




XT Series
Electrode Steam Humidifiers








**Installation, Operation,
and Maintenance Manual**



Warnings and cautions

 WARNING Indicates a hazardous situation that could result in death or serious injury if instructions are not followed.	CAUTION Indicates a hazardous situation that could result in damage to or destruction of property if instructions are not followed.
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 WARNING	
	<p>Attention installer</p> <p>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>DRI-STEEM® technical support: +3211823595</p> <p>Read all warnings and instructions</p> <p>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>Hot surfaces and hot water</p> <p>This steam humidification system has extremely hot surfaces. Water in steam cylinders, steam pipes, 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>Disconnect electrical power</p> <p>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 48 before performing service or maintenance procedures on any part of the system.</p>

Warnings and cautions



 WARNING	
	<p>Electrical shock hazard</p> <p>If the humidifier starts up responding to a call for humidity during maintenance, severe bodily injury or death from electrical shock could occur. To prevent such start-up, follow the shutdown procedure on Page 48.</p>
CAUTION	
<p>Follow steam piping recommendations</p> <p>Controlling condensate flow and collection in an XT Series humidifier system is critical to maximum 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.</p>	
<p>Hot discharge water</p> <p>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.</p>	
<p>Excessive supply water pressure</p> <p>Supply water pressure greater than 80 psi (550 kPa) can cause the humidifier to overflow.</p>	
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Table of contents

Warnings and cautions	ii
Product overview	2
Models, capacities, and electrical specifications	4
Dimensional drawings	6
Dimensions and weights	7
Dispersion options	8
Installation	
Selecting a location	9
Staging multiple XT Series humidifiers	9
Mounting:	
Keyhole locations and dimensions	10
Removing steam cylinder	11
Wall mounting humidifier	11
Fill cup extension kit	12
Steam cylinder	13
Piping:	
Supply water and drain	14
Field piping overview	15
XT steam blowers	16
Humidifier wiring	17
Sensor placement	19
Dispersion:	
Selecting the dispersion assembly location	20
Returning condensate to steam cylinder	21
Condensate return guidelines	21
Steam outlet connections, Models 002 through 025	22
Steam outlet connections with hose, Models 033 through 083	23
Interconnecting piping requirements	
Condensate control and collection	24
Connecting to humidifier with steam hose	25
Single dispersion tube	
Dispersion tube with or without condensate drain	26
Dispersion tube without condensate drain, XT Models 002, 003, and 006	26
Dispersion tube with condensate drain, XT Models 002 through 017	27
Drip tee installation	28
Connecting to humidifier with tubing or pipe	29

Table of contents

Rapid-sorb®	30
Rapid-sorb with models 025 through 042	32
Rapid-sorb with Models 050 through 083	33
With header outside of duct for horizontal airflow	34
With header inside of duct for horizontal airflow	34
Steam supply connections to Rapid-sorb header	36
Condensate drain connections to Rapid-sorb header ..	36
Ultra-sorb® Model LV	36
XT steam blowers.	37
Mounting XT steam blower on top of humidifier	39
Remote mounting XT steam blower.	40
Wiring XT steam blowers.	41
Piping condensate to humidifier fill cup	41
Piping condensate to drain.	41
Operation	
Principle of operation	42
Start-up checklist	44
Control panel, Model XTS	45
Start-up procedure, Model XTS.	46
Start-up procedure, Model XTP.	47
Maintenance	
Shutdown procedure	48
Scheduled maintenance	48
Steam cylinder service life.	48
Cool-down procedure	
Model XTS	48
Model XTP	48
Replacing steam cylinder.	49
Drain valve.	50
Troubleshooting	
Model XTS	51
Model XTP	51
DRI-STEEM Technical Support	51
Replacement parts:	
XTS/XTP Models 002 through 042.	54
XTP Models 050 through 083	56
Steam blowers.	58
Warranty	Back cover

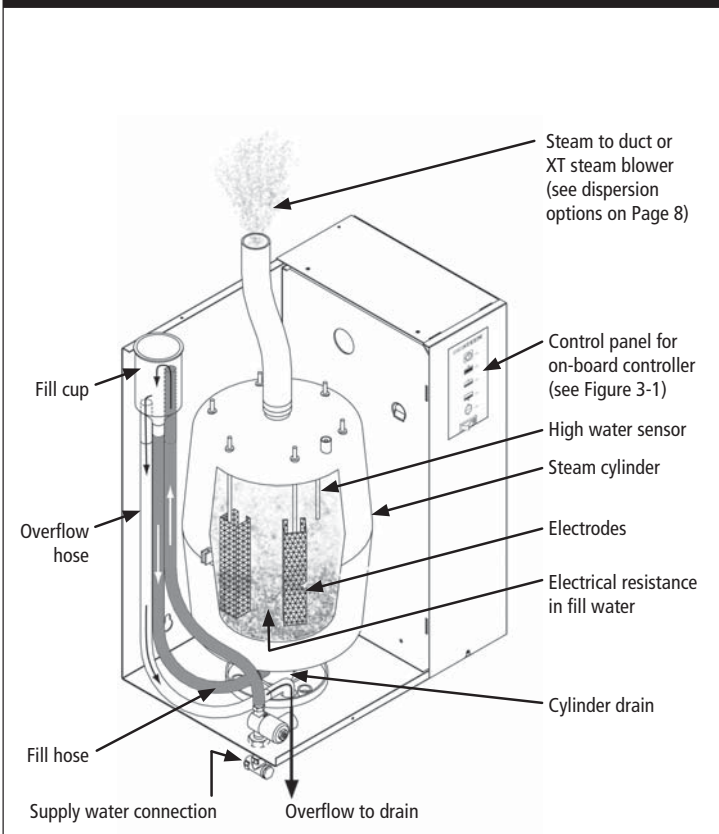
Product overview

Download DRI-STEEM literature

DRI-STEEM product manuals can be downloaded, printed, and ordered from our website: www.dristeem.com

DRI-STEEM XT Series electrode steam humidifiers use heat caused by electrical resistance in their fill water to boil the water into humidification steam. Steam output and water conductivity are managed via automatic draining and filling. See the components and operation summary in Figure 2-1.

Figure 2-1:
XT Series humidifier



Note: See detailed installation drawing on Page 15 and detailed principle of operation on Page 42.

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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 soft 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: The benefit of softened water is longer cylinder life (depending on water chemistry) than with hard water, because softened water does not coat the electrodes nearly as much as hard water. However, softened water ions stay in solution to much higher concentrations than hard water ions. This requires more frequent draining and filling, which results in less energy and water efficiency and less consistent steam output.

Controller

The standard controller in Model XTS humidifiers features push-button operation, with indicators for operating status and troubleshooting information. See “Operation” beginning on Page 42 for details.

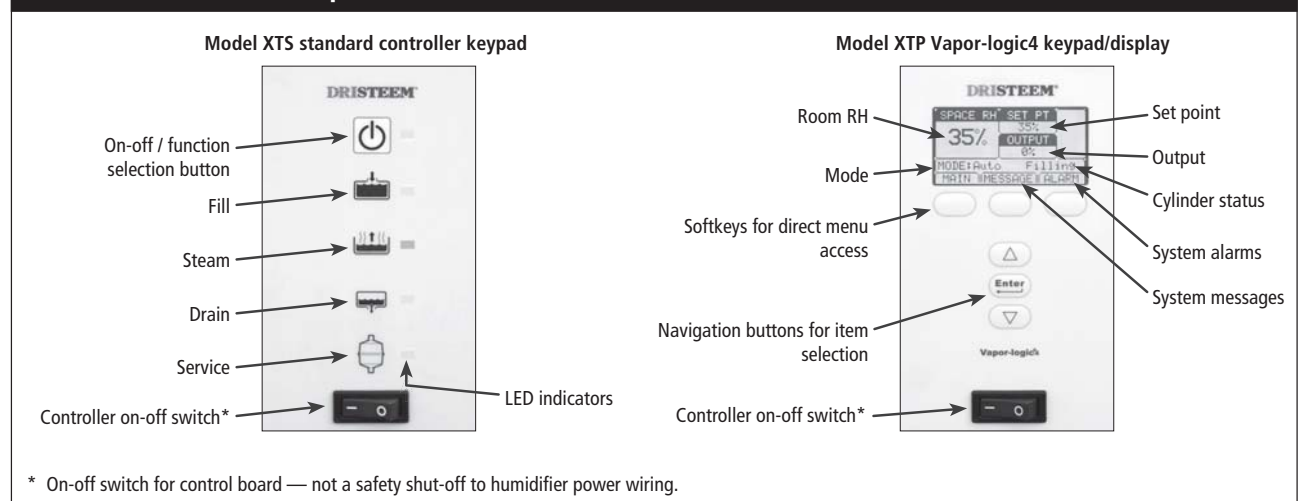
The Vapor-logic4 controller in Model XTP humidifiers features menus for all humidifier functions, with a Web interface for access to all functions via Ethernet.

Recommended supply water conductivity for DRI-STEEM electrode humidifiers is 125 to 1250 $\mu\text{S}/\text{cm}$ (roughly comparable to water hardness of 3 to 36 grains per gallon).

Demineralized, deionized, and reverse-osmosis water cannot be used. These water types are not conductive enough for electrode humidifiers.

The Vapor-logic®4 *Installation and Operation Manual* ships with Model XTP humidifiers. It is a comprehensive manual. Refer to it for information about the keypad/display and Web interface, and for troubleshooting information.

Figure 3-1:
XT Series humidifier control panels



Models, capacities, and electrical specifications

**Table 4-1:
XT Series humidifier technical data**

XTS / XTP model*	Input power (kW)	Nominal steam capacity		Nominal current draw (amps) **		
				Single-phase		Three-phase
		lbs/hr	kg/h	230V	400V	400V
002	1.7	5	2	7	—	—
003	3.3	10	5	15	8	5
006	6.0	20	8	26	15	9
010	10.0	30	14	—	—	14
017	16.5	50	22	—	—	24
025	25.0	75	34	—	—	36
033	33.3	100	45	—	—	48
042	41.7	125	57	—	—	60
050***	50.0	150	68	—	—	2 x 36
067***	66.7	200	91	—	—	2 x 48
083***	83.3	250	113	—	—	2 x 60
<p>* XTS models include standard controller. XTP models include Vapor-logic4 controller.</p> <p>** For circuit protection requirements, see Table 5-1.</p> <p>*** Model XTP only. These models have two steam cylinders and require independent service connections.</p>						

Line currents and fusing

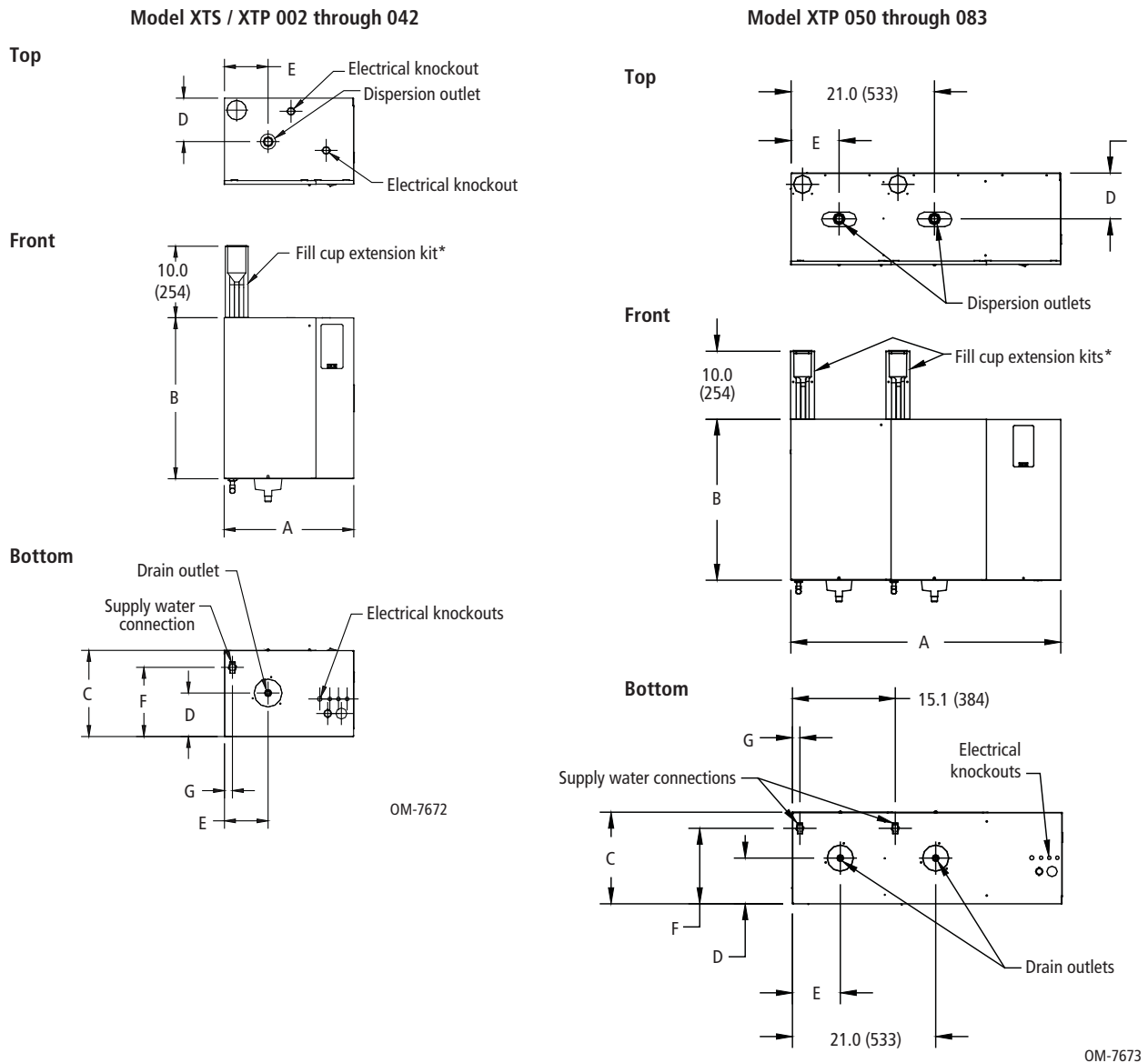
**Table 5-1:
Line currents and recommended fusing for XT Series humidifiers**

XTS / XTP model	kW	Phase	Volts	Maximum line current (amps)	Recommended fusing (amps)
002	1.7	1	230	9	13
003	3.3	1	400	10	15
		3	400	6	10
006	6.0	1	400	18	25
		3	400	10	13
010	10.0	3	400	17	25
017	16.5	3	400	29	40
025	25.0	3	400	43	63
033	33.3	3	400	58	80
042	41.7	3	400	72	100
050*	50.0	3	400	2 x 43	2 x 63
067*	66.7	3	400	2 x 58	2 x 80
083*	91.7	3	400	2 x 72	2 x 100

* Model XTP only. These models have two steam cylinders and require independent service connections.

Dimensional drawings

Figure 6-1:
XT Series humidifier dimensional drawings



Notes:

- * Fill cup extension kit is required and ships with Models 025 through 083 (ships loose). It is also required for Models 010 and 017 if maximum developed length of steam tubing is more than 20' (6 m) and duct static pressure exceeds 2" wc (498 Pa), and all XT Series humidifiers using Rapid-sorb or Ultra-sorb.
- Labeled dimensions: inches (millimeters).
- See mounting dimensions and electrical knockouts in Figure 10-1.

Dimensions and weights

**Table 7-1:
Dimensions by model number**

Dimension	Description	XTS / XTP model							
		002, 003, 006		010, 017		025, 033, 042		050*, 067*, 083*	
		inches	mm	inches	mm	inches	mm	inches	mm
A	Cabinet width	14.6	370	17.7	450	19.9	504	39.6	1005
B	Cabinet height	20.6	523	22.1	561	23.6	599	23.6	600
C	Cabinet depth	8.7	221	11.8	300	13.4	340	13.4	340
D	Cabinet back edge to steam/drain outlet centers	4.5	114	6.0	152	6.7	170	6.7	170
E	Cabinet left edge to steam/drain outlet centers	4.4	112	6.0	152	7.0	178	7.0	178
F	Cabinet back edge to supply water connection center	6.7	170	9.5	241	11.1	282	11.1	282
G	Cabinet left edge to supply water connection center	1.0	25	1.0	25	1.1	28	1.1	28

* Model XTP only

**Table 7-2:
Weights by model number**

	XTS / XTP model									
	002, 003		006		010, 017		025, 033, 042		050*, 067*, 083*	
	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
Shipping weight	37	17	37	17	48	22	61	28	135	62
Maximum operating weight	38	17	46	21	77	35	112	51	215	98

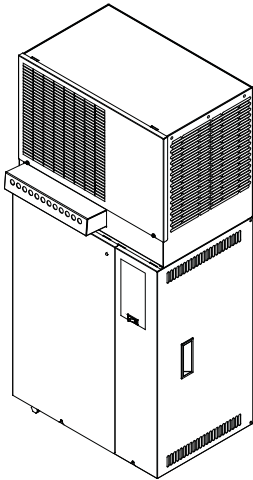
* Model XTP only

Dispersion options

The duct dispersion options in Figure 8-1 and the open space dispersion options in Figure 8-2 are available for XT Series humidifiers. For installation details, see “Dispersion” beginning on Page 20.

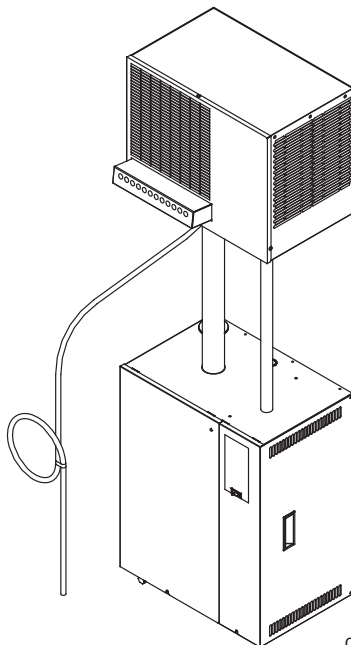
**Figure 8-2:
XT steam blowers**

Mounted on top of humidifier



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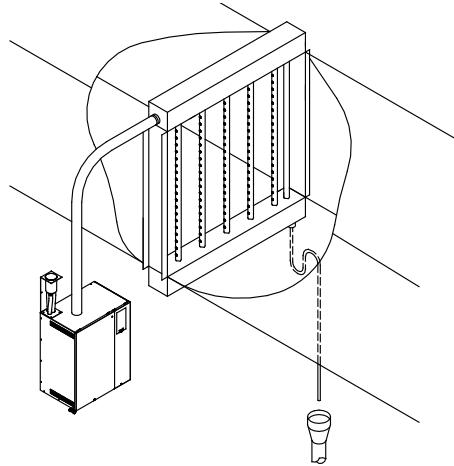
Mounted up to 10' (3 m) away from humidifier



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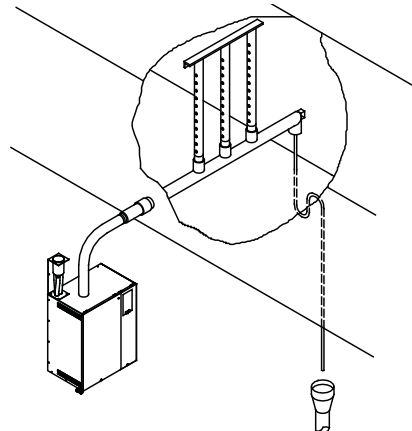
**Figure 8-1:
XT Series humidifier duct dispersion options**

Ultra-sorb



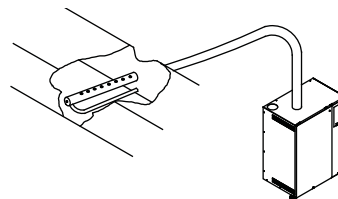
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Rapid-sorb



OM-7668

Single dispersion tube



Note: Models 010 and larger require condensate drain. See Page 27.

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Selecting a location

Humidifier

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

- **Proximity to the duct**

Install the humidifier near the air duct system where the dispersion assembly will be located. The maximum recommended length for steam hose connecting a single humidifier to a dispersion assembly is 10' (3 m). The maximum recommended developed length for tubing or pipe connecting a single humidifier to a dispersion assembly is 20' (6 m).

For more information about installing dispersion assemblies, see “Dispersion” beginning on Page 20.

- **Elevation of the installed dispersion assembly**

The recommended installation location for the dispersion assembly is at an elevation higher than the humidifier. However, if the dispersion assembly must be installed at an elevation lower than the humidifier, install a drip tee and drain. See “Drip tee installation” on Page 28.

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

- **Required clearances** (see Figure 9-1)

- **Electrical connections**

Electrical power supply connections are at the lower or upper right rear corner of the unit. See “Humidifier wiring” on Pages 17 and 18.

- **Supply water and drain piping connections**

Water supply piping and drain connections are at the bottom of the cabinet. See “Piping” on Page 14.

- **Exterior wall insulation**

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

Dispersion control devices

See Figure 19-1 for recommended installation locations for the dispersion assembly and associated control devices.

Important:

Install humidifier only in locations that meet the following temperature and relative humidity (RH) requirements:

Maximum ambient temperature:
104 °F (40 °C)

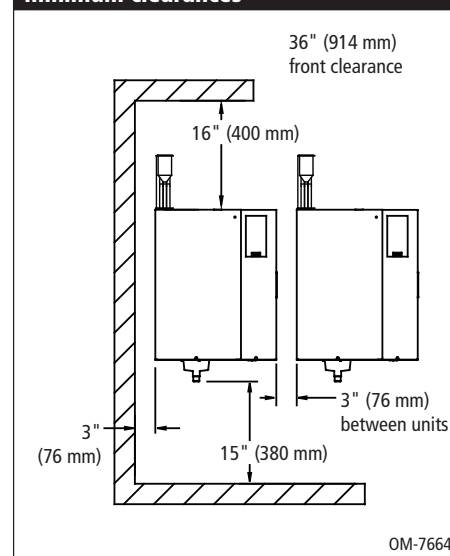
Minimum ambient temperature:
41 °F (5 °C)

Maximum ambient humidity:
80% RH (non-condensing)

Staging multiple XT Series humidifiers

Up to four XT Series 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-logic4 Installation and Operation Manual* for instructions on staging multiple humidifiers.

Figure 9-1:
XT Series humidifier recommended
minimum clearances



Mounting: Keyhole locations and dimensions

Figure 10-1:
XT Series humidifier mounting keyhole locations

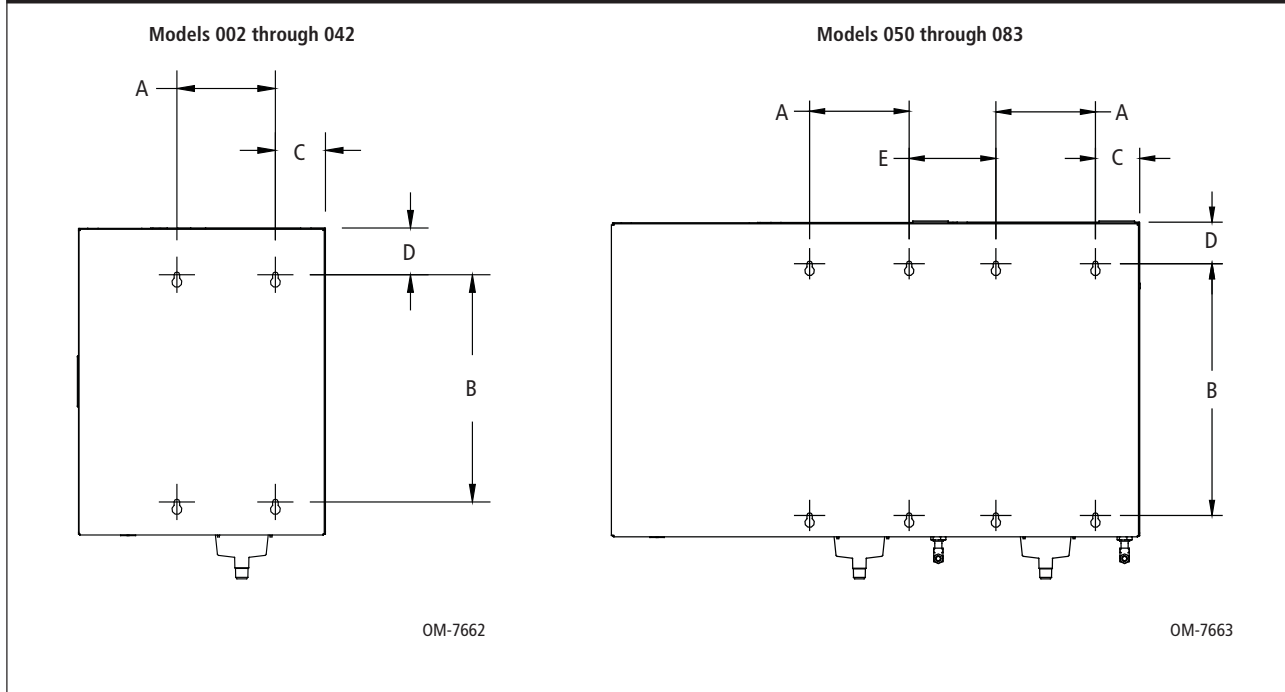


Table 10-1:
XT Series humidifier mounting keyhole dimensions

Dimension	XTS / XTP model							
	002, 003, 006		010, 017		025, 033, 042		050*, 067*, 083*	
	inches	mm	inches	mm	inches	mm	inches	mm
A	3.9	100	7.1	180	7.5	190	7.5	190
B	14.0	355	16.3	415	18.9	480	18.9	480
C	3.0	75	3.6	92	3.4	86	3.3	83
D	3.1	79	3.4	85	3.1	79	3.1	77
E	—	—	—	—	—	—	6.5	165

* Model XTP only

Mounting

Unpack the humidifier from the shipping carton, and remove the cabinet doors and steam cylinder.

Removing steam cylinder

Make sure the cylinder is empty and cooled before removing it.

1. Disconnect electrode and high water sensor connectors from steam cylinder.
2. Place hands palms-down below cylinder on both sides of drain outlet.
3. Press up against bottom of cylinder with backs of hands while pressing down against cabinet floor with fingers.
4. Raise cylinder until drain outlet clears drain valve body, and 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

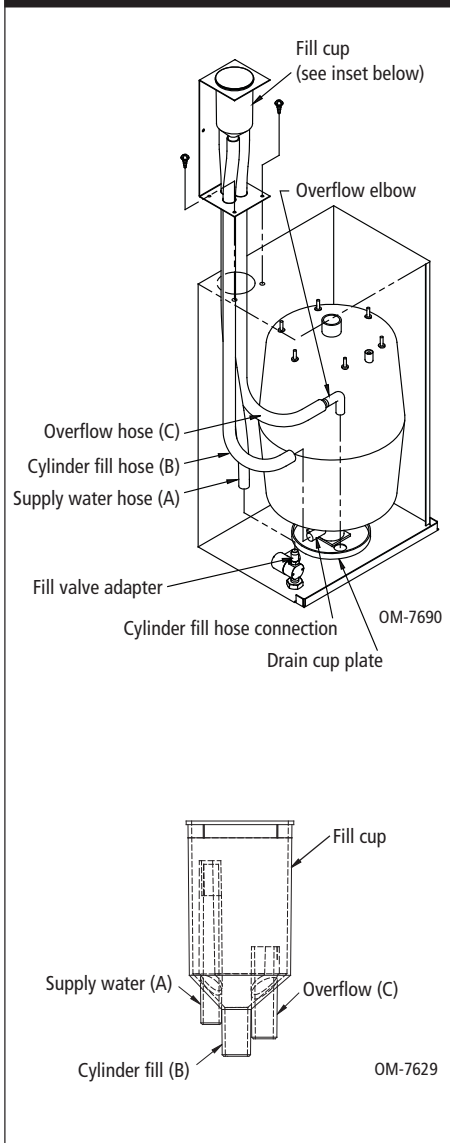
Mounting hazard

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.

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Fill cup extension kit

**Figure 12-1:
Fill cup extension kit**



A fill cup extension (Figure 12-1) is required for any of the following:

- Models 025 through 083 (kits ship loose with these models)
- All XT Series humidifiers using Ultra-sorb or Rapid-sorb
- Models 010 and 017, if maximum developed length of steam tubing is more than 20' (6 m), and duct static pressure exceeds 2" wc (498 Pa)

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Removing existing fill cup: Models 002 through 017

If installing a fill cup extension kit for Models 002 through 017, first remove the existing fill cup as follows:

1. Remove steam cylinder from XT cabinet (if not already out).
2. Expand spring clamps and slide them up cylinder fill hose and supply water hose, and disconnect hoses from cylinder fill hose connection and fill valve adapter.
3. Disconnect overflow hose from overflow elbow.
4. Remove fill cup and hoses (fill cup is press fit into top of XT cabinet).

Installing fill cup extension kit: all XT models

1. Remove steam cylinder(s) from XT cabinet (if not already out).
2. Route fill cup extension kit hoses into cabinet through fill cup hole, and fasten extension bracket as shown with two screws provided.
3. Cut supply water hose (small-diameter hose) (A) to length so it can attach to fill valve adapter without kinking.
4. Expand spring clamp and slide it onto supply water hose (A) far enough so it will not interfere, then push hose onto fill valve adapter. Expand and slide spring clamp into place.
5. Cut cylinder fill hose (bottom, center hose) (B) to length so it can attach to cylinder fill hose connection without kinking.
6. Expand spring clamp and slide it onto cylinder fill hose (B) far enough so it will not interfere, then push hose onto cylinder fill hose connection. Expand and slide spring clamp into place.
7. Cut overflow hose (C) to length so it can attach to overflow elbow without kinking.
8. Push overflow hose onto overflow elbow. Spring clamp is not required on this connection.

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 13-1.
2. Use water to lubricate drain outlet on bottom of cylinder and o-ring in drain valve body. See Figure 13-2.
3. 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.
4. Connect high water sensor (yellow) wire to single pin surrounded by plastic shoulder on cylinder.
5. Connect electrode plugs to pins on cylinder. Make sure all plugs fit snugly and are fully engaged on pins.

Note: If cylinder plugs become loose, obtain replacement plugs from DRI-STEEM. See “Replacement parts” on Pages 55 and 57 for part numbers.

Important: Cylinders with six electrodes 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 13-1:
Steam cylinder installation

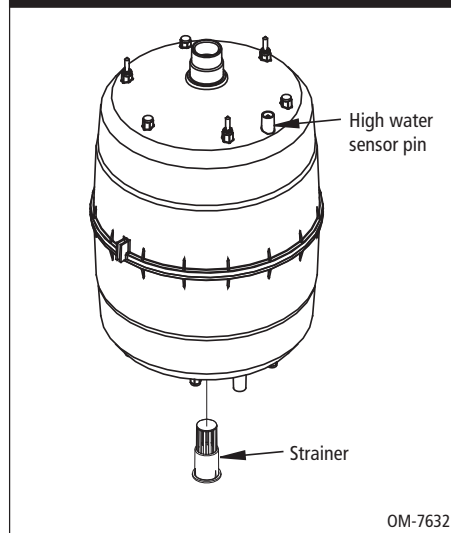
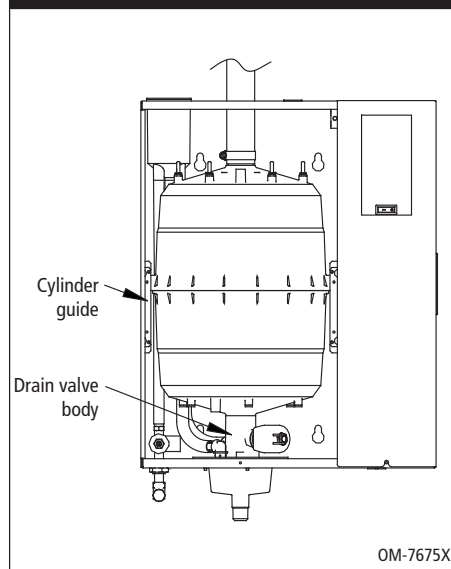


Figure 13-2:
Steam cylinder installation



Piping: Supply water and drain

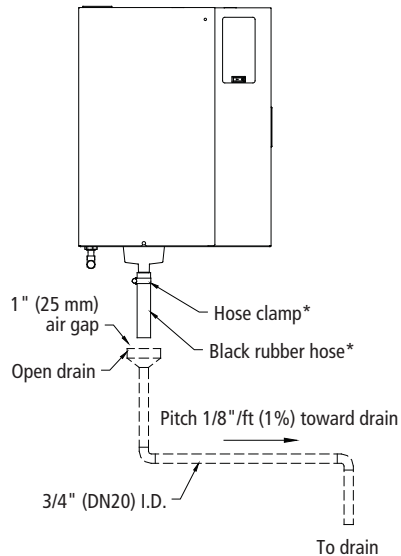
Important: Thoroughly flush the supply water piping to remove pipe residue and stagnant water before connecting piping to the humidifier. Pipe residue and stagnant water in the water supply piping can cause foaming, preventing the humidifier from reaching the required steam capacity.

WARNING

Hot drain pipes

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

**Figure 14-1:
Drain piping detail**



* Hose clamp and black rubber hose ship with each humidifier; they can also be ordered from DRI-STEEM. See Table 59-1.

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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 strainer.

Note: The supply water connection size is 3/8" BSP [DN10] in Europe.

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 XT Series humidifier features user-selectable drain water tempering. When drain water tempering is selected, the humidifier tempers drain water by opening the fill valve whenever the drain valve is energized, which automatically cools drain water before it enters the drain. Drain water tempering is intended to keep water entering the drain line no hotter 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 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 XT Series humidifier. The earth ground lug is shown in Figures 54-1 and 56-1.
- 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.

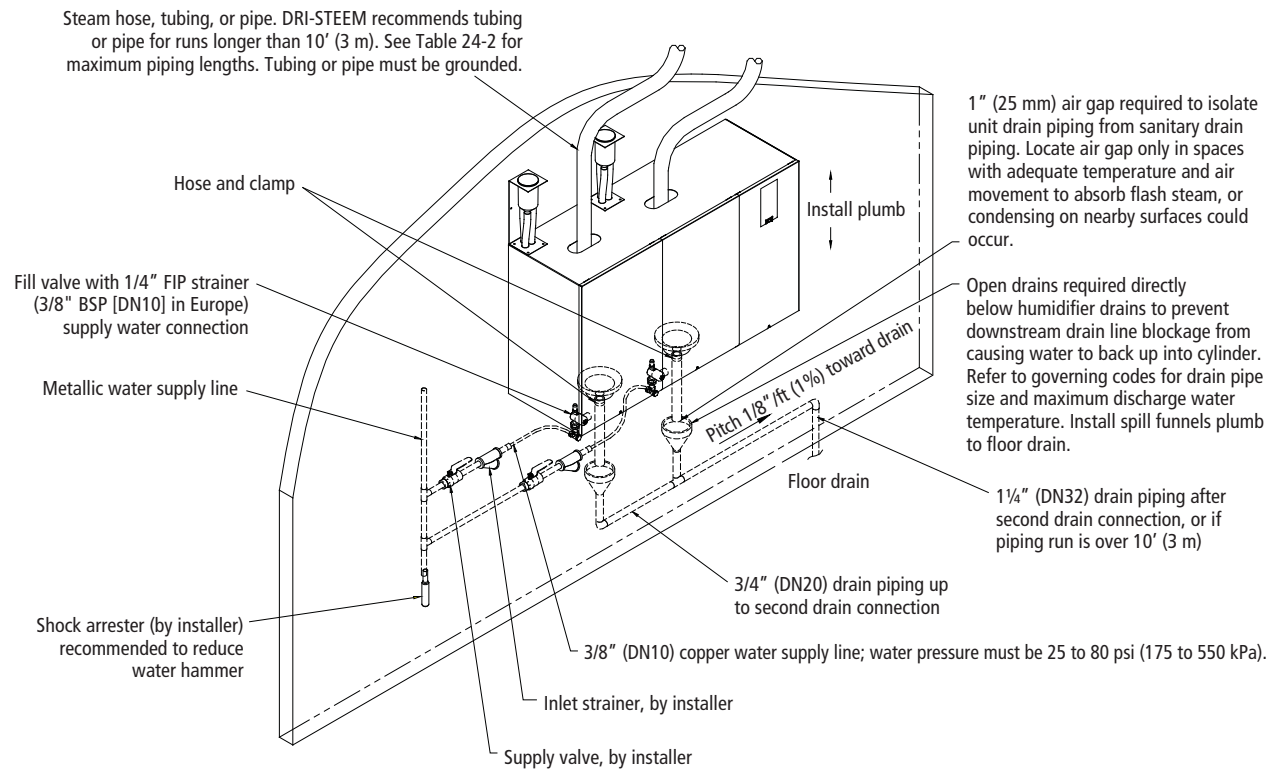
If drainage by gravity is not possible, use a reservoir pump rated for 212 °F (100 °C) water.

A drain hose is provided to function as the flexible connection from the drain cup to the field-installed open drain. See Figure 14-1.

Piping: Field piping overview

Figure 15-1:
XT Series humidifier field piping overview

Two-cylinder model shown

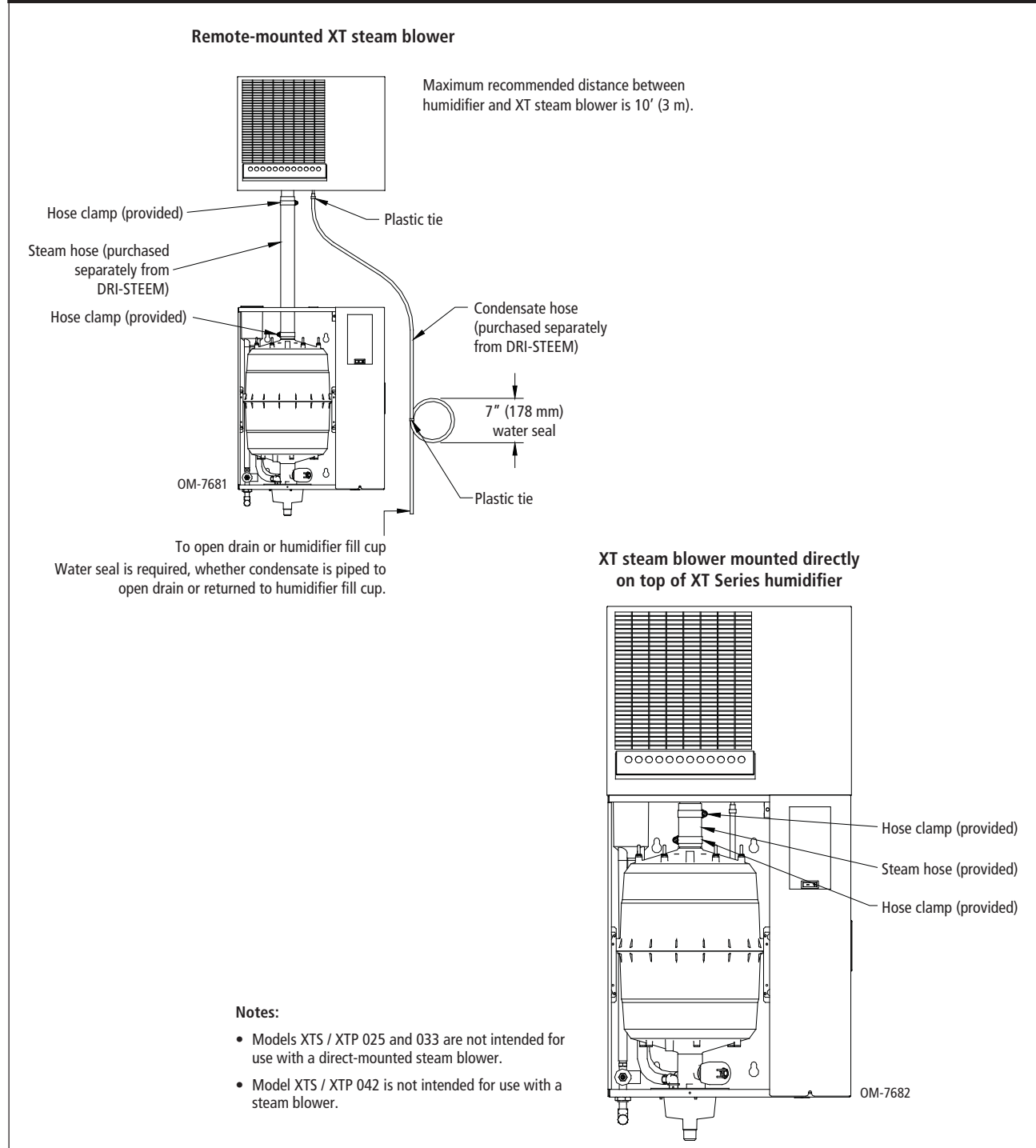


Note: Dashed lines indicate provided by installer.

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Piping: XT steam blowers

Figure 16-1:
Piping from XT Series humidifier to XT steam blower



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 17-1 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 XT Series humidifier cabinet. See Figure 6-1.

Control component placement

Follow the guidelines on Page 19 for placing humidistats, transmitters, and airflow proving switches.

CAUTION

Adding conduit connections not recommended

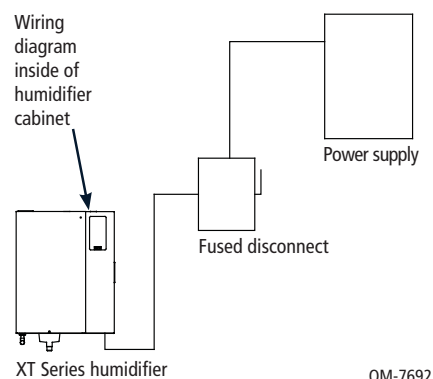
Adding alternate conduit connections is not recommended. If you must make additional holes in the humidifier cabinet, protect all internal components from debris, and vacuum out the cabinet when finished. Failure to follow these precautions can damage sensitive electronic components and void the DRI-STEEM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

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.

Figure 17-1:
Field wiring requirements



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 5-1.

Humidifier wiring



WARNING

Excessive moisture hazard

DRI-STEEM 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.

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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:

- For maximum EMC effectiveness, wire all humidity, high limit, and airflow controls using multicolored shielded/screened plenum-rated cable with a drain wire for the shield/screen. 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.

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.

For Model XTP, see "Step 1 – Field wiring" in the *Vapor-logic4 Installation and Operation Manual* for detailed instructions on the following:

- Control input wiring:
See the "Control input" section.
- Duct airflow proving switch and duct high limit humidistat wiring (recommended optional devices):
See the following sections:
"Airflow proving switch" and
"Duct high limit switch or transmitter"
- Remote signal wiring:
See the following sections:
"Programmable triac" and
"Programmable relay (dry contact)"

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.

Sensor placement

Sensor location is critical

Sensor location has a significant impact on humidifier performance. See the recommendations below and Figure 19-1.

Note: DRI-STEEM recommends that you do not interchange room and duct humidity devices. Room humidity devices are calibrated with zero or little airflow, whereas duct humidity devices require air passing across them.

Recommended humidity control (transmitter/humidistat) locations:

- A Ideal. Ensures the best uniform mix of dry and moist air with stable temperature control.
- B Acceptable, but room environment can affect controllability, such as when sensor is too close to air grilles, registers, or heat radiation from room lighting.
- C Acceptable. Provides uniform mixture of dry and moist air. If extended time lag exists between humidity generation and sensing, extend sampling time.
- D 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.
- E Not acceptable. These locations might not represent actual overall conditions in the space.
- F Not acceptable. Do not place sensors near windows, door passageways, or areas of stagnant airflow.

Recommended safety (airflow and high limit) sensor location:

- G Best sensing location for high limit humidistat or humidity sensor and airflow proving switch.

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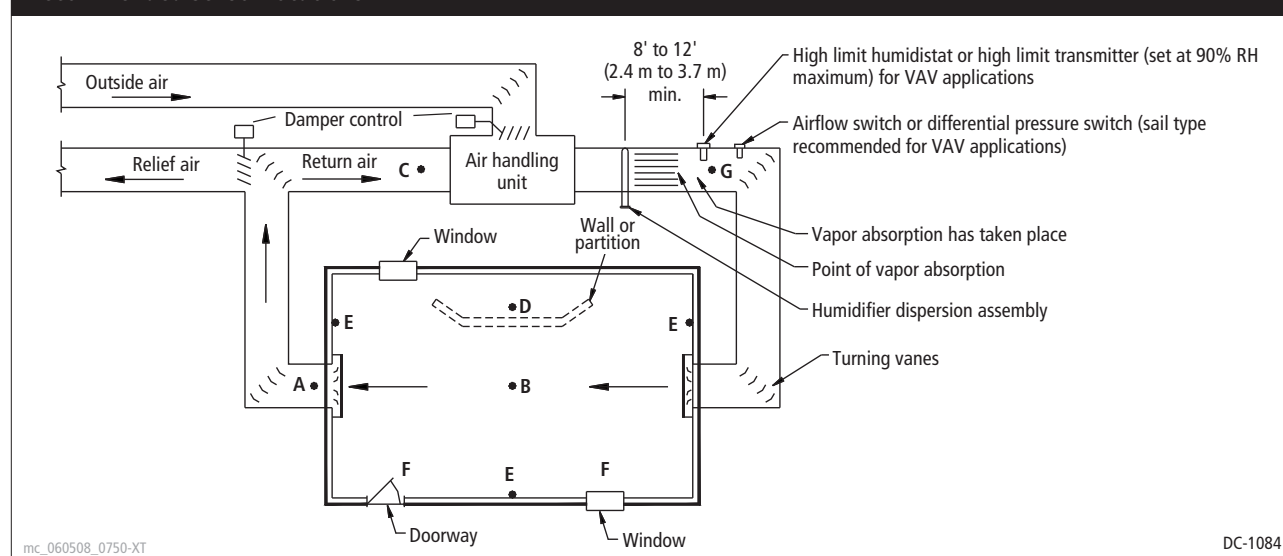
Other factors affecting humidity control

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

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Figure 19-1:
Recommended sensor locations



Dispersion: Selecting the dispersion assembly location



WARNING

Hot surface and steam hazard

Dispersion tube, steam hose, tubing, or hard pipe 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.

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DRI-STEEM humidifiers operate with several types of dispersion assemblies for open spaces and for ducts and air handling units.

Dispersion assemblies in ducts and air handling units must be positioned where the water vapor being discharged is carried off with the airstream and is absorbed before it can cause condensation or dripping.

- For each dispersion device, DRI-STEEM documents distances required for non-wetting to occur. Find more information about absorption non-wetting distances at www.dristeem.com.
- In general, the dispersion assembly is best placed where the air can absorb the moisture being added without causing condensation at or after the unit. This normally will be after the heating coil or where the air temperature is highest.
- Place the dispersion assembly such that absorption will occur
 - before the intake of a high efficiency filter, because the filter can remove the visible moisture and become waterlogged;
 - before coming in contact with any metal surface;
 - before fire or smoke detection devices;
 - before a split in the duct; otherwise, the dispersion assembly can direct more moisture into one duct than the other.
- 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.

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Dispersion: Returning condensate to steam cylinder

Condensate return guidelines

To prevent overfilling the steam cylinder, follow the guidelines below when returning condensate to the cylinder:

- When condensate can be returned to the steam cylinder:
 - Single tube dispersion
 - Up to 20 lbs/hr (9.1 kg/h) of steam production
 - 20' (6 m) or less of steam hose, tubing, or pipe between humidifier and dispersion
- When condensate should be wasted to the drain:
 - Ultra-sorb or Rapid-sorb dispersion
 - Single dispersion tube with condensate drain
 - Single dispersion tube with:
 - 20 lbs/hr (9.1 kg/h) or more of steam production, or
 - More than 20' (6 m) of steam hose, tubing, or pipe between humidifier and dispersion

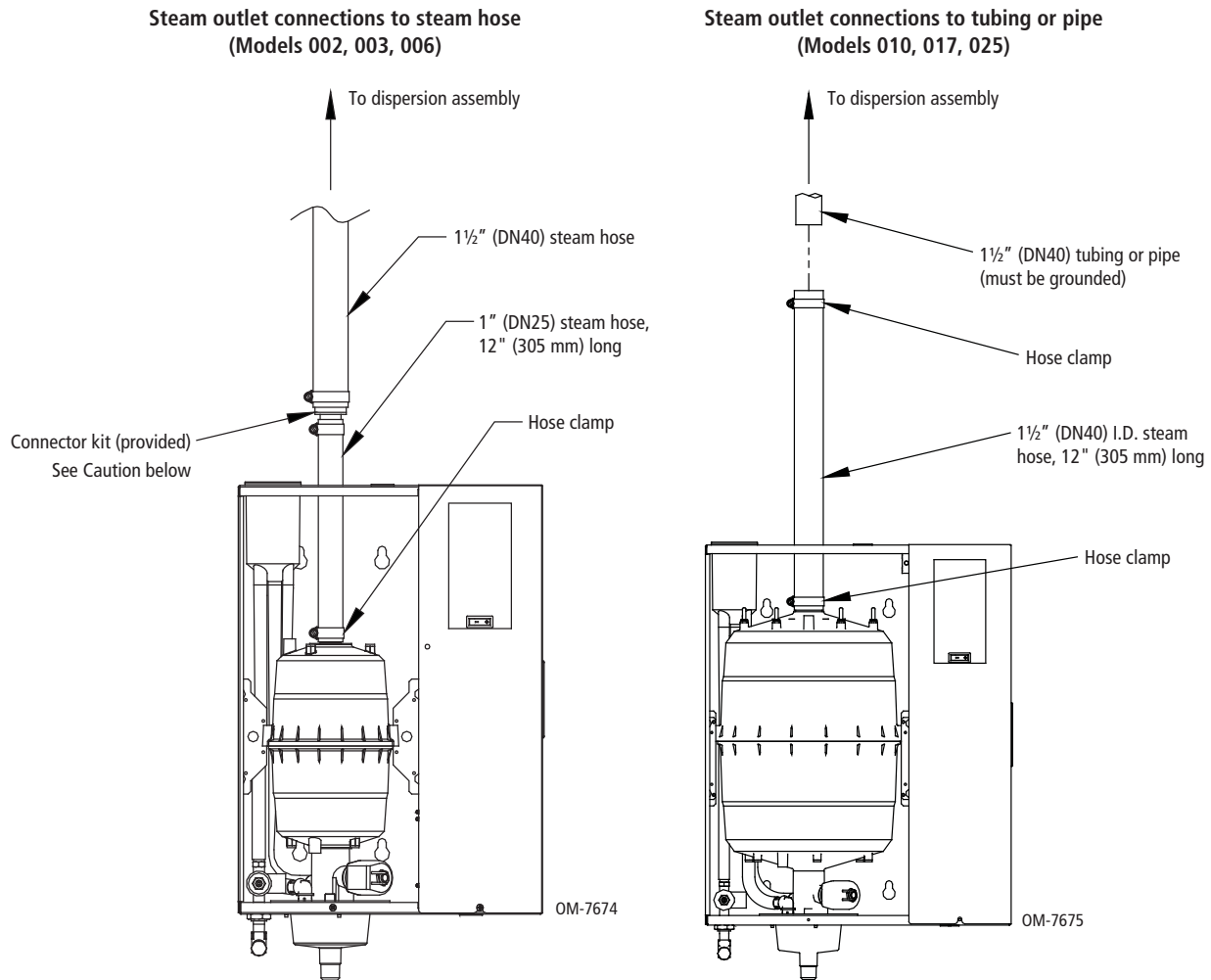
XT Series humidifier steam outlet

The steam outlet on the humidifier is sized to the output of the humidifier. DO NOT use interconnecting steam hose, tubing, or piping with an inside diameter smaller than the humidifier steam outlet. Reducing the inside diameter will result in the internal humidifier system pressure exceeding the parameters for acceptable performance.

- See maximum system pressure in Table 24-1.
- See maximum steam carrying capacities in Table 24-2.
- If the humidifier must be located higher than the dispersion assembly, use the recommended installation shown in Figure 28-1.

Dispersion: Steam outlet connections, Models 002 through 025

Figure 22-1:
Steam outlet connections, Models 002 through 025



CAUTION

Connector kit location

Install the connector kit for increasing from 1" to 1 1/2" (DN25 to DN40) hose or tube immediately above the XT Series humidifier as shown above.

Failure to install the connector kit immediately above the humidifier will cause system pressure fluctuations and increase cylinder pressure, steam velocity, and condensate noise.

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Notes:

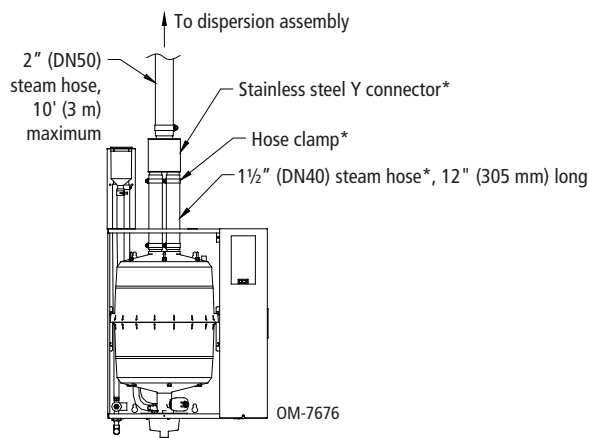
- Steam hose and clamps are provided with these humidifiers.
- Model 025 is shipped with a fill cup extension.

Dispersion: Steam outlet connections with hose, Models 033 through 083

Figure 23-1:
Steam outlet connections for Models 033 through 083 within 10' (3 m) of dispersion assembly

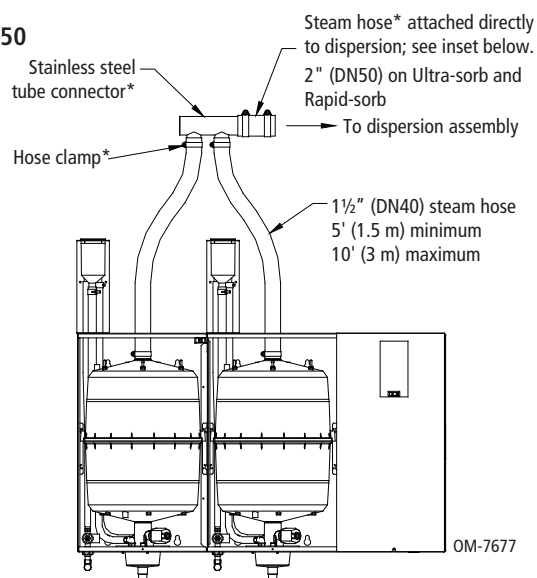
Note: For horizontal runs longer than 5' (1.5 m), hard pipe or tubing is required (see Figure 33-1). Do not use steam hose.

Models 033 and 042



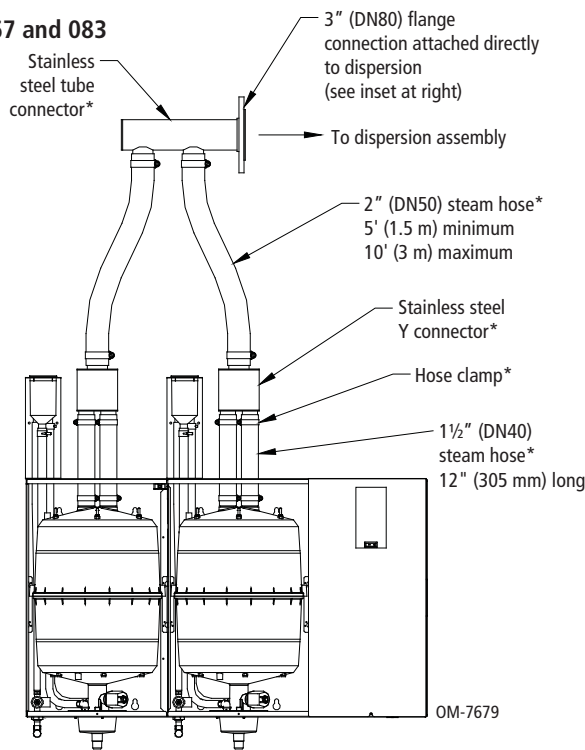
* Stainless steel Y connector, two 1 1/2" (DN40) hoses, and four hose clamps ship with each Model 033 humidifier.

Model 050



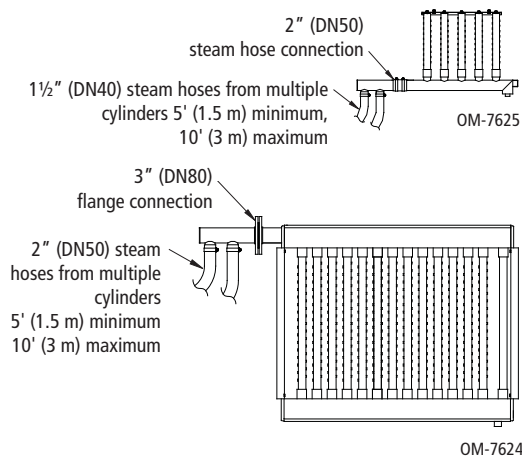
* Stainless steel tube connector, one 2" (DN50) hose, and two hose clamps ship with each Model 050 humidifier.

Model 067 and 083



* Stainless steel tube connector, two stainless steel Y-connectors, four 1 1/2" (DN40) hoses, and eight hose clamps ship with each Model 067 humidifier.

Connecting multiple cylinders to a dispersion assembly



For multiple cylinders, connect the stainless steel tube connector (provided with Models 050 through 083; available for staged XT Series humidifiers) directly to the dispersion inlet. The diameter and pitch of the tube connector must match the inlet diameter and pitch of the dispersion unit. Connect a maximum of two cylinders to the tube connector with steam hose, tubing, or pipe.

Dispersion: Interconnecting piping requirements

Condensate control and collection

Controlling condensate flow and collection in an XT Series humidifier system is critical to performance. To maximize humidifier performance:

- See Tables 24-1 and 24-2.
- Follow all installation recommendations for your specific humidifier and dispersion assembly from here through Page 41.

**Table 24-1:
Insulated 1½" (DN40) steam tubing maximum lengths for Models 002 through 017**

XTS / XTP model	Maximum developed length*	
	ft	m
002	13	4.0
003	25	7.6
006	50	15.2
010**	50	15.2
017**	50	15.2

Notes:

- For larger XT models, see Table 24-2.
- Values in this table are based on condensate flowing with steam (steam tubing pitched toward dispersion device).
- * Maximum developed lengths are based on 5% steam loss in piping. Developed length equals measured length plus 50% of measured length to account for pipe fittings.
- ** Values in this table are based on duct static pressure of 2" wc (498 Pa). For Models 010 and 017, if maximum developed length is more than 20' (6 m), and duct static pressure exceeds 2" wc (498 Pa), a fill cup extension kit (Figure 12-1) is required.

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**Table 24-2:
Maximum steam carrying capacity and length of interconnecting steam hose, tubing, and pipe for XT Series humidifiers**

XTS / XTP model	DRI-STEEM steam hose*						Copper or stainless steel tubing and Schedule 40 steel pipe (Insulate tubing or piping to minimize loss of capacity and efficiency.)					
	Hose I.D.		Maximum capacity per cylinder†		Maximum length††		Tube or pipe size		Maximum capacity per cylinder†		Maximum developed length†††	
	inches	DN	lbs/hr	kg/h	ft	m	inches	DN	lbs/hr	kg/h	ft	m
025, 050**	1½	40	75	34.0	10	3	1½	40	75	34.0	100	30
033, 067**	2	50	100	45.4	10	3	2	50	100	45.4	100	30
042, 083**	2	50	125	56.7	10	3	2	50	125	56.7	100	30

Notes:

- See Table 24-1 for XT Series humidifiers with lower capacities using 1½" steam tubing.
- Values in this table are based on condensate flowing with steam (steam hose, tubing, or pipe pitched toward dispersion device).
- * When using steam hose, use DRI-STEEM steam hose for best results. Field-supplied hose may have shorter life and may cause foaming in the cylinder resulting in condensate discharge at the dispersion assembly. Do not use steam hose for outdoor applications.
- ** Model XTP only. These models have two steam cylinders.
- † For Models 050, 067, and 083, capacities listed are the maximum steam carrying capacity per tube or pipe attached to each cylinder, with separate steam piping from each cylinder to the connection on the dispersion device. See Figure 33-1.
- †† DRI-STEEM typically recommends 10' (3 m) maximum steam hose length pitched at 2"/ft (15%). Steam hose has a tendency to sag if it is not supported for its full length. Sagging leads to collecting condensate and system pressure issues. Hard pipe or tubing is less prone to sagging and can allow for 1/8"/ft (1%) pitch minimum with longer runs.
- ††† Developed length equals measured length plus 50% of measured length to account for pipe fittings.

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Dispersion: Interconnecting piping requirements

Connecting to humidifier with steam hose

- Support steam hose for its full length to prevent sags, or low spots:
 - For single dispersion tube without condensate drain, maintain a minimum pitch of 2"/ft (15%) toward the steam cylinder.
 - For dispersion devices with condensate drain, maintain a minimum pitch of 2"/ft (15%) toward the dispersion device.
- Use DRI-STEEM steam hose. Other manufacturers of steam hose may use unacceptable release agents or material mixes that can affect humidifier system performance adversely. Using hose from alternative manufacturers increases the possibility of foaming in the cylinder and accelerated steam hose aging. Foaming causes condensate discharge at the dispersion assembly.
- Do not use steam hose in outdoor applications.
- Do not insulate steam hose. Insulation causes accelerated heat aging, causing the steam hose to become hard and susceptible to failure due to cracks.
- For single tube applications, see hose kit sizes in Table 27-2.

For hard pipe connections, see "Connecting to humidifier with tubing or pipe" on Page 29.

Important:

Steam hose must be supported for its full length to prevent sagging or low spots.

Table 25-1:
Steam loss of interconnecting steam hose, tubing, and pipe

Description	Nominal hose, tubing or pipe size		Steam loss				Insulation thickness	
			Noninsulated		Insulated			
	inches	DN	lbs/hr/ft	kg/h/m	lbs/hr/ft	kg/h/m	inches	mm
Hose	1½	40	0.15	0.22	N/A	N/A	N/A	N/A
	2	50	0.20	0.30	N/A	N/A	N/A	N/A
Tubing	1½	40	0.11	0.164	0.02	0.03	2	50
	2	50	0.14	0.21	0.025	0.037	2	50
Pipe	1½	40	0.22	0.33	0.02	0.03	2	50
	2	50	0.25	0.38	0.025	0.037	2	50

Note: These data are based on an ambient air temperature of 80 °F (27 °C), fiberglass insulation, copper tubing, and Schedule 40 pipe.

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Dispersion: Single dispersion tube

Important:

Failure to follow the recommendations in this section can result in excessive back pressure on the humidifier. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from the dispersion tube.

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CAUTION

Connector kit location

Install the connector kit for increasing from 1" to 1½" (DN25 to DN40) hose or tube immediately above the XT Series humidifier as shown above.

Failure to install the connector kit immediately above the humidifier will cause system pressure fluctuations and increase cylinder pressure, steam velocity, and condensate noise.

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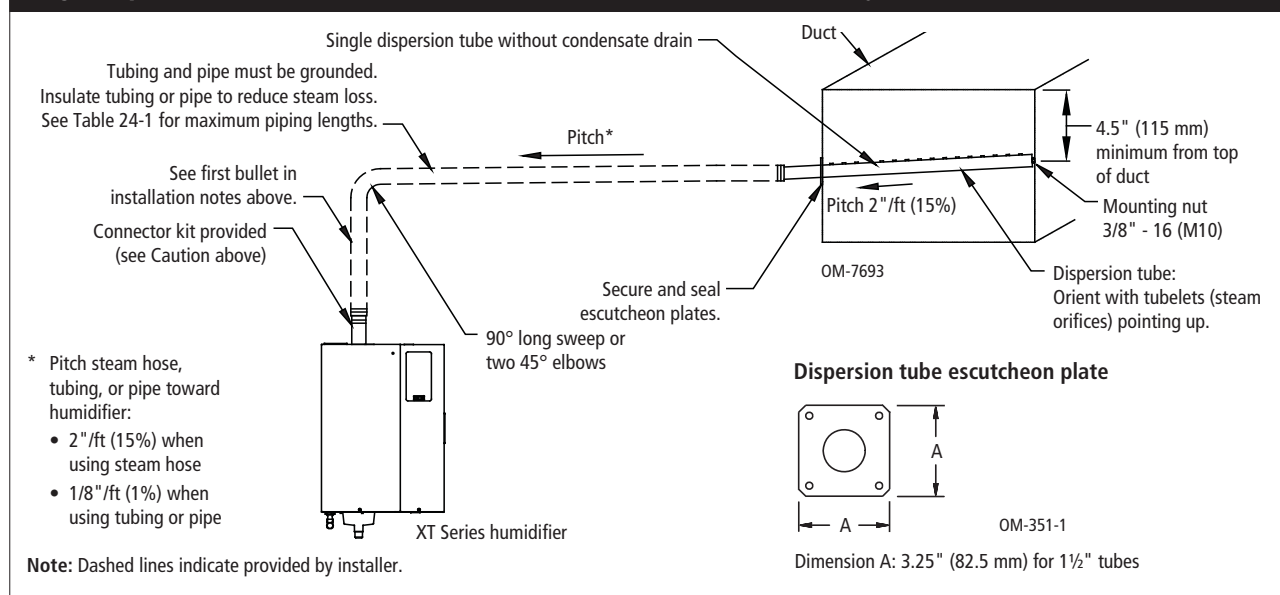
Dispersion tube with or without condensate drain

- Use DRI-STEEM's hard pipe adapter kit to connect the steam outlet to hard pipe. Use a hose cuff and clamps to connect the steam outlet to tubing.
- Thin-walled tubing heats up faster than heavy-walled pipe causing less steam loss at start-up.
- Hard pipe or tubing diameter must match XT steam outlet connection.
- See maximum steam carrying capacities in Table 24-1 and steam loss in Table 25-1.
- If mounting the humidifier above the level of dispersion tube, see "Drip tee installation" on Page 28. See also vertical riser drip details in Figure 29-1.

Dispersion tube without condensate drain, XT Models 002, 003, and 006

- See Figure 26-1.
- Maximum capacity of 1½" (DN40) dispersion tube without condensate drain is 28.4 lbs/hr (13 kg/h).
- Condensate can flow back to the cylinder against 20 lbs/hr (9.1 kg/h) steam flow. Pitch the steam supply line back toward the humidifier (see Figure 26-1).

Figure 26-1:
Single dispersion tube without condensate drain, Models 002, 003, and 006 only



Dispersion: Single dispersion tube

Dispersion tube with condensate drain, XT Models 002 through 017

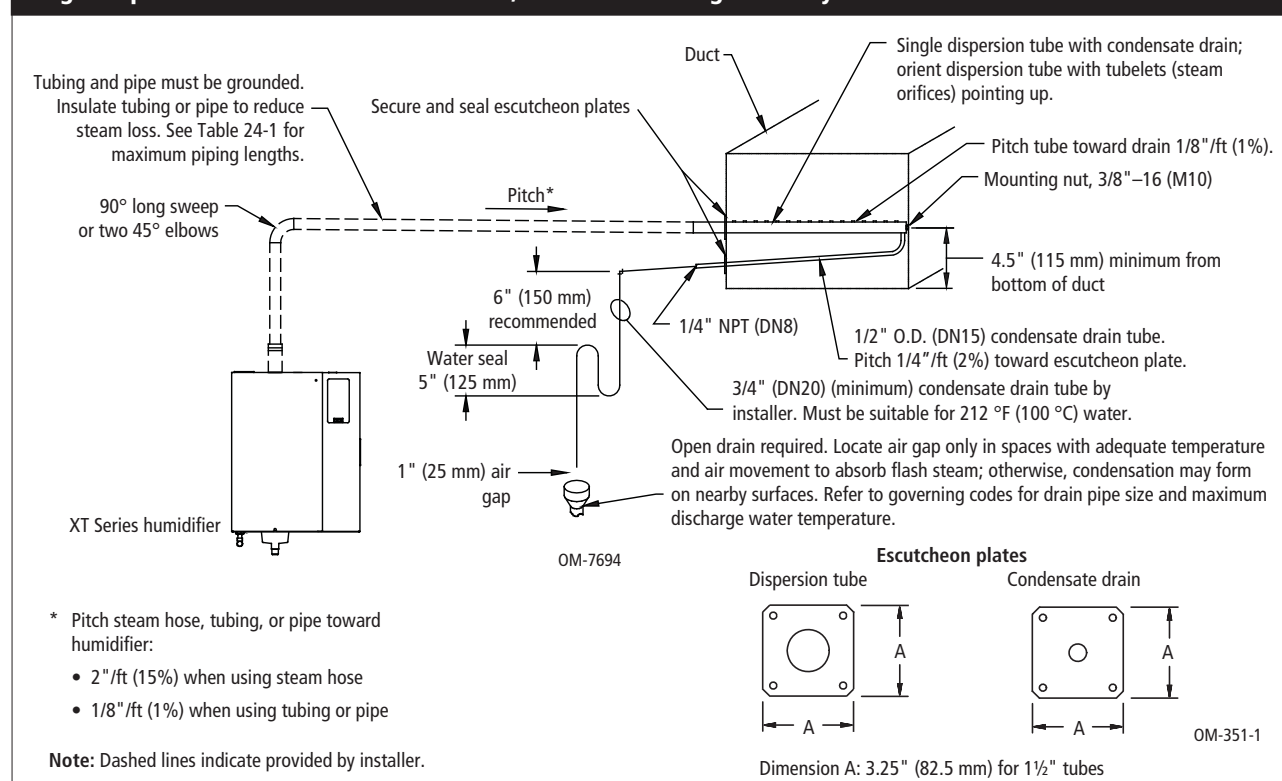
- See Figure 27-1.
- Maximum capacity of 1½" (DN40) dispersion tube with condensate drain is 56.8 lbs/hr (25.8 kg/h).
- Models 010 through 083 have capacities requiring dispersion devices with condensate drains. DRI-STEEM recommends pitching steam piping for these models towards the dispersion device. For XT Series humidifiers with capacities more than 20 lbs/hr (9.1 kg/h), do not drain condensate back to the cylinder. When a vertical riser is required in the steam piping, a drip tee is required in order to eliminate a condensate collection point that will restrict steam flow. See vertical riser examples in Figure 29-1.
- If maximum developed length is more than 20' (6 m), and duct static pressure exceeds 2" wc (498 Pa), a fill cup extension kit (Figure 12-1) is required.

Table 27-2:
Hose kit sizing by capacity

Hose kit (steam hose, dispersion tube, and hardware)	Maximum tube capacity	
	lbs/hr	kg/h
1½" (DN40) without drain	28.4	12.9
1½" (DN40) with drain	56.8	25.8
These capacities require multiple tube assemblies and cannot use a single hose kit.	> 56.8	> 25.8

Capacities of Models 025 through 083 require multiple tube assemblies and cannot use a hose kit. For multiple tube assemblies, see "Rapid-sorb" beginning on Page 30.

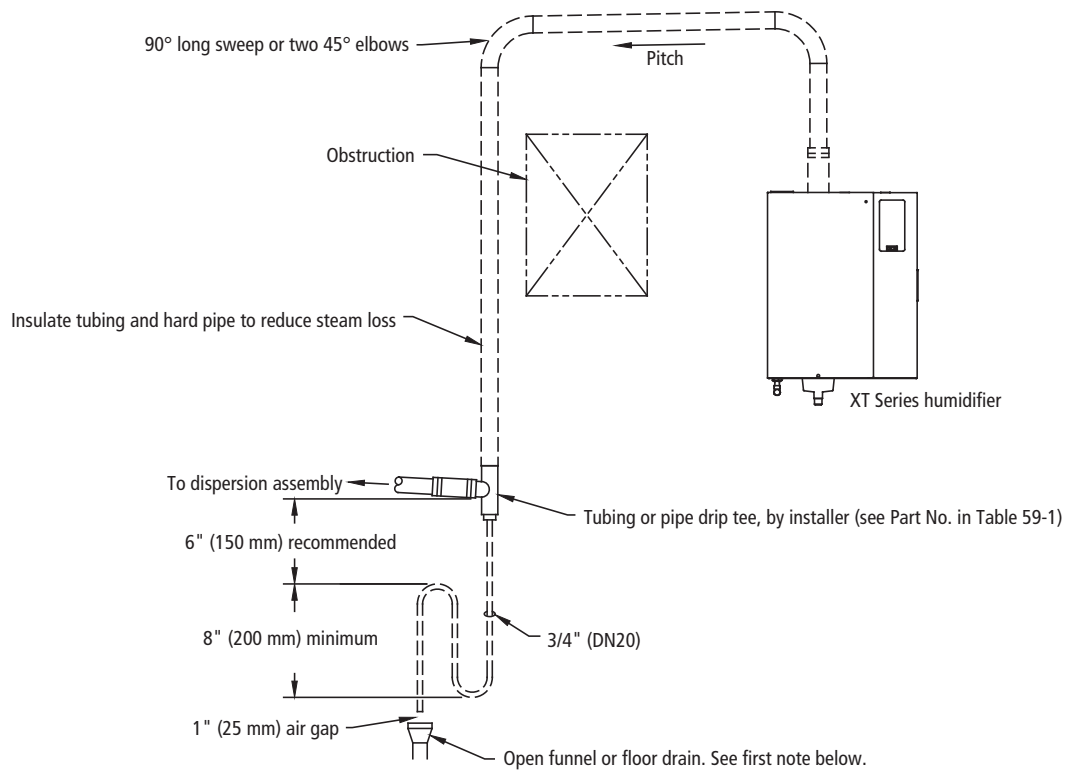
Figure 27-1:
Single dispersion tube with condensate drain, Models 002 through 017 only



Dispersion: Drip tee installation

Install a drip tee as shown below when the humidifier is mounted higher than the dispersion assembly, when interconnecting hose or piping needs to go over an obstruction, or when interconnecting piping runs are long.

**Figure 28-1:
Drip tee installation**



Notes:

- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Support steam hose for its full length so there are no sags or low spots.
- Dashed lines indicate provided by installer.

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Dispersion: Connecting to humidifier with tubing or pipe

See Figures 26-1 and 27-1 for interconnecting tubing and pipe pitch requirements for single tube applications. See Table 31-1 for interconnecting tubing and pipe pitch requirements for Rapid-sorb applications.

- Support interconnecting piping between the humidifier steam outlet and the dispersion system with pipe hangers. Failure to properly support the entire steam piping weight may cause damage to the humidifier tank and void the warranty.
- Ground metal steam pipes. See “Grounding steam pipes” at right.
- Steam supply adapters are available from DRI-STEEM. These adapters convert a tubing outlet on the humidifier to threaded pipe, allowing a pipe connection.
- 90° elbows are not recommended. DRI-STEEM recommends 90° long sweeps. Two 45° elbows, 1' (0.3 m) apart may also be used.
- Thin wall tubing heats up faster and causes less start-up loss than heavy wall pipe.
- Insulating hard pipe reduces the loss in output caused by condensation.
- When using hard pipe, take care to remove ALL traces of lubricants used to thread the pipe. This will minimize the possibility of tank foaming. Denatured alcohol or mineral spirits work best for removing lubricant.

Important:

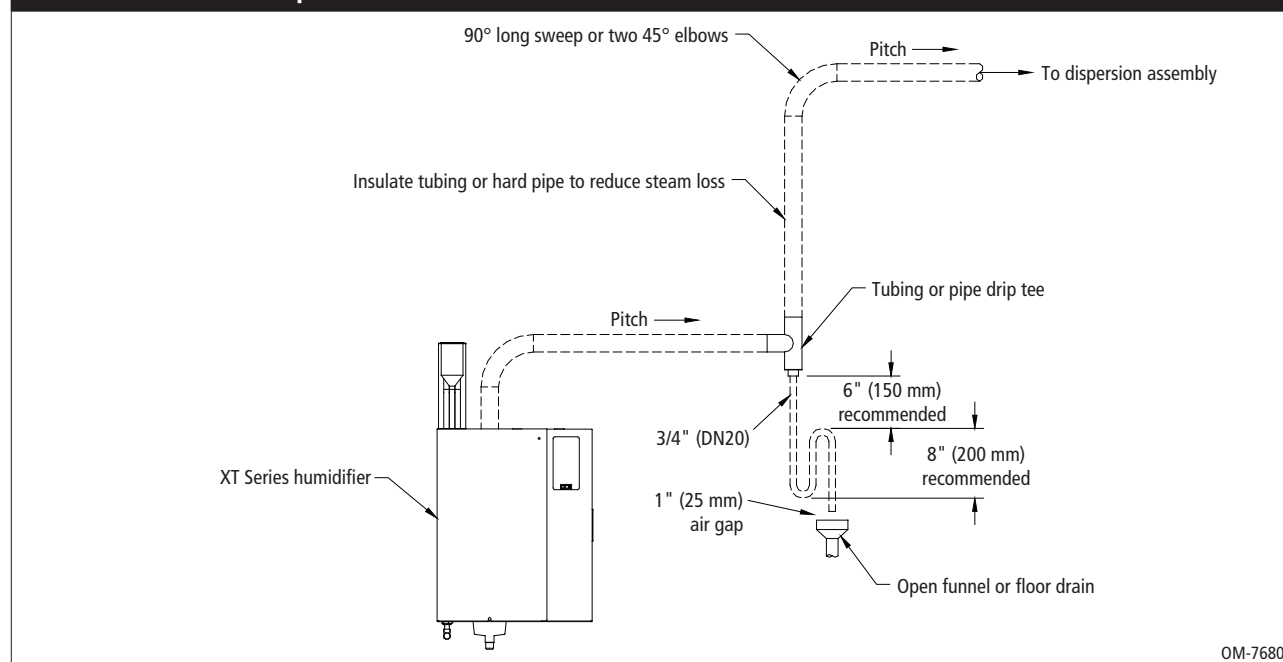
Failure to follow the recommendations in this section can result in excessive back pressure on the humidifier. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from the dispersion tube.

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Grounding steam pipes

The XT Series humidifier has built-in functionality for detecting and eliminating foaming in the steam cylinder. However, because brief periods of foaming are possible, grounding metal steam pipes back to the humidifier earth ground lug is necessary. This earth ground will prevent foam from creating an electrically conductive path from the electrically charged cylinder water to the metal steam pipe. The earth ground lug is shown in Figures 54-1 and 56-1.

Figure 29-1:
Detail of vertical riser drips



Dispersion: Rapid-sorb®



WARNING

Hot surface and steam hazard

Dispersion tube, steam hose, tubing, or hard pipe 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.

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Important:

Before marking and drilling holes in the duct or air handler, refer to ALL pitch requirements for the Rapid-sorb assembly you received (see Table 31-1). The size, quantity, and location of penetrations are determined by the dimensions and configuration of the Rapid-sorb assembly you received.

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Important:

Failure to follow the recommendations in this section can result in excessive back pressure on the humidifier. This will result in unacceptable humidification system performance such as leaking gaskets, blown water seals, erratic water level control, and spitting condensate from the dispersion tube.

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Read all dispersion instructions in this manual, and follow the installation instructions below:

- Unpack shipment and verify receipt of all Rapid-sorb components with packing list. Report any shortages to DRI-STEEM immediately. The components typically include the following:

- Multiple dispersion tubes
- Header
- 3/4" × 2" (19 mm × 51 mm) L-bracket

Note: Dispersion tubes, header, and L-bracket are each tagged with the customer requested identification number.

- A single duct escutcheon plate the size of the header
- Slip couplings or hose cuffs and clamps
- Accessories such as duct plates, slip couplings, or hose cuffs
- Bolts and washers for mounting the dispersion tubes to the bracket

- L-bracket mounting holes (see note at left):

- L-bracket 50" (1270 mm) long or shorter has a mounting hole 4" (100 mm) from each end for mounting the L-bracket to the duct or air handler wall.
- L-bracket longer than 50" (1270 mm) has an additional mounting hole in the center.

Note: Hardware for mounting the L-bracket to the duct or air handler wall and the hardware for the header support bracket is not provided.

- Select an installation location that provides necessary access in and around the ductwork or air handler.
- The Rapid-sorb typically is installed centered side to side in a duct, or is installed across the face of a coil in an air handler.
- The center line of the outer dispersion tubes should never be closer than 4.5" (114 mm) from the side of the ductwork or air handler wall.
- The following instructions are for a typical Rapid-sorb installation — horizontal-airflow duct with Rapid-sorb header either inside or outside the duct. See the Dri-calc Installation Guides library or contact your representative/distributor or DRI-STEEM for installation instructions for air handler or vertical airflow applications.

Dispersion: Rapid-sorb

Pitch requirements

- For Rapid-sorb with the header outside a horizontal-airflow duct, consider the following:
 - 1½" (DN40) dispersion tubes: Use a fastener of sufficient length to accommodate the 1/8"/ft (1%) pitch requirements toward the ¾" pipe thread (DN20) header drain fitting.
 - 2" (DN50) dispersion tubes: The bracket can be mounted flush to the ductwork. The 1/8"/ft (1%) pitch typically can be accomplished in the length of the hose cuffs used to connect the tubes to the header.
- See Table 31-1 and the drawings on the following pages for pitch requirements.

**Table 31-2:
Rapid-sorb dispersion tube capacities
(horizontal tubes)**

Tube diameter		Tube capacity			
		Insulated		Uninsulated	
inches	DN	lbs/hr	kg/h	lbs/hr	kg/h
1½	40	43.0	19.5	40.0	18.1
2	50	80.0	36.3	77.0	34.9

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**Table 31-3:
Rapid-sorb header capacities**

Header capacity		Header diameter	
lbs/hr	kg/h	inches	DN
≤ 250	≤ 113	2	50
251-500	114-227	3	80
501-800	228-363	4	100
801-1300	364-591	5	125
1301-2100	592-955	6	150

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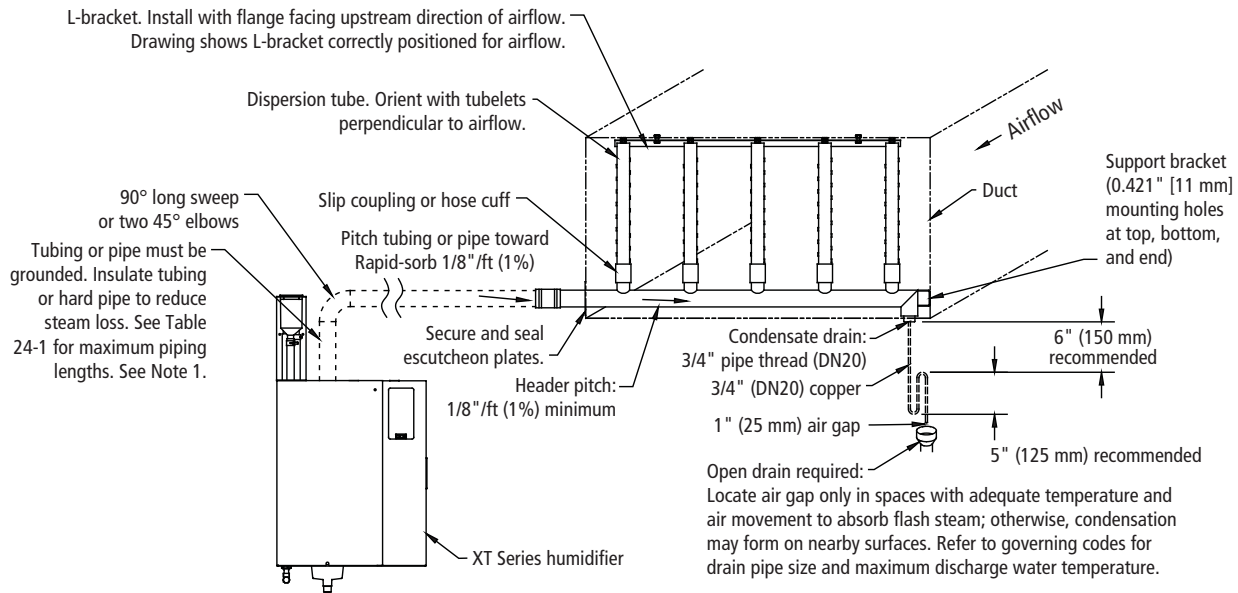
**Table 31-1:
Pitch of interconnecting piping, dispersion tubes, and headers for Rapid-sorb evaporative dispersion units**

Airflow	Type of interconnecting piping	Diameter of interconnecting piping	Pitch of interconnecting piping	Pitch of dispersion tubes	Pitch of header
Horizontal	Steam hose	1½" (DN40) 2" (DN50)	2"/ft (15%) toward Rapid-sorb	Vertically plumb	1/8"/ft (1%) toward condensate drain
	Tubing or pipe	1½" (DN40) 2" (DN50)	1/8"/ft (1%) toward Rapid-sorb		
Vertical	Steam hose	1½" (DN40) 2" (DN50)	2"/ft (15%) toward Rapid-sorb	2"/ft (15%) toward header	1/8"/ft (1%) toward condensate drain
	Tubing or pipe	1½" (DN40) 2" (DN50)	1/8"/ft (1%) toward Rapid-sorb		

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Dispersion: Rapid-sorb with models 025 through 042

Figure 32-1:
Rapid-sorb in a horizontal airflow with header inside the duct



Notes:

1. Use DRI-STEEM's hard pipe adapter kit to connect steam outlet to hard pipe. Use a hose cuff and clamps to connect steam outlet to tubing.
2. See installation procedure on Pages 34 and 35.
3. Dashed lines indicate provided by installer..

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! WARNING

Hot surface and steam hazard

Dispersion tube, tubing, or hard pipe 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.

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Dispersion: Rapid-sorb with Models 050 through 083

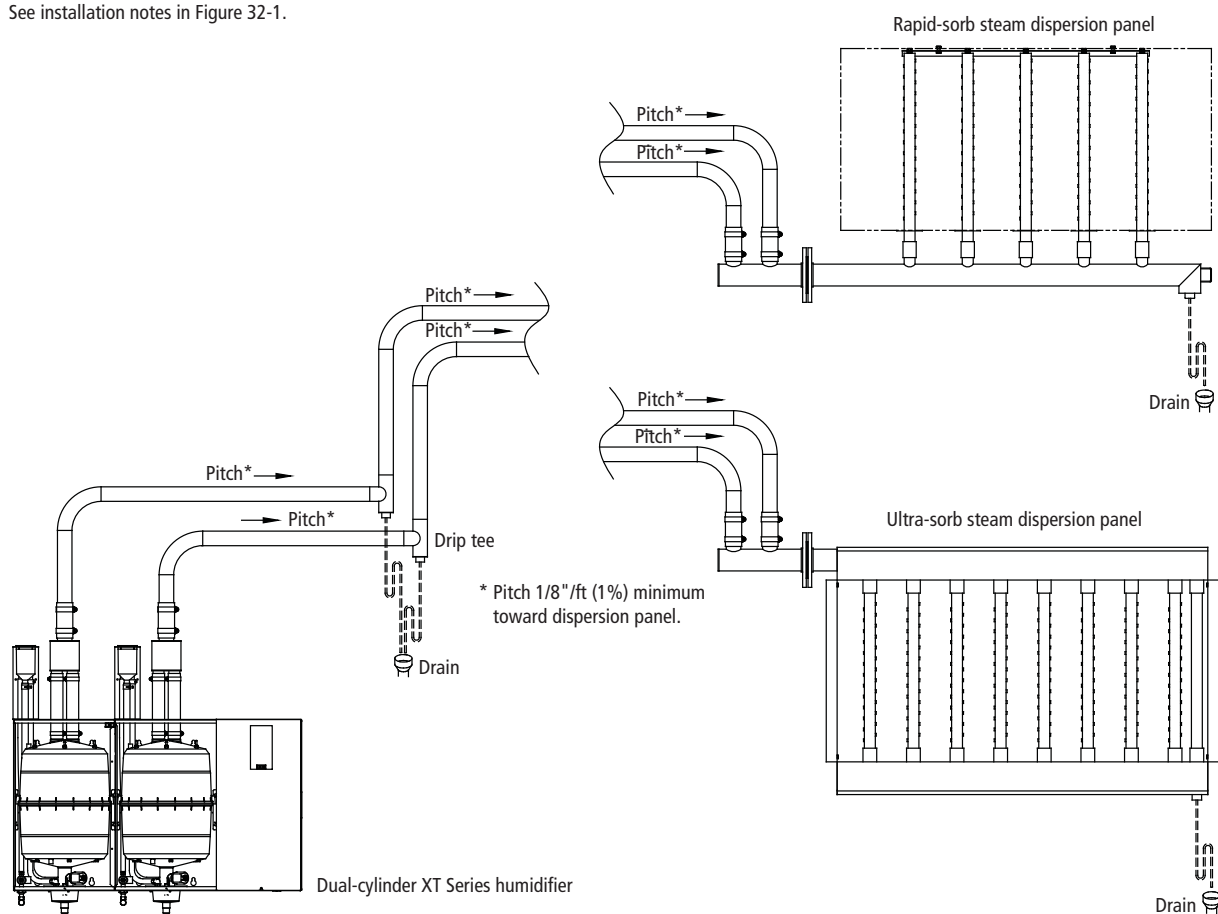
Models 050 through 083 have capacities requiring dispersion devices with condensate drains (Figure 33-1). For these models, DRI-STEEM recommends

- running separate steam piping from each cylinder to the connection on the dispersion device, and
- pitching steam piping toward the dispersion device.

The installer should not attempt to drain condensate back to the cylinder. When a vertical riser is required in the steam piping, a drip tee is required in order to eliminate a condensate collection point that will restrict steam flow.

Figure 33-1:
Dual-cylinder XT Series humidifier connected to Rapid-sorb or Ultra-sorb with riser drips in steam supply lines

See installation notes in Figure 32-1.



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Dispersion: Rapid-sorb

CAUTION

Operate Rapid-sorb within rated steam capacity

Excessive steam flow to the Rapid-sorb steam dispersion assembly can cause condensate to exit the tubelets, which can cause water damage and standing water in the duct or air handler.

To avoid condensate exiting the tubelets, do not operate the Rapid-sorb beyond its rated capacity.

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With header outside of duct for horizontal airflow

1. Mark and cut holes in the ductwork for the dispersion tubes. Use the L-bracket as a template to mark the holes on the duct floor.
2. Temporarily, loosely suspend or support the header below the final location. Vertical balance point of the dispersion tube length dictates where the header should be suspended or temporarily supported.
3. Continue with Step 4 at right.

With header inside of duct for horizontal airflow

Note: See the instructions at left for installing Rapid-sorb with the header *outside* the duct for horizontal airflow.

1. Mark and cut holes in ductwork or air handler for steam header penetration, condensate drain piping, and header support bracket fastener. Allow 1/8"/ft (1%) header pitch toward the support bracket when you drill the hole for the header support bracket fastener.
2. Loosely fasten the header in place.
3. Rotate the header 90° so the header stubs point horizontally in the duct.

When installing in an air handler, the rotation of the header is often less than 90°. Typically, due to the condensate drain piping requirements, the header can be set on the floor of the air handler, assembled in the vertical position, and then raised and mounted in place.

4. Mount the dispersion tubes on the header with the slip couplings or hose cuffs:
 - When installing slip couplings for 1½" (DN40) dispersion tubes, take care not to shear O-rings.
 - Set slip coupling on header stub or dispersion tube so O-ring is resting on face of tubing.
 - Rotate slip coupling while pushing it onto the tubing.
 - O-rings are lubricated at factory. If additional lubrication is necessary, DO NOT use petroleum-based lubricant.
5. Allow the dispersion tubes to rest against the bottom of the duct.
6. Position the flange of the L-bracket so it is upstream of the tubes when the assembly is rotated into position. Fasten the L-bracket to the end of the dispersion tubes with the provided bolt, lock washer, and flat washer.

Dispersion: Rapid-sorb

7. Rotate the assembly up until the L-bracket aligns with the mounting holes in the duct or air handler.
 - For 1½" (DN40) dispersion tubes:
 - Header pitch is duplicated in the L-bracket.
 - Dispersion tube and slip coupling must be fully engaged on header stub for O-rings to provide a seal.
 - High end of L-bracket can be fastened tight to duct or air handler.
 - Fastener on low end of L-bracket must be long enough to compensate for pitch. Use a nut on both sides of L-bracket and duct or air handler for stability.
 - 2" (DN50) dispersion tubes
 - Fasten bracket to top of duct and use hose cuffs to compensate for header pitch.
 - Before securing hose cuffs with hose clamps on dispersion tube and header stub, verify that dispersion tube orifices are directed perpendicular to airflow.
8. Verify that all fasteners are secure:
 - L-bracket to duct
 - Dispersion tubes to L-bracket
 - Hose clamps on 2" (DN50) tubes
 - Header support bracket fastener
9. Secure and seal the header escutcheon plate around the header.

Note:

See Page 36 for steam supply and condensate drain line connection instructions.

Dispersion: Rapid-sorb

**Figure 36-1:
Ultra-sorb with the High-efficiency Tube
option**



High-efficiency Tube option

Dispersion assemblies with the High-efficiency Tube option are designed to produce significantly less dispersion-generated condensate and airstream heat gain, which reduces wasted energy by up to 85%. These improvements are accomplished by reducing the thermal conductivity of the tubes with 1/8" of polyvinylidene fluoride (PVDF) insulating material on the outside of the tubes. These assemblies require careful unpacking, installation, and handling. If your dispersion assembly has the High-efficiency Tube option, be sure to read this section carefully.

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Steam supply connections to Rapid-sorb header

Connect the steam supply interconnecting piping from the humidifier to the Rapid-sorb. The steam supply piping requires a minimum of 1/8"/ft (1%) pitch toward the header.

If multiple humidifiers are supplying one Rapid-sorb, a multiple steam supply connector is needed. Typically, the multiple steam supply connector attaches to the Rapid-sorb header supply end with hose cuff and clamps:

1. Route the necessary number of steam supplies from the humidifiers to the steam supply connector.
2. Position the steam supply connector to accept the steam supplies while maintaining the necessary pitch.
3. Make sure the hose clamps on the steam supply connector and header are tight.

Condensate drain connections to Rapid-sorb header

Piping must be minimum 3/4" I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.

The condensate drain line must be piped as shown in Figure 32-1. Provide a 6" (150 mm) drop prior to a 5" (125 mm) water seal to:

- Ensure drainage of condensate from the header
- Keep steam from blowing out of the drain line

After the water seal, run the drain line to an open drain with a 1" (25 mm) vertical air gap.

- Cut the drain line at a 45° angle on the end above the drain to permit a direct stream of water into the drain pipe while maintaining a 1" (25 mm) air gap.
- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur.

All drain lines must be installed and sized according to governing codes.

Ultra-sorb® Model LV

For Ultra-sorb steam dispersion panel instructions, see the installation, operation, and maintenance manual shipped with the Ultra-sorb.

Also see Figure 33-1.

Dispersion: XT steam blowers

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

As steam is discharged from the XT steam blower, it quickly cools and turns to a visible fog that is lighter than air. As this fog is carried away from the XT 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 37-1 lists the maximum rise, spread, and throw non-wetting distances for XT Series humidifiers with XT steam blowers. 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.

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

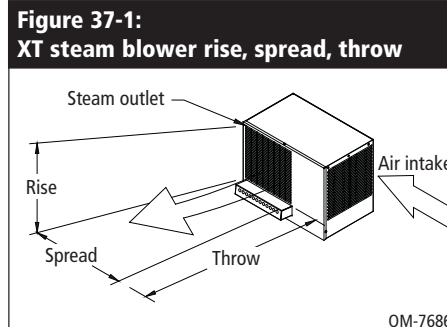


Table 37-1:
XT steam blower minimum non-wetting distances

XTS / XTP 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																								
002	5	2	0.7	0.2	0.9	0.3	1.9	0.6	0.8	0.2	1.2	0.4	2.1	0.6	1.1	0.3	1.5	0.5	2.5	0.8	1.5	0.5	1.5	0.5	3.2	1.0
003	10	5	1.4	0.4	1.9	0.6	3.8	1.2	1.7	0.5	2.4	0.7	4.3	1.3	2.3	0.7	3.0	0.9	5.0	1.5	3.0	0.9	3.0	0.9	6.5	2.0
006	20	8	2.5	0.8	2.8	0.9	6.5	2.0	3.0	0.9	3.3	1.0	7.4	2.3	3.8	1.2	4.0	1.2	8.5	2.6	4.0	1.2	4.0	1.2	10.0	3.0
010	30	14	3.1	0.9	3.0	0.9	7.5	2.3	3.6	1.1	3.4	1.0	8.7	2.7	4.3	1.3	4.0	1.2	9.5	2.9	4.2	1.3	3.5	1.1	11.0	3.4
017	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
025*	75	34	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
033*	100	45	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 XT steam blower

Spread: Minimum non-wetting width from the steam outlet of the XT steam blower

Throw: Minimum non-wetting horizontal distance from the steam outlet of the XT steam blower

* These XT Series humidifier models use two XT steam blowers.

Dispersion: XT steam blowers

The XT steam blower can be mounted on top of an XT Series humidifier cabinet, or wall-mounted remotely from the humidifier. See Figure 39-2.

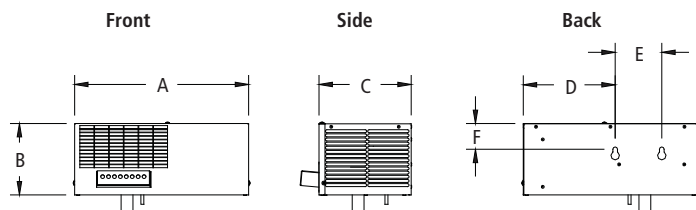
SDU-006E2, for capacities up to 20 lbs/hr (9.1 kg/h), can be directly mounted on Models 002, 003, and 006.

SDU-017E2, for capacities up to 50 lbs/hr (22.7 kg/h), can be directly mounted on Models 010 and 017.

XT steam blower installation must comply with governing codes.

**Figure 38-1:
XT steam blower dimensions**

SDU-006E2 shown



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**Table 38-1:
XT steam blower dimensions**

Dimension	SDU-006E2		SDU-017E2	
	inches	mm	inches	mm
A	14.7	373	17.9	455
B	6.0	152	13.8	350
C	7.8	198	11.0	279
D	3.0	76	3.6	91
E	3.9	99	7.1	180
F	2.7	69	4.2	107

**Table 38-2:
XT 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	m³/min			
SDU-006E2	20	9.1	12.5	5.7	9.5	4.3	106	3.0	0.16 A	17 W	49 dBA
SDU-017E2	50	22.7	27.5	12.5	22.5	11.3	665	18.8	0.23 A	23 W	53 dBA

Notes:

- XT steam blowers ship separately from XT Series humidifiers.
- Noise measurements taken 6.5' (2 m) in front of XT steam blower cabinet.

Dispersion: XT steam blowers

Mounting XT steam blower on top of humidifier

The condensate tee kit shipped with the XT steam blower returns condensate from a top-mounted XT steam blower to the humidifier's cylinder fill hose. See Figure 39-1. Install the kit as follows:

1. If humidifier is not already mounted to wall, see "Wall mounting humidifier" on Page 11.
2. Remove steam cylinder (see "Removing steam cylinder" on Page 11).
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 XT steam blower to wall as noted on Page 40.
6. Feed condensate hose into humidifier cabinet through knockout hole created in Step 5, place XT humidifier below XT 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 13).

For remote-mounting the XT steam blower, see Page 40.

Figure 39-1:
Condensate tee kit for top-mounted
XT steam blower

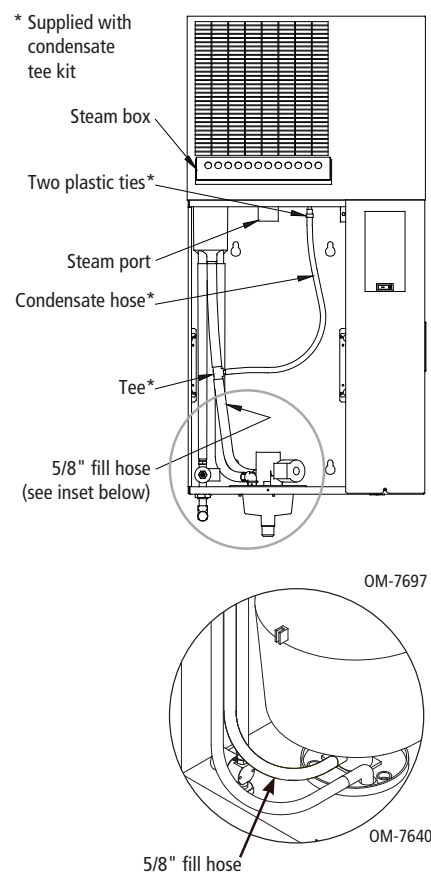
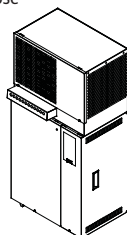


Figure 39-2:
Top- and remote-mounted XT steam blower

Mounted on top of humidifier

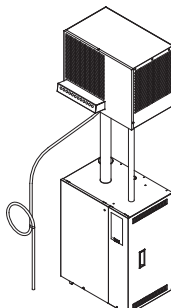
Condensate returned to steam cylinder fill hose



OM-7670

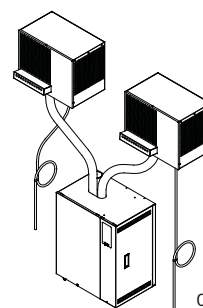
Mounted remotely from humidifier

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



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One XT Series humidifier with two XT steam blowers



OM-7699

Dispersion: XT steam blowers



WARNING

Standing water in XT steam blower

Make sure the XT 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 XT steam blower performance;
- cause 212 °F (100 °C) water to discharge from the XT steam blower, which can cause severe personal injury.

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Remote mounting XT steam blower

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

Follow the instructions below for your wall type:

Mount the XT 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 XT steam blower cabinet (for the lag bolts).
2. Predrill pilot holes in spanner board, and secure XT steam blower to spanner board with lag bolts.

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

See Table 37-1 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 37). Provide at least 3" (76 mm) of clearance on each side of the XT steam blower for air intake.

Dispersion: XT steam blowers

Wiring XT steam blowers

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

Connect XT steam blower fan wires to humidifier terminals 1L1, N, and GRD.

Refer to the external connections diagram shipped with the XT steam blower.

Piping condensate to humidifier fill cup

1. Remove fill cup cap from XT Series humidifier, and drill a 1/2" (13 mm) hole in fill cup cap for SDU-006E2 and SDU-017E2 condensate hose as shown in Figure 41-1.
2. Route XT 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 41-2. The water seal is required to ensure condensate drainage from the XT steam blower and to keep steam from blowing out of the condensate hose.

Piping condensate to drain

The XT steam blower condensate hose must be routed as shown in Figure 41-2. The water seal is required to ensure condensate drainage from the XT 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.

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Additional instructions

See instructions for piping from XT Series humidifier to XT steam blower in Figure 16-1.

Figure 41-1:
Piping condensate to humidifier fill cup

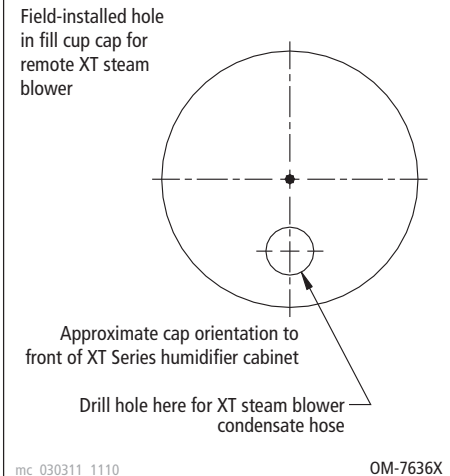
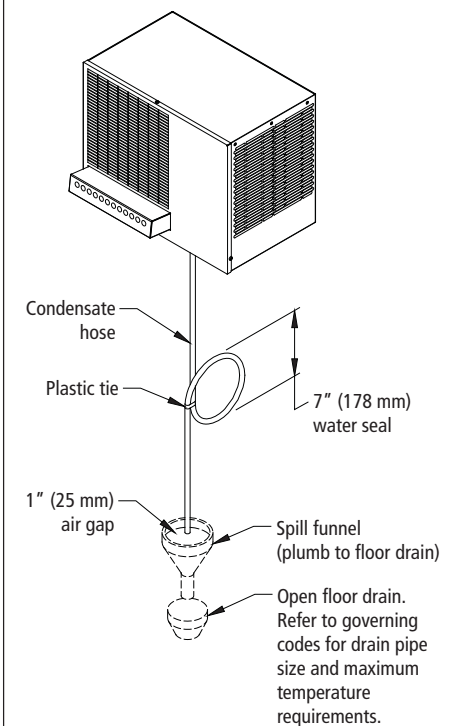


Figure 41-2:
Piping condensate to drain

SDU-017E2 shown



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 41-1.

OM-7687

Principle of operation

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, DRI-STEEM'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.

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, tubing, or piping to the XT steam blower or dispersion assembly, 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

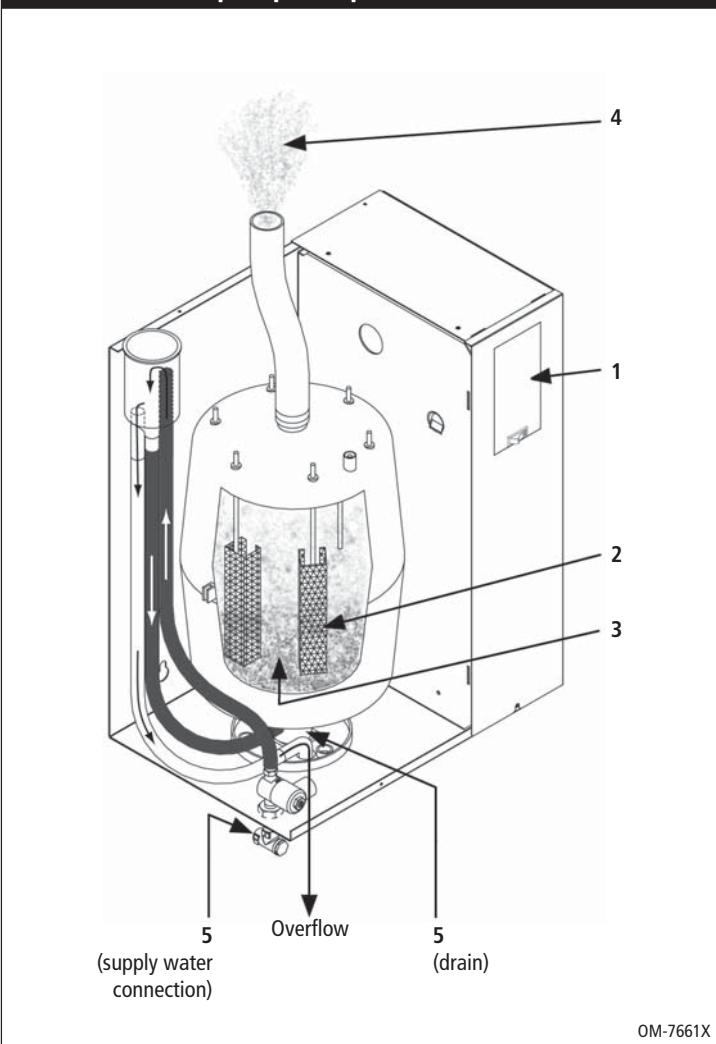
As steam production continues, the concentration of conductive ions in the water increases, eventually leading to increased electrical current through the water. An algorithm monitors water conductivity and auto tunes drain and fill cycles to keep electrical current within demand parameters. This optimizes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

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Principle of operation

Figure 43-1:
XT Series humidifier principle of operation



Start-up checklist

The *Vapor-logic4 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 Model XTP humidifiers and is available at our website: www.dristeem.com

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 and continue the process.

- ☐ Before you start, read this manual and other information sent with your humidifier.
- ☐ Verify that the field wiring is done per the instructions in this manual and per the unit wiring diagram.
- ☐ Do not use demineralized, deionized, or reverse-osmosis water.
- ☐ Confirm that all wiring is correct per the wiring diagram.
- ☐ Confirm that proper grounding and an approved earth ground are provided.
- ☐ Confirm that the water fill line was thoroughly flushed before it was connected to the humidifier.
- ☐ Turn water supply on and confirm that the drain valve is closed.
If the force of air exiting the water supply lines blows the fill cup cap off during the first fill cycle, this is not a sign of defect or a cause for concern; simply replace the fill cup cap after all the air has exited the water line.
- ☐ Turn power on and confirm that the Model XTP control panel LED indicators or Model XTP keypad/display are illuminated.
- ☐ Confirm that the airflow switch is closed.
- ☐ If you choose not to use the airflow switch, jumper **AFsw** and **24vac**.
- ☐ If you choose not to use on-off duct high limit, jumper **24vdc** and **DHL**.
- ☐ Confirm that the high limit humidistat input is closed or that the variable air volume (VAV) control system high limit transmitter is connected.
- ☐ With sufficient water in the steam cylinder, the airflow switch closed, the high limit humidistat closed, the door interlock safety switch closed, and a call for humidity, verify that the heat outputs are activated.
- ☐ Confirm that cleaning procedure has been performed:
 - Step 9 on Page 46 (Model XTS)
 - Step 9 on Page 47 (Model XTP)
- ☐ If you experience difficulties, see “Troubleshooting” and “DRI-STEEM Technical Support” on Page 51.

Control panel, Model XTS

Table 45-1:
Model XTS control panel

Symbol		Function
		On-off / function selection button. Press to turn humidifier on and off. Resets timer for start-up water conditioning. Note: Disconnect power to humidifier to reset internal timers.
LED indicator	Flashing green	Humidifier is preparing to turn on. Occurs if power to humidifier was turned off when humidifier was on. Humidifier turns on after LED flashes for one minute.
	Solid green	Humidifier is on.
	Off	Humidifier is turned off, or power is disconnected. Fill valve is not energized.
		Fill valve
LED indicator	Solid green	Fill valve is energized, filling, or replenishing cylinder with water. During drain cycle when fill valve is open (to allow cold water into cylinder to temper drain water), the fill valve LED does not illuminate.
	Flashing green	Fill and drain valves are pulsing to dislodge mineral deposits from drain. Occurs if high water probe detects water during drain cycle.
	Solid red	Humidifier cannot fill cylinder with water. Humidifier stops operating. Occurs after fill valve has been energized for 40 minutes and high water probe does not detect water.
	Off	Fill valve is not energized.
		Call for humidity
LED indicator	Solid green	Humidifier is turned on and receiving a call for humidity.
	Solid yellow	Humidifier is producing steam, but at less than the rated capacity. Occurs if humidifier has operated for 168 hours and does not detect current between the electrodes.
	Off	Humidifier is not producing steam.
		Drain valve
LED indicator	Solid green	Drain valve is energized, allowing water to drain from cylinder.
	Flashing green	Humidifier is preparing to drain.
	Off	Drain valve is not energized.
		Service
LED indicator	Flashing red	Cylinder has reached end of life. Humidifier continues to operate but at reduced capacity. Occurs after humidifier has operated for 168 hours plus another 24 hours at less than 75% of the maximum operating current.
	Solid red	Humidifier is not operating and requires service.
Controller on-off switch 		On-off switch for humidifier control board. — = On (closed) O = Off (open)
		 WARNING Electric shock hazard The controller on-off switch is not a safety shut-off to humidifier power wiring. Line voltage to the humidifier remains energized even when controller on-off switch is open. To disconnect electrical power to the humidifier, see the shutdown procedure on Page 48.

Start-up procedure, Model XTS



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.

Safety functions

Model XTS humidifiers are 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.

After the Model XTP humidifier is installed and connected properly:

1. Verify that the humidifier, controls, piping, electrical connections, steam supply, and dispersion units(s) are installed according to the following:
 - Installation instructions in this manual
 - Ladder style wiring diagram (inside humidifier cabinet)
 - External connections wiring diagram (inside humidifier cabinet)
 - Governing codes
2. Make sure cylinder is fully seated into drain valve, and verify that all electrical connections are secure before applying power.
3. Make sure cabinet doors and all electrical covers are in place and secure. See Warning at left.
4. Verify that the humidifier is mounted level and securely supported before filling with water. See operating weights in Table 4-1.
5. Verify that the humidifier is level front to back and side to side after it is full of water.
6. Perform all applicable “Start-up checklist” items. See Page 44.
7. Press On-off button on humidifier control panel.
On-off LED illuminates green.
Steam LED illuminates green, indicating a call for humidity, and Fill LED will illuminate green, indicating that fill valve is open and cylinder is filling. You should hear the water flowing. If water flows down drain while cylinder is filling, check for kinks in hoses and make sure O-ring is properly seated in groove in drain valve.
8. Monitor humidifier operation through multiple drain and fill cycles.
9. After the Fill LED turns off, perform the cleaning procedure as follows:
 - a. Operate humidifier long enough for steam to be produced.
 - b. Press and hold On-off button for five seconds to drain cylinder. You might hear fill valve open to allow cold water to flow into cylinder to cool drain water. Drain valve LED flashes for several minutes while cylinder drains.
 - c. Restart the humidifier, and repeat Steps a and b.
10. Press On-off button to turn humidifier back on.

Start-up procedure, Model XTP

After the Model XTP humidifier is installed and connected properly:

1. Verify that the humidifier, controls, piping, electrical connections, steam supply, and dispersion unit(s) are installed according to the following:
 - Installation instructions in this manual
 - *Vapor-logic4 Installation and Operation Manual*
 - Installation section
 - Pre-installation checklist
 - Ladder style wiring diagram (inside humidifier cabinet)
 - External connections wiring diagram (inside humidifier cabinet)
 - Governing codes
2. Make sure cylinder is fully seated into drain valve, and verify that all electrical connections are secure before applying power.
3. Make sure cabinet doors and all electrical covers are in place and secure. See Warning at right.
4. Verify that the humidifier is mounted level and securely supported before filling with water. See operating weights in Table 4-1.
5. Verify that the humidifier is level front to back and side to side after it is full of water.
6. Read the “Operation” section of the *Vapor-logic4 Installation and Operation Manual*.

Note: During start-up, do not leave the humidifier unattended.
7. Perform all applicable “Start-up checklist” items. See Page 44.
8. Monitor humidifier operation through multiple drain and fill cycles.
9. 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.



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.

Safety functions

Model XTP humidifiers are 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.

Capacity limitation

Model XTP only: Humidifier capacity can be limited to a user-specified maximum. Using the keypad/display or Web interface, from the Main menu, and select Tank Setup, then select Capacity Adjustment for menu options.

Maintenance procedures

WARNING

Shutdown procedure

To prevent severe bodily 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 standard control panel (Model XTS) or Vapor-logic4 keypad/display (Model XTP) to drain cylinder.
2. **Model XTP only:** Use Vapor-logic4 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.

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. Verify proper operation of the high limit humidistat, relays, and airflow proving switch.

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

Model XTS

1. Press and hold the on-off / function selection button for five seconds.
2. Let steam cylinder drain for 5 to 10 minutes (drain water is automatically tempered when drain water tempering is selected).
3. Close field-installed manual supply water shut-off valve, and allow cylinder to continue draining.

Model XTP

1. In Vapor-logic4 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.

Maintenance procedures

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.
3. Disconnect steam hose:
After cylinder and humidifier components have cooled, loosen steam hose clamp and disconnect steam hose from cylinder.
4. Disconnect electrode plugs and high water sensor wire.
5. Remove steam cylinder. See "Removing steam cylinder" on Page 11).
6. Vacuum scale and debris out of drain valve port.
Note: For more thorough cleaning, see drain valve maintenance instructions on Page 50.
7. Replace O-ring in drain valve body (new cylinder ships with new O-ring). Make sure O-ring is correctly placed.
8. Dampen O-ring seals **with water** before replacing cylinder. **Do not use lubricant or other substance.**
9. Install new steam cylinder. See "Installing steam cylinder" on Page 13).
10. Connect steam hose to cylinder.

Note: If returning humidifier to operation, see the start-up procedure on

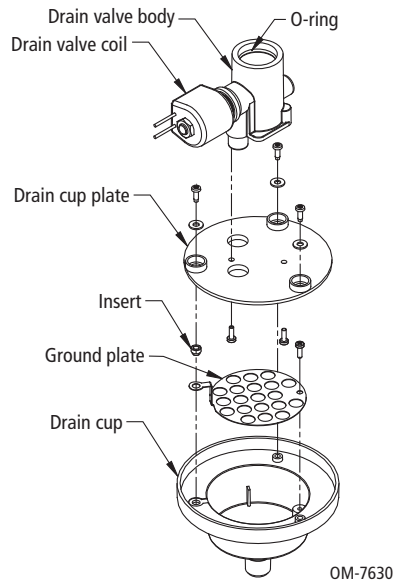
- Page 46 for Model XTS
- Page 47 for Model XTP

Note:

It is advisable to keep a spare steam cylinder in stock during the humidification season. See "Replacement parts" on Pages 55 and 57.

Maintenance procedures

Figure 50-2:
Drain valve assembly maintenance



Perform the following procedure **only** if the procedure at right does not resolve drain valve issues.

1. Perform Steps 1 through 4 at right.
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.

Note: Pay close attention to all parts shown above. Verify that:

- Ground plate is in groove of drain cup.
 - Insert is in place through ground plate loop.
- Failure to get ground plate and insert solidly connected to frame will compromise ground plane safety circuit.

7. Clean end of hose, and reconnect it to drain valve body with hose clamp.
8. Plug Molex plug into its mating wire harness plug.
9. See "Start-up procedure" on Page 47 if returning humidifier to operation.

Drain valve

If either of the following issues occur after several months of runtime, follow the drain valve maintenance procedures below. See Figure 50-1.

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

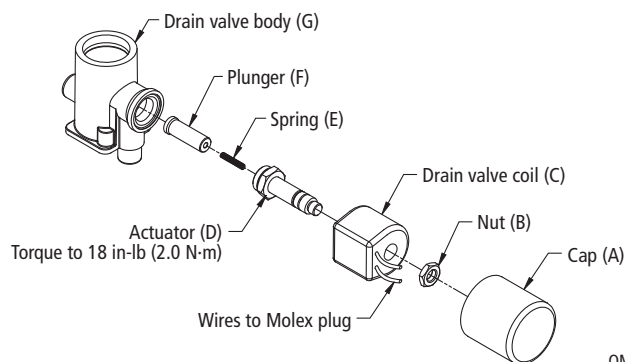
1. When steam cylinder is empty, turn humidifier off. Place all power disconnects in OFF position, and lock in OFF position.
2. Remove cabinet doors and steam cylinder (see Page 11).
3. Vacuum loose scale and debris out of the drain valve port.
4. Disconnect 2-pin Molex plug from 24 VAC drain valve coil.
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.

Note: 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 47 if returning humidifier to operation.

Note: If this procedure does not resolve valve issues, perform the drain valve assembly maintenance procedure in Figure 50-2.

Figure 50-1:
Drain valve body maintenance



Troubleshooting

Model XTS

1. Review possible causes and recommended actions in Table 52-1.
2. If the Troubleshooting guide does not help you solve the issue, call us with the following information available:
 - Product name and serial number
The product name and serial number are on the nameplate on the left side of the XT Series humidifier and XT 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.

Model XTP

1. Review possible causes and recommended actions in the *Vapor-logic4 Installation and Operation Manual*.
2. If the Troubleshooting guide does not help you solve the issue, call us with the following information available:
 - Product name, firmware version, and serial number
The product name and serial number are on the nameplate on the right side of the XT Series humidifier and XT steam blower.
To access the firmware version:
Keypad/display: Select Diagnostics in the Main menu, select Humidifier info, scroll down to Firmware version.
Web interface: Click Diagnostics in the toolbar, click Humidifier info, see Firmware version below.
 - Issue description
Example: water leaking, low humidity, high humidity, etc.
 - When issue began
Example: Always, after remodel, after a change in weather, etc.
 - System changes
Example: Pressure, new service, new controller, relocation, change in maintenance, etc.

DRI-STEEM Technical Support

Have the following information ready when calling Technical Support at +3211823595:

Humidifier model number

Humidifier serial number

Firmware version (Model XTP only)

When issue began

Issue description

Error codes and quantity/frequency of codes

Troubleshooting

**Table 52-1:
Model XTS humidifier troubleshooting guide**

Problem	Possible cause	Action
Humidifier will not turn on or turn off.	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 48, 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.
Steam LED does not turn on.	Call for humidity not being received	Make sure front cover is attached to engage safety interlock switch. Press On/Off button.
		Make sure ribbon cable from membrane switch is securely plugged into control circuit board.
		Check reset switch on transformer.
Water is leaking from humidifier.	Loose plumbing connections	Check wiring and settings of high RH limit switch and airflow proving switch.
		Check supply water connection at fill valve inlet. Tighten as needed.
		Check internal hose clamp connections. Reposition clamps and tighten as needed.
Water constantly runs down drain.	Malfunctioning drain valve.	Check steam hose connection on top of cylinder. Tighten clamp as needed.
		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.
Humidifier makes gurgling sound.	Water flowing from fill cup overflow port	Check internal hoses, and remove kinks or blockage.
		Excess condensate in steam hose
Fill valve makes banging sound.	Water hammer from line pressure	Make sure steam hose has constant downward slope to humidifier or to tees and traps in low spots of hose.
		Make sure water supply line does not contact ductwork.
		Install shock arrestor.
		Install section of 1/4" braided fill line. Conform to governing codes.

Continued

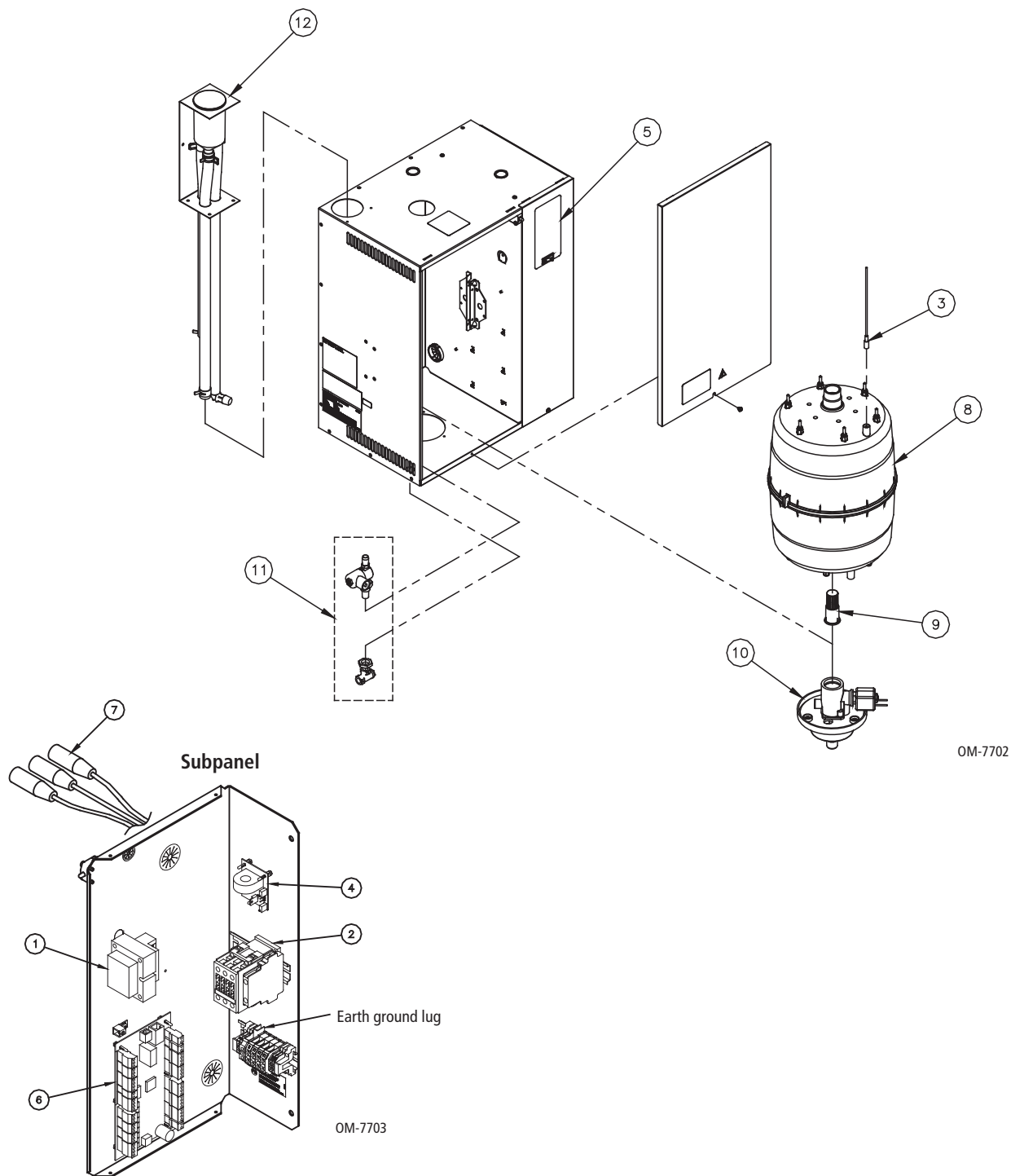
Troubleshooting

**Table 52-1:
Model XTS humidifier troubleshooting guide (continued)**

Problem	Possible cause	Action
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.
Water in duct from dispersion tube.	Dispersion tube installed incorrectly	Install dispersion tube with tubelets facing straight up.
	Impurities in steam hose or pipe causing foaming	Rinse cylinder and hose in clean water.
Service LED flashing red before end of humidification season.	Cylinder full of mineral deposits	Plumb humidifier to filtered water.
		Plumb humidifier to softened water.
	Humidifier runs in short cycles (does not reach capacity)	Use blower activation feature on ADHC or run constant HVAC fan.
Steam LED is yellow.	Humidifier operating below rated capacity Notes: <ul style="list-style-type: none">• This is normal for systems plumbed to low-conductivity water and systems that operate for short cycles.• XT Series humidifier recommended fill water conductivity is 125 to 1250 $\mu\text{S}/\text{cm}$.	Plumb humidifier to softened water.
		To determine operating current, attach clamp-on ammeter to one of the electrode wires on top of cylinder.
		Add add 1/4 to 1/2 tab sodium bicarbonate (i.e., Alka Seltzer) to water in cylinder increase water conductivity. Consult DRI-STEEM for further advice.
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: XTS/XTP Models 002 through 042

Figure 54-1:
XTS/XTP Models 002 through 042 replacement parts



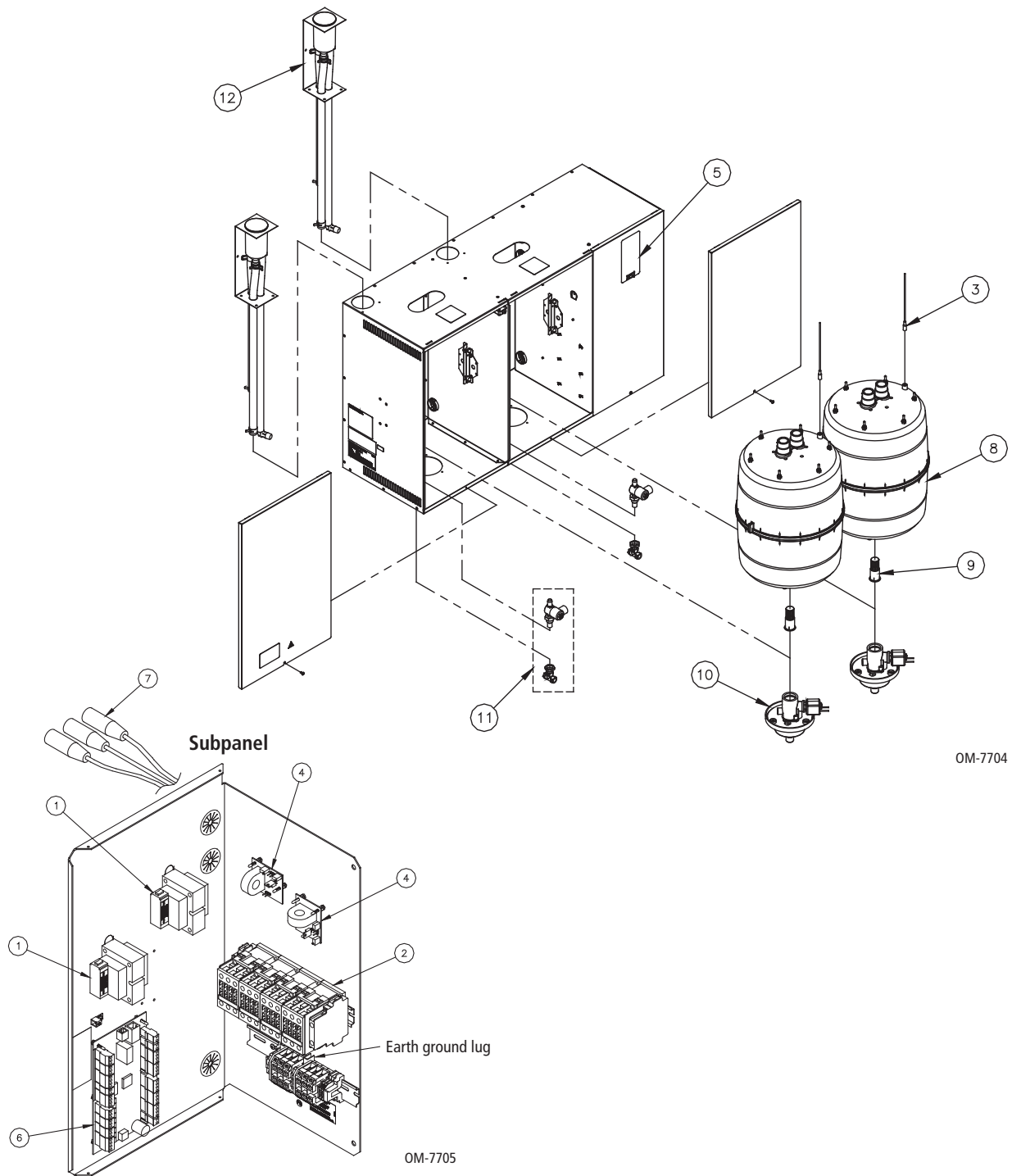
Replacement parts: XTS/XTP Models 002 through 042

**Table 55-1:
XTS/XTP Models 002 through 042 replacement parts**

Item	Description	Part No.
1	Transformer, 230/400 to 24 VAC	408985
2	Contactor - 24 VAC - 35 A	407010-001
	Contactor - 24 VAC - 55 A	407010-002
3	Plug, high water sensor	530010-105
4	Board, current sensing, 120/208/240 V (Model 002 only)	530013-001
	Board, current sensing, 208/230/240/277 V (All models except 002)	530013-004
5	Display board, Vapor-logic4 controller (Model XTP only)	408495-004
6	Main board, Vapor-logic4 controller (Model XTP only)	408495-001
	Main board, standard controller (not shown, Model XTS only)	Call DRI-STEEM
7	Kit, electrode wiring (plugs with wires: 1 red, 1 black, 1 white)	194625-001
8*	Kit, cylinder, 150 mm, 2E-233, 25/22 mm outlet	194601-101
	Kit, cylinder, 150 mm, 2E-865, 25/22 mm outlet	194601-102
	Kit, cylinder, 150 mm, 3E-141, 25/22 mm outlet	194601-104
	Kit, cylinder, 150 mm, 3E-219, 25/22 mm outlet	194601-105
	Kit, cylinder, 150 mm, 3E-290, 25/22 mm outlet	194601-107
	Kit, cylinder, 190 mm, 2E-384, 25/22 mm outlet	194601-108
	Kit, cylinder, 190 mm, 2E-773, 25/22 mm outlet	194601-109
	Kit, cylinder, 190 mm, 3E-166, 25/22 mm outlet	194601-111
	Kit, cylinder, 190 mm, 3E-256, 25/22 mm outlet	194601-112
	Kit, cylinder, 190 mm, 3E-389, 25/22 mm outlet	194601-114
	Kit, cylinder, 270 mm, 6E-129, 38/35 mm outlet	194601-015
	Kit, cylinder, 270 mm, 3E-357, 38/35 mm outlet	194601-016
	Kit, cylinder, 270 mm, 3E-419, 38/35 mm outlet	194601-017
	Kit, cylinder, 270 mm, 3E-484, 38/35 mm outlet	194601-018
	Kit, cylinder, 270 mm, 6E-107, 38/35 mm outlet	194601-019
	Kit, cylinder, 270 mm, 6E-143, 38/35 mm outlet	194601-020
	Kit, cylinder, 270 mm, 2E-226, 38/35 mm outlet	194601-022
	Kit, cylinder, 325 mm, 6E-230, 38/35 mm outlet	194601-023
	Kit, cylinder, 325 mm, 6E-319, 38/35 mm outlet	194601-025
	Kit, cylinder, 325 mm, 6E-220, 38/35 mm dual outlets	194601-026
	Kit, cylinder, 325 mm, 6E-428, 38/35 mm dual outlets	194601-028
9	Strainer, cylinder	531006
10	Drain valve assembly (see parts in Figure 50-2)	194610-001
11	Fill valve assembly Models 002 and 003	194622-001
	Fill valve assembly Models 006, 010, and 017	194622-002
	Fill valve assembly Models 025, 033, and 042	194622-003
12	Kit, fill cup extension (see parts in Figure 12-1)	194605-100
* See steam cylinder Part No. on your XT Series humidifier.		

Replacement parts: XTP Models 050 through 083

Figure 56-1:
XTP Models 050 through 083 replacement parts



Replacement parts: XTP Models 050 through 083

**Table 57-1:
XTP Models 050 through 083 replacement parts**

Item	Description	Part No.
1	Transformer, 230/400 to 24 VAC	408985
2	Contactor - 24 VAC - 35 A	407010-001
	Contactor - 24 VAC - 55 A	407010-002
3	Plug, high water sensor	530010-105
4	Board, current sensing, 208/230/240/277/400 V	530013-004
5	Display board, Vapor-logic4 controller	408495-004
6	Main board, Vapor-logic4 controller	408495-001
7	Kit, electrode wiring (plugs with wires: 1 red, 1 black, 1 white)	194625-001
	Kit, electrode wiring, extended (plugs with wires: 1 red, 1 black, 1 white)	194625-002
8*	Kit, cylinder, 325 mm, 6E-230, 38/35 mm outlet	194601-023
	Kit, cylinder, 325 mm, 6E-319, 38/35 mm outlet	194601-025
	Kit, cylinder, 325 mm, 6E-220, 38/35 mm dual outlets	194601-026
	Kit, cylinder, 325 mm, 6E-428, 38/35 mm dual outlets	194601-028
9	Strainer, cylinder	531006
10	Drain valve assembly (see parts in Figure 50-2)	194610-001
11	Fill valve assembly Models 050, 0673, and 083	194622-003
12	Kit, fill cup extension (see parts in Figure 12-1)	194605-100
* See steam cylinder Part No. on your XT Series humidifier.		

Replacement parts:
Steam blowers

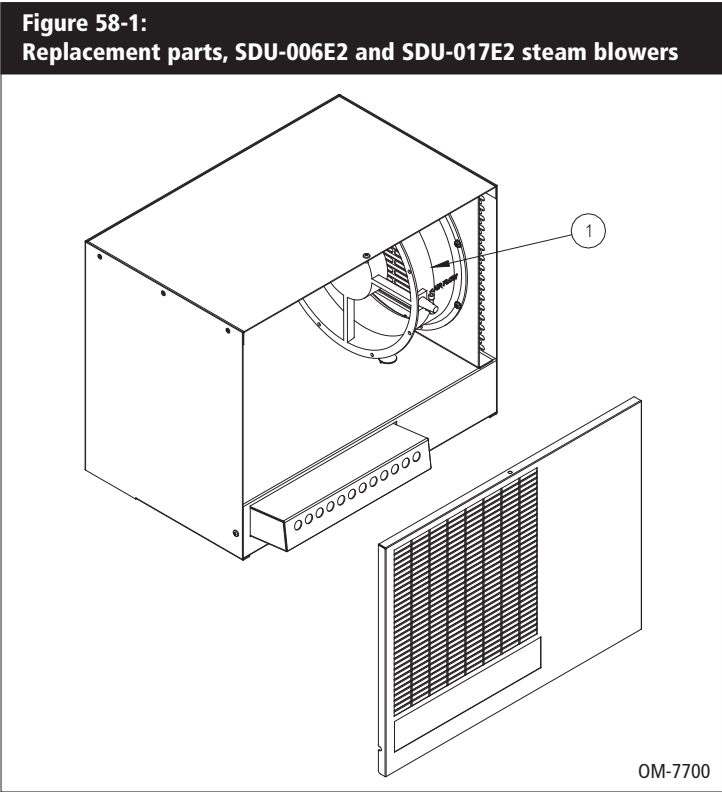


Table 58-1:
Replacement parts, SDU-006E2 and SDU-017E2 steam blowers

Item	Description	Part No.
1	Fan, SDU-006E2	407109-002
	Fan, SDU-017E2	306377

Accessories

**Table 59-1:
Accessories**

Description	Part No.
Steam hose, 1" (DN25) x 10' (3 m), for remote XT steam blower	305400-100
Steam hose, 1½" (DN40) x 10' (3 m), wire-reinforced	305400-010
Steam hose, 2" (DN50) x 10' (3 m), wire-reinforced	305400-010
Condensate hose, 1/4" (DN8) x 13' (4 m), for remote XT steam blower	305400-150
Hose clamp, 1" (DN25) I.D.	700560-100
Hose clamp, 23 mm, spring band	700560-023
Hose clamp, 19 mm, spring band	700560-019
Hose clamp, 1½" (DN40) I.D.	700560-150
Hose clamp, 2" (DN50) I.D.	700560-200
Kit, inline tee, 304 stainless steel, 1½" (DN40)	191071-001
Humidistat, duct high limit, HC-201	405850-201
Humidistat, room, HC-101	405870
Humidity transmitter, duct, 2% RH DSB	405884-009
Humidity transmitter, room, 2% RH	405883-008
Switch, airflow, AFS-112-150, electric	406190

Expect quality from the industry leader

For more than 45 years, DRI-STEEM has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of the XT Series humidifier. DRI-STEEM leads the industry with a Two-year Limited Warranty and optional extended warranty.

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Form No. XT-IOM-M-1111
Part No. 890000-141

Two-year Limited Warranty

DRI-STEEM Corporation ("DRI-STEEM") warrants to the original user that its products will be free from defects in materials and workmanship for a period of two (2) years after installation or twenty-seven (27) months from the date DRI-STEEM ships such product, whichever date is the earlier.

If any DRI-STEEM product is found to be defective in material or workmanship during the applicable warranty period, DRI-STEEM's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product, or the refund of the purchase price, at DRI-STEEM's election. DRI-STEEM shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product. The Limited Warranty does not include cylinder replacement for electrode steam humidifiers.

DRI-STEEM's Limited Warranty shall not be effective or actionable unless there is compliance with all installation and operating instructions furnished by DRI-STEEM, or if the products have been modified or altered without the written consent of DRI-STEEM, or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Any warranty claim must be submitted to DRI-STEEM in writing within the stated warranty period. Defective parts may be required to be returned to DRI-STEEM.

DRI-STEEM's Limited Warranty is made in lieu of, and DRI-STEEM disclaims all other warranties, whether express or implied, including but not limited to any IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

DRI-STEEM SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory, even if DRI-STEEM has notice of the possibility of such damages.

By purchasing DRI-STEEM's products, the purchaser agrees to the terms and conditions of this Limited Warranty.

Extended warranty

The original user may extend the term of the DRI-STEEM Limited Warranty for a limited number of months past the initial applicable warranty period and term provided in the first paragraph of this Limited Warranty. All the terms and conditions of the Limited Warranty during the initial applicable warranty period and term shall apply during any extended term. An extended warranty term of an additional twelve (12) months or twenty four (24) months of coverage may be purchased. The extended warranty term may be purchased until eighteen (18) months after the product is shipped, after which time no extended warranties are available.

Any extension of the Limited Warranty under this program must be in writing, signed by DRI-STEEM, and paid for in full by the purchaser.

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