse main breaker must be of sufficient size to handle the maximum fuse rating as indicated on the specification label on the unit.
- Ground the humidifier cabinet; a ground lug is provided in the wiring compartment.
- Use only wire with copper conductors rated 90°C or higher for high voltage and grounding.**
- Avoid running high voltage wire next to PC board. Use bottom knockout for high voltage wire inlet.



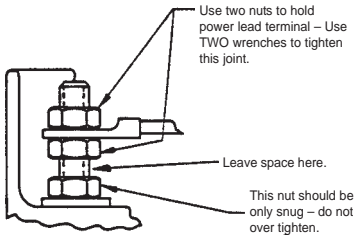
**Figure 5-1: Mounting Brackets and Bolt Locations**

### 3. Water Fill Supply

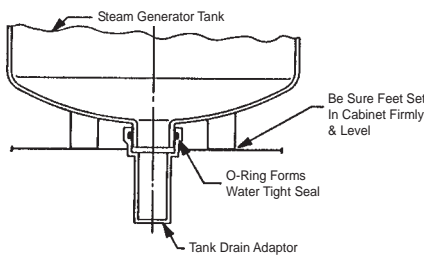
- Only ordinary (potable) tap water should be used. **Do not use brackish or contaminated water.**
- Softened water may not be suitable. The softening process can produce treated water with conductivity too high.
- Demineralized, deionized or distilled water is not recommended unless it is blended with tap water. Consult factory if you have one of these water supplies.
- Humidifier maintenance and performance can be affected by water quality. Ideal water conductivity is 200 to 400 micromhos. Depending on the application (voltage, capacity, etc.), water conductivities between 50 and 800 micromhos have been used successfully. Please consult factory if micromhos are over 800. If unsure of water conductivity, Armstrong will test free of charge. Consult factory.
- Connect the water supply to the 3/8" tube compression fitting on the fill valve adapter.
- Connect the unit to the building water supply (20 to 125 psig pressure). Install a shut-off valve near the humidifier.



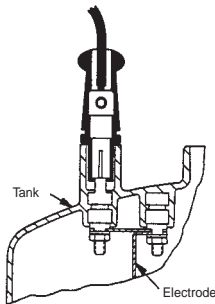
## Installation and Maintenance EHU-600 Series Humidifiers



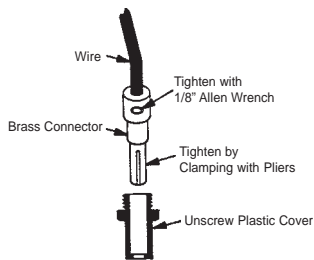
**Figure 6-1: Steam Generator Tank Connections**



**Figure 6-2: Generator Tank Installation**



**Figure 6-3: Electrode Connector**



**Figure 6-4: Electrode Connector Push on Plug**

Model EHU-600, 601 & 602	O.D.	Length L (cm)	Duct Width		Weight lbs. (kg)
			Min.	Max.	
D-1	1-1/2" (38)	12" (30)	11" (28)	16" (41)	2 (1)
D-1.5	1-1/2" (38)	18" (46)	17" (43)	22" (56)	2 (1)
D-2	1-1/2" (38)	24" (61)	23" (58)	34" (86)	3 (1.4)
D-3	1-1/2" (38)	36" (91)	35" (89)	46" (117)	4 (2)
D-4	1-1/2" (38)	48" (122)	47" (119)	58" (147)	4 (2)
D-5	1-1/2" (38)	60" (152)	59" (150)	70" (178)	5 (2.3)
D-6	1-1/2" (38)	72" (183)	71" (180)	82" (208)	6 (3)

**Chart 6-1: Selecting Proper Steam Dispersion Tube**

### 4. Connect Drain

Connect to a suitable waste draining system, an open drain is recommended. Local plumbing codes may specify details of this connection. Be sure the drain line is well pitched (recommend 1" per foot) and is minimum 1" size copper pipe. Do not use PVC pipe. Drain water is hot. Drain the water where it will not present a hazard to personnel. Be sure the cabinet drain (EHU-601/602 only) has a 6" water seal ("P" trap). **Note:** A special EPROM is available to temper drain water to 160°F or lower. Consult factory.

Model EHU-600: Steam generator drain and cabinet drain are the same, 1" O.D. A short piece of 1" I.D. clear hose is provided.

Models EHU-601 and 602: Steam generator drain is 3/4" NPT. Cabinet drain is 5/8" O.D. (See Section 13 Submittal Drawing).

### 5. Install Steam Generator

Model EHU-600: The steam generator is shipped installed on the EHU-600 model. Using wrenches, be sure steam generator tank connections are installed and tightened according to the tank label (see Fig. 6-1).

Models EHU-601 and 602: The steam generator(s) is shipped separately on the EHU-601 and 602 models. Make sure the O-ring is properly placed in the tank drain adaptor (see Fig. 6-2). Insert the bottom center connection of the steam generator into the drain adaptor. Connect the push-on socket plug electrical leads to the electrode connectors located on top of the steam generator (see Fig. 6-3). Make sure the push-on plugs are tight (see Fig. 6-4). **Remember, a loose joint is a hot joint.**

**NOTE:** Please consult factory for duct applications offering high static pressure (4" W.C. or greater or high velocity ducts >2000 FPM).

### 6. Install Steam Dispersion Tube

- a. Verify that the proper length and type of steam dispersion tube has been selected. See Chart 6-1 for proper dispersion tube lengths. The standard dispersion tube has a built-in slope to allow for gravity drainage of condensate back to the steam generator (see Fig. 7-1). When the dispersion tube capacity is greater than 40 lbs/hr the steam flow rate is too high to allow for gravity drainage and the EHU dispersion tube with 1/2" O.D. drain tube must be used (see Fig. 7-2).

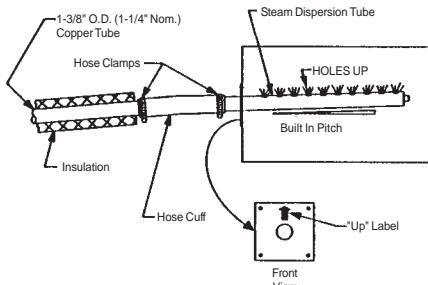
For dispersion tube **without drain:** Cut a 1 5/8" diameter hole in the duct (template provided). See Figure 7-3A.

For the dispersion tube **with drain:** Cut hole in duct as shown in Figure 7-3B. Connect 1/4" pipe or 1/2" O.D. tubing to the drain tube. A template is included for cutting holes in the duct.

- b. Select a location on the duct that provides adequate length for vapor mixing and the shortest connection length to the humidifier. If steam piping run is more than 20 feet, install a "P" trap drain every 20 feet (see Fig. 7-5). Maximum piping run is 40 feet.



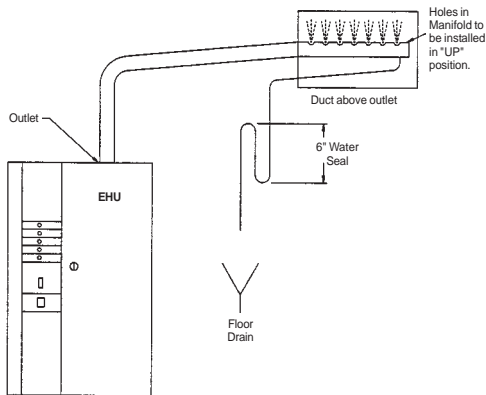
## Installation and Maintenance EHU-600 Series Humidifiers



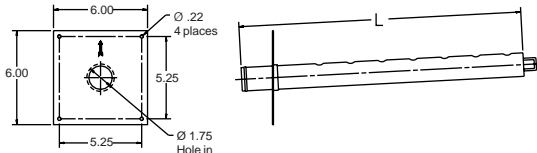
**Figure 7-1: Connection at Duct**

Preferably the location should be 6 inches down stream and/or 10 feet upstream from any dampers, vanes, bends in the duct, or controllers (i.e. high limit stat). Do not install the dispersion tube into ducts in which airflow exceeds 2,000 FPM. Do not restrict airflow in ducts with a depth of 8 inches or less. Avoid placing manifold in downward, high velocity airflow as dynamic air pressure will restrict steam flow.

The preferred installation of the dispersion tube is above the humidifier as shown in Figure 7-2. This allows for gravity drainage of condensate back to the humidifier. Figure 7-4 shows the correct installation when the steam dispersion tube is below the humidifier. If this installation is used, a 1 1/4" copper tee may be used for the drain connection (see Fig. 7-5).

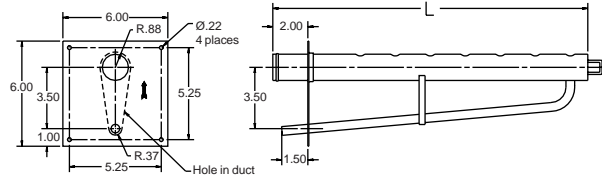


**Figure 7-2: EHU Dispersion Tube with 1/2" O.D. Drain Tube (For More Than 40 lb/hr Capacity per Tube)**



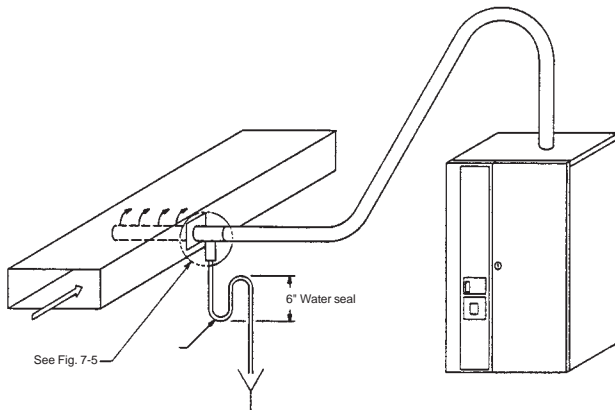
**For steam capacity  
40 lb/hr or less**

**Figure 7-3A: For Dispersion Tube Without Drain**

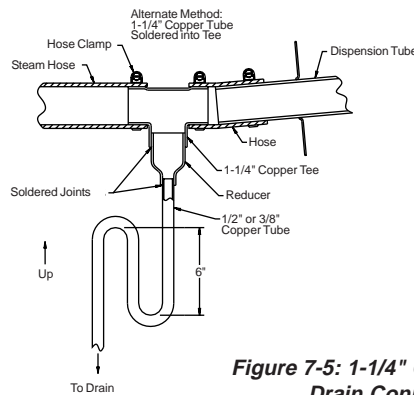


**For steam capacity  
above 40 lb/hr**

**Figure 7-3B: For Dispersion Tube With Drain**



**Figure 7-4: Dispersion Tube Below Steam Outlet on Humidifier**



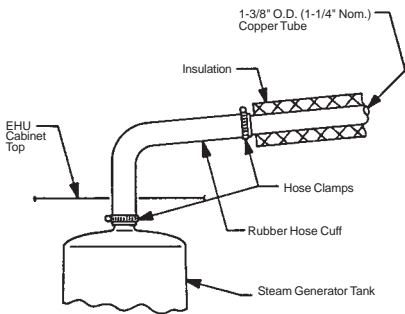
**Figure 7-5: 1-1/4" Copper Tee for Drain Connection**

- c. Insert the dispersion tube into the duct so the holes face upward. **Never** install the tube with the holes facing downward. Fasten the mounting plate to the outside of the duct with sheet metal screws. If the dispersion tube is 36" long or more, support the far end with threaded rod or similar means.





## Installation and Maintenance EHU-600 Series Humidifiers



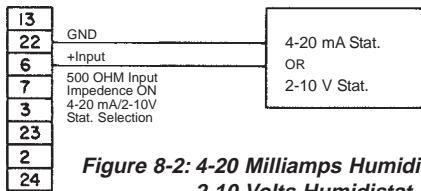
**Figure 8-1: Connection at Unit**

d. Connect the dispersion tube to the steam generator using minimum 1 1/4" nom. (EHU-600) or 1 1/2" (EHU-601/602) size hard copper tube (customer supplied) and the two short hoses supplied with the humidifier. See Figures 7-1 and 8-1. Insulate the copper tube to minimize condensation. Long runs of pipe and/or high duct static pressure may require 1 1/2" or 2" copper pipe. See Figure 8-6.

If the optional 10 ft. flexible steam hose is used, cut the steam hose to length as required. Wipe out the inside of each hose end before installing. Connect the cut end of the hose to the dispersion tube. Tighten all hose clamps.

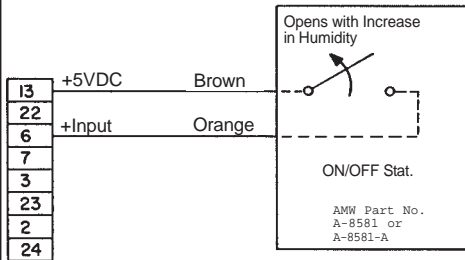
e. If duct static pressure and piping back pressure exceeds 4" W.C. please consult factory for special mounting procedures.

**Steam hose or pipe must be free of loops, kinks, and sags to allow for gravity drainage of condensate. (Provide pitch of 1" per foot.) Hose supports may be required to accomplish this.**

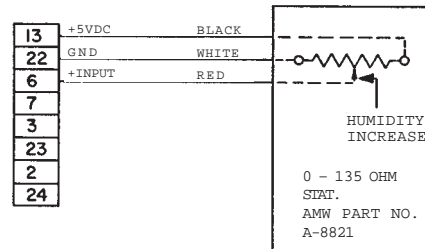


**Figure 8-2: 4-20 Milliamps Humidistat  
2-10 Volts Humidistat**

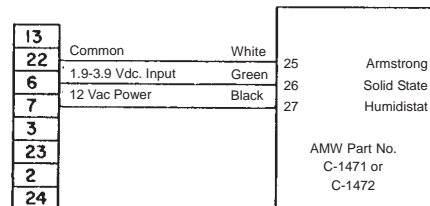
Please consult factory for additional information on wiring A18609, A18610, or A17888 Armstrong Humidistats.



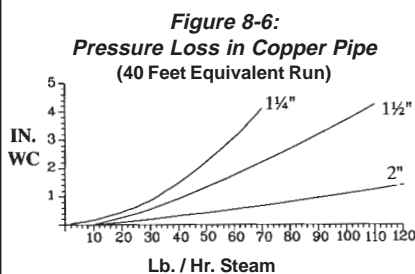
**Figure 8-4: On/Off Humidistat**



**Figure 8-3: 0-135 Ohms Humidistat**



**Figure 8-5: Armstrong Humidistat**



**Figure 8-6:  
Pressure Loss in Copper Pipe  
(40 Feet Equivalent Run)**

### 7. Control Humidistat

The Series EHU-600 is compatible with any humidistat with the following characteristics:

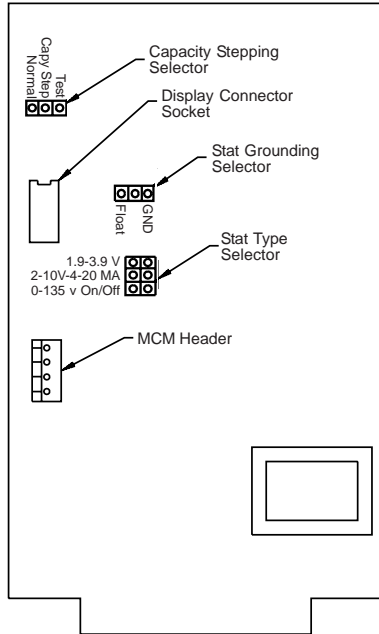
**NOTE:** Use of shielded wire or wiring in conduit is recommended for control wiring.

- 4-20 Milliamps**, See Fig. 8-2 for wiring instructions. **Note:** Printed Circuit Board has 500 ohm impedance for this type input signal. Some 4-20 inputs may require a floating ground. Change stat grounding selector on PC Board. See Figure 9-1.
- 2-10 Volts**, See Fig. 8-2 for wiring instructions. **Note:** Printed Circuit Board has 500 ohm impedance for this type input signal. The load resistor may be removed to increase input impedance, consult factory.
- 0-135 Ohms**, See Fig. 8-3 for wiring instructions.
- On/Off**, See Fig. 8-4 for wiring instructions.
- Armstrong Humidistat**. See Fig. 8-5 for wiring instructions.

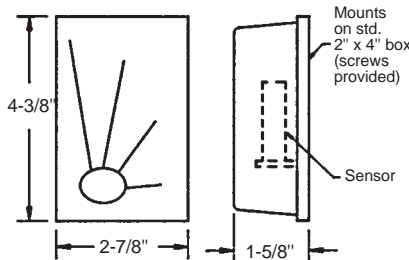




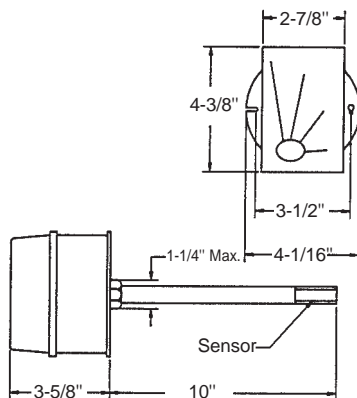
## Installation and Maintenance EHU-600 Series Humidifiers



**Figure 9-1: Location of Selector Pins on Printed Circuit Board**



**Figure 9-2: Wall Mounted Control Humidistat**



**Figure 9-3: Duct Mounted Control Humidistat**

The EHU-600 as shipped, is usually set to accept input signals from the Armstrong control humidistat. To adapt the EHU-600 to a different type of control humidistat (with characteristics as listed above) jumper B2 must be changed on the printed circuit board (See Fig. 9-1). For the Armstrong humidistat select the jumper position labeled 1.9-3.9V. If the desired humidistat has the characteristics 4-20 milliamps or 2-10 volts, change the jumper position to the position labeled 2-10V/4-20MA. If the desired humidistat has the characteristics on/off or 0-135 ohms, change the jumper to the position labeled 0-135Ω ON/Off. **Make sure main power is off when changing any PC board jumper setting.** See the troubleshooting section of this manual for additional information on humidistat wiring.

**Selecting The Proper Location:** The control humidistat should be located where it will be exposed to the average air condition of the space to be humidified. Avoid areas of restricted air circulation, or locations where the sensor will be subjected to air drafts, localized heat, or moisture sources such as coffee machines, computer blower outlets, doors to other rooms, or windows that can be opened.

Wall-mounted control humidistats (Armstrong Part C1471) are usually installed 4 ft. to 5 ft. above floor level. Often, the best location is beside a thermostat that controls temperature in the same space that is to be humidified, if that location meets the above criteria.

Duct-mounted control humidistats (Armstrong Part C1472) are also available for installation where sensing and control from return air or exhaust air ducts is preferable.

### Mounting The Armstrong Control Humidistat

**Caution: Do not check** humidistat circuit with ohmmeter or direct current with sensing element installed. Circuit may be checked without sensor installed.

**Wall Mounted Control Humidistat.** The wall mounted unit is designed to mount on a standard electrical outlet box. Mounting screw holes are provided in the top and the bottom of the back plate. See Fig. 9-2.

**Duct Mounted Control Humidistat.** The sensor is mounted on the end of the tube extending into the duct – not beneath the humidistat cover. The duct mounted control humidistat requires a 1 1/4" diameter hole in the side of the duct. See Fig. 9-3. See Figure 10-3 or 8-5 for wiring terminals and overall wiring diagrams.

### Operation And Adjustment Of The Armstrong Humidistat.

To set the Armstrong modulating humidistat to maintain a desired relative humidity, remove the outer plastic cover and verify that the number/color coded sensor element installed is in the RH control range desired (see Fig. 10-1). Figure 10-2 specifies the number/color code and corresponding humidity set point control range for each sensing



## Installation and Maintenance EHU-600 Series Humidifiers

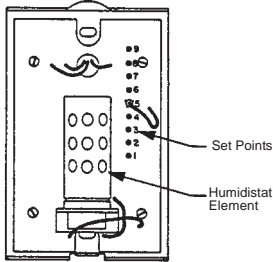


Figure 10-1: Armstrong Humidistat

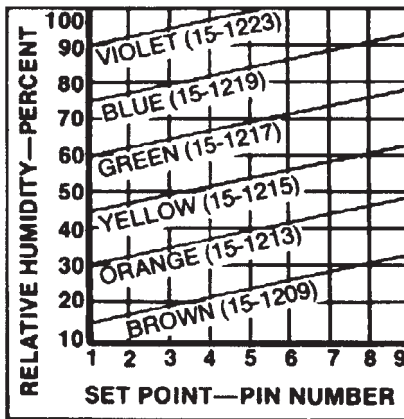
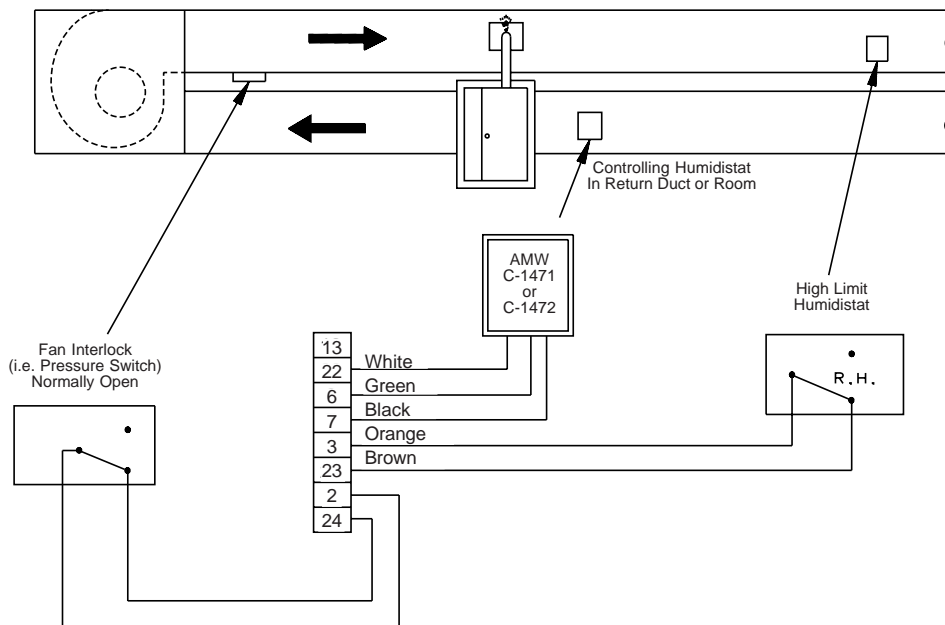


Figure 10-2: Control Range for Sensing Elements

Figure 10-3: Wiring Diagram



element. (Figure 10-2 can also be found on the inside of the humidistat cover.)

To set the RH control point within the range of the sensing element, the jumper wire must be attached to the proper set point pin. There are nine numbered pins spaced vertically on the right hand side of the humidistat circuit board; the jumper wire attaches to one of these. By using Figure 10-2, select the proper pin number to correspond to the percentage that is to be maintained in the space.

For example, assume that 40% RH is the desired condition and that the orange colored sensor (15-1213) is in its place in the controller. From Figure 10-2, it is seen that the horizontal line at 40% intersects the angular line labeled "orange" closest to the vertical line extending up from the "5". Once the jumper wire is set to pin 5, replace the cover. Now the humidistat can control the humidifier steam output at the proper modulated rate to maintain 40% RH.

The humidistat will send a 1.9 to 3.9 Vdc signal to the humidifier as the space humidity drops from 42.5 to 37.5% RH (+/- 2.5% RH throttling range). As the humidistat signal varies from 1.9 to 3.9 Vdc the humidifier demand signal varies from 0 to 100%. For input signals below 1.9 Vdc the demand stays at 0% and for signals above 3.9 Vdc the demand stays at 100%.

### 8. High Limit Duct Humidistat

A duct mounted High Limit Stat (Armstrong Part A8581) is recommended as a precaution against localized saturation in the duct. It is an on-off controller that opens the contact on a rise in humidity (opens on fault). See Figure 10-3 for wiring terminals and overall wiring diagrams.



## Installation and Maintenance EHU-600 Series Humidifiers

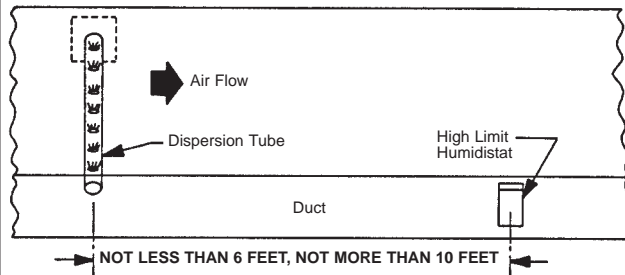


Figure 11-1: High Limit  
Duct Humidistat

It should be mounted 6 to 10 feet downstream from the steam dispersion tube (see Fig. 11-1). The high limit stat must be upstream of filters, silencers, takeoffs, etc. since these devices can reduce duct humidity and prevent the high limit stat from doing its job. Complete mounting instructions are contained in the High Limit Stat package.

### 9. Fan Interlock Switch

A fan interlock switch is recommended to deactivate the humidifier when there is insufficient air flow in a duct system. A duct pressure switch is preferred as a fan interlock device. The pressure switch should open on insufficient air flow (opens on fault). See Figure 10-3 for wiring terminals and overall wiring diagrams. Complete installation and wiring instructions are contained in the duct pressure switch package.

Armstrong Pressure Switch: (Armstrong Part A9023) All Pressure and electrical connections and set point adjustments are on side for each installation. Temperature limit: 32°F. to 180°F.

Maximum surge pressure: 10 psig Rated pressure: 45" H<sub>2</sub>O

Pressure connections: 1/8" NPT Operating range: 0.07 to 0.15" H<sub>2</sub>O

#### Installation:

- Select a location that is free from excessive vibration, corrosive atmosphere and within temperature limitations.
- Connect switch from pressure source with tubing (1/4" O.D. is recommended) to high pressure port. The low pressure port is left open to atmosphere.

**Note:** Above procedure is for downstream side of fan installation. For fan suction side installation, see instructions accompanying switch.

- Electrical connections to the switch are provided by means of screw terminals marked common and normally open. The normally open contacts close when pressure increases beyond the set point.
- Complete instructions are contained in the pressure switch package.

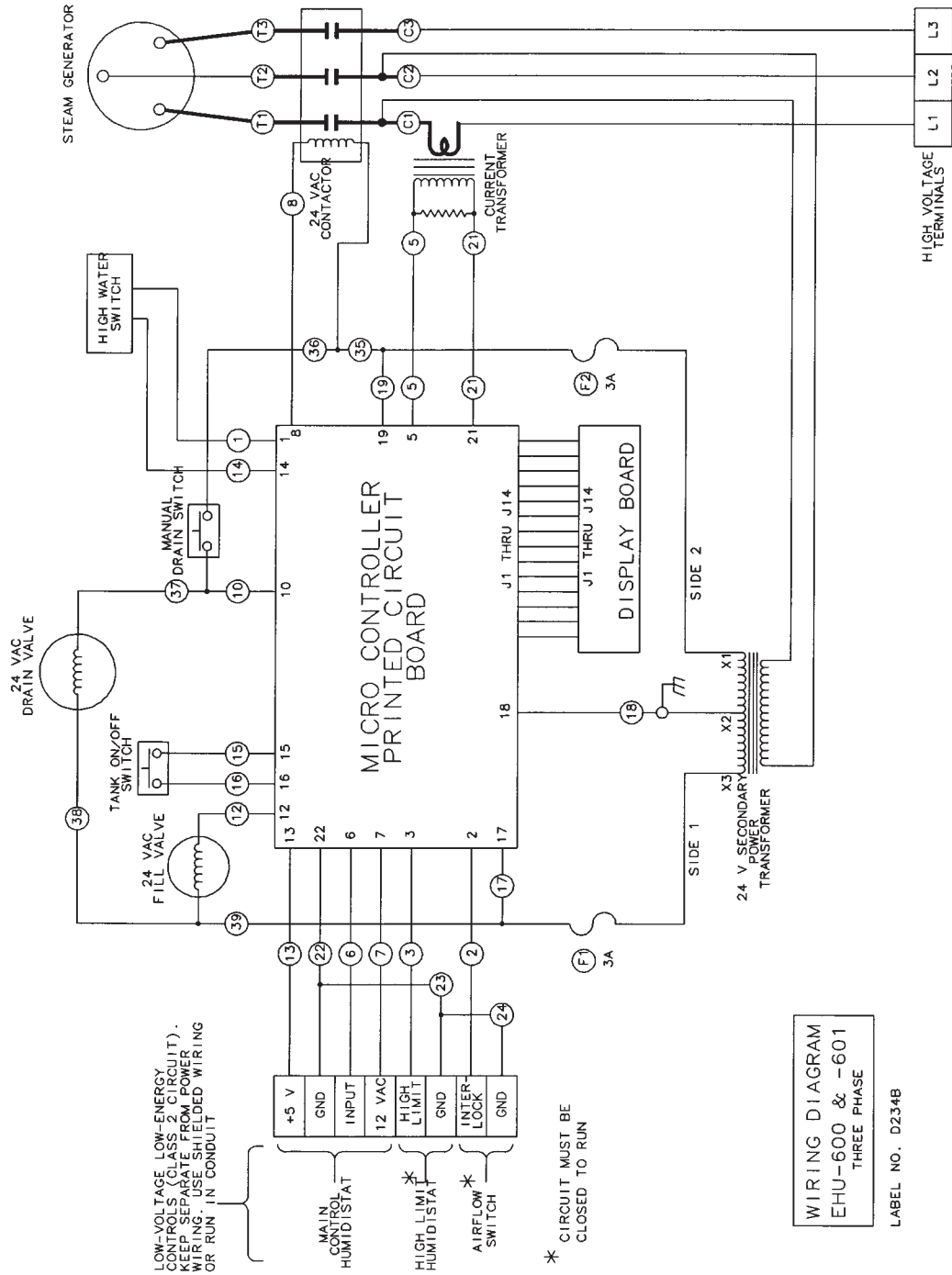
**Note: Limit switches (high limit and fan interlock switches) open on fault.**



# Installation and Maintenance EHU-600 Series Humidifiers

## 10. Wiring Diagram

Figure 12-1: EHU-600 Wiring Diagram



LOW VOLTAGE LOW-ENERGY CONTROL CIRCUIT. KEEP SEPARATE FROM POWER WIRING. USE SHIELDED WIRING OR RUN IN CONDUIT.

\* CIRCUIT MUST BE CLOSED TO RUN



## Installation and Maintenance EHU-600 Series Humidifiers

### 11. Capacity Chart

**Chart 13-1: EHU-600 Series Capacities and Nominal Amperage Ratings**

Nom * Amp Rating	MCM Module	Recommended Branch Circuit		Output lb./hr. (kg/hr.) @ Voltage										
				Single Phase				Three Phase						
				Wire	Fuse	120	208	240	277	208	240	346 <sup>1</sup>	380	415 <sup>2</sup>
<b>Model EHU-600 Humidifiers (One Steam Generator)</b>														
7.0	7	14	15	2.1(9)	3.7 (1.7)	4.3 (2)	5 (2.3)	6 (2.7)	7 (3.2)		12 (5.5)		15 (6.8)	18 (8.2)
10.9	6	14	15	3.3(1.5)	6 (2.7)	7 (3.2)	8 (3.6)	10 (4.6)	12 (5.5)		18 (8.2)		23 (10.5)	29 (13.2)
14.6	1	15	20	4.5(2)	8 (3.6)	9 (4.1)	10 (4.6)	13 (5.9)	15 (6.8)		24 (11)		31 (14)	39 (17.8)
18.2	2	10	25		10 (4.6)	11 (5)	13 (5.9)	17 (7.7)	19 (8.7)		30 (13.7)		38 (17.3)	
21.9	3	10	30		12 (5.5)	13 (5.9)	15 (6.8)	20 (9.1)	23 (10.5)		37 (16.8)			
32.7	4	8	45		17 (7.7)	20 (9.1)	23 (10.5)	30 (13.7)	35 (16)					
36.3	5	8	50		19 (8.7)	22 (10)	26 (11.8)	33 (15)	38 (17.3)					
<b>Model EHU-601 Humidifiers (One Steam Generator)</b>														
18.2	2	10	25		10 (4.6)	11 (5)	13 (5.9)	17 (7.7)	19 (8.7)	28 (12.8)	30 (13.7)	33 (15)	38 (17.3)	48 (21.9)
21.9	3	10	30		12 (5.5)	13 (5.9)	15 (6.8)	20 (9.1)	23 (10.5)	33 (15)	37 (16.8)	40 (18.2)	46 (21)	58 (26.4)
32.7	4	8	45		17 (7.7)	20 (9.1)	23 (10.5)	30 (13.7)	35 (16)	50 (22.8)	55 (25)	60 (27.3)	69 (31.4)	86 (39.2)
36.3	5	8	50		19 (8.7)	22 (10)	26 (11.8)	33 (15)	38 (17.3)	55 (25)	61 (27.8)	66 (30)	77 (35)	96 (43.7)
42.0	8	6	60		22 (10)	26 (11.8)	30 (13.7)	38 (17.3)	44 (20)	64 (29)	70 (32)	77 (35)	89 (40.5)	
45.0	9	6	60		24 (11)	28 (12.8)	32 (14.6)	41 (18.7)	48 (21.9)	69 (31.4)	75 (34)	82 (37.3)	95 (43.3)	
48.0	10	6	70		25 (11.4)	29 (13.2)	34 (15.5)	44 (20)	51 (23.2)	73 (33.2)	80 (36.4)	88 (40)		
<b>Model EHU-602 Humidifiers (Two Steam Generators)</b>														
36.4	2	8	50		19 (8.7)	22 (10)	26 (11.8)	33 (15)	38 (17.3)	55 (25)	61 (27.8)	66 (30)	77 (35)	96 (43.7)
43.8	3	6	60		23 (10.5)	27 (12.3)	31 (14)	40 (18.2)	46 (21)	67 (30.5)	73 (33.2)	80 (36.4)	93 (42.3)	116 (53)
65.4	4	3	100		35 (16)	40 (18.2)	46 (20.9)	60 (27.3)	69 (31.4)	100 (45.5)	109 (49.6)	119 (54)	138 (62.8)	173 (79)
72.6	5	3	100		39 (17.8)	44 (20)	51 (23.2)	66 (30)	77 (35)	111 (50.5)	121 (55)	133 (60.5)	153 (69.7)	192 (87.4)
84.0	8	2	125		45 (20.5)	51 (23.2)	59 (26.9)	77 (35)	89 (40.5)	128 (58.3)	140 (63.8)	153 (69.7)	177 (80.6)	
90.0	9	2	125		48 (21.9)	55 (25)	64 (29)	82 (37.3)	95 (43.3)	137 (62.4)	150 (68.3)	164 (75.7)	190 (86.5)	

Notes:

(1) 346 volt units require 346/200 volt 4 wire system. (2) 415 volt units require 415/240 volt 4 wire system.

KW rating = humidity output (lb./hr.) x 0.345 (for energy calculations only; not for branch circuit sizing).

\*Nominal Amp Rating is for breaker sizing and UL purposes only. Average operating amperage is 88% of normal rating.

Capacities listed in table are based on average amperage draw.

### 12. Physical Data

**Chart 13-2: Series EHU-600, EHF-2 and EHF-3 Fan Packages**

Materials	
Generator Tank	Polypropylene
Cabinet	Steel-18 GA with Epoxy Enamel Coating
Electrodes	Type 430 Stainless Steel
Hose Cuffs	EPDM Rubber
<b>Duct Model</b>	
Dispersion Tube	Type 18-8 Stainless Steel
<b>Area Fan Unit Model</b>	
EHF-2,3 Cabinet	Steel -18 GA with Epoxy Enamel Coating
EHF-2 Blower Fan	115 VAC, 60 Hz, 1.3 amp 280 CFM @ 1380 RPM
EHF-3 Blower Fan	115 VAC, 60 Hz, 2.9 amp 465 CFM @ 1530 RPM

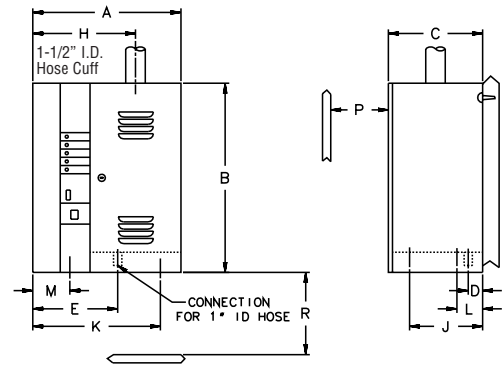
Model No.	Weights			
	Approximate Shipping		Maximum Operating	
	lb	kg	lb	kg
EHU-600	60	27	80	36
EHU-601	76	35	104	47
EHU-602	87	40	145	66
EHF-2	33	15	32	14.6
EHF-3	34	15.5	33	15



## Installation and Maintenance EHU-600 Series Humidifiers

### 13. Submittal Drawings

Chart 14:1 Dimensional Data	EHU-600		EHU-601		EHU-602	
	in	mm	in	mm	in	mm
"A" Width	18	457	18	457	31	787
"B" Height	23	584	28½	724	28½	724
"C" Depth	11½	292	13 <sup>11</sup> / <sub>32</sub>	339	13 <sup>11</sup> / <sub>32</sub>	339
"D" Tank Drain (Side)	6 <sup>5</sup> / <sub>8</sub>	168	6 <sup>3</sup> / <sub>16</sub>	157	6 <sup>3</sup> / <sub>16</sub>	157
"E" Tank Drain (Front)	10 <sup>5</sup> / <sub>16</sub>	262	8¼	210	8¼	210
"F" Cabinet Drain 5/8" OD	N/A	N/A	11½	292	18	457
"G" Tank #2 Drain (Front)	N/A	N/A	N/A	N/A	21 <sup>3</sup> / <sub>16</sub>	538
"H" Steam Outlet #1	12½	318	11½	292	11½	292
"I" Steam Outlet #2	N/A	N/A	N/A	N/A	13	330
"J" Water Supply* (Side)	8¼	210	9 <sup>13</sup> / <sub>16</sub>	249	9 <sup>13</sup> / <sub>16</sub>	249
"K" Water Supply* (Front)	15½	394	3 <sup>5</sup> / <sub>16</sub>	84	3 <sup>5</sup> / <sub>16</sub>	84
"L" Electrical Supply (Side)	3 <sup>1</sup> / <sub>8</sub>	80	2	51	2	51
"M" Electrical Supply (Front)	4½	114	2½	64	2½	64
"N" Fan Height (EHF-2)	13	330	N/A	N/A	N/A	N/A
"N" Fan Height (EHF-3)	16	406	Remote Installation Only			
"P" Front Clearance	18	457	24	610	24	610
"Q" Left Clearance	4	102	24	610	24	610
"R" Bottom Clearance	5	127	5	127	5	127
"S" Right Clearance	4	102	4	102	4	102



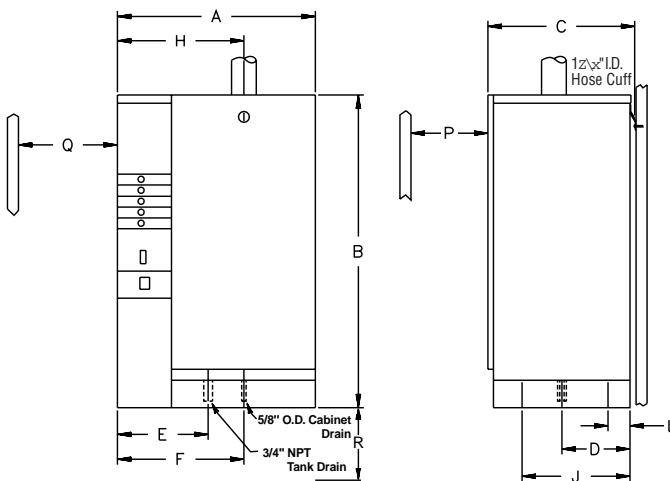
**Figure 14-1 Model EHU-600  
(Front and Side View)**

\*Water Supply Conn. 3/8" Compression.

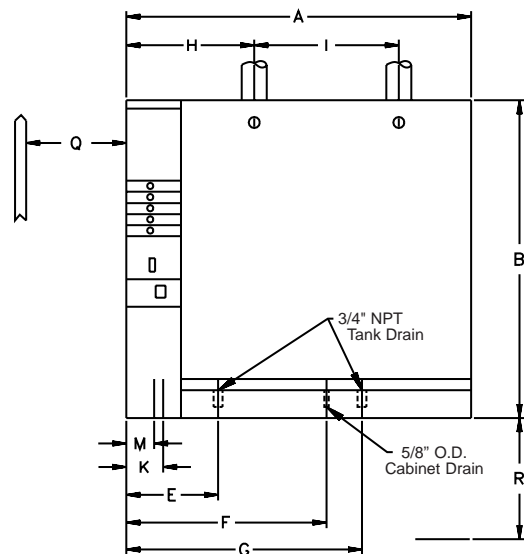
Unit is designed to mount on 16" centers.

2 lag screws are provided for EHU-600.

2 lag screws & bracket are provided for EHU-601 & 602.



**Figure 14-2: Model EHU-601  
(Front and Side View)**

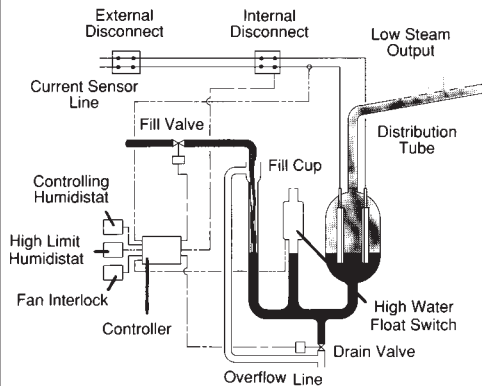


**Figure 14-3: Model EHU-602  
(Front View)**

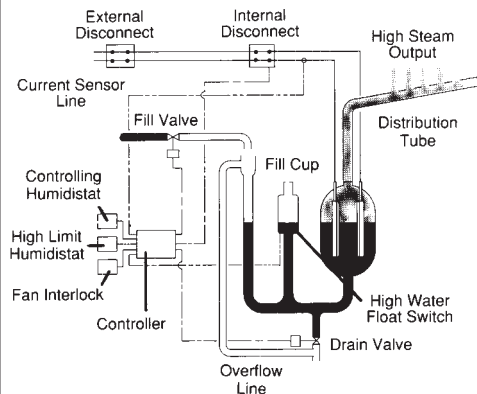


## Installation and Maintenance EHU-600 Series Humidifiers

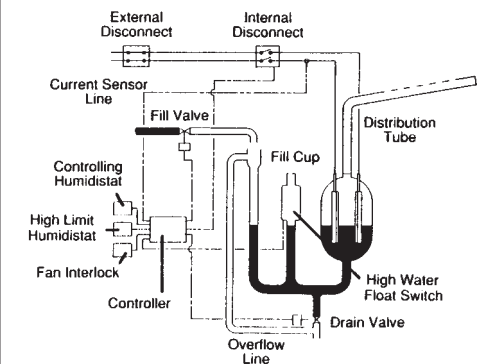
### Principle of Operation



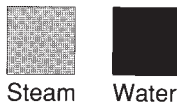
**Figure 15-1: 100% demand. Filling with water low, increasing steam output.**



**Figure 15-2: 100% demand. Fill valve cycling to maintain output. High water level. High, constant steam output.**



**Figure 15-3: No demand. Contactor opens. No steam output.**



#### 1. Operation

The Armstrong EHU-600 Series electronic steam humidifier converts ordinary tap water to steam and distributes it within the air being humidified to bring the relative humidity up to the desired level. It is the ideal solution for providing humidification where no steam is available or where a steam source is too remote for easy or economical piping. The Armstrong EHU-600 Series consists of three models: The EHU-600, 601 and 602. The maximum capacity of the series is 192 lb/hr.

The humidity demand, sensed by the humidistat, is indicated by the EHU demand meter. The microprocessor converts this demand signal into an amperage requirement. The power contactor closes, applying voltage to the electrodes, and the fill valve begins to fill the tank.

Water enters the bottom of the steam generator tank and rises until it reaches the electrodes. Upon contact, electrical current flows through the water, causing it to boil and produce steam (Fig. 15-1).

When the water level rises, as shown in Fig. 15-2, increased electrical current flows through the water, producing more steam. This increase will continue until the required output of steam (i.e. amperage requirement) is reached.

At this point, the fill valve will cycle off and on to maintain the required amperage. When the humidistat senses the added moisture in the air, the demand for humidity begins to drop. As the demand drops, the output of the unit is modulated down by boiling away water and not filling, allowing amperage to decrease, thereby reducing the steam flow. The fill valve can then cycle at the lower steam output (amperage) requirement.

Fig. 15-3 shows what happens when the humidistat demand signal drops below a minimum demand: The contactor is de-energized, and steam output stops.

Steam output may also be stopped by a duct high-limit humidistat or a fan interlock switch. These devices prevent excess moisture and condensation in the duct. If these devices open, the Tank Off light will illuminate and the fill will turn off.

A high-water float switch prevents water carryover into the duct due to too high a water level in the tank. When the high water level is reached the TANK FULL light comes on and the fill valve is blocked until some water is boiled away and the water level drops. This is not uncommon on startup. If the TANK FULL light is on continuously during normal service then the tank probably needs cleaning.





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## Installation and Maintenance EHU-600 Series Humidifiers

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An automatic drain cycle blows down mineral-laden water to increase tank life and reduce maintenance requirements. If the water in the steam generator is not very conductive it will reach the high water level. The drain duration is adjusted based on how often the high water level is reached.

An overcurrent protection circuit will drain water from the tank to reduce current flow and then de-energize the contactor to stop current flow if overcurrent still exists.

The EHU-600 Series has a patented self-regulating maximum output feature that eliminates manual adjustment and improves humidity control. In low demand situations, units with greater capacity can quickly overshoot setpoint because a fraction of the output satisfies the requirement. This on-again/off-again behavior is called "hunting" because the unit has difficulty attaining setpoint. The EHU-600 Series automatically adjusts maximum output up or down depending on the humidity demand history. If this feature is not desired it can be easily over ridden by changing the position of jumper BJ3 on the printed circuit board from CAPY STEP/NORMAL to CAPY STEP/TEST.

**Make sure main power is turned off whenever changing jumpers on PC board.**



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## Installation and Maintenance EHU-600 Series Humidifiers

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### 2. Suggested Specification

Steam humidifier for distribution of humidity (steam vapor) into air handling system or directly into space shall be of the self-contained, electronically controlled design.

- a. Humidifier shall generate steam from ordinary tap water.
- b. Humidifier(s) shall have all internal components contained in a steel cabinet with a key-locked access door to prevent unauthorized access.
- c. Humidifier(s) shall be UL and CUL listed.
- d. Humidifier shall have modulating control to provide 10 to 100% capacity.
- e. Maximum capacity of humidifier shall self regulate with no manual adjustment.
- f. Humidifier shall have steam generator(s) that can be taken apart for inspections and cleaning, or if needed, replacement of internal parts.
- g. Drain cycle will be self regulating for automatic control of mineral (conductivity) buildup.
- h. Humidifier shall have programmed diagnostics to confirm that input and output circuits are functioning.
- i. Humidifier shall incorporate a demand meter to display status of main control humidistat signal.
- j. The electronic circuit shall provide automatic protection from excessive current and high water overflow.
- k. The humidifier fill water line(s) shall have an air gap to prevent backflow (syphoning) of contaminated water into the water supply system.
- l. Humidifier shall incorporate electrical terminals for installation of controlling stat, duct high-limit stat and fan interlock switch.
- m. Humidifier shall be supplied with stainless steel steam dispersion tube(s) which provide uniform steam distribution over the entire tube length and shall be supplied at various lengths (through 6 feet) to adequately span the widest dimension of the duct.
- n. When applicable, humidifier(s) shall have provisions for discharging steam vapor directly into room area using factory available fan distribution units as an accessory. These units shall be designed for either remote mounting or fit directly on top of humidifier.
- o. Humidifier shall be supplied with two hose cuffs for connection to hard copper tube (customer supplied). 1 1/2" ID flexible rubber hose shall be available as an optional item.
- p. Humidifier shall be supplied with a humidistat capable of modulating the steam flow, or be capable of working with the following common control signals without factory modification: 0-135 ohms, 2-10 Vdc, 4-20 milliamp and on/off control (SPST relay).



## Installation and Maintenance EHU-600 Series Humidifiers

### 3. Instrument Panel

**"Power" Light** – Indicates when the electrical supply is energized.

**"Fill" Light** – Indicates when the fill valve is energized to add water to the steam generator.

**"Drain" Light** – Indicates when the drain valve is energized to drain water from the steam generator. **Note: Drain light does not turn on when manual drain switch is energized.**

**"Tank Full" Light** – Indicates that the water level in the generator has risen to the high water float switch. The electronic controls automatically interrupt the fill cycle to prevent overflow. This may be a normal occurrence with a brand new or recently cleaned steam generator, especially if the water conductivity is low and amperage requirements are high. After a few days of operation the water level should drop below the high water level due to mineral (conductivity) build up in the tank. To temporarily increase tank water conductivity a small amount of salt can be added to the tank water. After extended use, repeated lighting of the **Tank Full** light indicates that, in spite of periodic draining of mineral-laden water, the steam generator should be inspected, and either cleaned or replaced.

**Note:** When the **Tank Full** light is on, the unit may not be able to generate a sufficient supply of steam to satisfy the demand.

**"Tank Off" Light** – Indicates when power to the generator has been interrupted. This may be due to low demand, high duct humidity interlock, fan interlock, high current, or failed drain system.

**"Demand Meter"** – Indicates the demand for humidity in relation to the RH set on the humidistat. The demand meter for the EHU-600 is a series of 5 LED's which indicate demands of 10%-30%, 30%-50%, 50%-70%, 70%-90%, and 90%-100%.

**"Tank On/Off"** – Pushing and releasing the top part of the black switch starts the humidifier or resets the internal overcurrent protection. Pushing and holding the TANK ON/OFF switch for 15 seconds starts the diagnostics system. See the section on **Maintenance**.

**"Manual Drain"** – Pushing and holding the bottom part of the black switch activates the manual drain. **Note: Drain light will not illuminate during the manual drain.**



Figure 18-1: Instrument Panel



## Start-Up Procedure

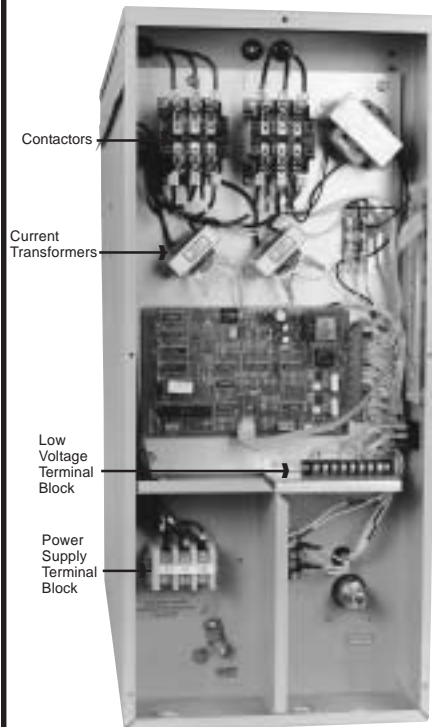


Figure 19-1: Electrical Component Identification  
(Model EHU-602 shown)

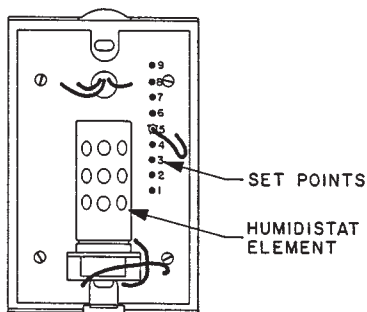


Figure 19-2: Humidistat Element

The following steps should be performed on all newly installed EHU Humidifier units to ensure that the humidifier functions correctly.

1. Turn power supply at disconnect off.
2. Open the two doors.
3. Examine the wiring and the components in the electrical compartment.
4. Check for any loose wires or quick-connect terminals that may have been pulled loose.
5. Using a screwdriver, **Tighten All Screw Terminals** on the **power supply terminal block, ground lug, and contactor** (See Figure 19-1) to ensure that no connections have become loose during shipping.
6. Locate the "**Low Voltage Terminal Block**" (See Figure 19-1).
7. Disconnect the control wiring to terminals 3 and 23 (**High Limit Humidistat**) and terminals 2 and 24 (**Air Proving Switch**), then jumper them out with the tabs provided, or a short piece of wire.
8. Turn on the water supply – Check for leaks.
9. Turn power supply on. The following should now happen:

- a. The "**Power**" and "**Tank Off**" lights will now be momentarily illuminated.
- b. The "**Tank Off**" light will go out and the "Fill Light" will go on. Unit will begin to fill.
- c. If the unit does not begin filling, force a 100% humidity demand by removing the **humidistat element** (See Figure 19-2). The unit will then start to fill, and the "**Tank Off**" light will go out. If not, the humidistat may be wired incorrectly or may not be the Armstrong humidistat. See troubleshooting section of this manual for more information on humidistat wiring.

NOTE: If the humidistat is not the standard Armstrong stat, the method of forcing a demand signal will be different. Generally, increasing the humidity set point on the humidistat will generate a demand signal. Check with the control system contractor for information.



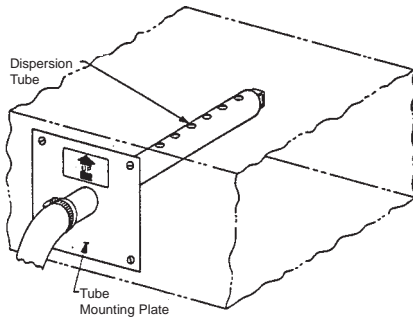
## Installation and Maintenance EHU-600 Series Humidifiers

Another method of forcing a 100% demand is to remove the controller input signal from terminal 6, jumper terminal 13 to terminal 6 with a short piece of wire, and select either 1.9-3.9Vdc or on/off control setting on the main circuit board.

10. While the tank is filling, open terminals 2 and 24 with a screwdriver, loosening and removing the jumper. The fill will stop and the **"Tank Off"** light will come on. Replace jumper; within 10 seconds the contactor will pull in and the fill will resume.
11. Repeat with terminals 3 and 23. The response will be identical to Step 10.
12. Let the unit continue to fill and allow to boil.
  - a. If the water level reaches within 4" of the **steam generator tank** top, the **high level float switch** will block the fill, and illuminate the **"Tank Full"** light. This is normal on relatively pure water, but to complete the start-up testing, push and hold the **drain** switch to drain 1/2 of the tank, then, with power off, add one pinch (1/4 teaspoon) of salt to the **fill cup**. This should allow the water to boil by increasing the water's conductivity.
  - b. If **"Tank Full"** light illuminates with water level below midway point in the tank, the back pressure due to duct static or steam dispersion piping is too high. Consult factory.
13. On typical beginning fill, after the fill stops, using an **ammeter**, the tank leads will each be drawing between 35-40% of "nominal amp rating" at this point. (See unit label for nominal amp rating.)
14. Press the **drain** switch. Verify that the unit is drawing freely. Be sure the drain line is well pitched and is 1" size copper pipe. Do NOTE use PVC pipe.
15. Install the humidstat element, or verify that it is in place.
16. Verify that the humidity set-point is at the desired value.
17. Blow "humidly" on the humidstat element. The following should happen:
  - a. The **demand meter** will go to zero.
  - b. The unit will shut down, lighting the **"Tank Off"** light.
  - c. The unit may energize again after the sensor "dries" out. The **demand meter** indicates the humidstat signal, so once the sensor "dries out" the demand will climb back to 100% (maybe less if the humidity level is within the control range of the humidity setting.)
18. Reconnect the **air proving switch** to terminals 2 and 24. Verify that the **air proving switch** is wired to that it opens on no air flow and is closed with air flow (normally open).



## Installation and Maintenance EHU-600 Series Humidifiers



**Figure 21-1: Tube Mounting Plate**

19. Reconnect the **high limit stat** (if used) to terminals 3 and 23. Verify that the **high limit stat** is wired so that it opens at the high limit setpoint and is closed below this point (normally open).
20. Inspect the steam outlet piping. Verify that there are no untrapped low spots.
21. If the **dispersion tube** is equipped with a drain fitting, verify that it is working. Look at the **tube mounting plate**, there is an Armstrong "A" Logo or "UP" sticker which should be pointing up. If not, the tube will not drain properly (See Figure 21-1).
22. When using EHF-2 Fan Package units, the fan must be turned on for steam to be generated. The fan will stay on when the humidity demand is satisfied. See IB-96 for complete installation instructions of the EHF-2 Fan Unit.
23. Turn power off, if humidification is not needed now.
24. Close and lock the doors, and store the key away from the unit.



## Maintenance

### 1. Recommended Maintenance Schedule

#### 1 Week after start up

- Check unit operation
- Look in drain pan for leaks.
- Check steam piping for leaks.
- Observe duct low points for signs of poor humidity distribution.

#### 1 Month to 1 year

Clean or replace steam generator and/or electrodes. Be sure unit is draining freely by pushing and holding drain light during fill cycles.

### 2. Water quality and treatment for EHU Series humidifiers

#### General

The real reason to acquaint yourself with this material is maintenance. On poor quality water, EHU Series Humidifiers require more maintenance, also, your water heater, drinking fountains, washers, etc., so this maintenance is required when you can least afford to perform it. Hopefully, understanding the problem and possible solutions will help avoid problems in the first place.

**How water affects the EHU:** The EHU is an electrode boiler. When no water is present, the electrodes are separated by air and no current is conducted. When water contacts the electrodes, the conductive minerals in the water allows current to flow. Conductivity is the measure of how conductive the water is and is measured in micromhos ( $\mu\text{mhos}/\text{cm}^2$ ). The more conductivity, the lower the water level will be to draw a given current say, 10 amps.

**What affects conductivity?** Obviously, minerals dissolved in the water. Pure distilled water is not conductive. This includes deionized and reverse osmosis diffusion water treatment. Pure water can't work in an EHU because it will not allow amperage draw (it's not conductive). Most tap water is conductive however, so it will work in an EHU. The type and quantity of minerals can vary greatly depending on the source of the water (See Chart 23-1).

*Steam generator water levels at given current and water conductivity*



*Figure 22-1: Dry, No current*



*Figure 22-2: Low conductivity, 10 amps*



*Figure 22-3: High conductivity, 10 amps*





## Installation and Maintenance EHU-600 Series Humidifiers

<i>Chart 23-1: Typical Minerals Found in Water</i>	<b>Analysis of water, in parts per million, except for pH and color</b>			
Constituent or property	River <sup>1</sup>	Well <sup>2</sup>	Canal <sup>3</sup>	Lake <sup>4</sup>
Silica (SiO <sub>3</sub> ) _____	5.4	41	6.6	11
Iron (Fe) _____	.11	.04	.11	.10
Calcium (Ca) _____	9.6	50	83	2.9
Magnesium (Mg) _____	2.4	4.8	6.7	9.5
Sodium (Na) _____	4.2	10	12	8690
Potassium (K) _____	1.1	5.1	1.2	138
Carbonate (CO <sub>3</sub> ) _____	0	0	0	3010
Bicarbonate (HCO <sub>3</sub> ) _____	26	172	263	3600
Sulfate (SO <sub>4</sub> ) _____	12	8.0	5.4	10500
Chloride (Cl) _____	5.0	5.0	20	668
Fluoride (F) _____	.1	.4	.2	—
Nitrate (NO <sub>3</sub> ) _____	3.2	20	1.3	5.8
Dissolved solids _____	64	250	310	25000
Hardness _____	34	145	235	46
Color _____	7	0	97	2
pH _____	6.9	7.9	7.7	9.8

1-Stream in Connecticut 2-Logan County, CO 3-Drainage from Everglades, FL 4-Northcentral North Dakota

**The drain cycle:** EHU Series humidifiers have a built in blowdown circuit to intermittently purge mineral accumulations from the water. This is a bottom blowdown, so if minerals stick to the sides of the steam generator, they will accumulate. The standard drain interval is every 30 minutes for the EHU-600 and every 15 minutes for the EHU-601/602. Drain duration is automatically adjusted based on water hardness. If the water is very hard an increased drainage EPROM may be needed. Please consult the factory.

**Water related maintenance:** There are two types of water related maintenance required in EHU Series humidifiers:

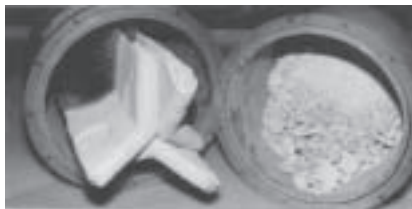
### 3. Tank Cleaning

The tank is full of white or light brown colored mineral buildup. This buildup may be anywhere from soft and chalky to rock hard.

Tank cleaning can usually be handled one of five ways:

- a. **Mechanical:** Wire brush or scrape electrodes and tank walls clean. NOTE: If cleaning mechanically it is not necessary to clean the electrodes to the bare metal. Removal of major accumulations is the only requirement.
- b. **Chemical:** Commercial Muriatic acid preparations work well on most accumulations. See Section 3, "Steam Generator Cleaning Procedure."

**Caution:** Muriatic acid can cause severe chemical burns if not handled properly. Wear rubber gloves and eye protection when using. Read and follow carefully the safety procedures on the chemical package.



**Figure 23-1: Tank filled with mineral buildup.**



## Installation and Maintenance EHU-600 Series Humidifiers

- c. **Softening:** Water softeners remove calcium and add sodium which stays in solution instead of plating out. Minerals will drain out and accumulate less.

**Caution:** Soft water may be more conductive and does not allow a protective coating to form on electrodes. Because salt is infinitely soluble in water the drainage rates required will increase dramatically. Special EPROMs may be needed. In general avoid using softened water if conductivity is above  $250 \mu\text{mhos}/\text{cm}^2$ . Expect to replace electrodes more frequently. Discontinue if any arcing and/or foaming occurs in tank. (See Electrode Disintegration)

- d. **Water Purification:** If you have pure water available such as: Deionized water, Reverse Osmosis diffusion water, or distilled water, they can be blended with tap water or softened water to reduce the total mineral content. Pure water alone is not conductive enough to pull current. Consult your water purification equipment vendor for proper blending equipment. Consult the factory for recommended blend amounts. In general if blending with tap water conductivity of incoming water should be around  $200\text{-}300 \mu\text{mhos}/\text{cm}^2$ . If blending with softened water conductivity should be around  $100 \mu\text{mhos}/\text{cm}^2$ . Too much softened water will cause arcing and foaming in the generator. Watch the unit closely for a few days to ensure proper operation. The water is too pure when the "Tank Full" light comes on excessively.

- e. **Magnetic Treatment:** Magnetic coils designed to allow water to be "magnetized" have been found useful, in some instances, in reducing mineral buildup in the steam generator. The coil is inserted in the incoming water line and may or may not be electrically powered. Best success has been seen on well water with high amounts of calcium dissolved in it. It's best to use these on a trial basis at first to determine if there is a benefit with the water being used.



Figure 24-1: Electrode Disintegration

#### 4. Electrode Disintegration/Replacement

The tank may turn black or red, arcing or flashing may be visible inside the tank when operating. See Figure 24-1.

**Electrode Disintegration:** Starts generally due to poor quality water being present in the steam generator. Poor quality water means water with high conductivity. Because the water is highly conductive, the EHU operates with a low water level at normal current. Low water levels mean that the current is concentrated on a small amount of electrode surface area and is flowing through very little water. This high amp flow/low water levels is what usually gets arcing started, besides being very corrosive.

Electrode disintegration is most likely in the following instances:

- High voltage (especially 480 and 600 volts);
- Hard water (in excess of 20 grains/gal.);
- Long drain lines;
- Low amperage units;
- Any** unit with a plugged drain line;
- Any** unit with a malfunctioning drain valve;
- Any** unit with any of the above on softened water.



## Installation and Maintenance EHU-600 Series Humidifiers

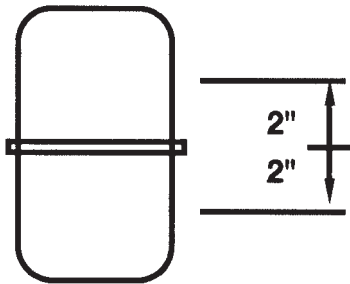


Figure 25-1: Optimum Water Level

**Note:** Arcing or flashing in the steam generator tank can be caused by one or more of the following:

1. Poor drainage
2. Abnormal water conditions
3. Dirty tank (needs cleaning)

If you notice arcing, shut the unit off and call the factory before restarting unit. If water conductivity is higher than  $600\mu\text{mhos}/\text{cm}^2$  and arcing is occurring, a special increased drainage EPROM may be required. Consult factory.

Optimum water level: As you are aware by now, water level plays a key role in EHU Amperage Control. The EHU will change water level automatically to adjust humidity output. Therefore, to provide optimum humidity control, the tank water level should be within 2" of the center of the steam generator.

### 3. Steam Generator Cleaning Procedure

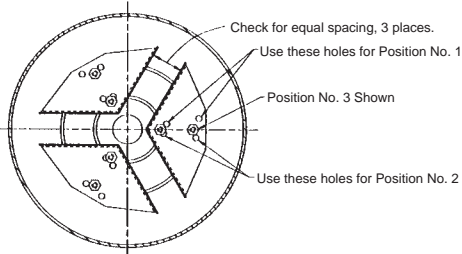
This procedure is intended as a guide only. Read and follow label directions on any cleaning product. Check local codes before disposing of chemicals.

**Caution:** Muriatic acid can cause severe chemical burns if not handled properly. Wear rubber gloves and eye protection when using. Read and follow carefully the safety procedures on the package.

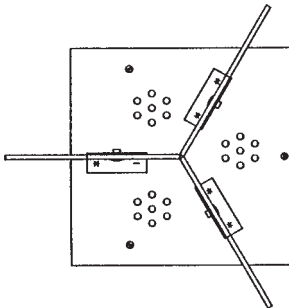
- a. Obtain several gallons of muriatic acid. Muriatic acid is a name for weak hydrochloric acid. It is available in most hardware, pool chemical, or farm supply outlets.
- b. Let steam generator tank cool after removal from EHU unit.
- c. Examine the tank inside by looking down through the steam outlet (top connection). Be sure the tank is cool.
  1. If tank is black or dark brown, it can't be chemically cleaned. The electrodes may have disintegrated. The tank will require a thorough cleaning and possibly electrode replacement.
  2. If tank has white/tan/grey mineral accumulations, estimate how high the tank must be filled with muriatic acid to dissolve the minerals. Never fill the tank more than 2/3 full.
- d. Plug the tank bottom. Move the tank to a location where disposal and clean up will be easy.
- e. Take care to add the acid only to the tank insides. The outside electrical terminals or metal flange parts may be damaged by the acid.



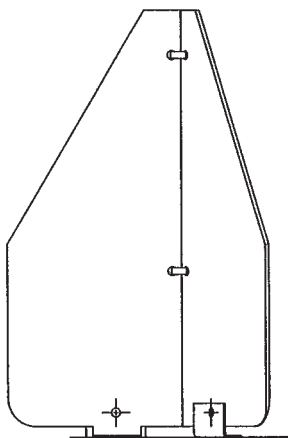
## Installation and Maintenance EHU-600 Series Humidifiers



**Figure 26-1: Model EHU-601 and EHU-602  
3 Ph Electrode Installation  
(Top View)**



**Figure 26-2: Top view  
Barrier Assembly**



**Figure 26-3: Side View  
Barrier Assembly**

- f. Never fill the tank more than  $\frac{2}{3}$  full. Watch the tank outside wall for the liquid level. Stop if foaming occurs and fills the tank more than  $\frac{2}{3}$  full.
- g. The  $\frac{2}{3}$  full requirement is to keep acid from attacking the electrical connections inside the top of the tank.
- h. Let the tank cleaning action take place for 15 minutes. Drain the fluid out the tank bottom. Rinse the tank twice with clean water.
- i. Observe the inside to determine if another treatment is necessary.
- j. It is not necessary for the electrodes to be cleaned down to bare metal. Removal of major accumulations is the only requirement.
- k. Helpful Hints:
  - Keep a rotating spare tank for installation in each humidifier. Cleaning can be done when convenient, not rushed.
  - Check the drain valve, tank drain adapter and tubing for proper operation and good flow when the tank is drained prior to removal.
  - On EHU-600 models, it is easier to disconnect the electrical wires back at the contactor, not on top of the steam generator tank.
- l. Re-install the steam generator tank. Make sure all electrical connections are tight; see Page 6. Check unit for proper operation.

### 4. Electrode Installation

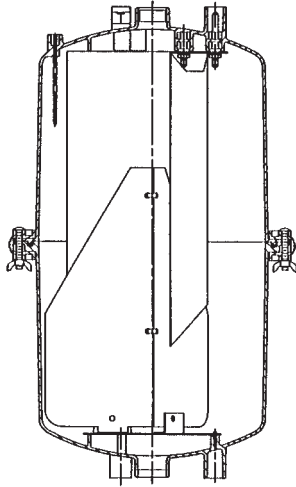
#### Models EHU-601 and EHU-602 – Three Phase

- a. Clean the inside of the steam generator thoroughly and rinse with clear water.
- b. High voltage units are supplied with a barrier/drain screen assembly in the lower tank half to reduce the possibility of arcing and increase electrode life. Inspect the barrier/drain screen assembly and replace if necessary. (See Figures 26-2, 26-3, and 27-1.)
- c. Make sure terminals and contact area on electrode top plates are clean and free of rust. Wire brush, if necessary. Set the electrodes in place. Be sure to use the same pair of holes on all electrodes. If you do not know which position (set of holes) to use, follow these recommendations (See Figure 26-1).

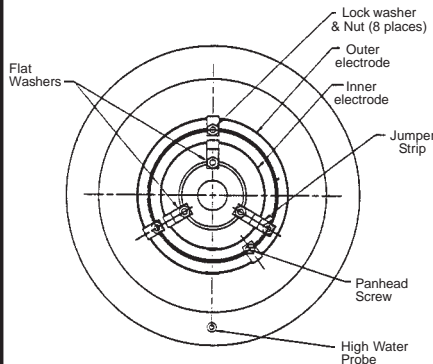
**NOTE:** The EHU-600 electrodes are not adjustable in the field. However, a set of closer spaced electrodes for low water conductivity are available. Consult the factory or your Armstrong Representative.



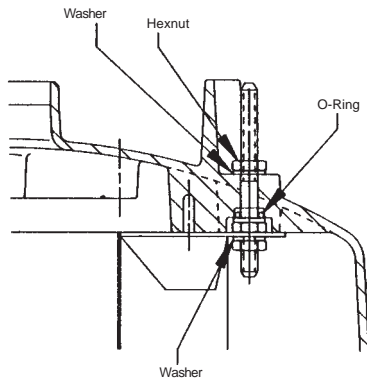
## Installation and Maintenance EHU-600 Series Humidifiers



**Figure 27-1: Three Phase Tank with Barriers Installed**



**Figure 27-2: Single Phase Electrode Installation Models EHU-601 and 602**



**Figure 27-3: Electrode Installation Model EHU-600**

**Chart 27:1**

Position	Approx. Spacing	Voltage / Condition
#3 with barriers	1 <sup>1</sup> / <sub>4</sub> "	380-600 Volts / high conductivity water
#3	1 <sup>1</sup> / <sub>4</sub> "	208-240 Volts / high conductivity water
#2	1"	208-240 volts / medium conductivity water
#1	3 <sup>3</sup> / <sub>4</sub> "	208-240 Volts / low conductivity water

- d. Put a stainless steel lockwasher and nut on each stud and tighten all nuts. (A 7/16" socket on a 6" or longer extensions makes this easier and safer!)
- e. Check the spacings between the electrodes and make sure they are equal (3 places). Bend the electrodes by hand to adjust spacings.
- f. When reinstalling push pin connector, make sure they are tight. See Figure 6-3 and 6-4.

NOTE: If barriers are used, electrodes must be in #3 position.

### Models EHU-601 and EHU-602 – Single Phase

- a. Clean the inside of the steam generator thoroughly and rinse with clear water.
- b. Set the jumper strip in place first (see Figure 27-2). Then set the outer electrode in place and install a stainless steel lockwasher and nut on the three outer studs, install the pan head screw as shown. Tighten the nuts and screw. (A 7/16" socket on an extension makes this step, and the next, much easier and safer!)
- c. Set the two flat washers in place as shown. Then set the inner electrode in place and put a lockwasher and nut on each of the inner studs. Tighten all nuts.  
CAUTION: To ensure proper and safe operation, all parts must be assembled exactly as shown. Use the high water probe as a location reference.
- d. When reinstalling push pin connector, make sure they are tight. See Figure 6-3 and 6-4.

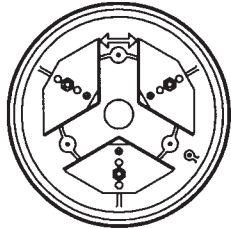
### Model EHU-600 – Three Phase

- a. Clean the inside of the steam generator thoroughly and rinse with clear water.
- b. High voltage units are supplied with a barrier/drain screen assembly in the lower tank half to reduce the possibility of arcing and increase electrode life. Inspect the barrier/drain screen assembly and replace if necessary.
- c. Place a flat washer and O-ring on each 1/4" electrode stud (see Figure 27-3).
- d. The other mounting hole on each electrode is attached to the tank top with the slotted self-tapping screws. (See Figure 28-1)
- e. From the outside, install a flat washer and 1/4" hex nut on each electrode stud (see Figure 27-3). Tighten these so they are snug.
- f. See Section 5 of Installation Procedure (Page 6) for information on installing steam generator in unit.

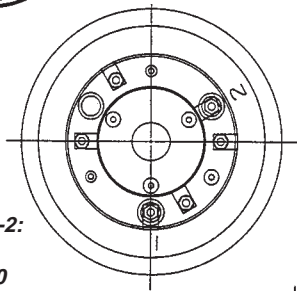


## Installation and Maintenance EHU-600 Series Humidifiers

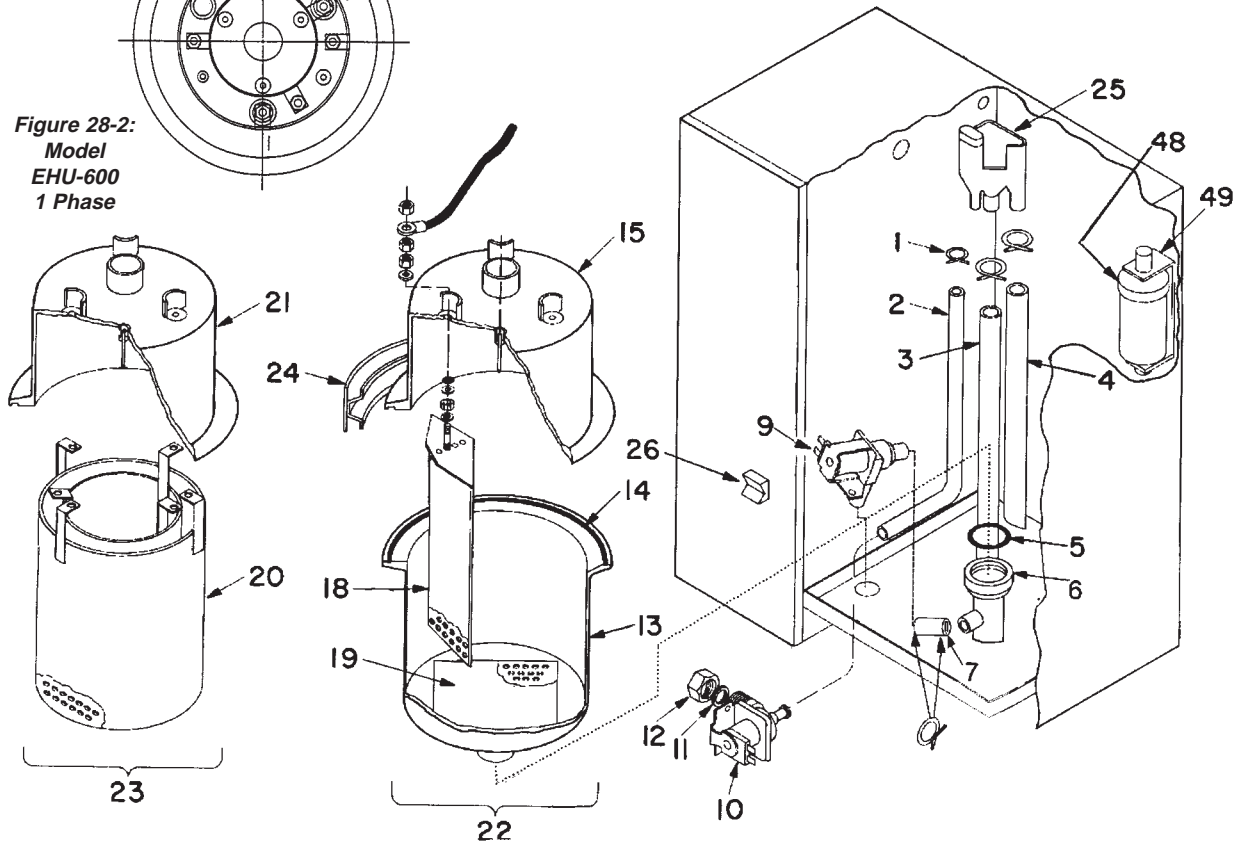
Check for equal spacing, 3 places.



**Figure 28-1:**  
Model  
EHU-600  
3 Phase



**Figure 28-2:**  
Model  
EHU-600  
1 Phase



*Model EHU-600 is shown above. Models EHU-601 and EHU-602  
are similar but some part numbers are different.*

### Parts Description

- |                                |                                  |                                      |
|--------------------------------|----------------------------------|--------------------------------------|
| 1. Hose Clamp                  | 11. Hose Nut Gasket              | 21. Upper Tank Half - 1 Phase        |
| 2. Fill Valve to Fill Cup Tube | 12. Hose Nut Reducer             | 22. Tank Assembly Complete - 3 Phase |
| 3. Fill Cup to Adapter Tube    | 13. Lower Tank Half              | 23. Tank Assembly Complete - 1 Phase |
| 4. Fill Cup Overflow Tube      | 14. Tank "O" Ring Seal           | 24. V Band Clamp                     |
| 5. Drain "O" Ring Seal         | 15. Upper Tank Half - 3 Phase    | 25. Fill Cup                         |
| 6. Tank Drain Adapter          | 18. Electrode Assembly - 3 Phase | 26. Rocker Switch                    |
| 7. Adapter to Drain Valve Tube | 19. Drain Screen                 | 48. Float Switch                     |
| 9. Drain Valve                 | 20. Electrode Assembly - 1 Phase | 49. Float Switch Bracket             |
| 10. Fill Valve                 |                                  |                                      |





## Diagnostics

The EHU-600 has a diagnostic function which serves as a trouble-shooting aid. The diagnostics will check all the output circuits: fill valve, drain valve, contactor, and display lights to make sure they are working. It then shows the status of all input circuits: fan interlock switch, high limit duct humidistat, high water switch or probe, and humidistat demand signal.

To initiate the diagnostic routine:

- a. Turn water supply off.
- b. If the tank contains water, press and hold **Manual Drain** switch until the tank is empty. **Drain** light will not come on.
- c. Press and hold the **Tank On/Off** switch until the **Fill** light begins to blink (approximately 15 seconds). The **Tank Off** light will go off if it is on or go on if it is off.
- d. Release the switch when the **Fill** light begins to blink. This signals that the diagnostics routine has begun.

For the purpose of the diagnostic function, the lights on the front panel of the humidifier correspond to assigned input and output circuits. **Note:** The **Power** light remains on during the whole diagnostic routine and does not correspond to any circuit.

### 1. Output Circuits

The first half of the diagnostics routine checks the output circuits. Each light on the humidifier panel will flash on and off twice, in order, from top to bottom.

When a light comes on, you will hear the corresponding valve or contactor open and close. Chart 29-1 shows the output circuits in the order they are tested.

Chart 29-1

Light	Corresponding Output Circuit
Fill	Fill Valve
Drain	Drain Valve
Tank Full	No related output(a)
Tank Off	Contactor(s)
Demand Meter	No related output(b)

- a. The **Tank Full** light indicates a high water condition. The output portion of the diagnostics checks whether this light is functioning.
- b. The output portion of the diagnostics indicates whether the demand meter lights are functioning.





## Installation and Maintenance EHU-600 Series Humidifiers

### 2. Input Circuits

After the output circuits have been checked, the **Tank Full** light will begin blinking continuously, signaling the start of the input test. Each light corresponds to an input circuit. Chart 30-1 shows the input circuits tested. All are tested simultaneously.

*Chart 30-1*

Light Not On	Check Input Circuit
Fill	(a) High water probe
Drain	(b) Fan interlock switch
Tank Full	Blinking indicates input testing
Tank Off	(c) High limit humidistat
Demand Meter	(d) Control humidistat

**NOTE:** The Tank full light will continue to flash during the input test.

- a. If light is off, circuit is complete. Check for water in tank or dirty tank.
- b. If light is off, check that fan interlock switch is wired properly.
- c. If light is off, check that high limit stat is wired properly.
- d. If no demand signal, room is either over-humidified, or stat is mis-wired, or malfunctioning.

If **All** the lights are on, then all controls are allowing the humidifier to fill. In case of component malfunction, consult your Armstrong Representative or the factory for further assistance.

**Note:** To end the diagnostic routine, push and release the **Tank On/Off** switch once. If left in the diagnostic routine for more than 3 minutes, the DRAIN light will begin to cycle 1 minute off, 3 minutes on.

If the unit is functioning normally, turn the water supply back on. **Push and release the Tank On/Off switch again to start the unit.**

During normal operation, if the drain is open (**Drain** light on) for more than 3 minutes, the contactors will trip out the unit and turn the **Tank Off** light on. This indicates some form of drain system failure (clogged drain, failed valve, etc.) **The unit may be reset only by turning the main power on and off.**

**For additional troubleshooting information, please request Form 903 from factory or call HVAC Application Engineering at (269) 273-1415 or Fax (269) 273-9500. Visit our web site [www.armstrong-intl.com](http://www.armstrong-intl.com).**



## Humidistat Troubleshooting

If the Armstrong Humidistat is mis-wired Table 31-1 shows the unit response. \* indicates wrong wire connected. W, G, and B stand for white, green, and black, the wire colors on the humidistat. See Section 7 for more information on control humidistat wiring.

**Table 31-1**

Terminal			Demand Meter	Functional Response
22	6	7		
W	G	B	Responds to stat normally, 0% with jumper disconnected. 100% with sensor out.	<b>Correct wiring.</b> Unit fills and drains normally.
B*	G	W*	5 demand lights flicker with or without sensor or pigtail	<b>Contactor cycles or chatters.</b> Unit fills continuously.
B*	W*	G*		
G*	B*	W*	5 demand lights flicker with or without sensor or pigtail.	<b>Contactor chatters</b> Unit will not fill.
G*	W*	B*	1 or no demand light(s) flicker with or without sensor or pigtail.	Tank off. Contactor will not energize. Unit will not fill.
W	B*	G*		

Table 31-2 shows the units response if jumper BJ2 is in the wrong position and the Armstrong humidistat is wired correctly. See Section 7 for more information on jumper locations and selections.

**Table 31-2**

Jumper BJ2 Pin No.	Labeled	Functional Response
4	1.9-3.9	<b>Correct Pin No.</b> Unit responds normally.
3	2-10V/4-2MA	0% demand. Unit will not fill. Tank off.
2	0-135 <b>On/Off</b>	Unit responds normally but over wider %RH range.



## Installation and Maintenance EHU-600 Series Humidifiers

### ARMSTRONG INTERNATIONAL, INC. LIMITED WARRANTY AND REMEDY

Armstrong International, Inc. ("Armstrong") warrants to the original user of those products supplied by it and used in the service and in the manner for which they are intended, that such products shall be free from defects in material and workmanship for a period of one (1) year from the date of installation, but not longer than 15 months from the date of shipment from the factory, [unless a Special Warranty Period applies, as listed below]. This warranty does not extend to any product that has been subject to misuse, neglect or alteration after shipment from the Armstrong factory. Except as may be expressly provided in a written agreement between Armstrong and the user, which is signed by both parties, Armstrong **DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

The sole and exclusive remedy with respect to the above limited warranty or with respect to any other claim relating to the products or to defects or any condition or use of the products supplied by Armstrong, however caused, and whether such claim is based upon warranty, contract, negligence, strict liability, or any other basis or theory, is limited to Armstrong's repair or replacement of the part or product, excluding any labor or any other cost to remove or install said part or product, or at Armstrong's option, to repayment of the purchase price. As a condition of enforcing any rights or remedies relating to Armstrong products, notice of any warranty or other claim relating to the products must be given in writing to Armstrong: (i) within 30 days of last day of the applicable warranty period, or (ii) within 30 days of the date of the manifestation of the condition or occurrence giving rise to the claim, whichever is earlier. **IN NO EVENT SHALL ARMSTRONG BE LIABLE FOR SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE OR PROFITS OR INTERRUPTION OF BUSINESS.** The Limited Warranty and Remedy terms herein apply notwithstanding any contrary terms in any purchase order or form submitted or issued by any user, purchaser, or third party and all such contrary terms shall be deemed rejected by Armstrong.

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.



#### **Armstrong International, Inc.**

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