




# AS150 Steam Humidifier with Steam Dispersion Unit








Installation, Operation, and Maintenance Manual



READ AND SAVE THESE INSTRUCTIONS

# Warnings and cautions

 <b>WARNING</b>	<b>CAUTION</b>
Indicates a hazardous situation that could result in death or serious injury if instructions are not followed.	Indicates a hazardous situation that could result in damage to or destruction of property if instructions are not followed.

 <b>WARNING</b>	
	<p><b>Attention installer</b> Read this manual before installing, and leave this manual with product owner. This product must be installed by qualified HVAC and electrical contractors. Installation must be code approved. Improper installation can cause property damage, severe personal injury, or death as a result of electric shock, burns, or fire.</p> <p>Anden Technical Support: 800-972-3710</p> <p><b>Read all warnings and instructions</b> Read this manual before performing service or maintenance procedures on any part of the system. Failure to follow all warnings and instructions could produce the hazardous situations described, resulting in property damage, personal injury, or death.</p> <p>Failure to follow the instructions in this manual can cause moisture to accumulate, which can cause bacteria and mold growth or dripping water into building spaces. Dripping water can cause property damage; bacteria and mold growth can cause illness.</p>
  	<p><b>Hot surfaces and hot water</b> This steam humidification system has extremely hot surfaces. Water in steam cylinders, steam tubing, and dispersion assemblies can be as hot as 212 °F (100 °C). Discharged steam is not visible. Contact with hot surfaces, discharged hot water, or air into which steam has been discharged can cause severe personal injury. To avoid severe burns, follow the cool-down procedure in this manual before performing service or maintenance procedures on any part of the system.</p>
 	<p><b>Disconnect electrical power</b> Disconnect electrical power before installing supply wiring or performing service or maintenance procedures on any part of the humidification system. Failure to disconnect electrical power could result in fire, electrical shock, and other hazardous conditions. These hazardous conditions could cause property damage, personal injury, or death.</p> <p>Contact with energized circuits can cause property damage, severe personal injury, or death as a result of electrical shock or fire. Do not remove cabinet doors until electrical power is disconnected.</p> <p>Follow the shutdown procedure on Page 28 before performing service or maintenance procedures on any part of the system.</p>

# Warnings and cautions



## WARNING



### Electrical shock hazard

If the humidifier starts up responding to a call for humidity during maintenance, severe personal injury or death from electrical shock could occur. To prevent such start-up, follow the shutdown procedure on Page 28.

## CAUTION

### Follow steam piping recommendations

Controlling condensate flow and collection in an Anden AS150 Series humidifier system is critical to maximize performance. Failure to follow the steam piping recommendations in this manual can cause system pressure fluctuations and increase cylinder pressure, steam velocity, and condensate noise.

### Hot discharge water

Discharge water can be as hot as 212 °F (100 °C) and can damage some drain plumbing materials not rated for hot drain water. To prevent such damage, make sure drain water tempering is selected, and supply water is not heated. Do not shut off supply water to the cylinder before it is drained.

### Excessive supply water pressure

Supply water pressure greater than 80 psi (550 kPa) can cause the humidifier to overflow.

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## ATTENTION INSTALLER

### Original Instructions

Read this manual before installing. Leave manual with product owner.

Anden Technical Support  
800-972-3710

### Website:

Documents can be viewed, printed or ordered from our website, [www.anden.com](http://www.anden.com).

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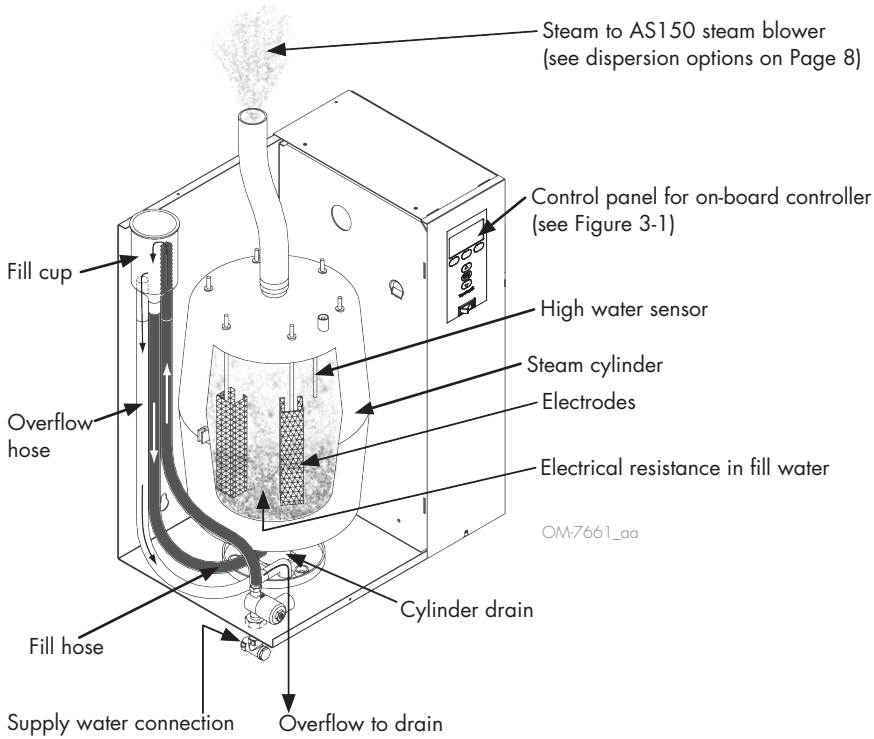
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# Product overview

The AS150 electrode steam humidifier uses heat caused by electrical resistance in their fill water to boil the fill water into humidification steam. Steam output and water conductivity are managed via automatic draining and filling. See Figure 2-1.

**FIGURE 2-1: AS150 SERIES HUMIDIFIER COMPONENTS**



Note: See detailed installation on Page 10 and principle of operation on Page 24.

## Download Anden literature

Anden product manuals can be downloaded, printed, and ordered from our website: [www.anden.com](http://www.anden.com)

The *Vapor-logic Installation and Operation Manual* ships with Model AS150 humidifiers. It is a comprehensive manual. Refer to it for information about the keypad/display and Web interface, and for troubleshooting information.

# Product overview

## SUPPLY WATER

There are benefits and trade-offs to consider when the application allows a choice between hard and softened water:

**Hard water:** The benefit of hard water is less frequent draining and filling than with softened water, which results in better energy and water efficiency and more consistent steam output. However, cylinder replacement could be more frequent with hard water, because hard water scale coats the electrodes. The harder the water, the more frequent the need for a new cylinder.

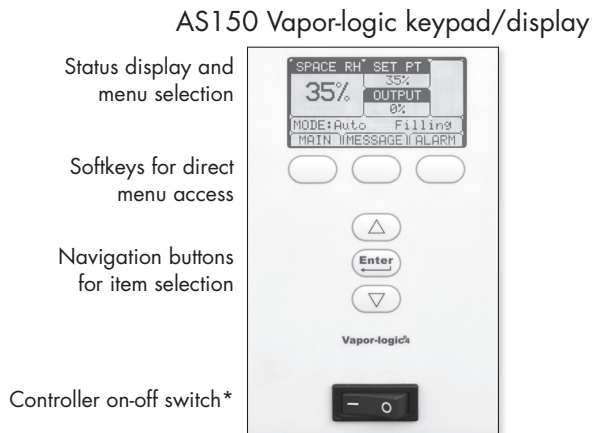
**Softened water** may be used in the AS150 series electrode humidifier. However, softened water ions stay in solution to much higher concentrations than hard water ions. The result can be more frequent draining and filling, which results in less energy and water efficiency, and less consistent steam output. While softened water can reduce scale build-up in the cylinder, it can also shorten cylinder electrode life.

## CONTROLLER

The Model AS150 humidifier Vapor-logic® controller features menus for all humidifier functions, with a Web interface for access to all functions via Ethernet.

Table 3-1: Supply water guidelines for AS150 series electrode humidifiers	
Supply water conductivity	125* to 1250 µS/cm (roughly comparable to water hardness of 10 to 36 grains per gallon).
Chlorides	Not limited
pH	6.5 to 8.5
Silica	< 15 ppm
Demineralized, deionized, and reverse-osmosis water cannot be used.	
Supply water outside of these guidelines may void your Anden warranty. Please contact your Anden Representative or Anden Technical Support if you need advice.	
* For optimal low conductivity operation enable the Mini Drain feature in your Vapor-logic controller: Main > Setup > Anden management > Mini Drain > Enable.	

**FIGURE 3-1: AS150 SERIES HUMIDIFIER CONTROL PANEL**



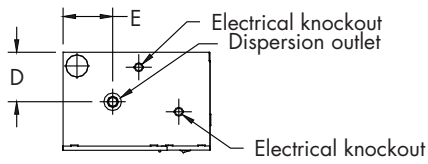
\* On-off switch for control board — not a safety shut-off to humidifier power wiring.

# Dimensional drawings, capacities, line currents, and fusing

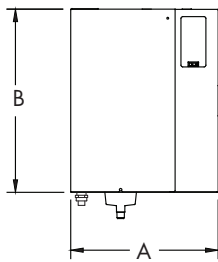
**FIGURE 4-1: AS150 HUMIDIFIER DIMENSIONAL DRAWINGS**

Model AS150

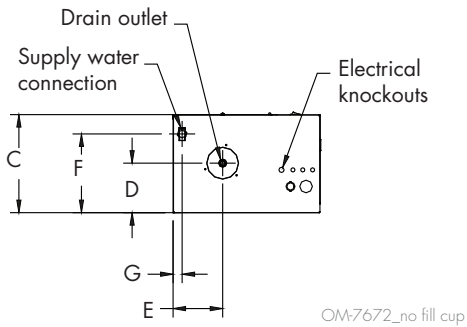
Top



Front



Bottom



Notes:

- \* Fill cup extension is required for the following:
  - When developed length of steam tubing is more than 20' (6 m) and duct static pressure exceeds 2" wc (498 Pa)
- Labeled dimensions: inches (millimeters).
- See mounting dimensions in Figure 8-1.

**Table 4-1:**  
Line currents and recommended fusing for Anden AS150 Series humidifiers

Model	Nominal steam capacity		kW	Phase	Volts	Maximum line current (amps)	Recommended fusing (amps)
	lbs/hr	kg/h					
AS150							
017	50	22	16.5	3	240	48	60



## Dimensions and weights

**Table 5-1:**  
AS150 Series humidifier dimensions by model number

Dimension	Description	AS150	
		inches	mm
A	Cabinet width	17.7	450
B	Cabinet height	24.1	612
C	Cabinet depth	11.8	300
D	Cabinet back edge to steam/drain outlet centers	6.0	152
E	Cabinet left edge to steam/drain outlet centers	6.0	152
F	Cabinet back edge to supply water connection center	9.5	241
G	Cabinet left edge to supply water connection center	1.0	25

**Table 5-2:**  
AS150 Series humidifier weights by model number

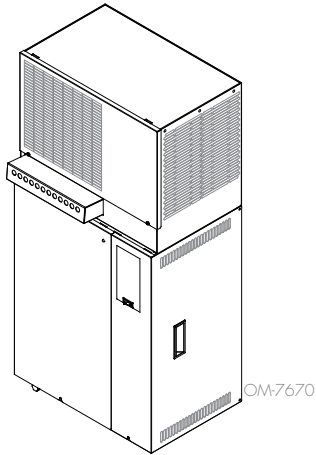
	AS150	
	lbs	kg
Shipping weight	50	23
Maximum operating weight	79	36

## Dispersion options

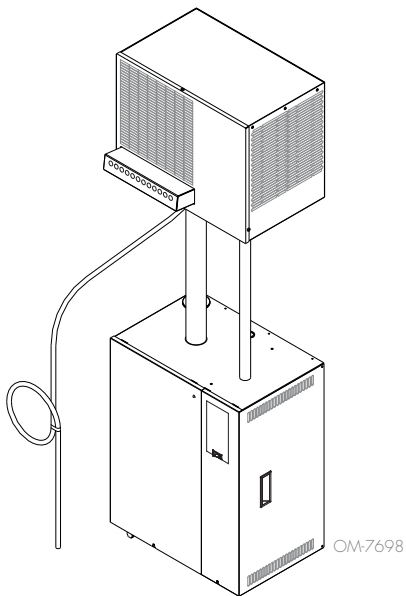
Open space dispersion options in Figure 6-1 are available.

**FIGURE 6-1: AS150 STEAM BLOWERS**

Mounted on top of humidifier



Mounted up to 10' (3 m) away from humidifier



Notes:

- Models AS150 and larger require condensate drain.
- Anden steam blowers (SDU) shipped with fuses to be installed in connected AS150 series humidifiers. North America only

## Selecting a location

### HUMIDIFIER

When selecting a location for the humidifier, consider the following:

- **Elevation of the installed steam dispersion unit**

The required installation location for the steam fan pack is at an elevation higher than the humidifier.

Before installing a dispersion assembly or interconnecting piping, review all pitch requirements in the "Dispersion" section of this manual.

- Temperature and relative humidity (RH):

Install humidifier only in locations that meet the following temperature and RH requirements:

- Maximum ambient temperature: 104 °F (40 °C)
- Minimum ambient temperature: 41 °F (5 °C)
- Maximum ambient humidity: 80% RH (non-condensing)

- Required clearances (see Figure 7-1)

- Electrical connections

Electrical power supply connections are at the lower or upper right rear corner of the unit.

- Supply water and drain piping connections

Water supply piping and drain connections are at the bottom of the cabinet. See "Piping" on Page 11.

- Exterior wall insulation

Install the humidifier on an exterior wall only if the wall is properly insulated.

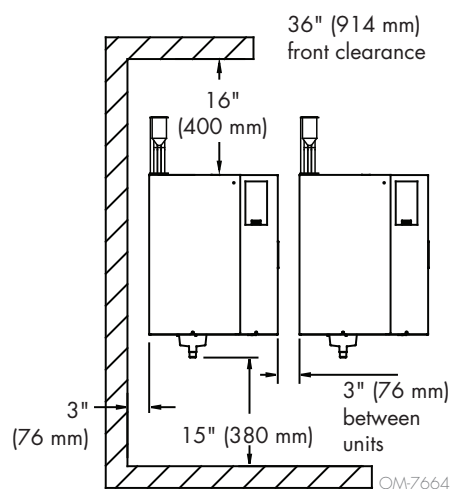
### DISPERSION CONTROL DEVICES

See page 17 for recommended installation locations for the fan pack.

### Staging multiple humidifiers

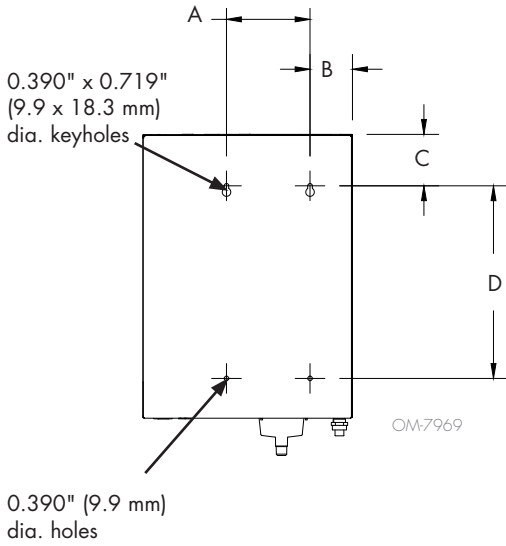
Up to four Model AS150 humidifiers can be staged to operate in sequence. In a sequenced application, one control input signal is divided into user-selectable control input signals for the connected humidifiers. See the *Vapor-logic Installation and Operation Manual* for instructions on staging multiple humidifiers.

**FIGURE 7-1: AS150 SERIES HUMIDIFIER RECOMMENDED MINIMUM CLEARANCES**



# Mounting

**FIGURE 8-1: AS150 SERIES HUMIDIFIER MOUNTING KEYHOLE LOCATIONS**



**Table 8-1:**  
AS150 Series humidifier mounting keyhole dimensions

Dimension		
	inches	mm
A	7.1	180
B	3.6	92
C	4.4	112
D	16.3	414
E	—	—

## Mounting

Unpack the humidifier from the shipping carton, and remove the cabinet doors and steam cylinder (see removing steam cylinder instructions below).

Note: When first unpacking the humidifier, cut and remove the shipping strap that goes around the cylinder and through the cylinder guides. This strap does not need to be replaced.

### REMOVING STEAM CYLINDER

If sent to this page from the “Maintenance” section, and the humidifier has been operating, make sure the cylinder is empty and cooled before removing it. See the shutdown and cool-down procedures on Page 28.

1. Carefully pull the electrode plugs straight up off the cylinder to ensure no damage to the plug boot occurs.
2. Disconnect the high water sensor wire.
3. Place hands palms-down below cylinder on both sides of drain outlet.
4. Press up against bottom of cylinder with backs of hands while pressing down against cabinet floor with fingers.
5. Raise cylinder until drain outlet clears drain valve body and the side tabs on the cylinder have cleared the cylinder guides. Remove cylinder from cabinet.

### WALL MOUNTING HUMIDIFIER

Mount the humidifier level and plumb using the lag bolts provided. Follow the instructions below for mounting on a wood stud wall.

1. Mount spanner boards on wall, spanning at least two studs. Position one board at top of cabinet (for the lag bolts), and other board at bottom of cabinet.
2. Pre-drill pilot holes in spanner boards, and secure humidifier to spanner boards with lag bolts.

Note: Use the appropriate mounting methods and mounting hardware for other wall types.

### WARNING

#### Mounting hazard

Mount humidifier per the instructions in this manual and to a structurally stable surface. Improper mounting of the humidifier can cause it to fall or tip, resulting in severe personal injury or death.

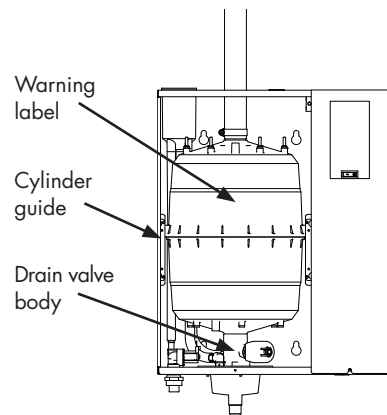
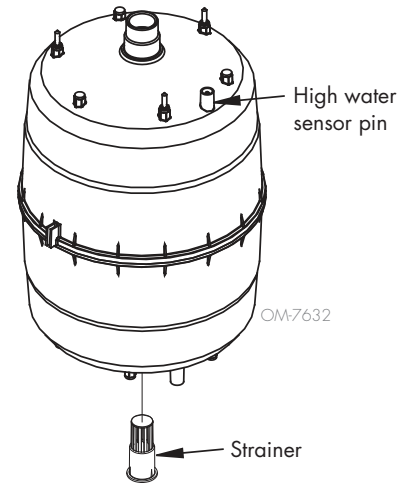
# Steam cylinder

**INSTALLING STEAM CYLINDER**

1. Make sure strainer is pressed into steam cylinder drain outlet and strainer flange is flush with bottom of cylinder outlet. See Figure 10-1.
2. Use water to lubricate drain outlet on bottom of cylinder and O-ring in drain valve body. See Figure 10-1.
3. Slide steam hose that connects to cylinder and steam blower up until it is engaged on steam inlet of steam blower and tight against bottom of steam blower.
4. Slide steam outlet of new cylinder all the way up into open end of steam hose from Step 3.
5. With Warning label on cylinder facing you, lower cylinder drain outlet into drain valve body, and rotate cylinder so side tabs line up with cylinder guides inside cabinet. Push down on cylinder until drain outlet is fully seated in drain valve body.
6. Slide steam hose down so it is fully engaged on cylinder steam outlet. Re-install hose clamp(s).
7. Connect high water sensor (yellow) wire to single pin surrounded by plastic shoulder on cylinder.
8. **Connect electrode wires to pins on top of cylinder. Make sure all plugs fit snugly and are fully engaged on pins.**

**Important:** Three phase cylinders have color-coded dots on the cylinder and color bands on the electrode plugs. When connecting the plugs, match the band colors on the plugs with the dot colors on the cylinder. Refer to the wiring diagram shipped with the humidifier if necessary.

**FIGURE 10-1: STEAM CYLINDER INSTALLATION**



**CAUTION**

If cylinder plugs become loose, damage to the humidifier may occur. Obtain replacement plugs from Anden. See "Replacement parts" on Page 35 for part numbers.

## Piping: Supply water and drain

### SUPPLY WATER PIPING

Use only copper for supply water piping; do not use rubber or plastic. The standard supply water connection before the fill valve is a 1/4" FIP.

In cases where water hammer may be a possibility, consider installing a shock arrestor. Water pressure must be 25 to 80 psi (175 to 550 kPa).

### DRAIN PIPING

Drain piping must be code-approved, 3/4" (DN 20) ID material rated for 212 °F (100 °C) minimum.

The drain cup has an integral grounding plate and requires a field-installed 1" (25 mm) air gap to a drain funnel to prevent conduction of electricity in the drain line.

The AS150 Series humidifier features user-selectable drain water tempering. When drain water tempering is selected, the humidifier tempers drain water before it enters the drain. Drain water tempering keeps water entering the drain line less than 140 °F (60 °C). Manually energizing the drain valve when the supply water is shut off can allow 212 °F (100 °C) water to enter the drain line.

Observe the following precautions when selecting and installing drain piping to ensure personal safety and material integrity:

- When using copper or other metallic drain piping, ground the drain piping to the earth ground lug in the AS150 Series humidifier.
- Chlorinated polyvinyl chloride (CPVC) piping is a non-metallic alternative for drain piping. It is rated up to 212 °F (100 °C) for intermittent-use, low-pressure applications.

The connection size for the steam cylinder drain is 1" (DN25) hose. Do not reduce this connection size. If drainage by gravity is not possible, use a reservoir pump rated for 212 °F (100 °C) water.

The open drain must be at least 12" (300 mm) below the bottom of the AS150 humidifier, to help prevent steam condensation on the humidifier. Use the 12" (300 mm) drain hose provided and position above field-installed open drain. Alternately, route drain line away from beneath humidifier to open drain. See Figure 11-1.

### AUTOMATIC DRAIN WATER TEMPERING

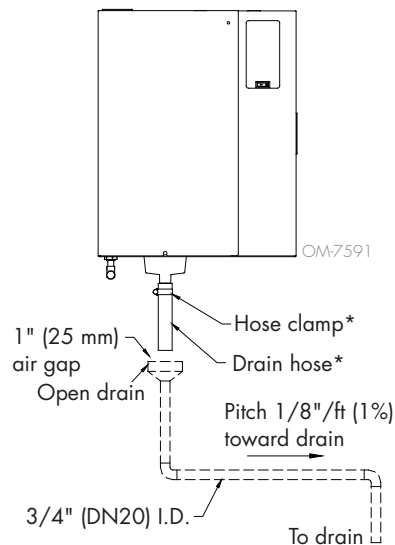
AS150 Series humidifiers are shipped with drain water tempering set to ON.

**Important:** Thoroughly flush supply water piping to remove pipe residue and stagnant water before connecting piping to humidifier. Pipe residue and stagnant water in water supply piping can cause foaming, preventing humidifier from reaching required steam capacity.

**⚠ WARNING**

**Hot drain pipes**  
Drain piping surface may be hot. Touching or contact with hot pipe may cause severe personal injury.

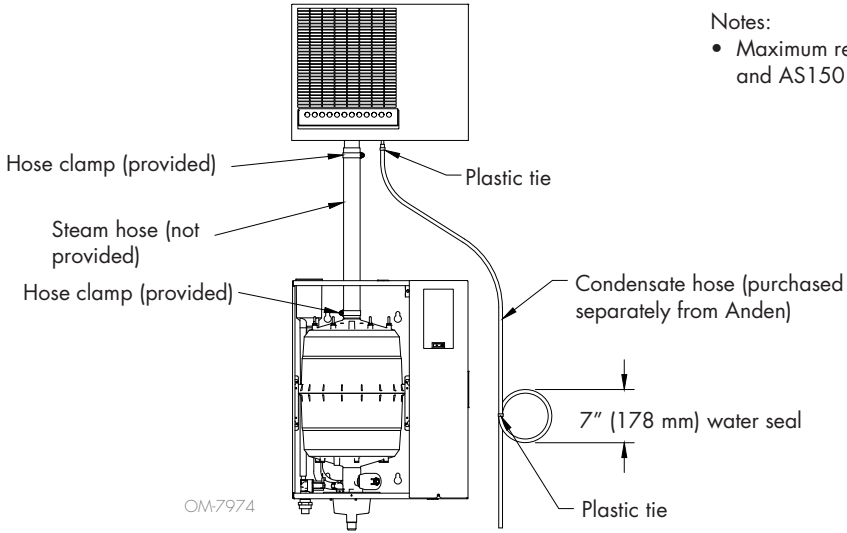
**FIGURE 11-1: DRAIN PIPING DETAIL**



- \* Ships with humidifier
- Dashed lines indicate provided by installer
- The open drain must be at least 12" (300 mm) below the bottom of the AS150 humidifier, to help prevent steam condensation on the humidifier.

# Piping: Steam blowers

**FIGURE 12-1: PIPING FROM AS150 SERIES HUMIDIFIER TO REMOTE AS150 STEAM BLOWER**



Notes:

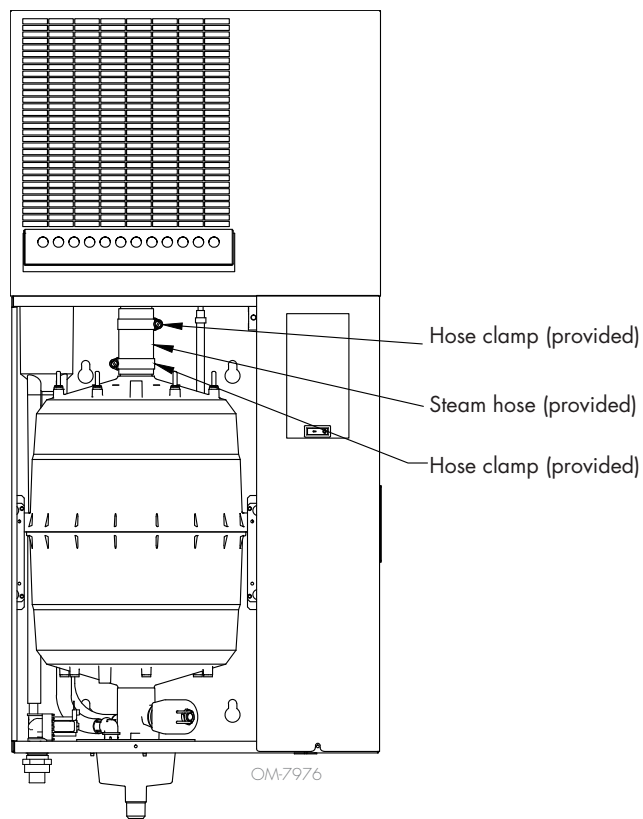
- Maximum recommended distance between humidifier and AS150 steam blower is 10' (3 m).

To open drain or humidifier fill cup.  
Water seal is required, whether condensate is piped to open drain or returned to humidifier fill cup.



# Piping: AS150 steam blowers

**FIGURE 13-1: PIPING FROM AS150 SERIES HUMIDIFIER TO TOP-MOUNTED AS150 STEAM BLOWER**



Notes:

- Maximum recommended distance between humidifier and AS150 steam blower is 10' (3 m).

# Humidifier wiring

All wiring must be code approved and in accordance with the unit wiring diagram. Power supply wiring must be rated for 105 °C. See Figure 14-1 for the humidifier wiring diagram locations.

When selecting a location for installing the humidifier:

- Avoid areas close to sources of electromagnetic emissions such as power distribution transformers.
- Do not loop power wiring.
- Do not use aluminum wire.

### CONDUIT KNOCKOUTS

Conduit and control wiring knockouts are provided on the AS150 Series humidifier cabinet. See Figure 4-1.

### CONTROL COMPONENT PLACEMENT

Follow the guidelines on Page 16 for placing humidistats and transmitters.

## **⚠ WARNING**

### Electric shock hazard

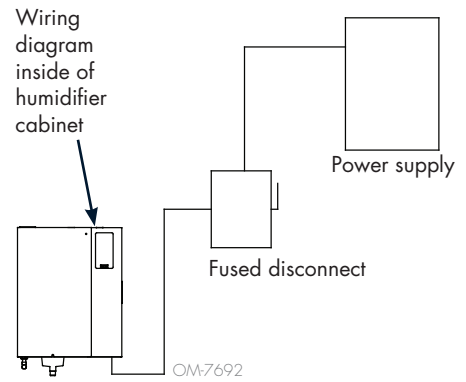
Only qualified electrical personnel should perform field wiring installation procedures. Improper wiring or contact with energized circuits may cause property damage, severe personal injury, or death as a result of electric shock and/or fire.

## CAUTION

### Adding conduit connections not recommended

Adding alternate conduit connections is not recommended. If you must make additional holes in the humidifier cabinet, protect all internal components from debris, and vacuum out the cabinet when finished. Failure to follow these precautions can damage sensitive electronic components and void the Anden warranty.

**FIGURE 14-1: FIELD WIRING REQUIREMENTS**

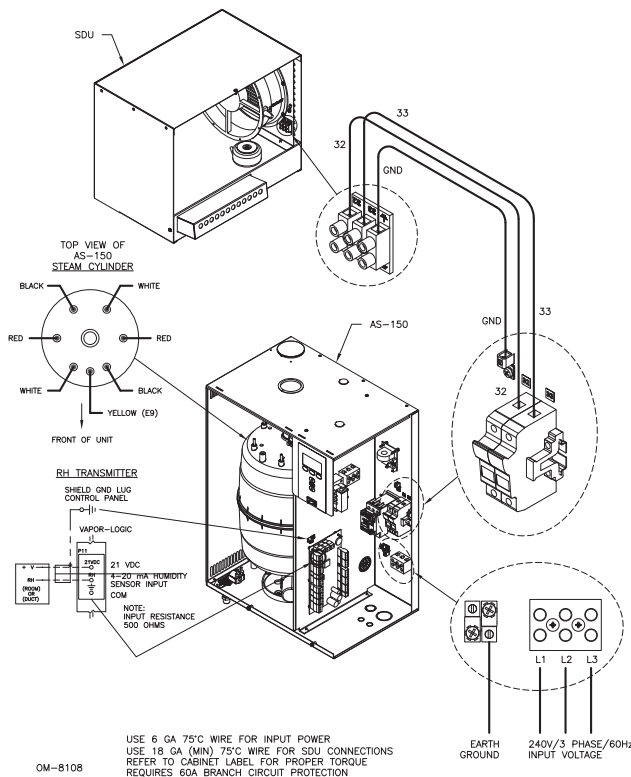


AS150 Series humidifier

Notes:

- Control wiring and power wiring must be run in dedicated or separate earthed metal conduit, cable trays, or trunking.
- Separate the line voltage wiring from low voltage control circuit wiring when routing electrical wiring inside the humidifier cabinet.
- Do not use chassis or safety grounds as current-carrying commons. Never use a safety ground as a conductor or neutral to return circuit current.
- For circuit protection requirements, see recommended fusing in Table 4-1.

**FIGURE 14-1: WIRING DIAGRAM**



# Humidifier wiring

## CONNECTION INSTRUCTIONS

Before connecting power, refer to the wiring diagram or the data plate on the outside of the cabinet for wire sizing amperage.

For control signal wiring from a humidistat, transmitter, or signal by others, see the wiring diagrams shipped inside the humidifier.

See “Step 1 – Field wiring” in the *Vapor-logic Installation and Operation Manual* for detailed instructions on the following:

- Control input wiring:  
See the “Control input” section.

## EARTH GROUNDING REQUIREMENTS

A code-approved safety earth grounding system is required. The ground connection must be made with solid metal-to-metal connections. Ground wire should be the same size as power wiring.

## UNITS WITH STEAM BLOWER

Steam blowers (SDUs) receive power for operation from the AS150 series humidifier. For North America only: Install 2 fuses in the AS150 unit to provide power to the steam blower. Fuses are shipped with the steam blower. Replacements available from Anden.

## WARNING

### Excessive moisture hazard

Anden strongly recommends installing a duct airflow proving switch and a duct high limit humidistat. These devices prevent a humidifier from making steam when there is low airflow in the duct or when the RH level in the duct is too high. Failure to install these devices can result in excessive moisture in the duct, which can cause bacteria and mold growth or dripping through the duct.

### Proper wiring prevents electrical noise.

Electrical noise can produce undesirable effects on electronic control circuits, which affects controllability. Electrical noise is generated by electrical equipment, such as: inductive loads, electric motors, solenoid coils, welding machinery, or fluorescent light circuits. The electrical noise or interference generated from these sources (and the effect on controllers) is difficult to define, but the most common symptoms are erratic control or intermittent operational problems.

### Important:

- Connect the drain wire to the shield/screen ground terminal with wire less than 2" (50 mm) in length.
- Do not ground shield at the device end.

# Sensor placement

## HUMIDISTAT AND SENSOR LOCATIONS ARE CRITICAL

Humidistat and sensor location have a significant impact on humidifier performance. In most cases, do not interchange duct and room humidity devices. Room humidity devices are calibrated with zero or little airflow; whereas duct humidity devices require air passing across them.

Recommended sensor locations (see Figure 16):

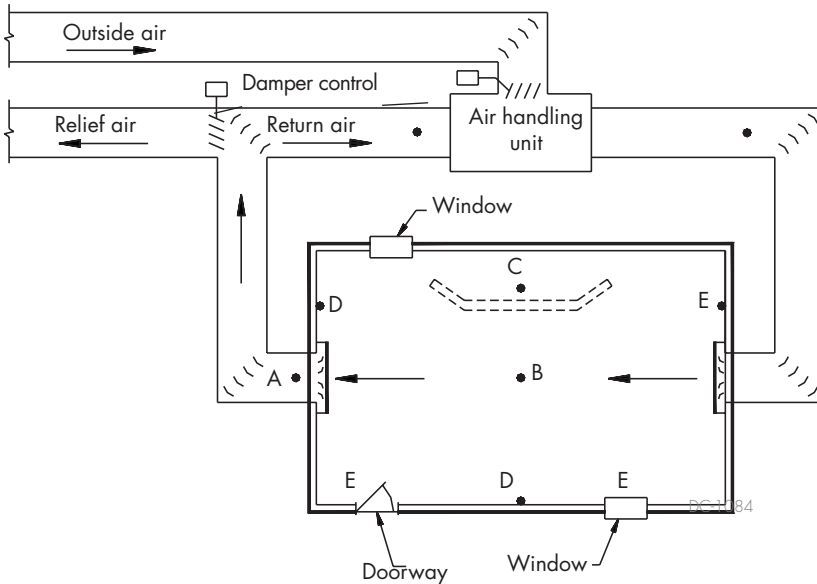
- A Ideal. Ensures the best uniform mix of dry and moist air with stable temperature control if HVAC is running constantly.
- B Ideal. Mounted centrally above the canopy in an area shielded from water, light and heat sources
- C Acceptable (behind wall or partition) for sampling entire room if sensor is near an air exhaust return outlet. Typical placement for sampling a critical area.
- D Not acceptable. These locations may not represent actual overall conditions in the space.
- E Not acceptable. Do not place sensors near windows, door passageways, or areas of stagnant airflow.

## Other factors affecting humidity control

Humidity control involves more than the controller's ability to control the system. Other factors that play an important role in overall system control are:

- Size of humidification system relative to load
- Overall system dynamics associated with moisture migration time lags
- Accuracy of humidistats and humidity transmitters and their location
- Dry bulb temperature accuracy in space or duct
- Velocities and airflow patterns in ducts and space environments
- Electrical noise or interference

**FIGURE 16-1: RECOMMENDED SENSOR LOCATION**



## Dispersion: Selecting the steam dispersion unit location

Anden humidifiers operate with several types of dispersion assemblies for open spaces and for air handling units.

The steam dispersion unit should be positioned so steam outlet is not directed onto the plant canopy.

- In general, the steam dispersion unit is best placed where the air can absorb the moisture being added without causing condensation at or after the unit.
- Place the steam dispersion unit such that absorption will occur prior to interacting with any surface, the crop canopy, lighting and fire detection or smoke detection device.
- When draining dispersion condensate to an open drain, provide a 1" (25 mm) air gap between the condensate drain piping and the drain. Locate the gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces.

### **WARNING**

#### **Hot surface and steam hazard**

Dispersion assembly and steam hose or tubing can contain steam, and surfaces can be hot. Discharged steam is not visible. Contact with hot surfaces or air into which steam has been discharged can cause severe personal injury.

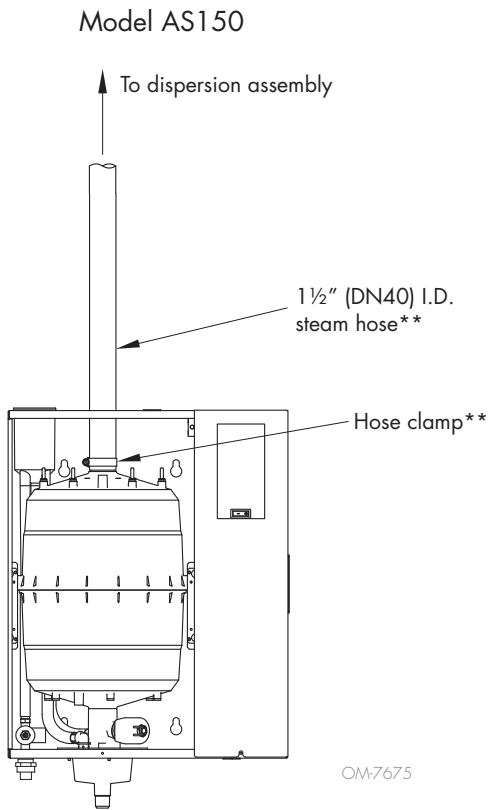
#### **CONDENSATE RETURN GUIDELINES**

To prevent overfilling the steam cylinder, follow the condensate guidelines when condensate should be wasted to the drain:

- More than 10' (3 m) of steam hose between humidifier and dispersion

# Dispersion: Steam outlet connections

**FIGURE 18-1: STEAM OUTLET CONNECTIONS**



\*\* Provided by installer.

## Dispersion: Steam blowers

Fuses provided with the steam blowers must first be installed in the Anden AS150 steam humidifier.

On a call for humidity, the controller closes the contactors to energize the humidifier electrodes and the AS150 steam blower. When the call for humidity is satisfied, the controller opens the humidifier contactor, which stops the steam blower.

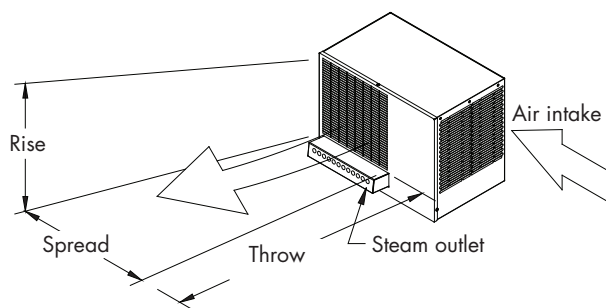
As steam is discharged from the AS150 steam blower, it quickly cools and turns to a visible fog that is lighter than air. As this fog is carried away from the AS150 steam blower by the airstream, it tends to rise toward the ceiling.

If the fog contacts solid surfaces (columns, beams, ceiling, pipes, etc.) before it disappears, it can condense and drip. The greater the space relative humidity, the further the fog will rise, spread, and throw.

Table 19-1 lists the maximum rise, spread, and throw non-wetting distances for AS150 steam blower. Surfaces cooler than ambient temperature, or objects located within this minimum dimension, can cause condensation and dripping. To avoid steam impingement on surrounding areas, observe the minimum non-wetting distances in the table.

Steam blowers are field wired to the AS150 humidifier blower terminals. A wiring diagram is included with the AS150 steam blower.

### AS150 STEAM BLOWER RISE, SPREAD, AND THROW



OM-7686

**Table 19-1:**  
Anden AS150 humidifier and steam blower minimum non-wetting distances

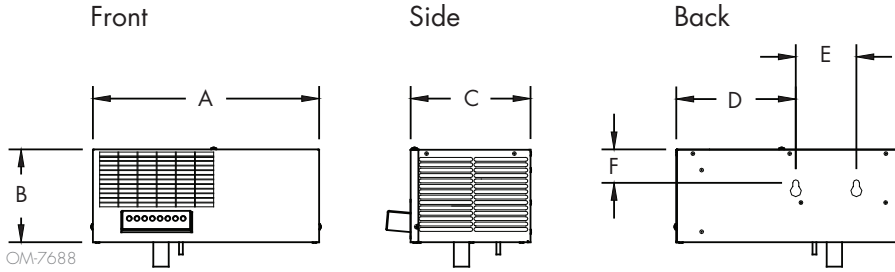
Model	Nominal steam capacity		30% RH @ 70 °F (21 °C)						40% RH @ 70 °F (21 °C)						50% RH @ 70 °F (21 °C)						60% RH @ 70 °F (21 °C)					
			Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
	lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
AS150	50	22	3.3	1.0	3.1	0.9	9.6	2.9	3.8	1.2	3.5	1.1	10.7	3.3	4.4	1.3	4.0	1.2	12.0	3.7	4.8	1.5	4.7	1.4	14.0	4.3

Rise: Minimum non-wetting height above the steam outlet of the AS150 steam blower  
 Spread: Minimum non-wetting width from the steam outlet of the AS150 steam blower  
 Throw: Minimum non-wetting horizontal distance from the steam outlet of the AS150 steam blower

# Dispersion: Steam blowers

**FIGURE 20-1: AS150 STEAM BLOWER DIMENSIONS**

SDU-006E shown



The steam blower can be mounted on top of an AS150 Series humidifier cabinet, or wall-mounted remotely from the humidifier. See Figure 20-1.

Note: AS150 steam blower installation must comply with governing codes.

**Table 20-1:  
AS150 steam blower dimensions**

Dimension	SDU-017E	
	inches	mm
A	17.9	455
B	13.8	350
C	11.0	279
D	3.6	91
E	7.1	180
F	4.2	107

**Table 20-2:  
Steam blower specifications**

Model	Maximum capacity		Shipping weight		Operating weight		Volume airflow		Current draw at 115V (50/60 Hz)	Input power	Noise
	lbs/hr	kg/h	lbs	kg	lbs	kg	cfm	m <sup>3</sup> /min			
SDU-017E	50	22.7	29.0	13.2	24.0	10.9	665	18.8	0.23 A	23 W	53 dBA

- Notes:
- Steam blowers ships with the AS150 humidifier.
  - Noise measurements taken 6.5' (2 m) in front of AS150 steam blower cabinet.



# Dispersion: Steam blowers

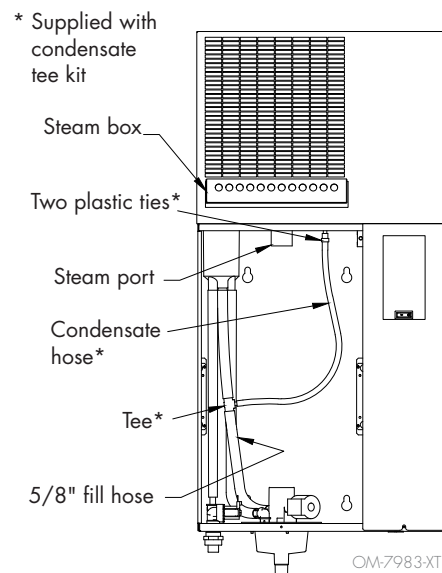
## MOUNTING AS150 STEAM BLOWER ON TOP OF HUMIDIFIER

The condensate tee kit shipped with the steam blower returns condensate from a top-mounted steam blower to the humidifier's cylinder fill hose. See Figure 21-1. Install the kit as follows:

1. If humidifier is not already mounted to wall, see "Wall mounting humidifier" on Page 9.
2. Remove steam cylinder (see "Removing steam cylinder" on Page 9).
3. Assemble condensate hose from kit to condensate outlet at base of steam box, and install both plastic ties (included) on hose to ensure secure connection to steam box condensate outlet.
4. Assemble hose cuff and clamp to steam port on steam box.
5. Remove middle-rear knockout on top of humidifier cabinet, and mount AS150 steam blower to wall as noted on Page 22.
6. Feed condensate hose into humidifier cabinet through knockout hole created in Step 5, place AS150 humidifier below AS150 steam blower on wall, and secure humidifier to wall.
7. Push small burr of tee into loose end of condensate hose that was fed into cabinet in Step 6.
8. Cut midpoint of 5/8" fill hose that connects center port on fill cup to fill connection on floor of humidifier cabinet. Avoid kinks by leaving slack in fill hose for cylinder installation.
9. Install tee in 5/8" fill hose that was cut in Step 8.
10. Install steam cylinder (see "Installing steam cylinder" on Page 10).

For remote-mounting the steam blower, see Page 22.

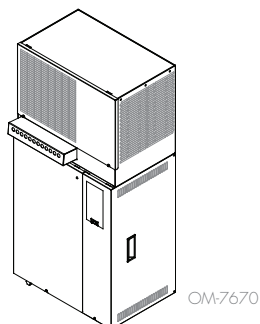
**FIGURE 21-1: CONDENSATE TEE KIT FOR TOP-MOUNTED AS150 STEAM BLOWER**



**FIGURE 21-2: TOP- AND REMOTE-MOUNTED STEAM BLOWER**

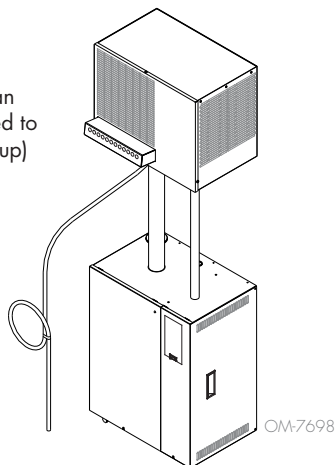
Mounted on top of humidifier

Condensate returned to steam cylinder fill hose



Mounted remotely from humidifier

Condensate returned to open drain (condensate can also be returned to humidifier fill cup)



## Dispersion: Steam blowers

### **REMOTE MOUNTING STEAM BLOWER**

The steam blower is constructed with a pitch toward the drain; however, it must be installed level and plumb for proper drainage. See the Warning.

#### **WARNING**

##### **Standing water in steam blower**

Make sure the steam blower is installed plumb. If it is not installed plumb, standing water can accumulate, which can:

- cause bacteria and mold growth, which can cause illness;
- affect steam blower performance;
- cause 212 °F (100 °C) water to discharge from the AS150 steam blower, which can cause severe personal injury.

Follow the instructions below for your wall type:

Mount the steam blower using the lag bolts provided. Follow the instructions below for mounting on a wood stud wall.

1. Mount spanner board on wall, spanning at least two studs, at top of AS150 steam blower cabinet (for the lag bolts).
2. Predrill pilot holes in spanner board, and secure steam blower to spanner board with lag bolts.

Note: Use the appropriate mounting methods and mounting hardware for other wall types.

See Table 19-1 to determine clearance requirements for your application.

Make sure walls, ceilings, and other obstructions are not within the non-wetting dimension, or condensation and dripping could occur (read Page 19).

Provide at least 3" (76 mm) of clearance on each side of the steam blower for air intake.

### **INSTALLING BASE PLATE**

The steam blower has a base plate for remote-mounted steam blower applications. The base plate isolates the hot steam box from contact. After the electrical connections are made, assemble the base plate onto the bottom of the steam blower with the screws provided.

# Dispersion: Steam blowers

## WIRING STEAM BLOWERS

Make the following wiring connections between the humidifier and the AS150 steam blower, and tighten all terminals securely:

- Fuses provided.
- Connect AS150 steam blower fan wires to humidifier terminals 32, 33, and GRD.
- Refer to the external connections diagram shipped with the AS150 steam blower.

## PIPING CONDENSATE TO HUMIDIFIER FILL CUP

1. Remove fill cup cap from AS150 Series humidifier, and drill a 1/2" (13 mm) hole in fill cup cap for the condensate hose as shown in Figure 23-1.
2. Route steam blower condensate hose through hole in fill cup cap, and secure condensate hose in place.

Note: Make sure condensate hose has a water seal, as shown in Figure 23-2. The water seal is required to ensure condensate drainage from the AS150 steam blower and to keep steam from blowing out of the condensate hose.

## PIPING CONDENSATE TO DRAIN

The AS150 steam blower condensate hose must be routed as shown in Figure 23-2. The water seal is required to ensure condensate drainage from the AS150 steam blower and to keep steam from blowing out of the condensate hose.

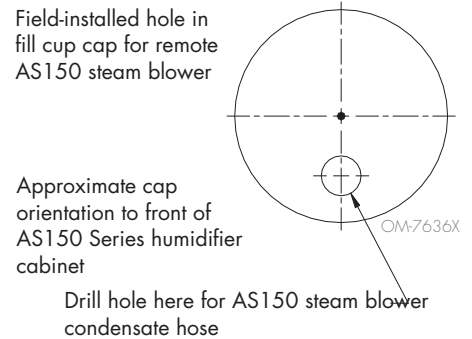
After the water seal, run the condensate hose to an open drain. Cut the hose at a 45 degree angle on the end above the drain to permit a direct stream of water into the drain while maintaining an air gap.

The condensate hose must be installed and sized according to governing codes.

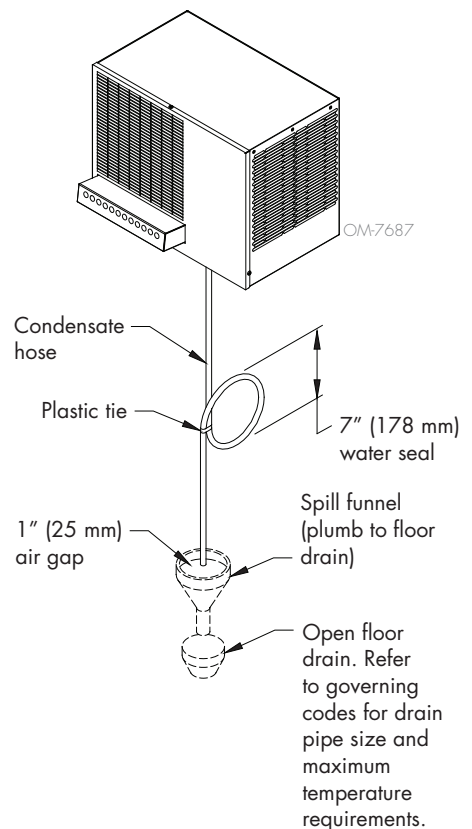
## ADDITIONAL INSTRUCTIONS

See instructions for piping from AS150 Series humidifier to the steam blower on pages 12 and 13.

**FIGURE 23-1: PIPING CONDENSATE TO HUMIDIFIER FILL CUP**



**FIGURE 23-2: PIPING CONDENSATE TO DRAIN**



Note:  
Shown with condensate to open drain. Condensate can also be returned to fill cup through field-installed hole in fill cup cap. See Figure 23-1.

# Principle of operation

## **1. CONTROLLER RECEIVES A CALL FOR HUMIDITY**

When the RH level in the humidified space drops below set point, the humidifier controller receives a call for humidity and calculates a corresponding electrical current. The controller closes the contactor, which energizes the electrodes. If there is not enough water in the steam cylinder, the fill valve opens and water enters the steam cylinder.

## **2. ENERGIZED ELECTRODES BOIL WATER INTO STEAM**

When the water level in the steam cylinder rises to touch the electrodes, electrical current flows through the water between the electrodes. Electrical resistance in the water causes the water to heat up and boil into steam. The steam flows through the steam outlet and through steam hose or tubing to the AS150 steam blower, where it is discharged into the airstream.

## **3. ELECTRICAL CURRENT INCREASES TO MEET DEMAND**

As the amount of water covering the electrodes increases, current flow increases. The fill valve remains open until the amperage increases to 10 percent above the current corresponding to the demand signal. Then the fill valve closes, and the water boils into steam.

## **4. WATER CONTINUES TO BOIL INTO STEAM**

As the water boils into steam, the amount of water covering the electrodes decreases, and current flow decreases. When current flow decreases to 10 percent below the current corresponding to the demand signal, the fill valve opens to increase the water level in the steam cylinder, which increases current flow and steam production.

## **5. CONTROLLER INITIATES DRAIN/FILL CYCLES TO FLUSH CONDUCTIVE IONS**

As steam production continues, the concentration of conductive ions in the water increases, eventually leading to increased electrical current through the water. An algorithm monitors water conductivity and auto tunes drain and fill cycles to keep electrical current within demand parameters. This optimizes humidifier performance based on water conditions and steam production.

The humidifier has user-selectable drain water tempering. When drain water tempering is selected, drain water is automatically cooled before entering the drain.

## **WATER CONDUCTIVITY**

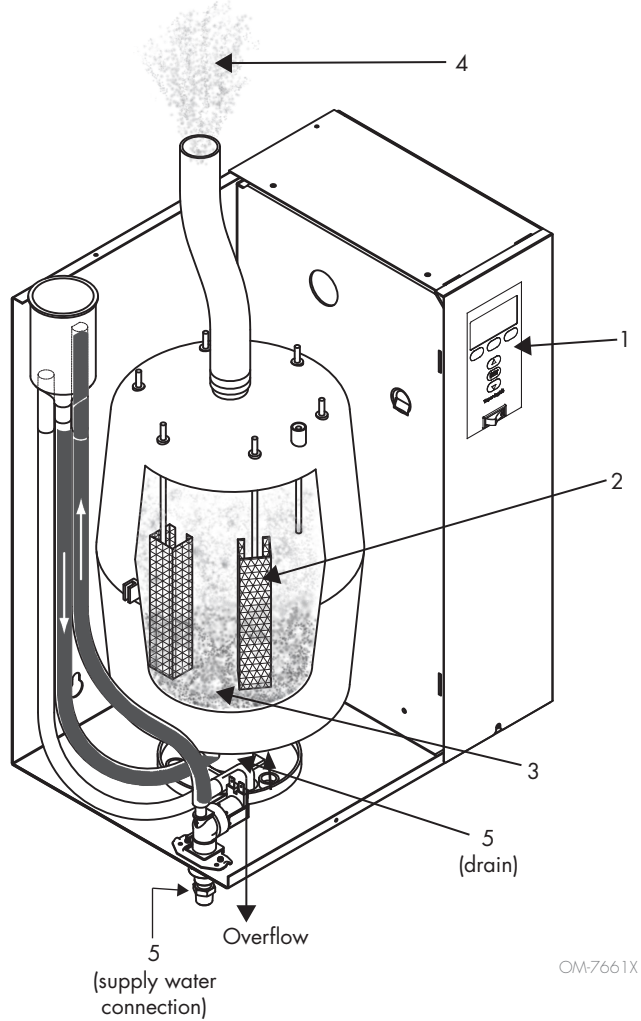
In electrode humidifiers, steam output is directly related to the resistance of the water in the steam cylinder and, therefore, the conductivity of the water between the electrodes. Higher water levels cover more electrode surface and result in more steam; lower water levels cover less electrode surface and result in less steam. Since water conductivity and water level both correlate to steam output, Anden's algorithm monitors conductivity and manages drain and fill cycles to optimize humidifier performance and provide proper steam output.

## **DRAIN AND FILL CYCLES**

As the water in the cylinder boils into steam, the concentration of conductive ions increases until it reaches a threshold that triggers a drain and fill cycle. This rids the cylinder of highly conductive water and replaces it with less conductive fill water. The more conductive the fill water and the higher the demand, the more quickly the threshold is reached, and the more frequently the cylinder automatically drains and fills to stay within the parameters for proper steam output.

# Principle of operation

**FIGURE 25-1: ANDEN AS150 SERIES HUMIDIFIER PRINCIPLE OF OPERATION**



## SAFETY FUNCTIONS

The Anden AS150 Series humidifier is protected against running dry — current does not flow if the electrodes in the steam cylinder are not submerged in water.

If the current rating exceeds 120% of nominal current, the drain valve opens automatically. As the water level drops, the current rating drops back to the nominal value.

If the current rating exceeds 120% of the nominal current after several drainage operations, the humidifier shuts down automatically.

## Start-up checklist

Your humidification system may not have all of the options listed below. If an item does not apply to your system, skip to the next item.

- Verify that humidifier, controls, piping, electrical connections, steam supply, and dispersion units(s) are installed according to installation instructions in this manual and:
  - Ladder style wiring diagram and external connections wiring diagram (inside humidifier cabinet)
  - Governing codes
  - Vapor-logic Installation and Operation Manual
    - Installation section
    - Pre-installation checklist
- Verify that field wiring is done per instructions in this manual and per unit wiring diagram.
- Confirm that proper grounding and an approved earth ground are provided.
- Confirm that instructions in the Electric shock hazard warning have been followed.
- Confirm that water fill line was thoroughly flushed before it was connected to the humidifier.
- Verify that humidifier is mounted level and securely supported before filling with water. See operating weights in Table 5-1.
- Make sure cylinder is fully seated into drain valve, and verify that all electrical connections are secure.
- Turn water supply on (do not use demineralized, deionized, or reverse-osmosis water) and confirm that drain valve is closed.
 

If the force of air exiting water supply lines blows fill cup cap off during first fill cycle, this is not a sign of defect or a cause for concern; simply replace fill cup cap after all air has exited water line.
- Verify that humidifier is level and plumb when filled with water.
- Turn power on and confirm that Model AS150 keypad/display illuminates.
- Jumper AFsw and 24vac terminals
- With sufficient water in steam cylinder, door safety interlock switch closed, and a call for humidity, verify that heat outputs are activated.
- If you experience difficulties, see "Troubleshooting" on Page 31.

### WARNING

#### **Electric shock hazard**

Contact with energized circuits can cause property damage, severe personal injury or death as a result of electrical shock or fire.

Make sure cabinet doors are installed before turning on electrical power.

For proper operation of safety interlock switch, install electrical-side door first, then install cylinder-side door.

# Model AS150

## START-UP PROCEDURE

After the Model AS150 humidifier is installed and connected properly:

1. Perform all applicable “Start-up checklist” items on Page 26.
2. Read and follow the instructions in the “Operation” section of the *Vapor-logic Installation and Operation Manual*.
3. Note: During start-up, do not leave the humidifier unattended.
4. Monitor humidifier operation through multiple drain and fill cycles.
5. Perform the cleaning procedure as follows:
  - a. Operate humidifier long enough for steam to be produced.
  - b. Using the keypad/display:
    - At the Main menu, select Tank Status, and press Enter.
    - Select Mode, and press Enter.
    - Select Drain, and press Enter.
    - Let steam cylinder drain for 5 to 10 minutes until empty.
  - c. Restart the humidifier, and repeat Steps a and b.

## CAPACITY LIMITATION

The Anden AS150 humidifier capacity can be limited to a user-specified maximum using the keypad/display or Web interface. From the Main menu, select **Tank Setup**, then select **Capacity Adjustment** for menu options.

## WARNING

### Electric shock hazard

Only qualified electrical personnel should perform start-up procedure.

Contact with energized circuits can cause property damage, severe personal injury or death as a result of electrical shock or fire.

Make sure cabinet doors are installed before turning on electrical power.

For proper operation of safety interlock switch, install electrical-side door first, then install cylinder-side door.

The *Vapor-logic Installation and Operation Manual* is a comprehensive operation manual. Refer to it for information regarding the following features:

- Keypad/display and Web interface setup and menu information
- Control input signals and functions
- Safety features
- Alarm screens and fault messages

This manual ships with the Anden AS150 humidifiers and is available at our website: [www.anden.com](http://www.anden.com)

# Maintenance: Shutdown and cool-down procedures

**SCHEDULED MAINTENANCE**

At 1000-hour intervals or when “Service interval reached” appears in the Messages Log, inspect the steam cylinder, fill and drain valves, steam hose, condensate piping, water supply piping, drain piping, drain, and all other parts for proper operation and cleaning requirements.

**STEAM CYLINDER SERVICE LIFE**

Steam cylinder service life depends on operating hours and water hardness. If “Check cylinder” appears in the Messages Log during and shortly after start-up, the message can be cleared and will stop repeating after a few drain and fill cycles.

When “Check cylinder” appears in the Messages Log after extended operation, the humidifier will continue to run, but the cylinder must be replaced to ensure optimum output. Sure signs that a cylinder needs to be replaced are when it is approximately one-third full of minerals, or minerals have bridged between electrodes.

To replace the steam cylinder, first follow the cool-down procedure below.

**COOL-DOWN PROCEDURE**

1. In Vapor-logic keypad/display Main menu, select Tank Status, and press Enter.
2. Select Mode, and press Enter.
3. Select Drain, and press Enter.
4. Let steam cylinder drain for 5 to 10 minutes (drain water is automatically tempered when drain water tempering is selected).
5. Close field-installed manual supply water shut-off valve, and allow cylinder to continue draining.

 **WARNING**

**Shutdown procedure**

To prevent severe personal injury or death from electrical shock, follow this shutdown procedure before performing service or maintenance procedures on this humidifier (after cylinder is drained and cooled):

1. Use Vapor-logic keypad/display to drain cylinder.
2. Use Vapor-logic controller keypad/display to change control mode to Standby.
3. Shut off all electrical power to humidifier using field-installed fused disconnect, and lock all power disconnect switches in OFF position.
4. Close field-installed manual water supply shut-off valve.

 **WARNING**

**Hot water system**

Cylinder and any undrained water may be hot. To avoid injury from hot water, follow the cool-down procedure before proceeding with maintenance.



## Maintenance: Replacing steam cylinder

1. When steam cylinder is completely empty, turn humidifier off. Place all power disconnects in OFF position, and lock in OFF position.
2. Remove cabinet doors, and make sure cylinder and humidifier components have cooled.
3. Carefully pull the electrode plugs straight up off the cylinder to ensure no damage to the plug boot occurs.
4. Inspect cylinder plugs. Obtain replacement plugs from Anden if deterioration, corrosion or loose fit occur.
5. Disconnect the high water sensor wire.
6. Remove both clamps on steam hose that connects to cylinder and steam blower.
7. Slide steam hose from Step 6 all the way up until it is tight against bottom of steam blower. Skip to Step 9.
8. Loosen steam hose clamp, and disconnect steam hose from cylinder.
9. Place hands palms-down below cylinder on both sides of drain outlet.
10. Press up against bottom of cylinder with backs of hands while pressing down against cabinet floor with fingers.
11. Raise cylinder until drain outlet clears drain valve body and the side tabs on the cylinder have cleared the cylinder guides. Remove cylinder from cabinet.
12. Vacuum scale and debris out of drain valve port.

Note: For more thorough cleaning, see drain valve maintenance instructions on Page 30.

13. Replace O-ring in drain valve body (new cylinder ships with new O-ring). Make sure O-ring is correctly placed.
14. Dampen O-ring seals **with water** before replacing cylinder. **Do not use lubricant or other substance.**
15. Install new steam cylinder. See "Installing steam cylinder" on Page 10.
16. Connect steam hose to cylinder, and re-install hose clamp.
17. Connect high water sensor (yellow) wire to single pin surrounded by plastic shoulder on cylinder.
18. **Connect electrode wires to pins on top of cylinder. Make sure all plugs fit snugly and are fully engaged on pins.**

**Important:** Three phase cylinders have color-coded dots on the cylinder and color bands on the electrode plugs. When connecting the plugs, match the band colors on the plugs with the dot colors on the cylinder. Refer to the wiring diagram shipped with the humidifier if necessary.

If returning humidifier to operation, see the start-up procedure on page 27.

### Note:

Anden recommends keeping a spare steam cylinder in stock during the humidification season. See "Replacement parts" on Page 35.

### CAUTION

If cylinder plugs become loose, damage to the humidifier may occur. Obtain replacement plugs from Anden. See "Replacement parts" on Page 35 for part numbers.

# Maintenance: Drain valve

## DRAIN VALVE

If either of the following issues occur after several months of runtime, follow the drain valve maintenance procedures below.

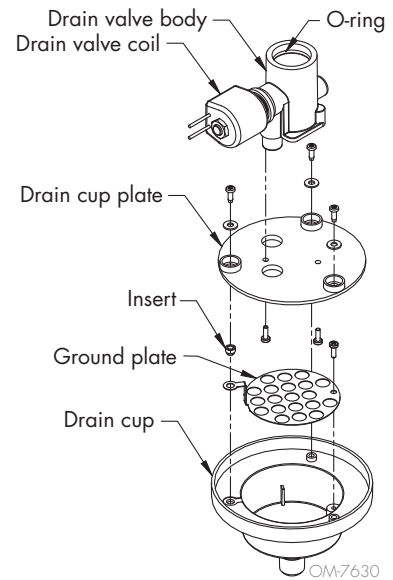
- Drain valve is closed, but draining and filling continue.
- End of cylinder life prompt appears prematurely.

## DRAIN VALVE BODY MAINTENANCE

1. When steam cylinder is empty, turn humidifier off. Place all power disconnects in OFF position, and lock in OFF position. See Figure 30-1.
2. Remove cabinet doors and steam cylinder (see Page 9).
3. Vacuum loose scale and debris out of the drain valve port.
4. Disconnect 2-pin Molex plug from 24 VAC drain valve coil.
5. Slide cap (A) off of drain valve coil (C).
6. Turn hex nut (B) counter-clockwise. Loctite on nut will cause drain valve coil assembly to turn out of drain valve body (G). Remove coil/actuator assembly from drain valve body. Make sure spring (E) and plunger (F) do not fall out of actuator (D).
7. Clean plunger (F), spring (E), actuator (D), and plastic drain valve body (G) with clean water.
8. Reassemble drain valve. When threading actuator (D) into drain valve body (G), make sure it is not cross threaded. Torque actuator into drain valve body to 18 in-lb (2.0 N·m).
9. Plug Molex plug into its mating wire harness plug, and slide cap (A) onto drain valve coil (C).
10. See "Start-up procedure" on Page 27 if returning humidifier to operation.

Note: If the procedure above did not resolve drain valve issues, perform the drain valve assembly maintenance procedure on Page 31.

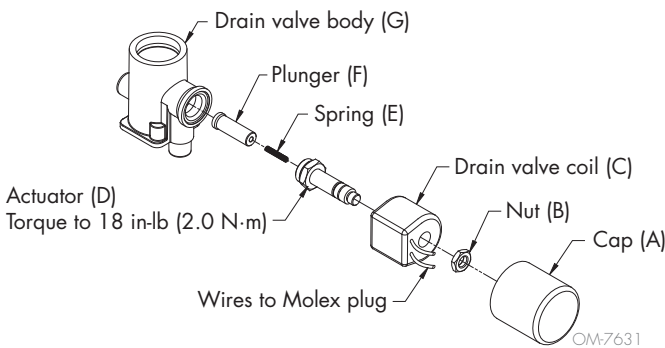
**FIGURE 30-1: DRAIN VALVE ASSEMBLY**



Notes:

- Pay close attention to all parts shown above. Verify that ground plate is in groove of drain cup, and insert is in place through ground plate loop.
- Failure to get ground plate and insert solidly connected to frame will compromise ground safety circuit.

**FIGURE 30-2: DRAIN VALVE BODY**



# Troubleshooting

## **DRAIN VALVE ASSEMBLY MAINTENANCE**

Perform the following procedure **only** if the procedure on Page 30 does not resolve drain valve issues. See Figure 30-2.

1. Perform Steps 1 through 4 on Page 30.
2. Remove the three screws and washers securing drain cup plate to drain cup.
3. Lift drain valve body/plate assembly off of drain cup.
4. Vacuum loose scale and debris out of drain cup.
5. Remove ground plate, and clean scale and debris from ground plate and outlet of drain valve body.
6. Reassemble drain valve assembly: Fit mounting screws with washers, insert them through drain cup plate, and tighten them into drain cup. See notes in Figure 30-2.
7. Clean end of hose, and reconnect it to drain valve body with hose clamp. Plug Molex plug into its mating wire harness plug.
8. See "Start-up procedure" on Page 27 if returning humidifier to operation.

## **TROUBLESHOOTING**

Follow the procedure below to resolve issues with Model AS150 humidifiers:

1. Review possible causes and recommended actions in Table 32-1.
2. If Table 32-1 does not help you solve the issue, call Anden Technical Service (see inset at right) with the following information available:
  - Humidifier model number and serial number (see nameplate on side of the humidifier and steam blower)
  - Issue description  
Example: water leaking, low humidity, high humidity, etc.
  - When issue began  
Example: After maintenance, cylinder replacement, etc.
  - System changes  
Example: Pressure, new service, new controller, relocation, change in maintenance, etc.

## **Anden Technical Support**

Have the following information ready when calling Technical Support. See phone number inside front cover of this manual.

Humidifier model number
Humidifier serial number
When issue began
Issue description

# Troubleshooting

**Table 32-1:**  
**Model AS150 humidifier troubleshooting guide**

Problem	Possible cause	Action
Humidifier will not turn on	Field-wired terminal connections	Check L1, N/L2 and Ground connections.
		Check wiring connections and settings on accessory items such as high limit switch and airflow proving switch.
	Internal connections	Follow the shutdown procedure on Page 28, then make sure electrode and high water probe connections on top of cylinder are securely connected.
		Make sure ribbon cable from membrane switch is securely plugged into control circuit board.
		Check that terminals from internal components are securely attached to proper tabs on circuit boards.
	No power to humidifier	Make sure one of the electrode wires extends through toroid ring on current sensing circuit board.
		Check main power supply and switch.
	Humidifier not turned on	Check for proper voltage across L1 and N/L2 terminals.
		Make sure front cover is attached to engage safety interlock switch. Press On-off button.
	No power to 24V control circuit	Make sure ribbon cable from membrane switch is securely plugged into control circuit board.
Check reset switch on transformer.		
Check that the transformer line fuses (2) are in place and conductive.		
Water constantly runs down drain.	Malfunctioning drain valve.	Check valve function using Test Mode.
	Debris in drain valve preventing it from closing	Remove cylinder, and clean debris from drain valve.
	O-ring in drain valve not properly seated in groove	Remove cylinder, and reposition O-ring.
	Water flowing from fill cup overflow port	Check internal hoses, and remove kinks or blockage.
Water is leaking from humidifier.	Loose plumbing connections	Check supply water connection at fill valve inlet. Tighten as needed.
		Check internal hose clamp connections. Reposition clamps and tighten as needed.
		Check steam hose connection on top of cylinder. Tighten clamp as needed.
Humidifier makes gurgling sound.	Excess condensate in steam hose	Make sure steam hose has constant downward slope to humidifier or to tees and traps in low spots of hose.
Fill valve makes banging sound.	Water hammer from line pressure	Make sure water supply line does not contact ductwork.
		Install shock arrestor.
		Install section of 1/4" braided fill line. Conform to governing codes.
Humidifier will not fill.	Field-installed supply water shut-off valve not open	Open valve.
	Malfunctioning fill valve	Check valve function using Test mode.
Humidifier will not drain.	Debris in drain valve blocking outlet port	Remove cylinder and clean debris from drain valve.
	Malfunctioning drain valve	Check valve function using Test mode.

*Continued*

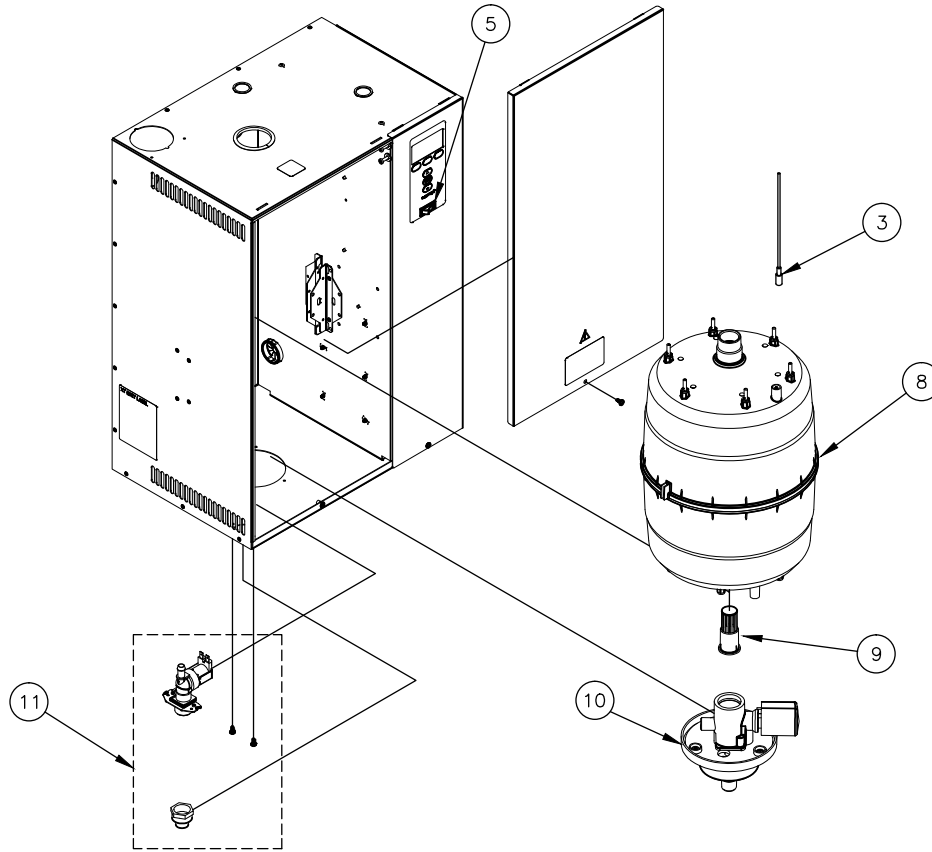
# Troubleshooting

**Table 32-1:  
Model AS150 humidifier troubleshooting guide (continued)**

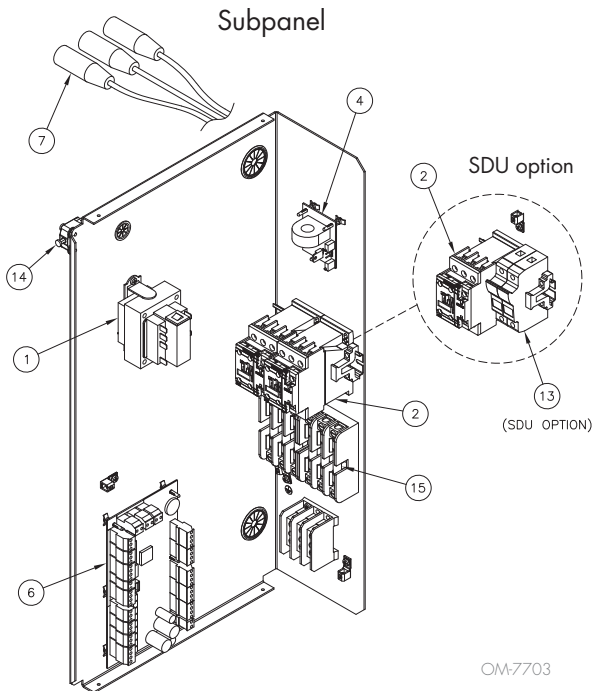
<b>Problem</b>	<b>Possible cause</b>	<b>Action</b>
Water discharge from Steam Dispersion Unit steam box	Impurities in steam hose or tubing causing foaming	Rinse cylinder and hose in clean water.
Humidifier is not satisfying demand.	Control setting too low	Adjust control to higher setting.
	Control mounted in wrong location	See installation instructions with control for correct mounting location.
Excess humidity.	Control setting too high	Adjust control to lower setting.
	Control mounted in wrong location	See installation instructions with control for correct mounting location.

# Replacement parts

FIGURE 34-1: REPLACEMENT PARTS



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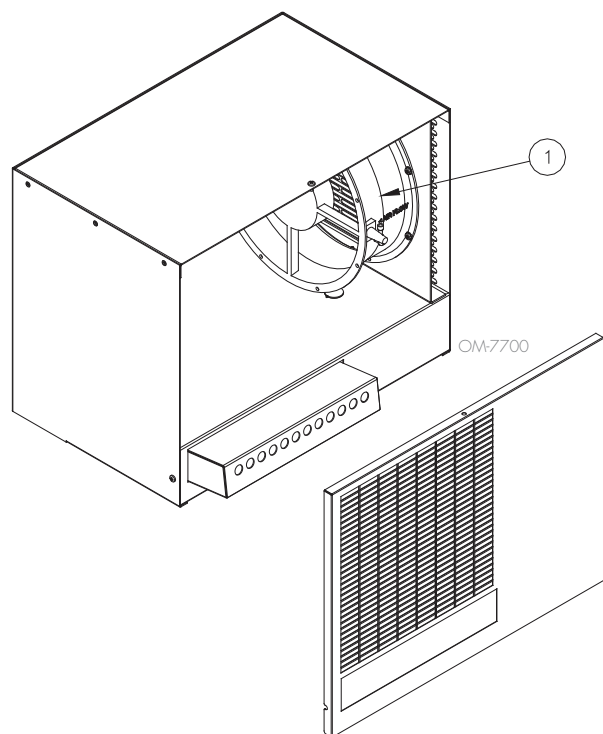
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# Replacement parts

**Table 35-1:**  
Models AS150 replacement parts

Item	Description	Part No.
1	Transformer, 208/240/480V, 24VAC	5863
2	Contactors <b>60 amp</b> siemens 3RT-23	5864
3	<b>Switch interlock with override</b>	5865
4	Board, current sensing, 208/230/240/277/400 V	5866
5	Board, display VL XT, display, Vapor-logic	5868
	Membrane, VL W/VL logo, display, Vapor-logic	5869
6	Main controller Vapor-logic 6	5870
7	Kit, electrode wiring (plugs/wires: 1 red, 1 black, 1 white)	5871
8	<b>Kit,Cylinder,AS-150</b>	<b>5872</b>
9	Strainer, cylinder	5873
10	Drain valve assembly (see parts in Figure 30-1)	5874
11	Valve fill Deltrol 0.26 orifice	5875
12	<b>Kit, fill cup assembly</b>	5876
13	Fuse 2A 600V ATM	5877
14	Kit, condensate return XT	5878
15	<b>Hose kit, remote mount SDU - Anden</b>	<b>5940</b>

**FIGURE 35-1: STEAM BLOWERS**



**Table 35-2:**  
SDU-017E steam blowers

Item	Description	Part No.
1	<b>KIT CONDENSATE MOUNTING SDU-017</b>	<b>5878</b>
2	<b>FUSE 2A 600V ATM</b>	<b>5877</b>
3	<b>TRANSFORMER 208/240/277V TO 120V 35VA</b>	<b>5948</b>
4	<b>FAN TUBE AXIAL 120V 550 CFM 10"</b>	<b>5949</b>

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800.972.3710 F: 608.257.4357  
Printed in USA  
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890000-270 REV B

