XT

Electrode Steam Humidifier

Installation, Operation, and Maintenance Manual

DRISTEEM®
The humidification experts

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

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WARNING

Attention installer

Read this manual before installing, and leave this manual with product owner. This product must be installed by qualified HVAC and electrical contractors and in compliance with local, state, federal, and governing codes. Improper installation can cause property damage, severe personal injury, or death as a result of electric shock, burns, or fire.

DRI-STEEM® technical support: 800-328-4447

Read all warnings and instructions

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.

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.

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Hot surfaces and hot water

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.

WARNING

Disconnect electrical power

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.

Contact with energized circuits can cause property damage, severe personal injury, or death as a result of electrical shock or fire. Do not open control cabinet or remove heater terminal or subpanel access panels until electrical power is disconnected.

Follow the shutdown procedure in this manual before performing service or maintenance procedures on any part of the system.

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Electrical shock hazard

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 procedure below before performing service or maintenance procedures on this humidifier:

1. Use Vapor-logic®4 keypad/display to drain the cylinder.
2. Use Vapor-logic®4 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.

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CAUTION

Hot discharge water

Discharge water can be as hot as 212 °F (100 °C) and can damage the drain plumbing.

Humidifiers equipped with a water tempering device need fresh make-up water in order to function properly. Make sure the water supply to the water tempering device remains open during draining.

If the humidifier is not equipped with a water tempering device, allow the tank to cool before opening the drain valve.

Excessive supply water pressure

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

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Table of contents

Controller

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

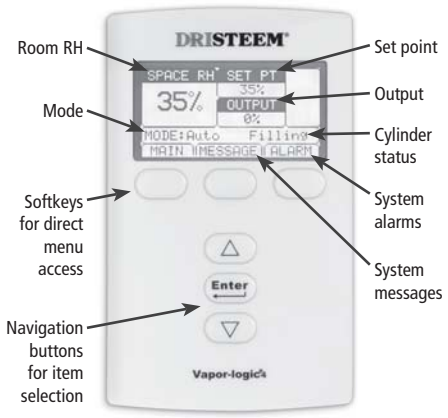
Download DRI-STEEM literature

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

Product overview

Figure 2-1:
Vapor-logic controller interfaces

Keypad/display



Web interface

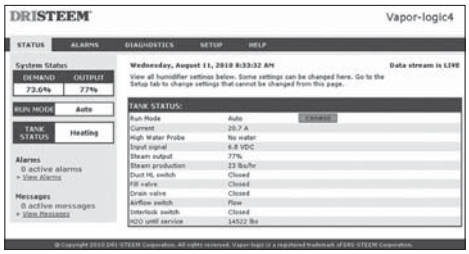
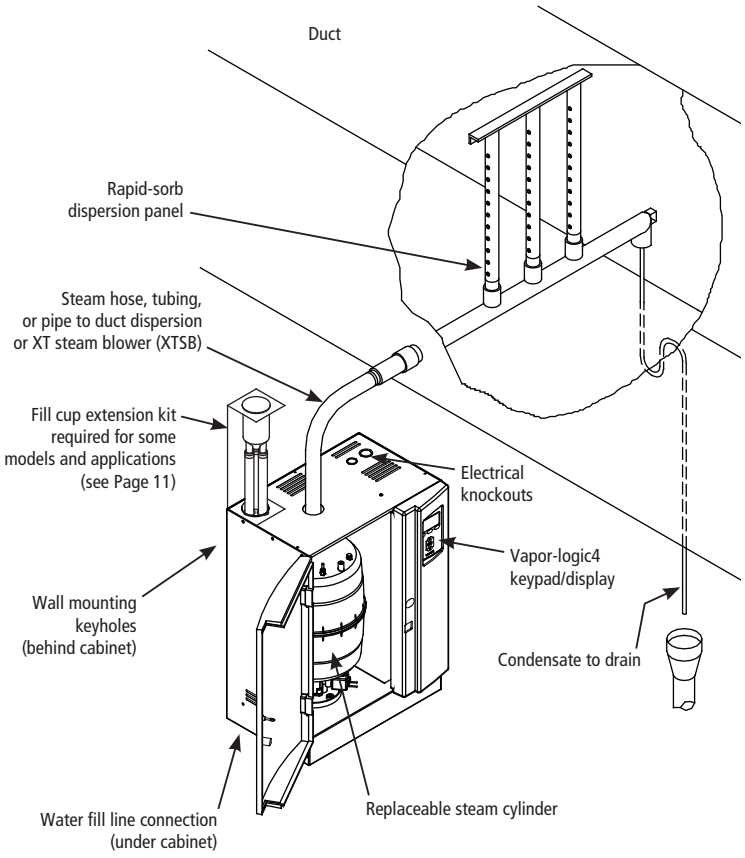


Figure 2-2:
XT humidifier installation overview



Notes:

See Pages 14 and 15 for detailed installation drawings.

Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty.

Supply water

XT electrode steam humidifiers use hard or softened supply water. Water conductivity must be in the range of 125 to 1250 µS/cm (roughly equivalent to 3.4 to 36.3 grains per gallon). See "Supply water considerations" on Page 44.

Demineralized, deionized, and reverse-osmosis water cannot be used, because they are not conductive enough for electrode steam humidifiers.

Heated supply water cannot be used, because unheated supply water is required for drain water tempering.

Product overview

Dispersion options

In addition to Rapid-sorb dispersion shown in Figure 2-2, the duct dispersion options below and the open space dispersion options in Figure 3-3 are available for XT humidifiers. See "Dispersion" beginning on Page 23.

Figure 3-1:
Ultra-sorb Model LV or LH dispersion

Model LV shown

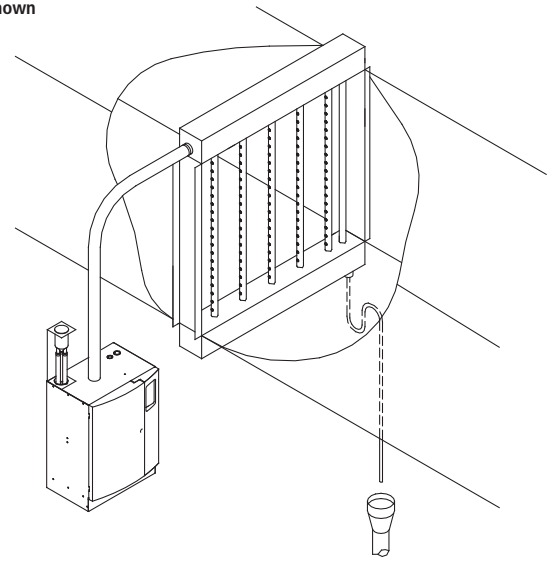


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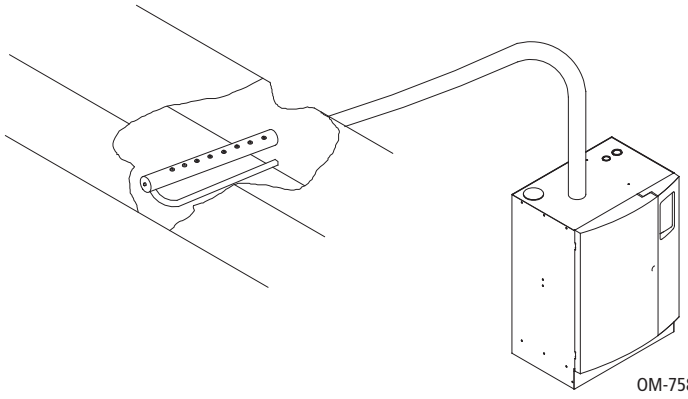
Figure 3-2:
Single dispersion tube



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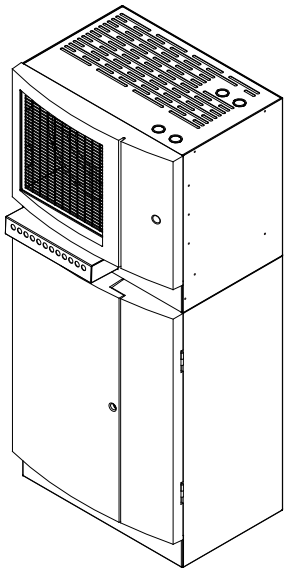
Note: Models XT-30 and larger require condensate drain when using 1½" (DN40) pipe or hose.

Figure 3-3:
XT steam blowers (XTSB)

Mounted on top of humidifier



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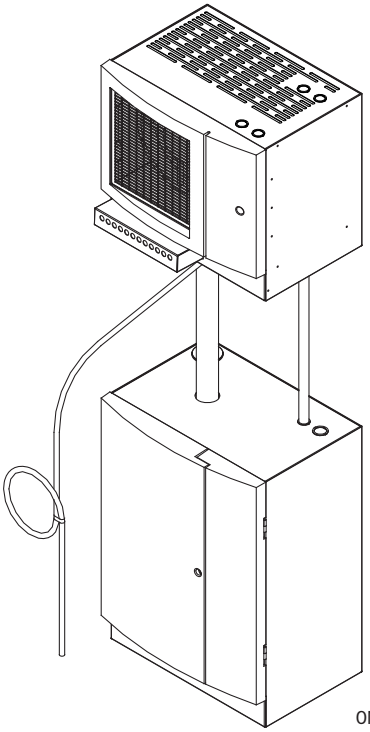
Mounted up to 10' (3 m) away from humidifier



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Specifications, capacities and weights

Table 4-1:
XT humidifier specifications

XT model	kW	Max. steam capacity		Current draw (amps)												Shipping weight		Max. operating weight	
				Single-phase							Three-phase								
		lbs/hr	kg/h	120V	208V	230V	240V	277V	480V	600V	208V	240V	400V	480V	600V	lbs	kg	lbs	kg
5	1.7	5	2.3	14.2	8.2	7.4	7.1	—	—	—	—	—	—	—	—	47.2	21.4	46.3	21.0
10	3.4	10	4.5	—	16.3	14.8	14.2	12.3	7.1	5.7	9.4	8.2	4.9	4.1	3.3	47.2	21.4	46.3	21.0
20	6.7	20	9.1	—	32.2	29.1	27.9	24.2	14.0	11.2	18.6	16.1	9.7	8.1	6.4	48.1	21.8	54.0	24.5
30	10.1	30	13.6	—	—	—	—	—	—	—	28.0	24.3	14.6	12.1	9.7	62.2	28.2	87.5	39.7
50	16.8	50	22.7	—	—	—	—	—	—	—	46.6	40.4	24.2	20.2	16.2	62.2	28.2	87.5	39.7
75	25.1	75	34.0	—	—	—	—	—	—	—	—	—	36.2	30.2	24.2	75.2	34.1	124.3	56.4
100	33.5	100	45.4	—	—	—	—	—	—	—	—	—	48.4	40.3	32.2	75.2	34.1	124.3	56.4
150	50.3	150	68.1	—	—	—	—	—	—	—	—	—	72.6	60.5	48.4	129.2	58.6	242.9	110.2
200	67.0	200	90.8	—	—	—	—	—	—	—	—	—	96.7	80.6	64.5	129.2	58.6	242.9	110.2

Note: For circuit protection requirements, see Table 5-1.

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Fusing and line currents

Table 5-1:
Recommended fusing and line currents for XT humidifiers

Model	Phase	Volts	Line amps			kW	Recommended fusing amps
			L1	L2	L3		
XT-5	1	120	14.2	14.2	—	1.7	25
		208	8.2	8.2	—	1.7	15
		230	7.4	7.4	—	1.7	13
		240	7.1	7.1	—	1.7	15
XT-10	1	208	16.3	16.3	—	3.4	25
		230	14.8	14.8	—	3.4	25
		240	14.2	14.2	—	3.4	25
		277	12.3	12.3	—	3.4	20
		480	7.1	7.1	—	3.4	15
		600	5.7	5.7	—	3.4	10
	3	208	9.4	9.4	9.4	3.4	15
		240	8.2	8.2	8.2	3.4	15
		400	4.9	4.9	4.9	3.4	13
		480	4.1	4.1	4.1	3.4	10
		600	3.3	3.3	3.3	3.4	10
XT-20	1	208	32.2	32.2	—	6.7	50
		230	29.1	29.1	—	6.7	50
		240	27.9	27.9	—	6.7	45
		277	24.2	24.2	—	6.7	40
		480	14.0	14.0	—	6.7	25
		600	11.2	11.2	—	6.7	20
	3	208	18.6	18.6	18.6	6.7	30
		240	16.1	16.1	16.1	6.7	25
		400	9.7	9.7	9.7	6.7	16
		480	8.1	8.1	8.1	6.7	15
		600	6.4	6.4	6.4	6.7	10
XT-30	3	208	28.0	28.0	28.0	10.1	45
		240	24.3	24.3	24.3	10.1	40
		400	14.6	14.6	14.6	10.1	25
		480	12.1	12.1	12.1	10.1	20
		600	9.7	9.7	9.7	10.1	15
XT-50	3	208	46.6	46.6	46.6	16.8	70
		240	40.4	40.4	40.4	16.8	70
		400	24.2	24.2	24.2	16.8	40
		480	20.2	20.2	20.2	16.8	35
		600	16.2	16.2	16.2	16.8	25
XT-75	3	400	36.2	36.2	36.2	25.1	63
		480	30.2	30.2	30.2	25.1	50
		600	24.2	24.2	24.2	25.1	40
XT-100	3	400	48.4	48.4	48.4	33.5	80
		480	40.3	40.3	40.3	33.5	70
		600	32.2	32.2	32.2	33.5	50
XT-150	3	400	72.6	72.6	72.6	50.3	125
		480	60.5	60.5	60.5	50.3	100
		600	48.4	48.4	48.4	50.3	80
XT-200	3	400	96.7	96.7	96.7	67.0	150
		480	80.6	80.6	80.6	67.0	125
		600	64.5	64.5	64.5	67.0	100

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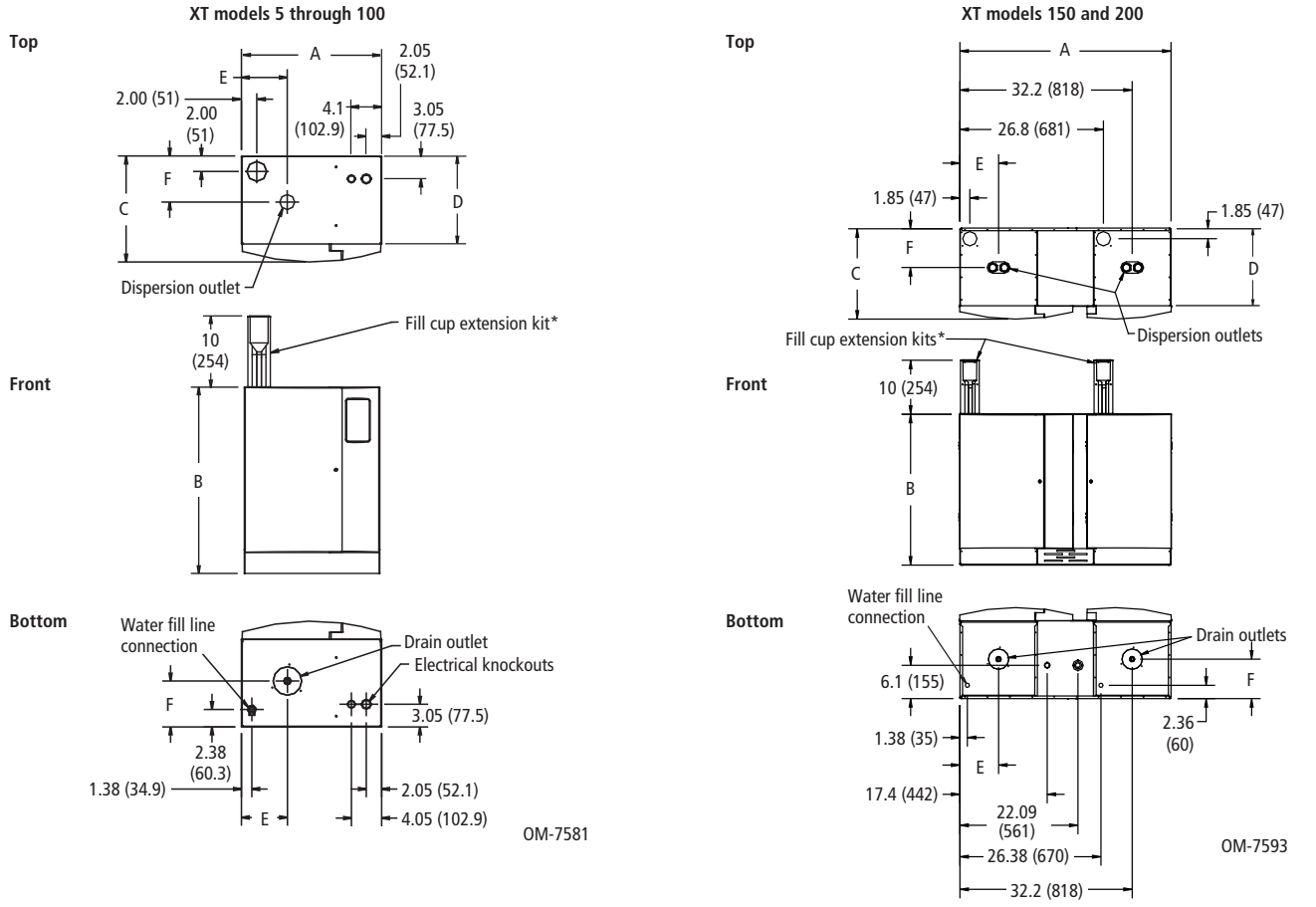
Dimensions

Figure 6-1: XT humidifier dimensional drawings

Labeled dimensions: inches (millimeters). See mounting dimensions and electrical knockouts in Figure 8-1.



* Fill cup extension kit is required for XT humidifier models 75 through 200 (ships loose with these models), for all XT humidifiers using Rapid-sorb or Ultra-sorb dispersion, and for all XT humidifiers with more than 20' (6 m) maximum developed length of tubing/pipe from humidifier to dispersion assembly.

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Table 6-1: Dimensions by model number

Dimension	Description	XT models							
		5, 10, and 20		30 and 50		75 and 100		150 and 200	
		inches	mm	inches	mm	inches	mm	inches	mm
A	Cabinet width	16.06	408	19.21	488	21.46	545	39.76	1010
B	Cabinet height	23.94	608	25.83	656	27.99	711	27.99	711
C	Cabinet depth including doors	12.05	306	14.09	358	16.89	429	16.97	431
D	Cabinet depth not including doors	10.00	254	11.80	300	14.40	184	14.40	184
E	Cabinet left edge to steam/drain outlet centers	4.61	117	6.22	158	7.20	183	7.24	184
F	Cabinet back edge to steam/drain outlet centers	6.14	156	6.18	157	7.24	184	7.24	184

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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 23.

- **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 19 and 20.

- **Supply water and drain piping connections**

  Water supply piping and drain connections are at the bottom of the cabinet. See "Piping" on Pages 14 and 15.

- **Exterior wall insulation**

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

Dispersion control devices

See Figure 22-1 for recommended installation locations for the dispersion assembly and associated control devices.

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Important:

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

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

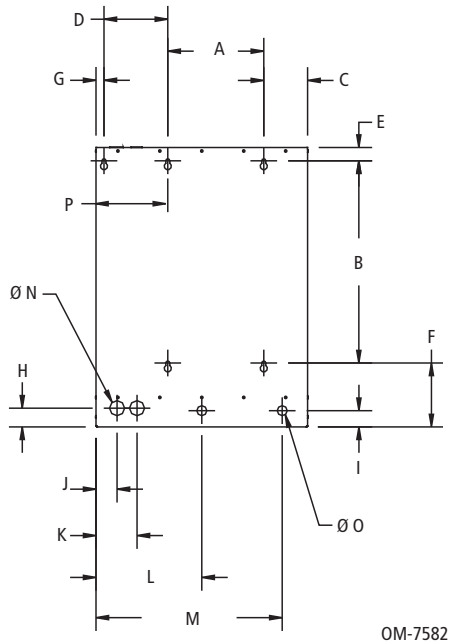
Minimum ambient temperature:
41 °F (5 °C)

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

Mounting:
Keyhole locations and dimensions

Figure 8-1:
XT humidifier mounting keyhole locations

XT models 5 through 100



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XT models 150 and 200

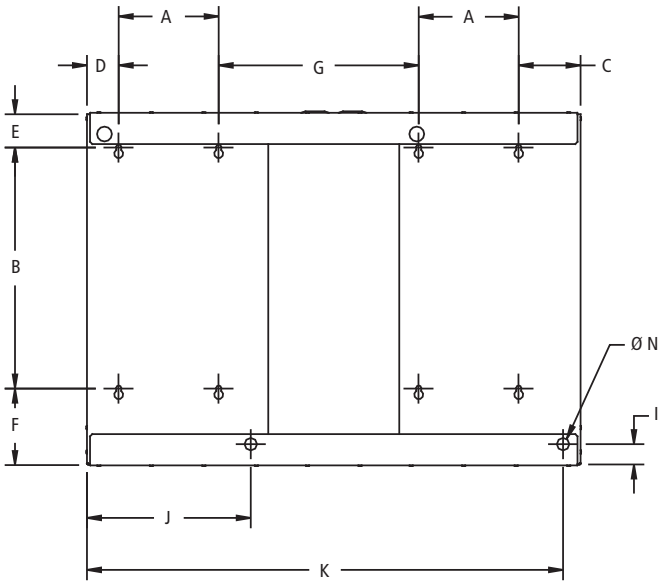

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Table 8-1:
XT humidifier mounting keyhole dimensions

Dimension	XT models							
	5, 10, and 20		30 and 50		75 and 100		150 and 200	
	inches	mm	inches	mm	inches	mm	inches	mm
A	5.00	127	8.15	207	9.62	244	8.00	203
B	16.52	420	18.12	460	20.24	514	19.27	489
C	3.60	91	3.60	91	4.39	112	4.95	126
D	—	—	—	—	6.39	162	2.54	65
E	0.97	25	1.33	34	1.33	34	2.73	69
F	6.40	163	6.40	163	6.40	163	6.19	157
G	—	—	—	—	0.80	20	16.00	406
H	1.88	48	1.88	48	1.88	48	—	—
I	1.63	41	1.63	41	1.63	41	1.70	43
J	2.06	52	2.06	52	2.11	54	13.10	333
K	4.06	103	4.06	103	4.11	104	38.09	967
L	7.89	200	9.47	241	10.59	269	—	—
M	14.43	367	17.44	443	18.65	474	—	—
N	1.51	38	1.51	38	1.51	38	1.00	25
O	1.00	25	1.00	25	1.00	25	—	—
P	7.12	181	7.12	181	7.19	183	—	—

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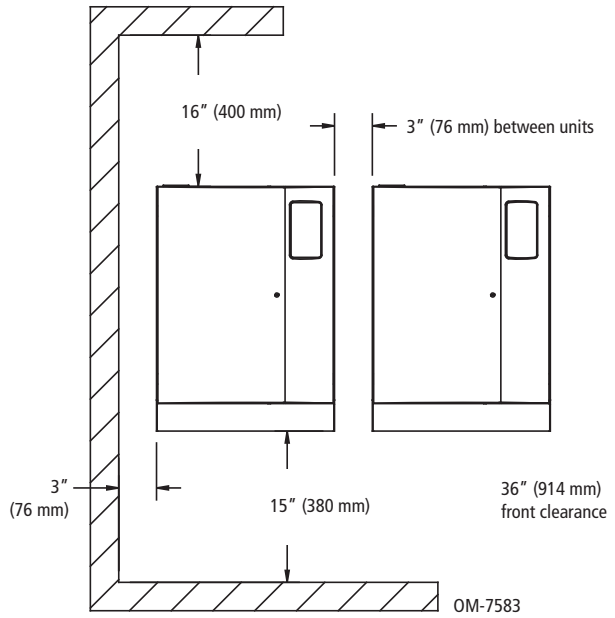
Mounting: Clearances

Figure 9-1:
XT humidifier recommended minimum clearances



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Mounting

Opening and closing cabinet doors

To open the cabinet doors, use a slotted screwdriver to rotate the quarter-turn fastener counterclockwise so the slot is vertical.

To close the doors, close the right then the left door, and push the quarter-turn fastener while turning clockwise so the slot is horizontal.

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

Removing cabinet doors

XT humidifier and XTSB doors have lift-off hinges for easy removal of open doors. The doors are captivated when closed but should be removed when open. An upward bump could damage the door if it jumps the hinges and falls.

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

Follow the instructions below for your model and wall type, and mount the humidifier level and plumb. See Figures 14-1 and 15-1.

- Wood studs 16" (406 mm) on center, XT models 75 through 200:
  Mark hole locations at centers of studs, and predrill ¼" (6 mm) diameter pilot holes. Secure humidifier to wall with lag bolts (provided).
- Metal studs 16" (406 mm) on center, XT models 75 through 200:
  Mark hole locations at centers of studs. Using a drill bit just large enough to push a 3/8" (10 mm) bolt through, drill through studs and wall, and through a backing plate on other side of wall. Push bolts through wall, studs, and backing plate. Secure humidifier to wall with bolts, and secure backing plate with washers and nuts.
- XT models 5 through 50, and XT models 75 through 200 if 16"-on-center (406 mm) studs are not available:
  Mount spanner boards on wall, spanning at least two studs. Position one board at top of cabinet (for the lag bolts), and the other board at bottom of cabinet. Secure humidifier to spanner boards with lag bolts.
- Hollow block or poured concrete wall, any XT model:
  Mark hole locations, and drill appropriate pilot holes for two 3/8" (10 mm) toggle bolts or two 3/8" (10 mm) machine bolt lead anchors. Secure humidifier in place with bolts and anchors.

Fill cup extension kit

A fill cup extension kit (Figure 11-1) is required for any of the following:

- XT humidifier models 75 through 200 (fill cup extension kit ships loose with these models)
- All XT humidifiers using Ultra-sorb or Rapid-sorb dispersion
- All XT humidifiers with more than 20' (6 m) maximum developed length of tubing/pipe from humidifier to dispersion assembly

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Removing existing fill cup: XT models 5 through 50

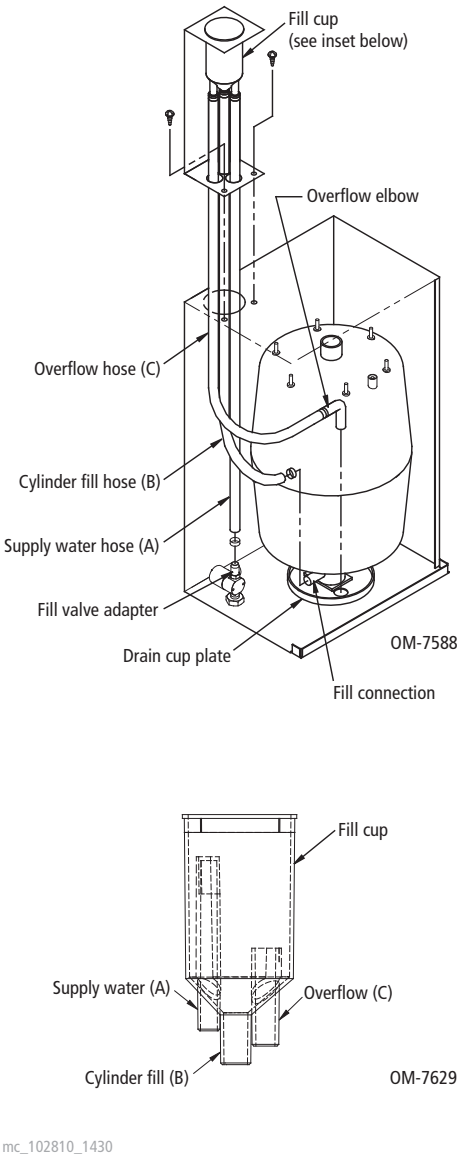
If installing a fill cup extension kit for XT models 5 through 50, first remove the existing fill cup as follows:

1. Remove steam cylinder from XT cabinet (if not already out). See "Removing steam cylinder" on Page 10.
2. Expand spring clamps and slide them up cylinder fill hose and supply water hose, and disconnect hoses from fill connection and fill valve adapter.
3. Disconnect overflow hose from overflow elbow.
4. Fill cup is press fit into top of XT cabinet. Rock fill cup back and forth while pushing up until it comes out, then remove fill cup and hoses.

Installing fill cup extension kit: all XT models

1. Remove steam cylinder(s) from XT cabinet (if not already out). See "Removing steam cylinder" on Page 10.
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 fill 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 fill 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. No spring clamp is required on this connection.

Figure 11-1:
Fill cup extension kit



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Steam cylinder

Figure 12-1:
Steam cylinder installation

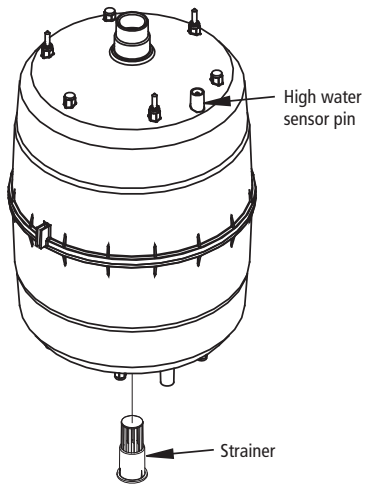
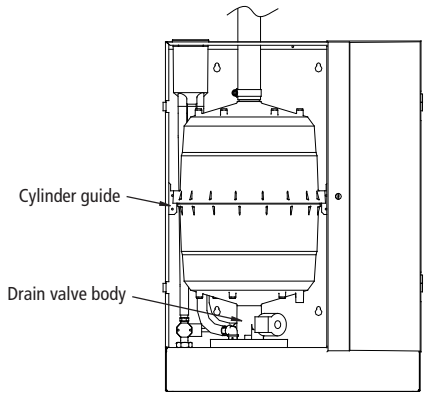


Figure 12-2:
Steam cylinder installation



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 12-1.
2. Use water to lubricate drain outlet on bottom of cylinder and o-ring in drain valve body. See Figure 12-2.
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 becomes 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.

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
  - Less than 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 tube dispersion with condensate drain **and**:
    - 20 lbs/hr (9.1 kg/h) or of more steam production, or
    - More than 20' (6 m) of steam hose, tubing, or pipe between humidifier and dispersion

Piping: Supply water and drain

Supply water piping

Use only copper for supply water piping; do not use rubber or plastic. The standard supply water connection before the fill valve is a 1/4" FIP 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, ¾" (DN 20) ID material rated for 212 °F (100 °C) minimum.

The XT 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 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). However, 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 humidifier.
- Chlorinated polyvinyl chloride (CPVC) piping is a non-metallic alternative for drain piping. It is rated up to 212 °F (100 °C) for intermittent-use, low-pressure applications.

The connection size for the steam cylinder drain is 1" (DN25) hose. Do not reduce this connection size.

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

A drain hose is provided to function as the flexible connection from the drain cup to the field-installed open drain. See Figure 13-1.

Piping drawings:

See the piping drawings on Pages 14 and 15.

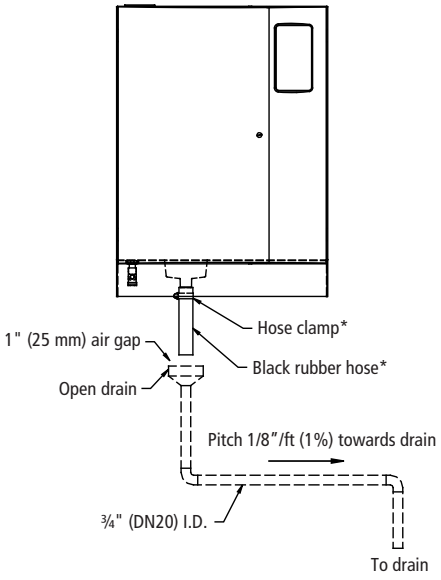
Important: Thoroughly flush the supply water piping to remove pipe residue and stagnant water before connecting piping to the humidifier. Pipe residue and stagnant water in the water supply piping can cause foaming, preventing the humidifier from reaching the required steam capacity.

⚠ WARNING

Hot drain pipes

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

Figure 13-1: Drain piping detail



* Hose clamp and black rubber hose ship with each humidifier; they can also be ordered from DRI-STEEM. See the replacement parts section of this manual for part numbers.

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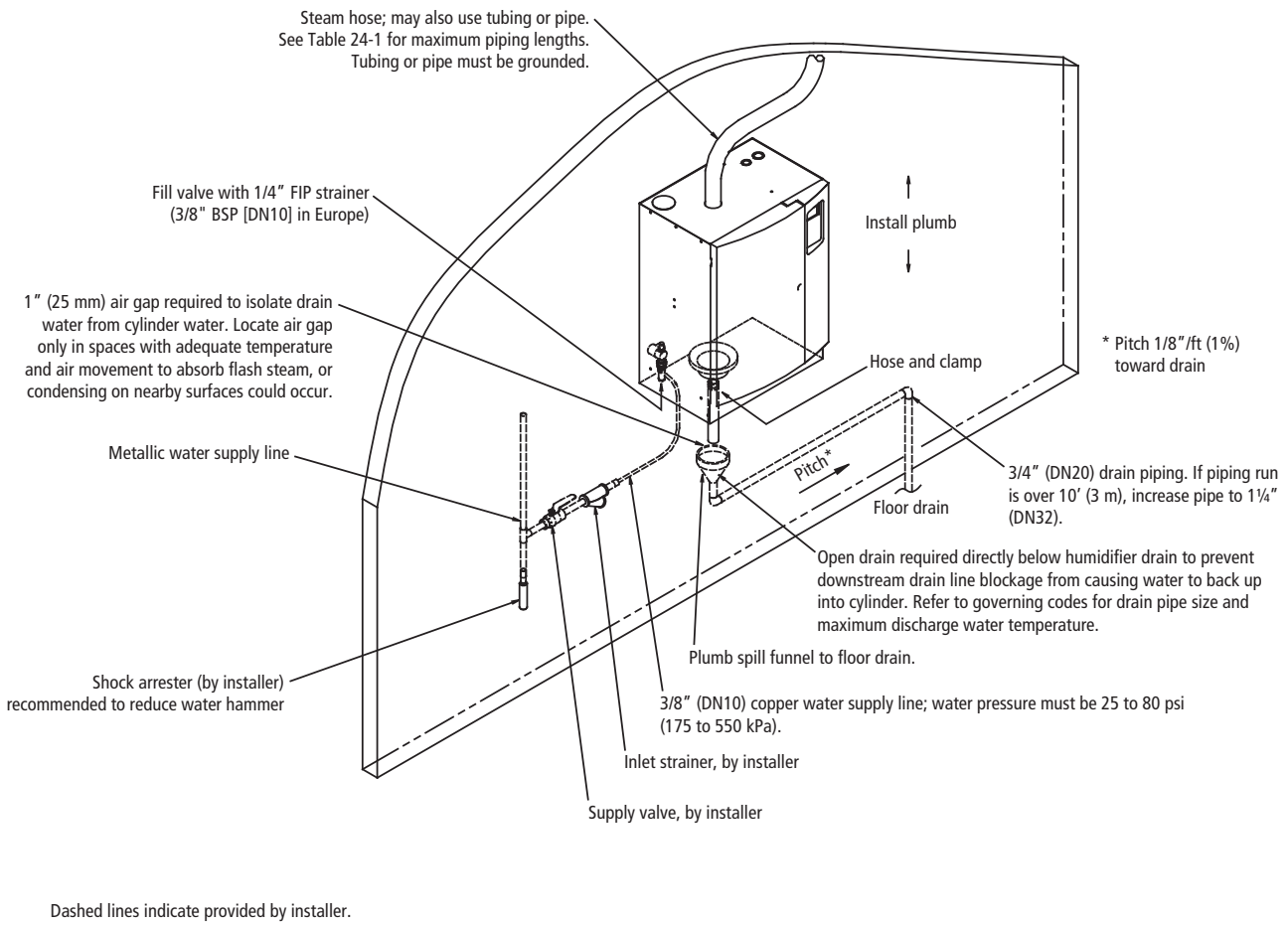
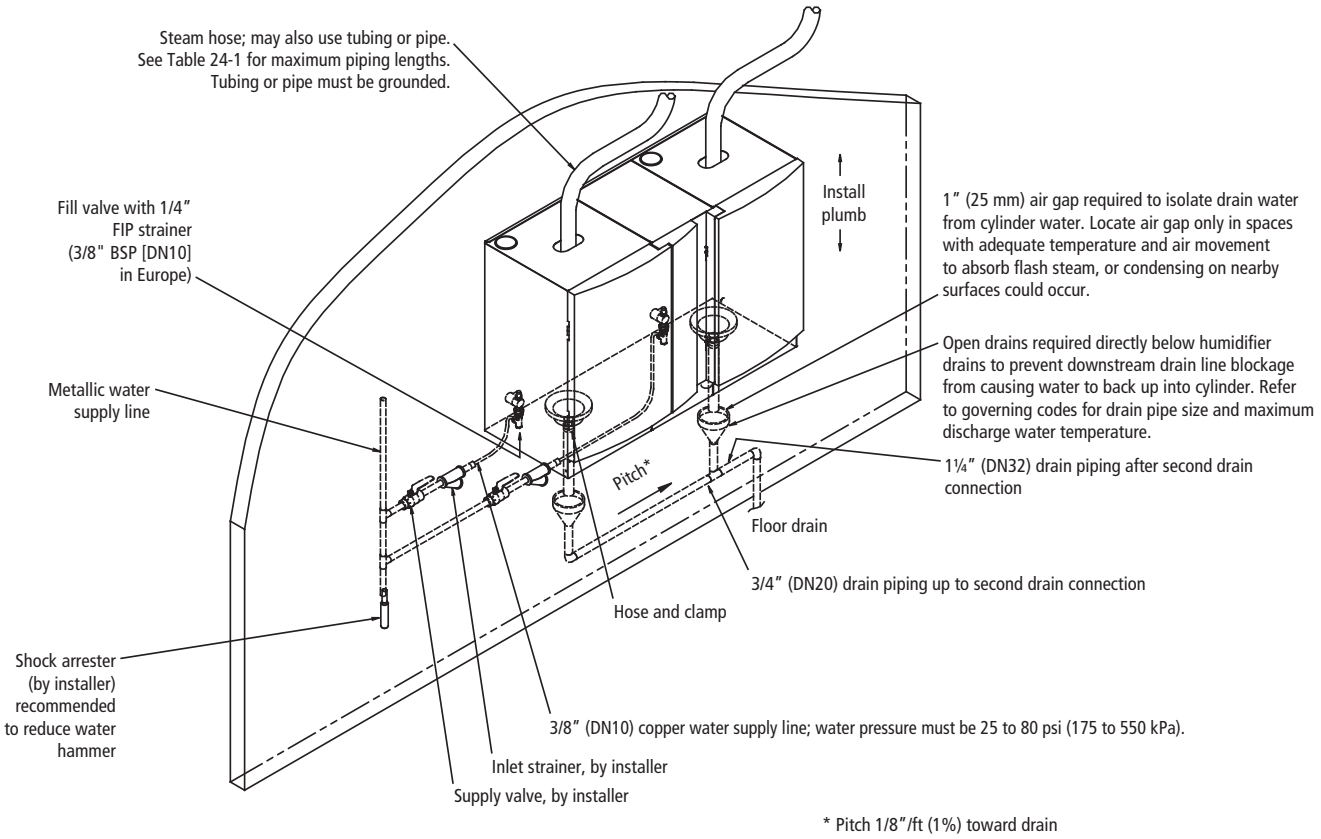
Piping:
XT models 5 through 100

Figure 14-1:
XT humidifier field piping overview, models 5 through 100



Piping:
XT models 150 and 200

Figure 15-1:
XT humidifier field piping overview, models 150 and 200



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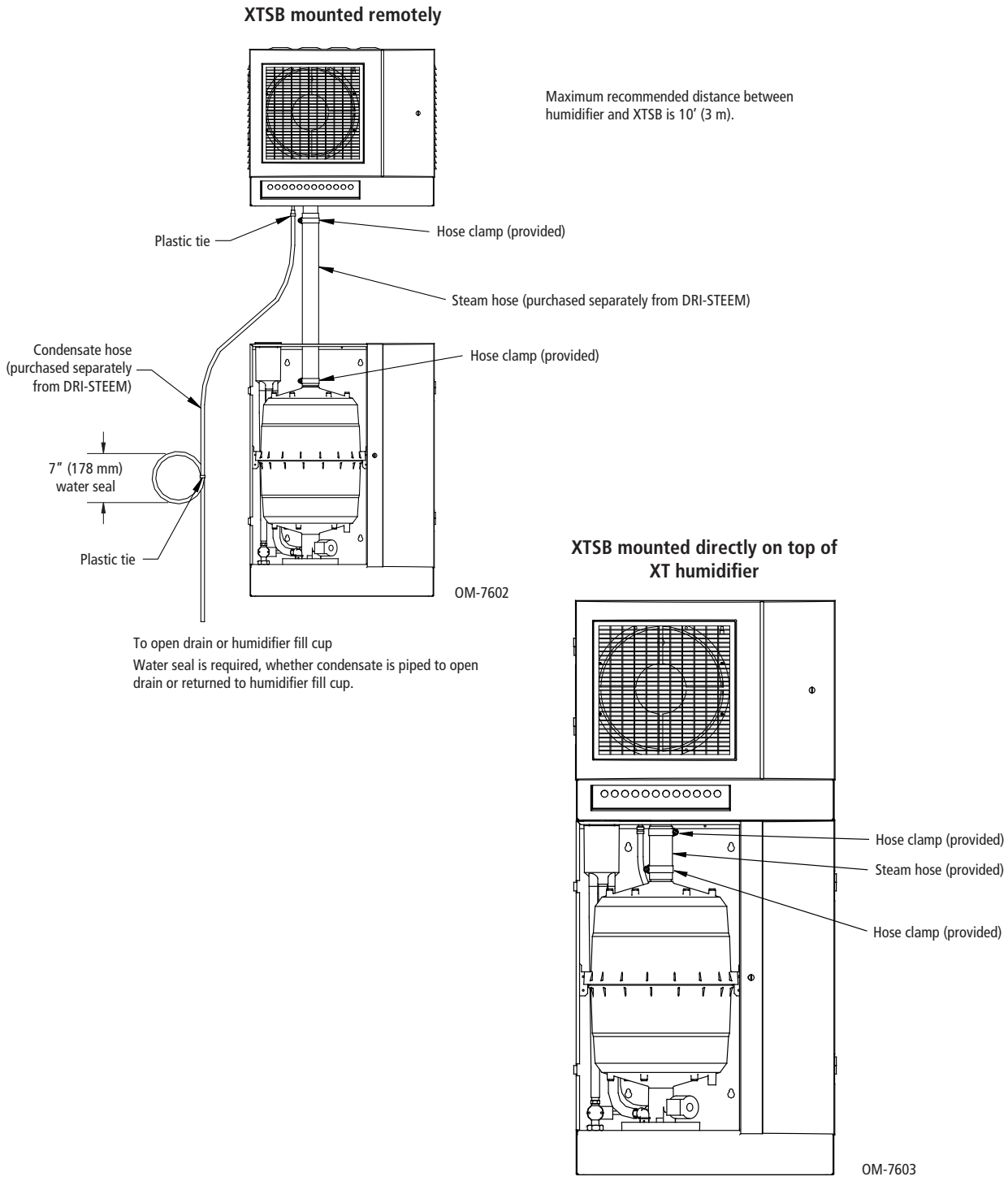
Piping:
XT steam blowers

Figure 16-1:
Piping from XT humidifier steam cylinders to XT steam blowers (XTSB)



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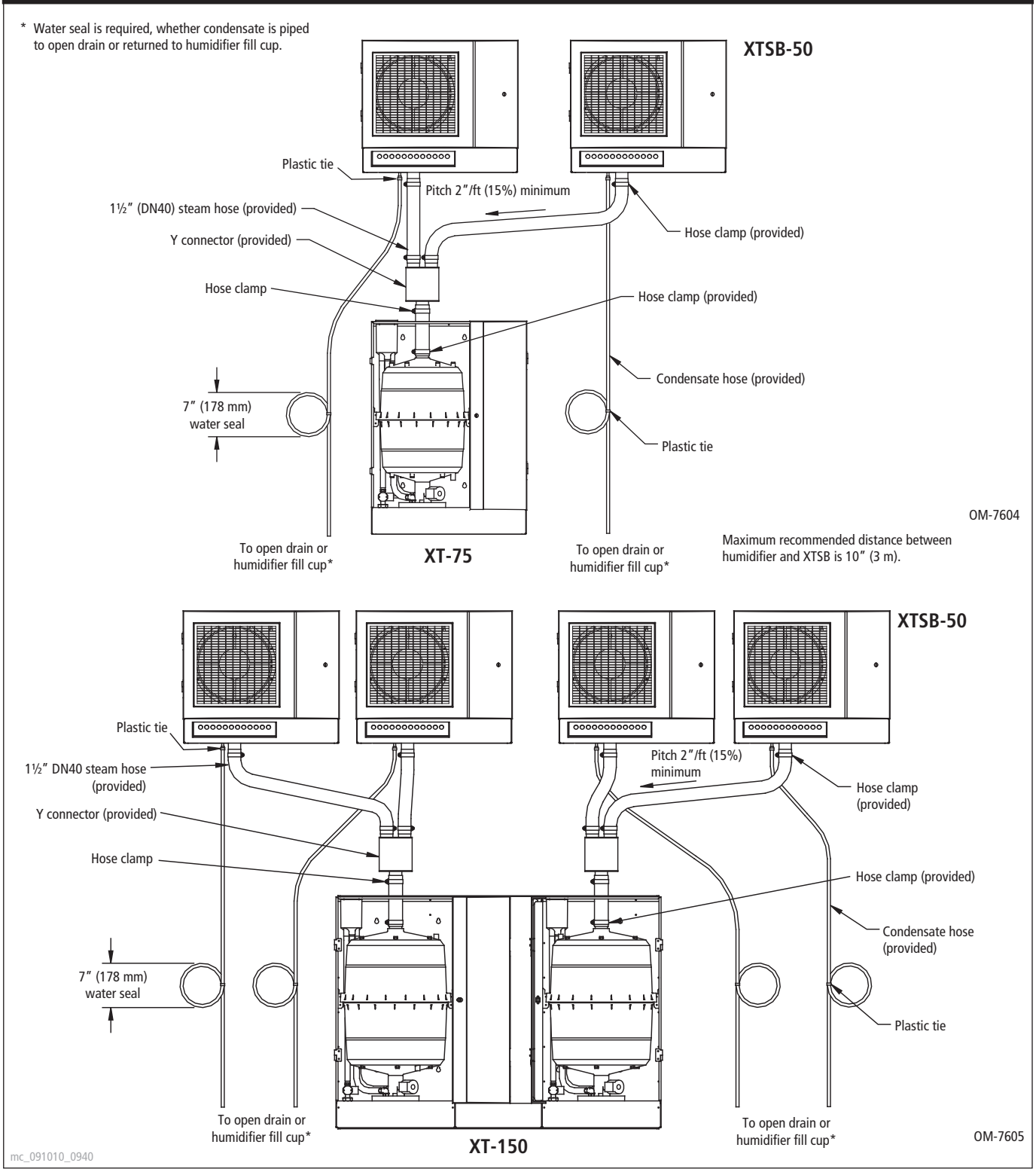
Piping:
XT steam blowers

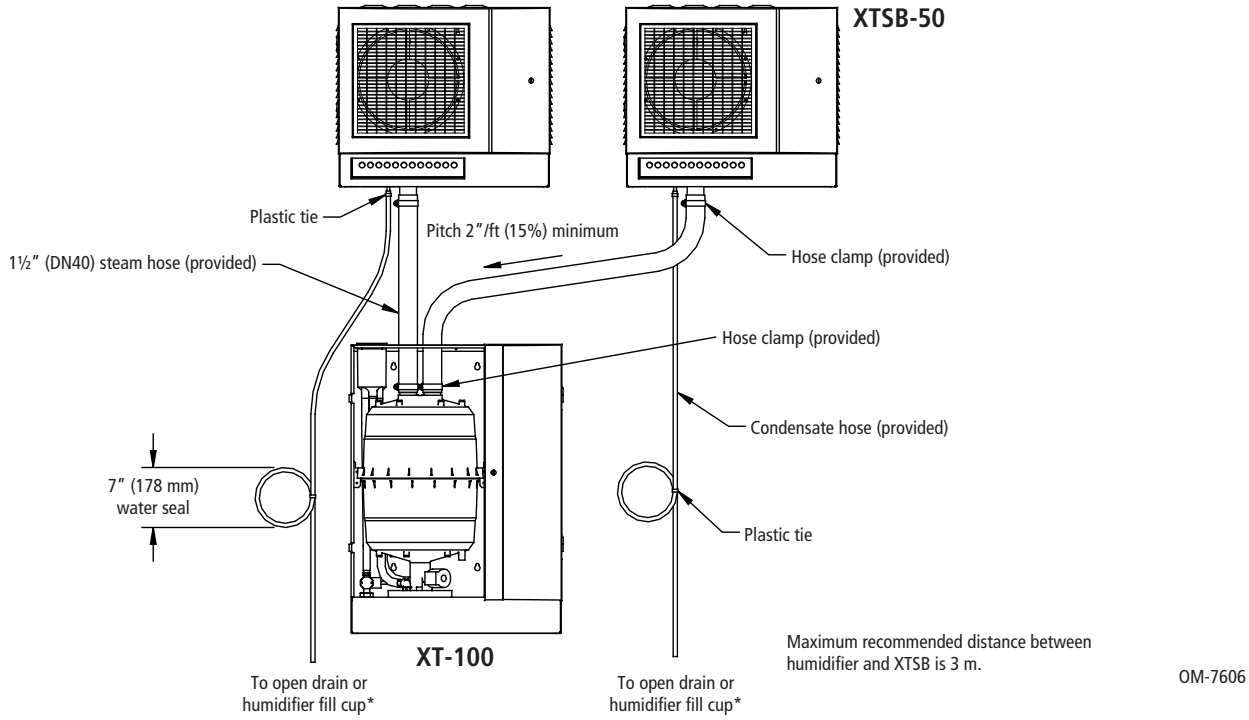
Figure 17-1:
Piping from XT humidifier steam cylinders to XTSBs with Y connectors

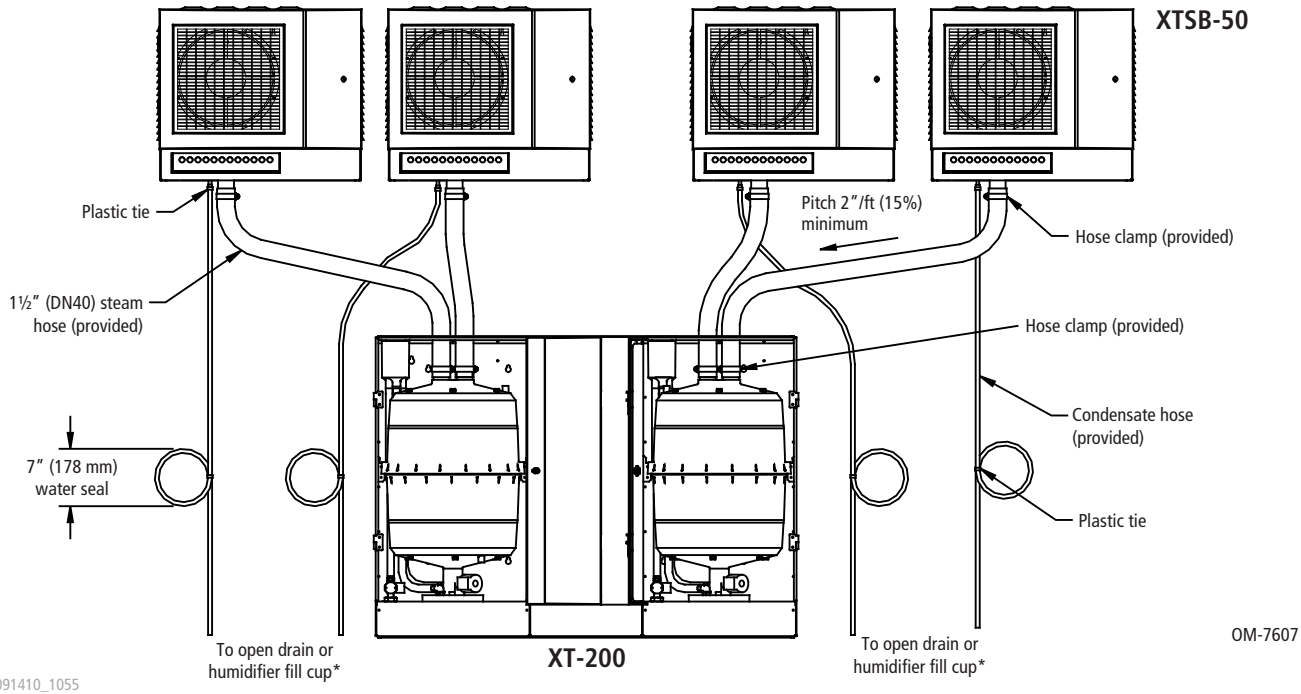


Piping:
XT steam blowers

Figure 18-1:
Piping from XT humidifier steam cylinders with multiple outlets to XTSBs

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





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Humidifier wiring

All wiring must be in accordance with all governing codes and with the unit wiring diagram. Power supply wiring must be rated for 105 °C. See Figure 19-1 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

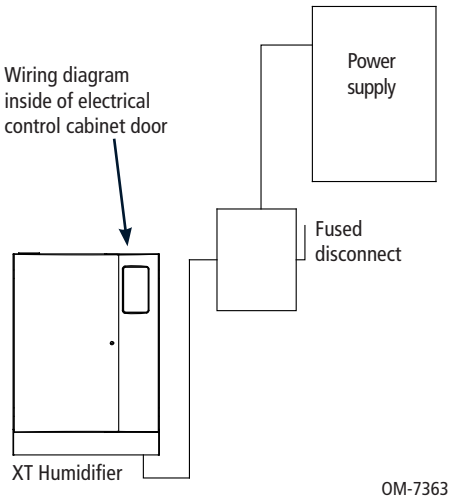
Conduit and control wiring knockouts are provided on the XT humidifier cabinet. See Figure 8-1.

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.

Figure 19-1:
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.

Humidifier wiring

⚠ 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.

⚠ 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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Control component placement

Follow the guidelines on Page 22 for placing humidistats, transmitters, and airflow proving switches.

Connection instructions

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

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

See "Step 1 – Field wiring" in the *Vapor-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)"

Humidifier wiring

Earth grounding requirements

A safety earth grounding system that meets national, state, and local electrical codes is required. The ground connection must be made with solid metal-to-metal connections. Ground wire should be the same size as power wiring.

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.

Humidistat and transmitter placement

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

Humidistat and sensor locations are critical

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

Recommended sensor locations (see figure below):

A Ideal. Ensures the best uniform mix of dry and moist air with stable temperature control.

B Acceptable, but room environment may 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 moisture generation and sensing, extend sampling time.

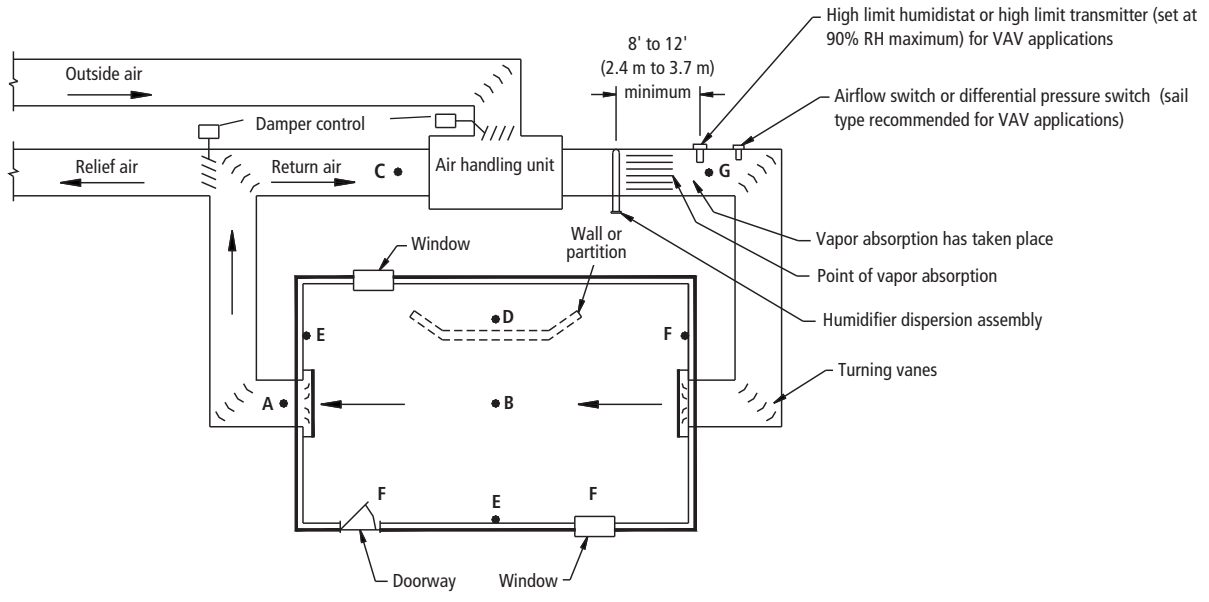
D Acceptable (behind wall or partition) for sampling entire room if sensor is near an air exhaust return outlet. Typical placement for sampling a critical area.

E Not acceptable. These locations may not represent actual overall conditions in the space.

F Not acceptable. Do not place sensors near windows, door passageways, or areas of stagnant airflow.

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

Figure 22-1:
Recommended humidistat and transmitter locations



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Dispersion:
Selecting the dispersion assembly location

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. For more information about absorption non-wetting distances, see the non-wetting tables in this humidifier's product catalog, available for viewing, printing or ordering 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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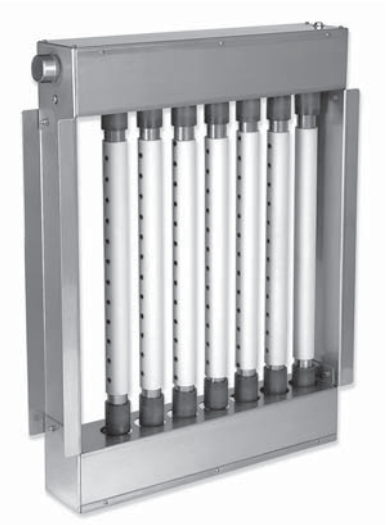
Figure 23-1:
Ultra-sorb with the High-efficiency Tube option



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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Dispersion: Interconnecting piping requirements

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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Important:

Reducing the inside diameter of the interconnecting piping will result in the internal humidifier system pressure exceeding the parameters for acceptable performance.

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The steam outlet on the humidifier is sized to the output of the humidifier. DO NOT use steam hose or interconnecting tubing/piping with an inside diameter smaller than the humidifier steam outlet. See note at left.

- See maximum steam carrying capacities in Table 24-1.
- If the humidifier must be located higher then the dispersion assembly, use the recommend installation shown in Figure 28-1.

Connecting to humidifier with steam hose

- Support steam hose to prevent sags, or low spots, and to maintain a minimum pitch of 2"/ft (15%) away from the humidifier.
- 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 tank foaming and accelerated 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 25-2.

Table 24-1:
Maximum steam carrying capacity and length of interconnecting steam hose, tubing, and pipe*

DRI-STEEM black steam hose†††						Copper or stainless steel tubing and Schedule 40 steel pipe					
Hose I.D.		Maximum capacity		Maximum length**		Tube or pipe size***		Maximum capacity		Maximum developed length†	
inches	DN	lbs/hr	kg/h	ft	m	inches	DN	lbs/hr	kg/h	ft	m
1½	40	150	68	10	3	1½	40	150	68	20	6
2	50	250	113	10	3	2	50	220	100	30	9
						3††	80††	450	204	80	24
						4††	100††	750	340	100	30
						5††	125††	1400	635	100	30
						6††	150††	2300	1043	100	30

* Based on total maximum pressure drop in hose, tubing, or piping of 5" wc (1244 Pa).

** Maximum recommended length for steam hose is 10' (3 m). Longer distances can cause kinking or low spots.

*** To minimize loss of capacity and efficiency, insulate tubing and piping.

† Developed length equals measured length plus 50% of measured length to account for pipe fittings. If maximum developed length is more than 20' (6 m), a fill cup extension kit is required. See Figure 11-1.

†† Requires flange connection.

††† 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 evaporating chamber resulting in condensate discharge at the dispersion assembly. Do not use steam hose for outdoor applications.

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Dispersion: Interconnecting piping requirements

Connecting to humidifier with tubing or pipe

- See Figures 30-1 and 31-1 for interconnecting tubing and pipe pitch requirements for single tube applications. See Table 33-1 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.
- 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; use two 45° elbows, 1' (0.3 m) apart.
- 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.

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Table 25-2: Hose kit sizing by capacity

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

Grounding steam pipes

The XT 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 XT humidifier earth grounding 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 grounding lug is shown in Figures 54-1 and 56-1.

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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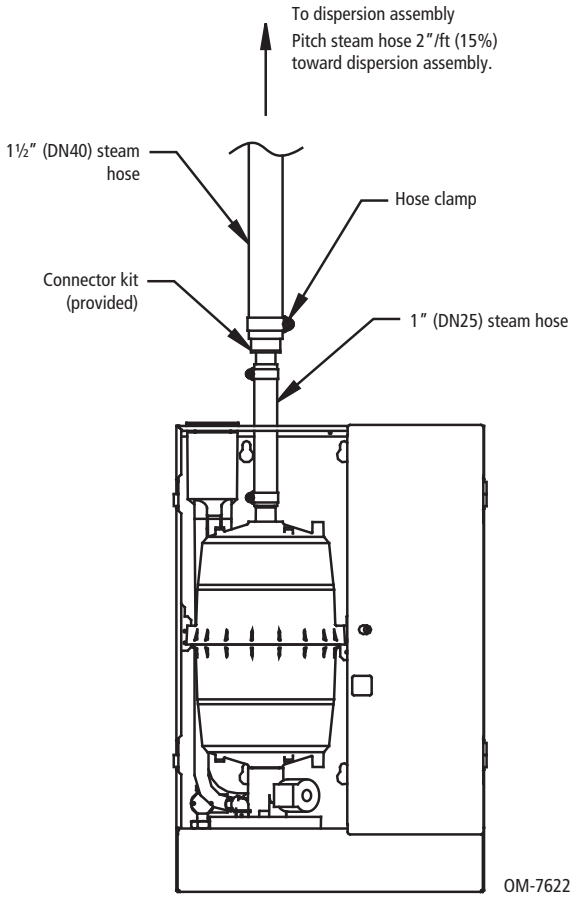
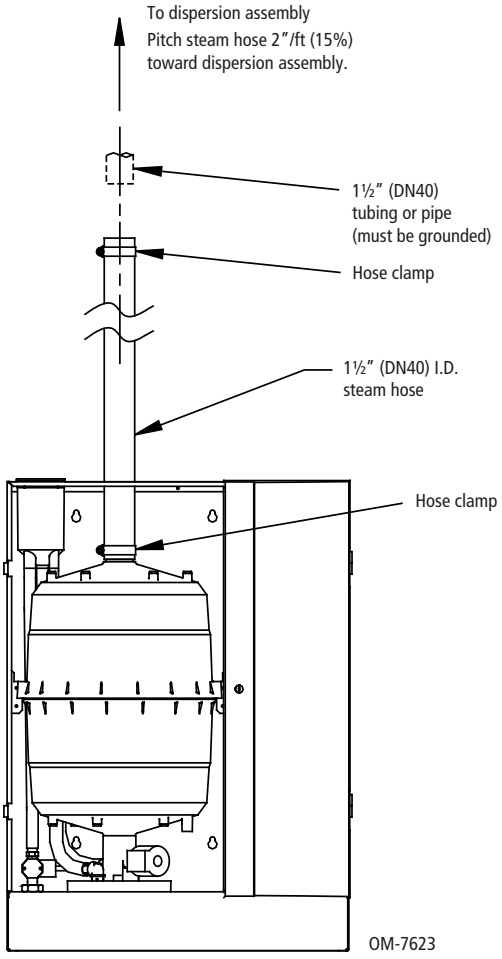
Dispersion:
Interconnecting piping requirements

Figure 26-1:
Piping connections to Single dispersion tube, Rapid-sorb, and Ultra-sorb Model LV or LH dispersion assemblies

Steam outlet connections to steam hose
(XT models 5, 10, 20 shown)



Steam outlet connections to tubing or pipe
(XT models 30, 50, 75 shown)



Steam hose and clamps are provided with these humidifiers.

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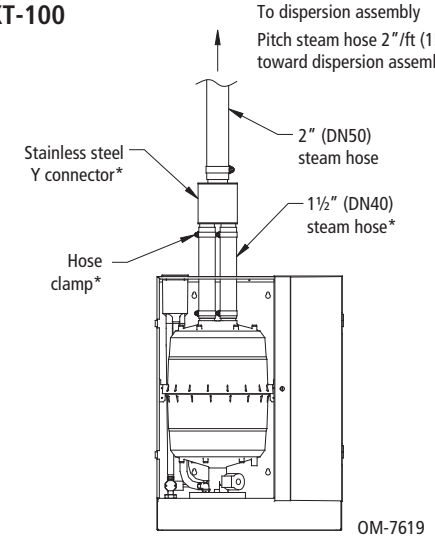
Dispersion:
Interconnecting piping requirements

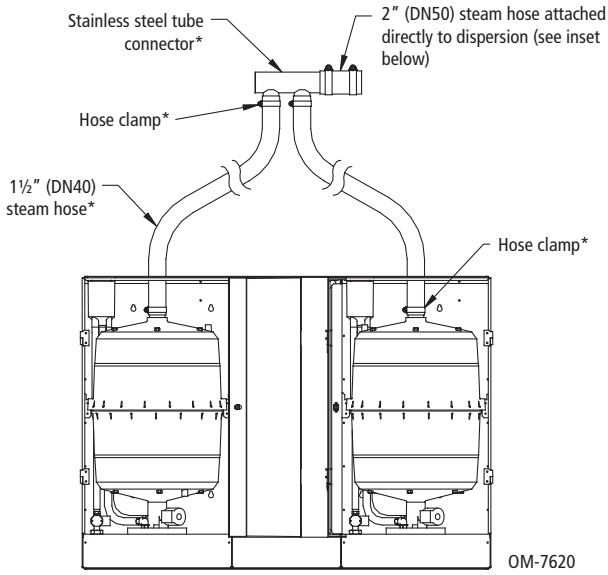
Figure 27-1:
Piping connections to Single dispersion tube, Rapid-sorb, and Ultra-sorb Model LV or LH dispersion assemblies

XT-100



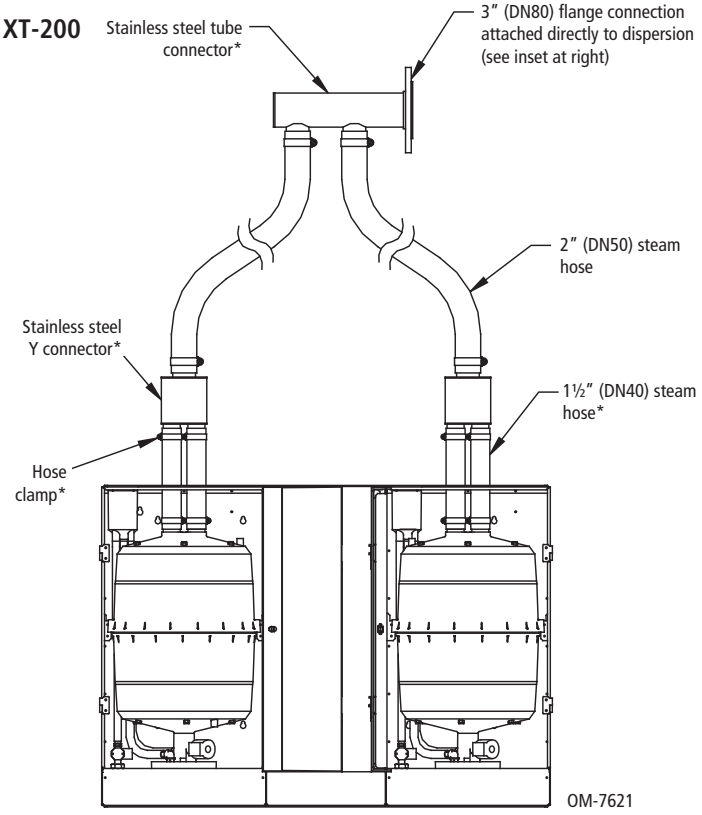
* Stainless steel Y connector, two 1½" (DN40) hoses, and four hose clamps ship with each XT-100 humidifier.

XT-150



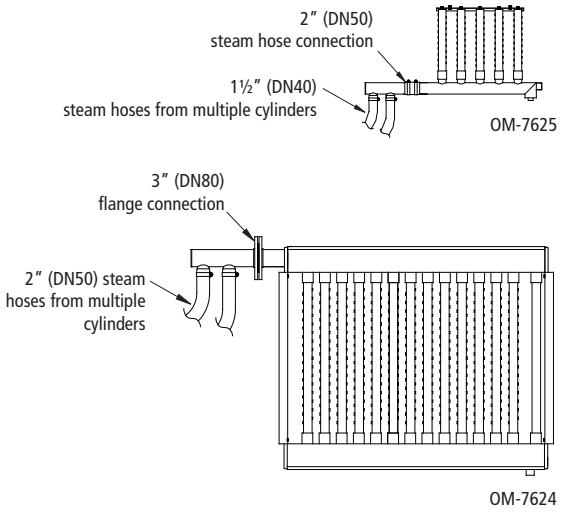
* Stainless steel tube connector, one 2" (DN50) hose, and two hose clamps ship with each XT-150 humidifier.

XT-200



* Stainless steel tube connector, two stainless steel Y-connectors, four 1½" (DN40) hoses, and eight hose clamps ship with each XT-200 humidifier.

Connecting multiple cylinders to a dispersion assembly



For multiple cylinders, connect the stainless steel tube connector (provided with XT models 150 and 200; available for staged XT 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.

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Dispersion: Drip tee installation

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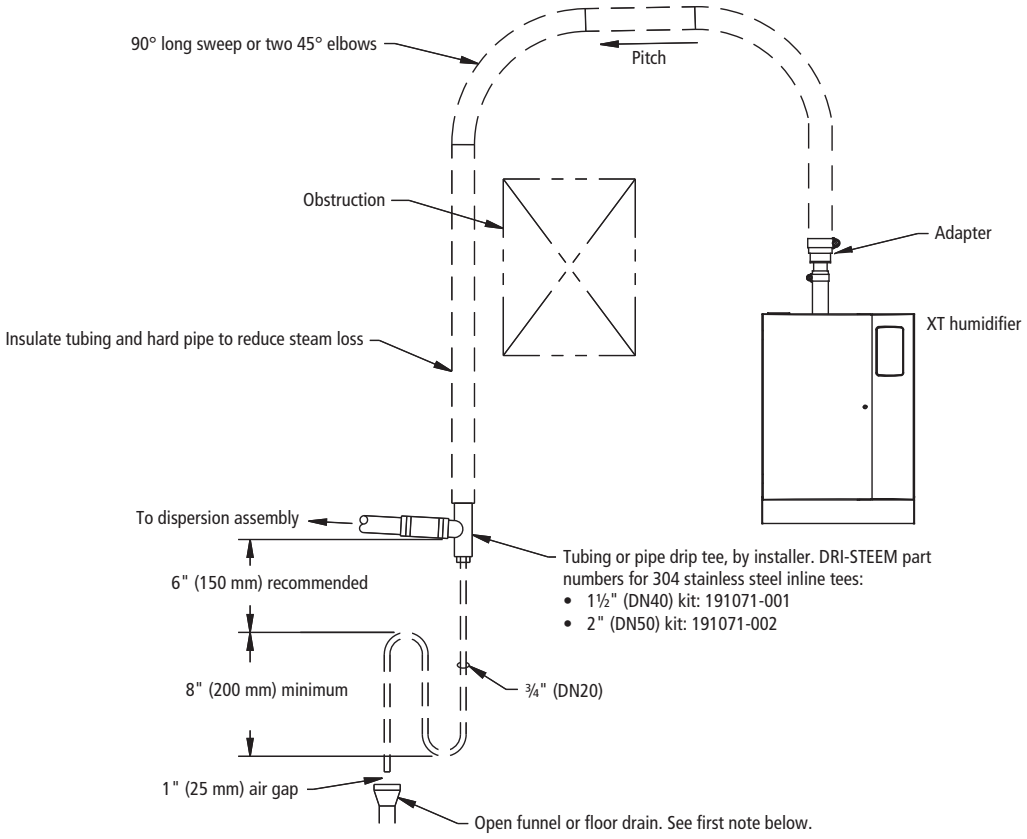
Install a drip tee as shown below when the humidifier is mounted higher than the dispersion assembly, when interconnecting hose or piping needs to go over an obstruction, or when interconnecting piping runs are long.

Important: Steam hose must be supported to prevent sagging or low spots.

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 so there are no sags or low spots.
- Dashed lines indicate provided by installer.

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OM-7364X

Dispersion: Single dispersion tube

Installation notes

- Use DRI-STEEM's hard pipe adapter kit to connect the steam outlet to hard pipe. Use a hose clamp to connect the steam outlet to steam hose. 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 the maximum steam carrying capacity and steam loss tables on Pages 24 and 25.
- Maximum capacity of dispersion tube without condensate drain:
  - 1½" (DN40): 28.4 lbs/hr (13 kg/h)
  - 2" (DN50): 56.8 lbs/hr (25.8 kg/h)
- Maximum capacity of dispersion tube with condensate drain:
  - 1½" (DN40): 56.8 lbs/hr (25.8 kg/h)
  - 2" (DN50): 85.2 lbs/hr (38.6 kg/h)
- Orient dispersion tube with tubelets (steam orifices) pointing up.
- If mounting the humidifier above the level of dispersion tube, see "Drip tee installation" on Page 28.
- Table 25-1 lists hose kit sizes by humidifier capacity. Note that the capacities of Models XT-75 through XT-200 require multiple tube assemblies and cannot use a hose kit. For multiple tube assemblies, see "Rapid-sorb" beginning on Page 32.

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See Single dispersion tube installation drawings in Figures 30-1 and 31-1.

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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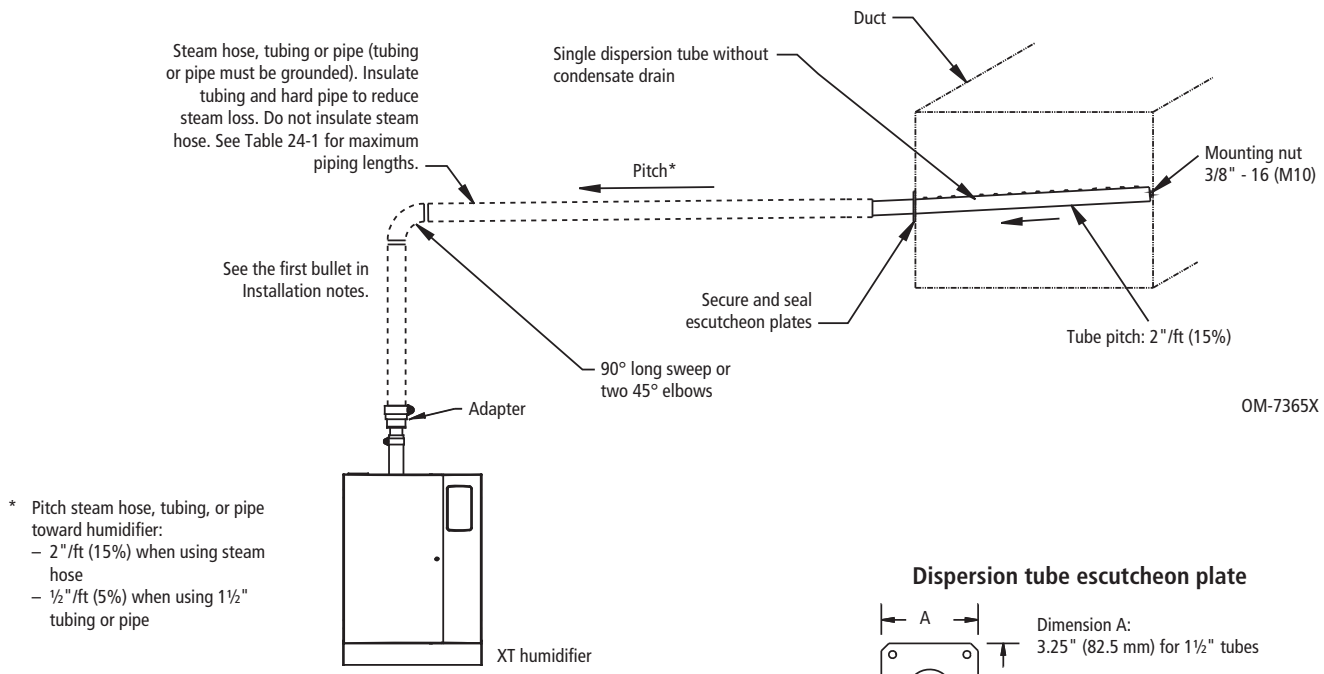
Dispersion:
Single dispersion tube

Figure 30-1:
Single dispersion tube without condensate drain



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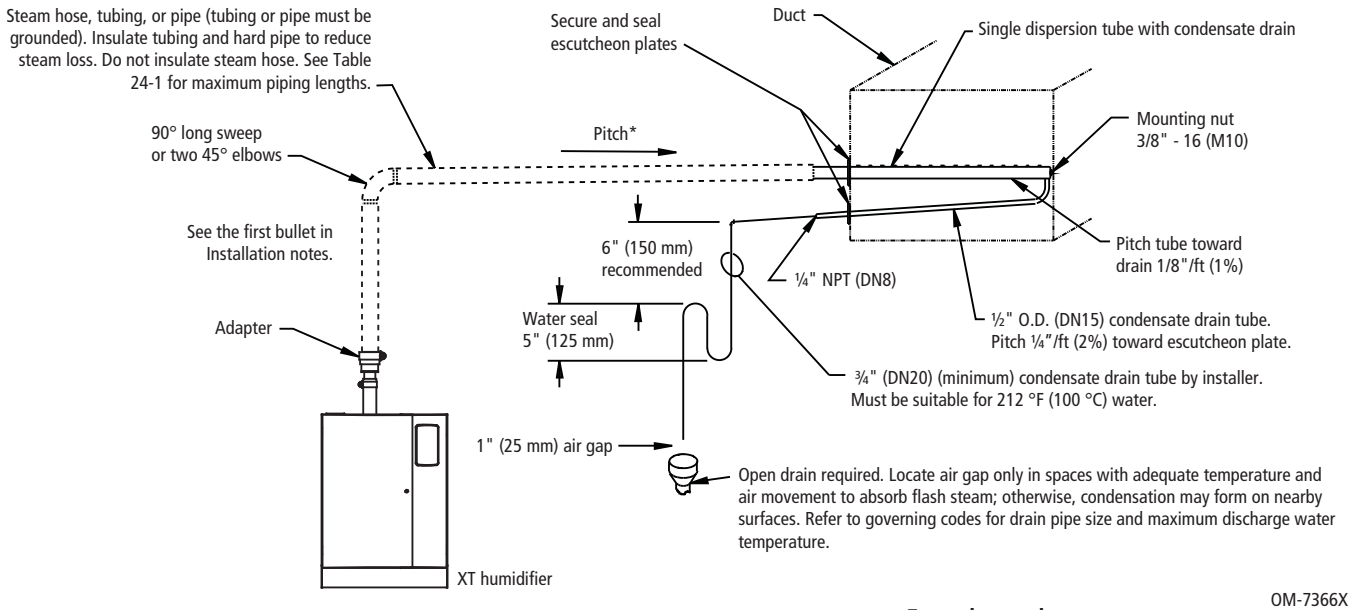
Dispersion:
Single dispersion tube

Figure 31-1:
Single dispersion tube with condensate drain



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.

mc_060110_1555

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 33-1). The size, quantity, and location of penetrations are determined by the dimensions and configuration of the Rapid-sorb assembly you received.

mc_060210_0937

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.

mc_060210_0843

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
  - ¾" × 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.

mc_060210_0945-NA

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 33-1 and the drawings on the following pages for pitch requirements.

mc_060210_0953-NA

Table 33-2:
Rapid-sorb dispersion tube capacities

Tube capacity		Tube diameter	
lbs/hr	kg/h	inches	DN
≤ 35	≤ 16	1½	40
36-70	17-32	2	50

mc_060210_0935

Table 33-3:
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

mc_060210_0936

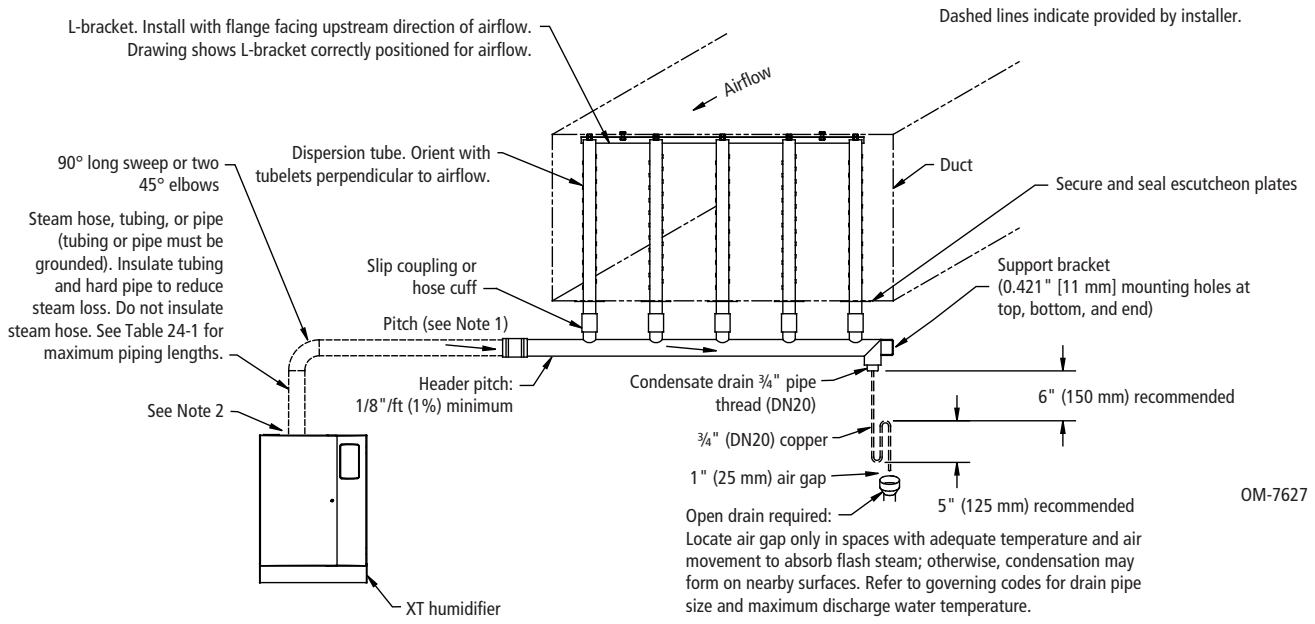
Table 33-1:
Pitch of interconnecting piping, dispersion tubes, and headers for Rapid-sorb evaporative dispersion units

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		

mc_060310_1000

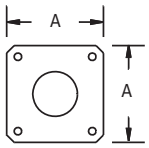
Dispersion: Rapid-sorb

Figure 34-1:
Rapid-sorb in a horizontal airflow with header outside the duct



Notes:
1 Pitch steam hose, tubing, or pipe toward Rapid-sorb:
– 2"/ft (15%) when using steam hose
– 1/8"/ft (1%) when using tubing or pipe
2 Use DRI-STEEM's hard pipe adapter kit to connect steam outlet to hard pipe. Use a hose clamp to connect steam outlet to steam hose. Use a hose cuff and clamps to connect steam outlet to tubing.

Dispersion tube escutcheon plates



Dimension A:
- 3.25" (82.5 mm) for 1½" tubes
- 5" (127 mm) for 2" tubes

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Header outside of duct, 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. Mount the dispersion tubes to the header with the slip coupling or hose cuff (provided).
   - When installing slip couplings for 1½" (DN40) dispersion tubes, take care not to shear the O-rings.
   - Set the slip coupling on the header stub or dispersion tube so the O-ring is resting on the face of the tubing.
   - Rotate the slip coupling as you push it onto the tubing.
   - The O-rings are lubricated at the factory. If additional lubrication is necessary, DO NOT use a petroleum-based lubricant.

Dispersion: Rapid-sorb

4. Position the flange of the L-bracket so it is upstream of the tubes when the assembly is raised and fastened into position. Fasten the L-bracket to the end of the dispersion tubes with the provided bolt, lock washer, and flat washer.
5. Before tightening the L-bracket bolts to the dispersion tubes:
   - For 1½" (DN40) dispersion tubes:
     - Dispersion tube will rotate in slip coupling. Verify that dispersion tube orifices are directed perpendicular to airflow.
     - Dispersion tube and slip coupling must be fully engaged on header stub for O-rings to provide a seal.
   - For 2" (DN50) dispersion tubes:

     Before securing hose cuff in place with hose clamps on dispersion tube and the header stub, verify that dispersion tube orifices are directed perpendicular to airflow.
6. Slide the assembly up until the L-bracket aligns with the mounting holes in the duct.
   - 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.
   - For 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 header pitch, 1/8"/ft (1%) toward drain, is maintained.
7. Permanently secure both ends of header, and verify that header pitch, 1/8"/ft (1%) toward drain, is maintained.
8. Verify that all fasteners are secure:
   - L-bracket to duct
   - Dispersion tubes to L-bracket
   - Hose clamps on 2" (DN50) tubes
9. Secure and seal the dispersion tube escutcheon plate and condensate drain tube escutcheon plate around the respective tubes, if applicable.

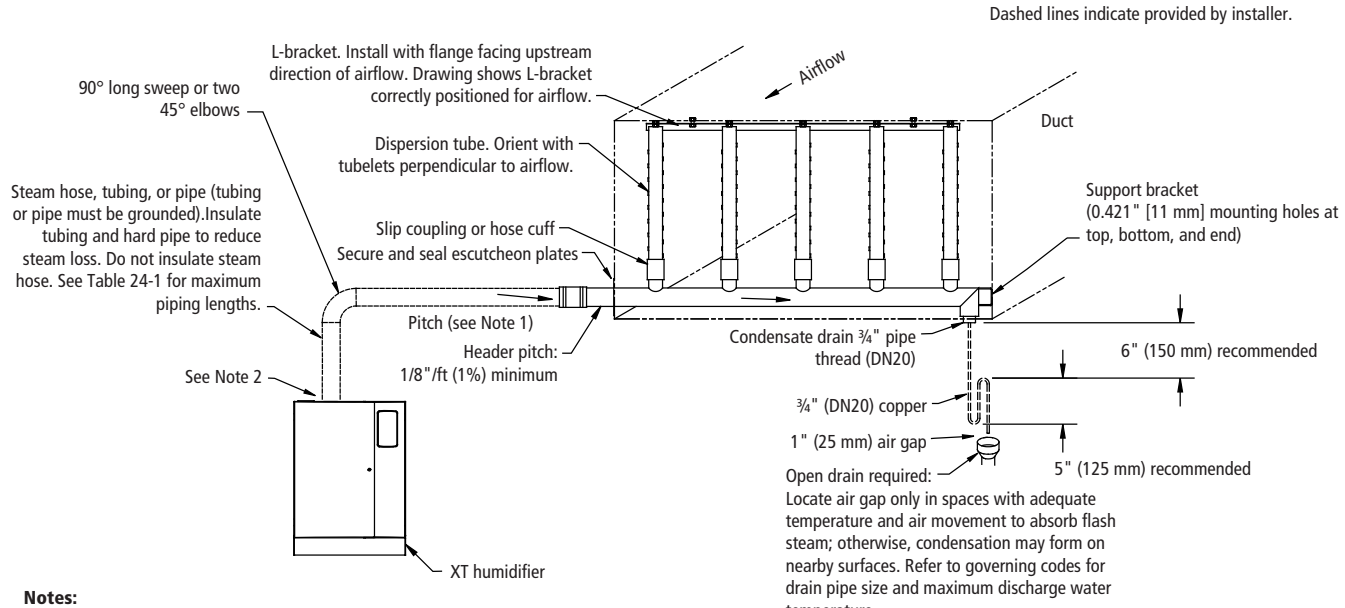
mc_060210_1015-NA

Note:

See Page 38 for steam supply and condensate drain line connection instructions.

Dispersion: Rapid-sorb

Figure 36-1:
Rapid-sorb in a horizontal airflow with header inside the duct



Notes:
1 Pitch steam hose, tubing, or pipe toward Rapid-sorb:
  – 2"/ft (15%) when using steam hose
  – 1/8"/ft (1%) when using tubing or pipe
2 Use DRI-STEEM's hard pipe adapter kit to connect steam outlet to hard pipe. Use a hose clamp to connect steam outlet to steam hose. Use a hose cuff and clamps to connect steam outlet to tubing.

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⚠ 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.

mc_060110_1555

Header inside of duct, 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.

Dispersion: Rapid-sorb

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.
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.

mc_060210_1050 -NA

Note:

See Page 38 for steam supply and condensate drain line connection instructions.

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.

mc_072010_0930

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 provided. 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 ¾" I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.

The condensate drain line must be piped as shown in Figures 34-1 and 36-1. Provide a 6" (152 mm) drop prior to a 5" (127 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 or LH

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

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Dispersion: XT steam blowers

On a call for humidity, the controller closes the contactors to energize the humidifier electrodes and the fan relay to energize the XT steam blowers (XTSB). When the call for humidity is satisfied, the controller opens the humidifier contactor but keeps the XTSB running for a preset amount of time, which is adjustable via the Vapor-logic4 Setup menu.

As steam is discharged from the XTSB, it quickly cools and turns to a visible fog that is lighter than air. As this fog is carried away from the XTSB 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 39-1 lists the maximum rise, spread, and throw non-wetting distances for XT humidifiers with XTSBs. 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.

XTSBs are field wired to the XT humidifier blower terminals. A wiring diagram is included with the XTSB.

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Figure 39-1: XTSB rise, spread, throw

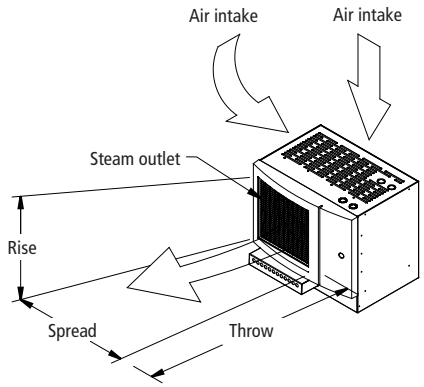

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Table 39-1: XTSB minimum non-wetting distances

XT model	Maximum steam capacity		30% RH @ 70 °F (21 °C)						40% RH @ 70 °F (21 °C)						50% RH @ 70 °F (21 °C)						60% RH @ 70 °F (21 °C)					
			Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
	lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
5	5	2.3	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
10	10	4.5	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
20	20	9.1	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
30	30	13.6	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
50	50	22.7	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
75	75	34.0	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
100	100	45.4	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
150	150	68.0	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
200	200	90.7	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 XTSB
Spread: Minimum non-wetting width from the steam outlet of the XTSB
Throw: Minimum non-wetting horizontal distance from the steam outlet of the XTSB

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Dispersion: XT steam blowers

The XTSB can be mounted on top of an XT humidifier cabinet, or wall-mounted remotely from the humidifier. See Figure 41-2.

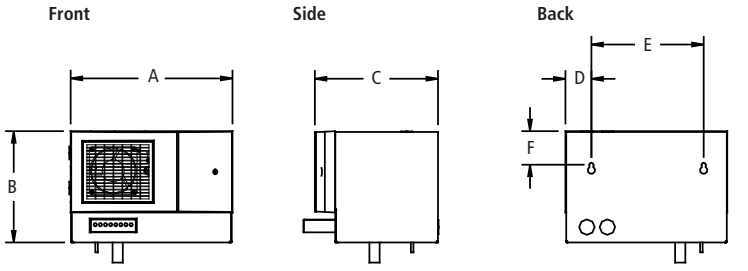
XTSB-20, for capacities up to 20 lbs/hr (9.1 kg/h), can be directly mounted on XT humidifier models 5, 10, and 20.

XTSB-50, for capacities up to 50 lbs/hr (22.7 kg/h), can be directly mounted on XT humidifier models 30 and 50.

XTSB installation must comply with governing codes.

Figure 40-1: XTSB dimensions

XTSB-20 shown



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Removing XTSB doors

XT humidifier and XTSB doors have lift-off hinges for easy removal of open doors. The doors are captivated when closed but should be removed when open. An upward bump could damage the door if it jumps the hinges and falls.

Table 40-1: XTSB dimensions

Dimension	XTSB-20		XTSB-50	
	inches	mm	inches	mm
A	15.82	402	19.09	485
B	10.86	276	16.06	408
C	12.03	306	14.09	358
D	2.56	65	0.98	25
E	10.97	279	11.73	298
F	3.27	83	2.72	69

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Table 40-2: XTSB specifications

XTSB model	Maximum capacity		Shipping weight		Operating weight		Volume airflow		Current draw at 115V (50/60 Hz)	Input power	Noise
	lbs/hr	kg/h	lbs	kg	lbs	kg	cfm	m^3/min			
20	20	9.1	24.0	10.9	20.9	9.5	106	3.0	0.2 A	18 W	49 dBA
50	50	22.7	41.0	18.6	38.1	17.3	665	18.8	0.23 A	23 W	53 dBA

Notes:
- XTSBs ship separately from XT humidifiers.
- Noise measurements taken 6.5′ (2 m) in front of XTSB cabinet.

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Dispersion: XT steam blowers

Mounting XTSB on top of humidifier

The condensate tee kit shipped with the XTSB returns condensate from a top-mounted XTSB to the humidifier's cylinder fill hose. See Figure 41-1. Install the kit as follows:

1. If humidifier is not already mounted to wall, see "Wall mounting humidifier" on Page 10.
2. Remove steam cylinder (see "Removing steam cylinder"on Page 10).
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 knockout at left rear corner on top of humidifier cabinet.
6. Feeding condensate hose into humidifier cabinet through knock-out hole created in Step 5, place XTSB on top of humidifier, and secure XTSB to humidifier with screws provided.
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 12).

Note: DRI-STEEM recommends securing top-mounted XTSB to the wall through mounting keyholes on back of XTSB.

Wiring top-mounted XTSB

1. Connect humidifier terminals L1, L2, STM, C, and GRD to matching XTSB terminals L1, L2, STM, C, and GRD. If needed, refer to external connections diagram shipped with XTSB.
2. Tighten all terminals securely.

For wall mounting the XTSB, see Page 42.

Figure 41-1: Condensate tee kit for top-mounted XTSB

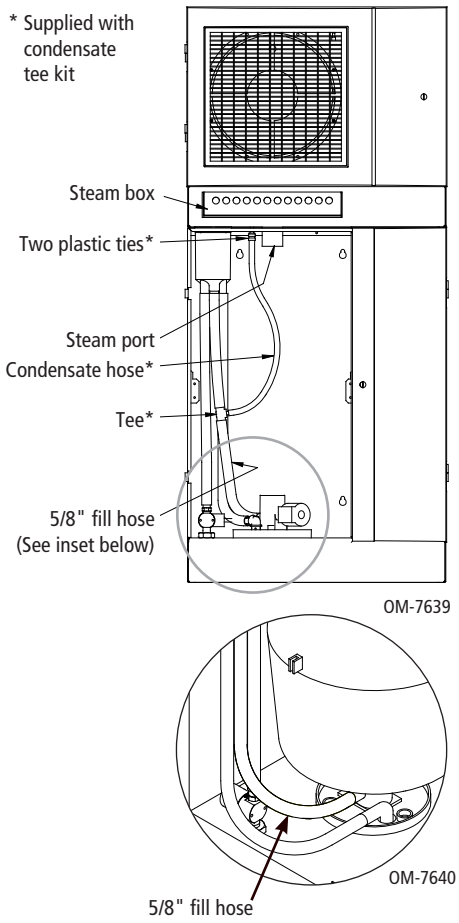
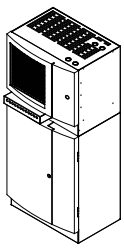


Figure 41-2: Top- and remote-mounted XTSB

Mounted on top of humidifier

Condensate returned to steam cylinder fill hose.



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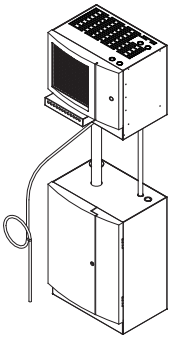
Mounted remotely from humidifier

Condensate returned to open drain. Condensate can also be returned to humidifier fill cup.



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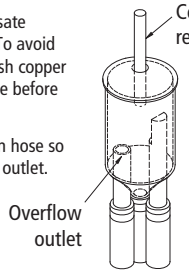
Condensate from remote XTSB returned to humidifier fill cup

Use DRI-STEEM condensate hose or copper tubing. To avoid foaming, thoroughly flush copper tubing to remove residue before routing to fill cup.

Offset condensate return hose so it is not above overflow outlet.



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mc_091010_0927

Dispersion: XT steam blowers

⚠ WARNING

Standing water in XTSB

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

Wall mounting XTSB

The XTSB 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:

- Wood studs 16" (406 mm) on center:

  Attach a spanner board to the wall with screws centered on the studs. Mark hole locations on the spanner board using the dimensions in Table 40-1, and predrill 1/8" (3 mm) diameter pilot holes. Secure the XTSB to the spanner board with the bolts provided.

- Metal studs 16" (406 mm) on center:

  Mark hole locations at centers of studs. Using a drill bit just large enough to push a 1/4" (7 mm) bolt through, drill through studs and wall, and through a backing plate on other side of wall. Push bolts through wall, studs, and backing plate. Secure XTSB spanner board with bolts provided.

- If 16" (406 mm) on-center studs are not available:

  If 16" (406 mm) on-center studs are not available, mount a spanner board on the wall, spanning two studs. If two horizontal spanner boards are used, locate one at the top of the XTSB for the mounting screws and the other board at the bottom of the XTSB.

- Hollow block or poured concrete wall:

  Mark hole locations on the wall using the dimensions in Table 40-1. Drill pilot holes sized for the supplied anchors, and mount the XTSB to the wall with the supplied screws and anchors.

See Table 39-1 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 39). Provide at least 3" (76 mm) of clearance on each side of the XTSB for air intake.

Dispersion: XT steam blowers

Wiring wall-mounted XTSB

Make the following wiring connections between the humidifier and the XTSB, and tighten all terminals securely:

Connect humidifier terminals L1, L2, STM, C, and GRD to matching XTSB terminals L1, L2, STM, C, and GRD.

Refer to the external connections diagram shipped with the XTSB.

Installing base plate

The XTSB has a base plate for wall-mounted XTSBs to isolate the hot steam box from contact. After the electrical connections are made, assemble the base plate onto the XTSB with the screws provided.

Piping condensate to XT humidifier fill cup cap

1. Remove fill cup cap from XT humidifier, and drill a ½" (13 mm) hole in fill cup cap for XTSB-20 and XTSB-50 condensate hose as shown in Figure 43-1.
2. Route XTSB 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 43-2. The water seal is required to ensure condensate drainage from the XTSB and to keep steam from blowing out of the condensate hose.

Piping condensate to drain

The XTSB condensate hose must be routed as shown in Figure 43-2. The water seal is required to ensure condensate drainage from the XTSB and to keep steam from blowing out of the condensate hose.

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

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

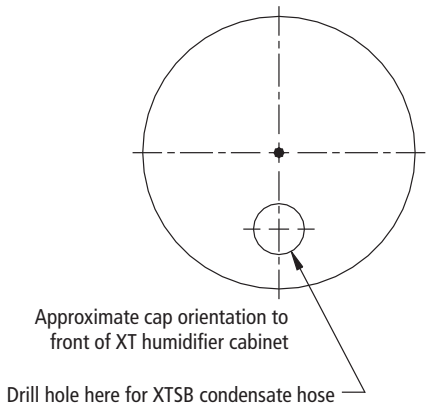
Additional instructions

See the following additional wall-mount XTSB instructions:

"Piping" for XTSBs, beginning on Page 16

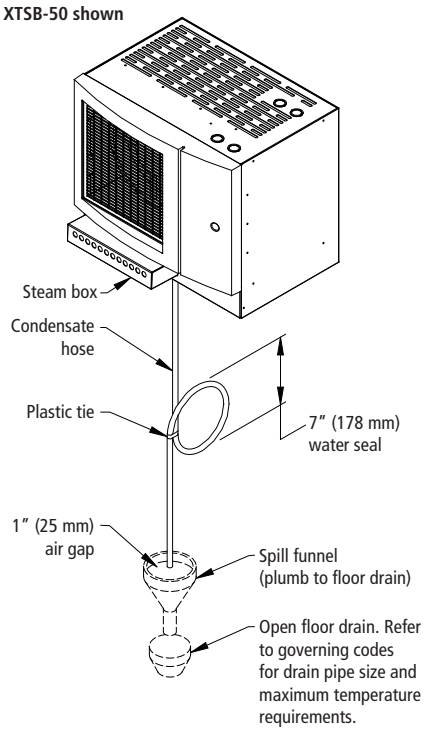
"Interconnecting piping requirements," beginning on Page 24.

Figure 43-1:
Field-installed hole in fill cup cap for remote XTSB



OM-7636X

Figure 43-2:
XTSB condensate drain hose



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 43-1.

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Supply water considerations

Electrode humidifiers function very differently from other humidifier technologies. Some of the factors to consider are steam output consistency, efficiency, cylinder life, and start-up time. Understanding these factors and the variables that impact them will result in proper application of this technology.

Output consistency and efficiency

DRI-STEEM's controller algorithm optimizes steam output consistency, water efficiency, and energy efficiency by managing the frequency and duration of drain and fill events for the supply water being used. The frequency and duration of drain and fill events is proportional to the conductivity of the supply water. Less conductive supply water requires less frequent drain and fill events, resulting in more consistent steam output and more efficient use of energy and water.

Cylinder life

Hard water scale coats the electrodes and eventually requires a cylinder replacement. The harder the water, the more frequent the need for a new cylinder.

Softened water is an option in some facilities. Because softened water ions stay in solution to much higher concentrations than hard water ions, softened water does not coat the electrodes nearly as much as hard water, potentially extending cylinder life.

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

- The benefit of softened water is longer cylinder life (depending on water chemistry), but the trade-off is more frequent drain and fill events.
- The benefit of hard water is less frequent drain and fill events but may result in more frequent cylinder replacement.

Start-up time

Start-up time is how long it takes the humidifier to reach output from a given demand when first installed and after cylinder changes. The more conductive the water, the shorter the start-up time.

Supply water considerations

Water conductivity and drain and fill events

The paragraphs below explain why steam output consistency, efficiency, cylinder life, and start-up time are impacted by water conductivity and by drain and fill events.

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 events to optimize humidifier performance and provide proper steam output.

Drain and fill events: 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 event. 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.

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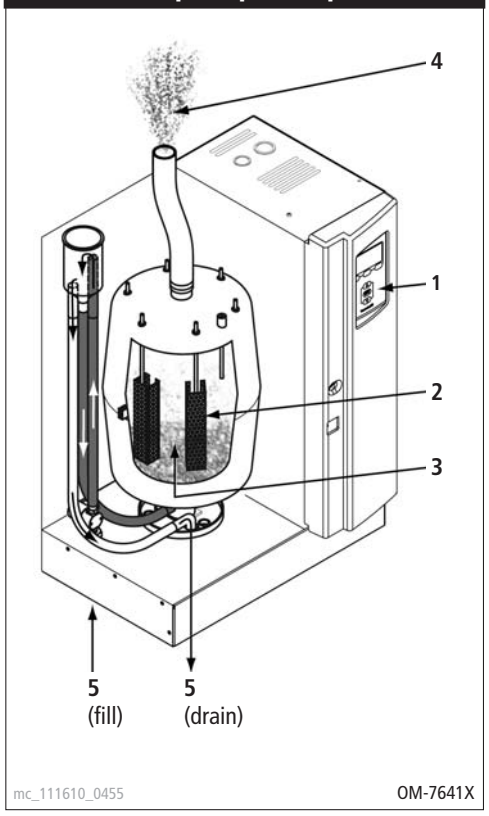
Recommended supply water conductivity for DRI-STEEM electrode humidifiers is 125 to 1250 µS/cm.

Principle of operation

Figure 46-1:
XT humidifier principle of operation



Staging multiple XT humidifiers

Up to four XT 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 XT humidifiers.

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 XTSB 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 events 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 events to keep electrical current within demand parameters. This optimizes humidifier performance based on water conditions and steam production.

The humidifier has integral drain water tempering. Drain water is automatically cooled before entering the drain.

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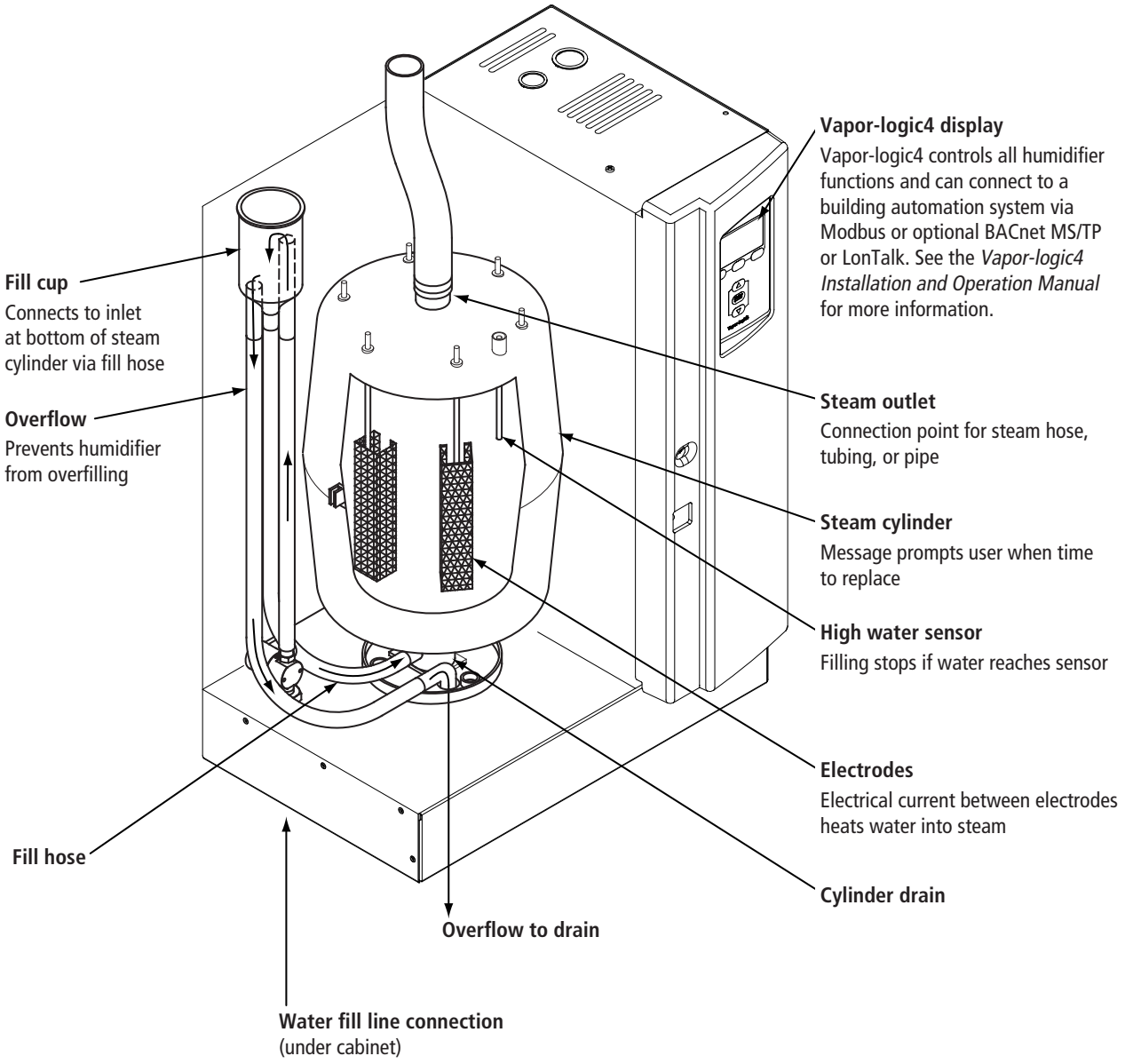
Components

Figure 47-1:
XT humidifier components



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Start-up procedure

XT humidifier and XTSB doors have lift-off hinges for easy removal of open doors. The doors are captivated when closed but should be removed when open. An upward bump could damage the door if it jumps the hinges and falls.

⚠ 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 that all electrical covers are in place and secure before turning on electrical power. These include the heater terminal cover, electrical panel cover, and subpanel access panels.

Safety functions

XT 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

XT 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.

After the system 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
   - *Vapor-logic4 Installation and Operation Manual*
     - Installation section
     - Installation checklist
   - Ladder style wiring diagram (inside humidifier cabinet)
   - External connections wiring diagram (inside humidifier cabinet)
   - All governing codes
2. Verify that all electrical connections are secure before applying power.
3. Make sure 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. 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 49.
8. Monitor humidifier operation through multiple fill cycles. The humidifier operating status appears on the keypad/display.
9. Perform the cleaning procedure as follows:
   a. Operate the humidifier long enough for steam to be produced.
   b. Drain the cylinder completely using the keypad/display:
      – At the Main menu, select Tank Status, and press Enter.
      – Select Mode Auto, and press Enter.
      – Select Drain, and press Enter.
      – Let the cylinder drain for 5 to 10 minutes until empty.
   c. Restart the humidifier, and repeat Steps a and b.

Start-up checklist

Your humidification system may not have all of the options listed below. If an item does not apply to your system, skip to the next item 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 keypad/display is 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 (Step 9 on facing page) has been performed.
- ☐ If you experience difficulties, see "Troubleshooting" and "DRI-STEEM Technical Support" on Page 53.

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

The manual was shipped with your humidifier and is available at our Web site: www.dristeem.com

Maintenance procedures

⚠ WARNING

Electric shock hazard

Contact with energized circuits can cause severe personal injury or death as a result of electric shock. To prevent shock, disconnect electrical power before performing service or maintenance procedures on an part of the humidification system.

When performing maintenance on the humidifier:

- Always switch the keypad control mode to Standby.
- Place all power disconnects in OFF position and lock in OFF position.
- Close the field-installed manual supply water shut-off valve.

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⚠ WARNING

Hot water system

Cylinder and any undrained water may be hot. To avoid injury from hot water, make sure cylinder and humidifier components have cooled before proceeding with maintenance.

Opening and closing cabinet doors

To open the cabinet doors, use a slotted screwdriver to rotate the quarter-turn fastener counterclockwise so the slot is vertical.

To close the doors, close the right then the left door, and push the quarter-turn fastener while turning clockwise so the slot is horizontal.

Scheduled maintenance

At 500-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

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 events.

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:

1. Close field-installed manual supply water shut-off valve.
2. Drain water from steam cylinder:
   - At Main menu, select Tank Status, and press Enter.
   - Select Mode Auto, and press Enter.
   - Select Drain, and press Enter.
   - Let the cylinder drain for 5 to 10 minutes until empty.

   Drain water is automatically tempered.
3. When steam cylinder is completely empty, turn humidifier off. Place all power disconnects in OFF position, and lock in OFF position.
4. Open cabinet doors. **See Warning at left.**

Maintenance procedures

5. Disconnect steam hose:
   After cylinder and humidifier components have cooled, loosen steam hose clamp and disconnect steam hose from cylinder.
6. Disconnect electrode plugs and high water sensor wire.
7. Remove steam cylinder. See “Removing steam cylinder”on Page 10).
8. Check drain valve:
   If the drain valve port is dirty, clean per instructions on Page 52.
9. Check O-ring.
   Ensure O-ring in drain valve body is correctly placed. Change O-ring if necessary. Dampen O-ring seals **with water** before replacing cylinder. **Do not use lubricant or other substance.**
10. Install new steam cylinder. See “Installing steam cylinder” on Page 12).
11. Connect steam hose to cylinder.

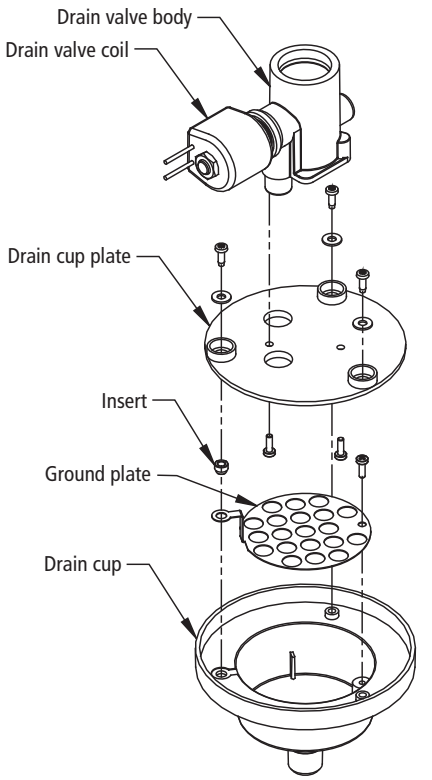
Note:

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

See "Start-up procedure" on Page 48 if returning humidifier to operation.

Maintenance procedures

Figure 52-1:
Drain valve assembly



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.

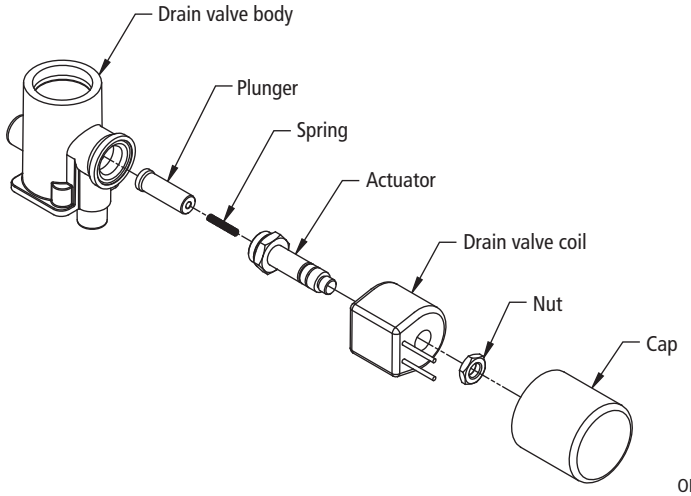
See "Start-up procedure" on Page 48 if returning humidifier to operation.

Drain valve

Always check the drain valve to determine whether it should be cleaned before installing a new steam cylinder. Typically, the drain valve port is as dirty as the used steam cylinder.

1. Remove steam cylinder (see "Removing steam cylinder" on Page 10).
2. Remove the three screws and washers securing drain cup plate to drain cup (see Figure 52-1).
3. Disconnect 2-pin Molex plug from 24 VAC drain valve coil. Note locations for reassembly.
4. Remove hose clamp and hose from drain valve body. Take drain valve assembly to a sink for disassembly and cleaning.
5. Slide black, plastic cap off the drain valve coil. Remove hex nut on top of coil, and slide coil off actuator (see Figure 52-2).
6. Loosen actuator with a wrench and unscrew from plastic valve body.
7. Clean exposed plunger, spring, actuator, and plastic drain valve body with clean water.
8. Reassemble. Tighten actuator 1/8 turn past hand tight.
9. Clean out end of hose. Reconnect it to drain valve body with the hose clamp.
10. Read note in Figure 52-1, then fit mounting screws with washers, and insert through drain cup plate.
11. Plug Molex plug into its mating wire harness plug.

Figure 52-2:
Drain valve body



Troubleshooting

1. Review possible causes and recommended actions in the *Vapor-logic4 Installation and Operation Manual*.
2. If you are still having problems, call us.
   If the Troubleshooting guide does not help you solve the problem, 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 humidifier and XTSB.
     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.
   - Problem definition
     Example: water leaking, low humidity, high humidity, etc.
   - When problem 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 before calling Technical Support (at 800-328-4447):

Humidifier model number _____

Humidifier serial number _____

Firmware version _____

Problem definition _____

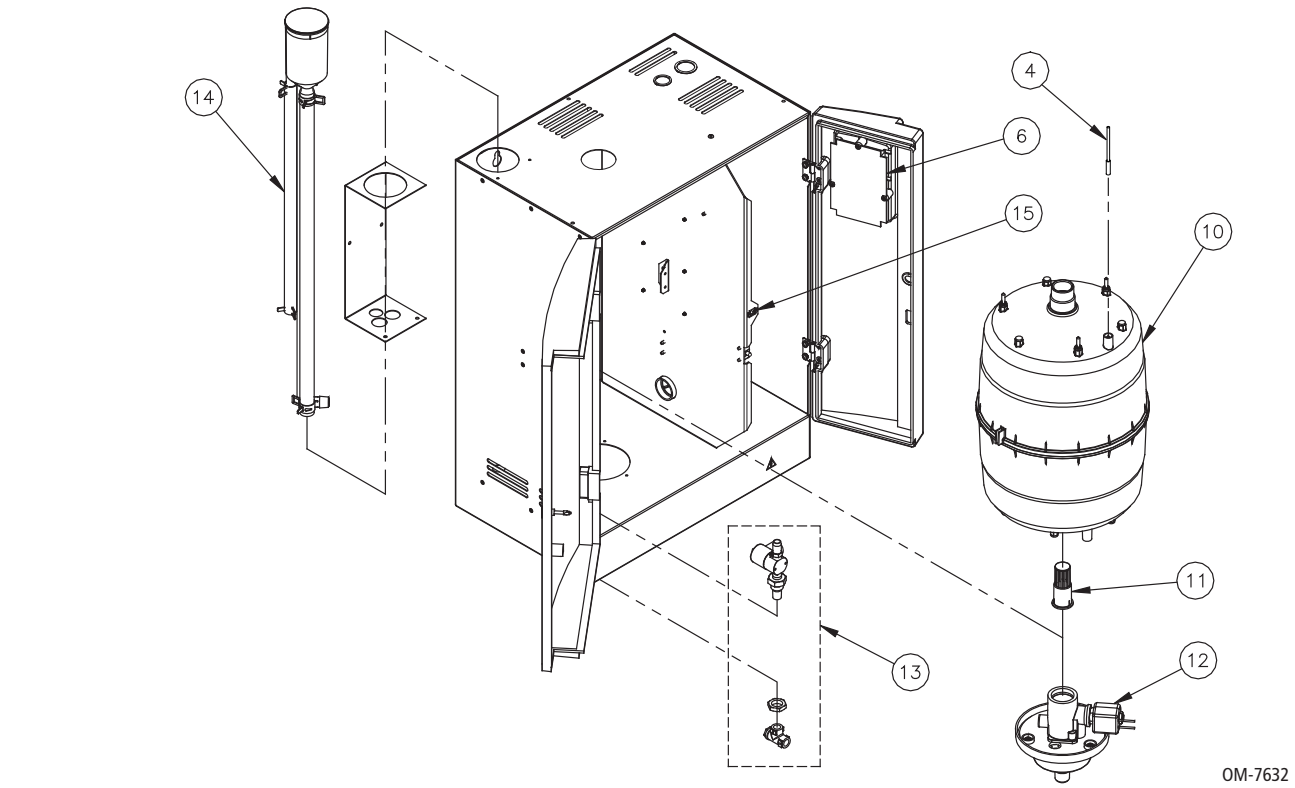
When problem began _____

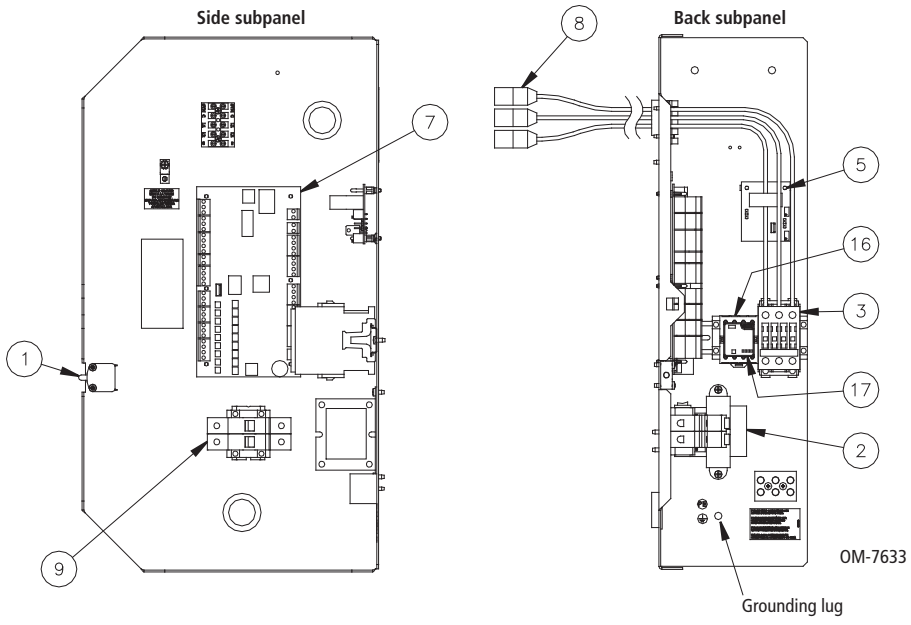
Error codes and quantity/frequency of codes _____

_____

Replacement parts: XT humidifier models 5 through 100

Figure 54-1:
XT humidifier models 5 through 100 replacement parts





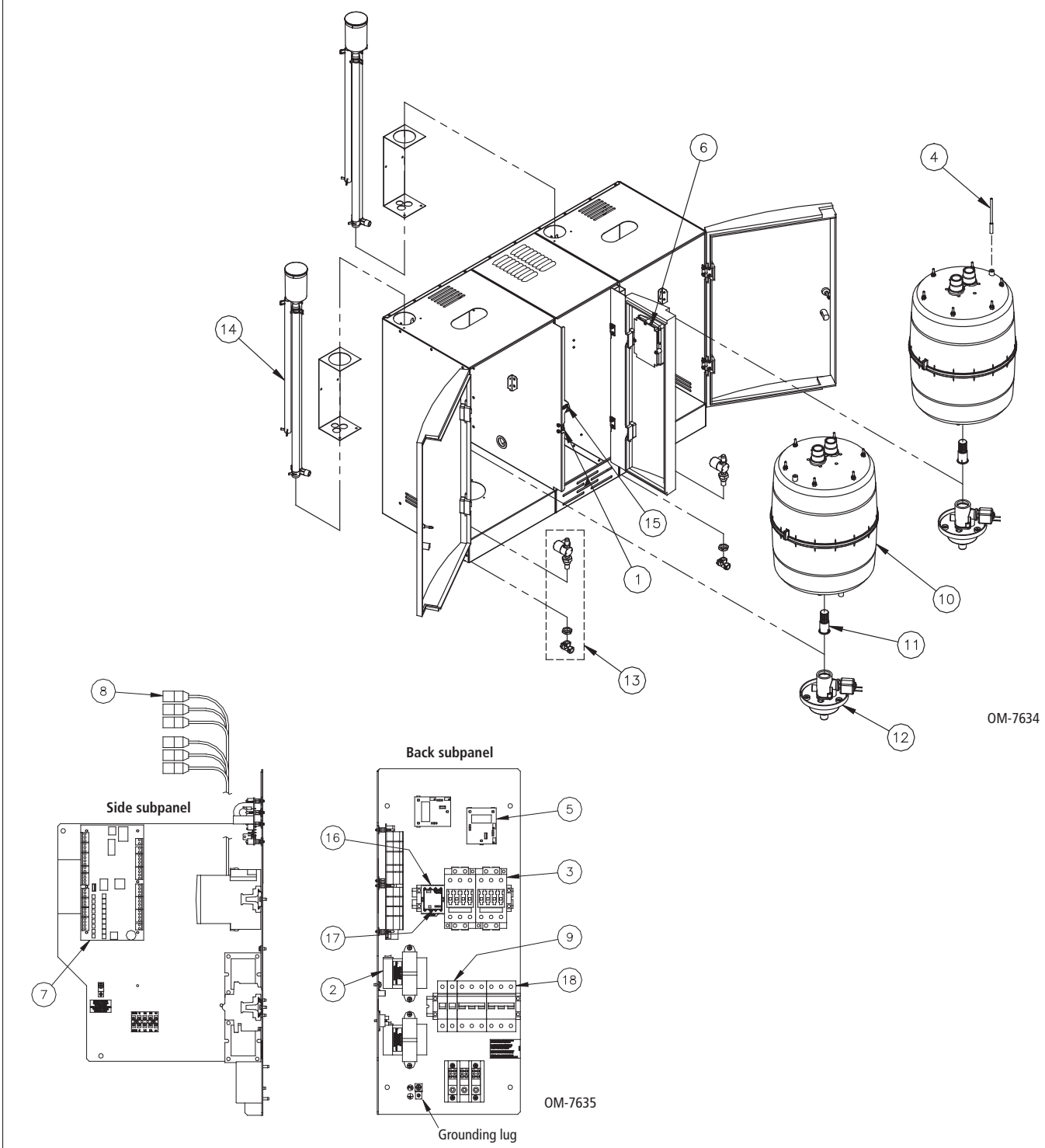
Replacement parts: XT humidifier models 5 through 100

Table 55-1: XT humidifier models 5 through 100 replacement parts

Item	Description	Part No.
1	Switch, door interlock	530010-002
2	Transformer, 208/240/480 to 24 VAC	408965-001
	Transformer 277 to 24 VAC	408982
	Transformer, 600 to 24 VAC	408986
	Transformer, 230/400 to 24 VAC	408985
3	Contactor - 24 VAC - 35 A	407010-001
	Contactor - 24 VAC - 55 A	407010-002
4	Plug, max. water level sensor	530010-105
5	Board, current sensing, 208/240/277 V (XT-5 only)	530013-001
	Board, current sensing, 400/480 V	530013-002
	Board, current sensing, 600 V	530013-003
	Board, current sensing, 208/230/240/277 V	530013-004
6	Vapor-logic4 display board	408495-004
7	Vapor-logic4 main board	408495-001
8	Electrode wiring kit (plugs with wires: 1 red, 1 black, 1 white)	194625-001
9	Breaker, 1 pole, 0.5 A, 277/480 V, D curve	406775-010
10	Kit, Cylinder, XT-5/10, 120-277 V, 1 phase	194601-001
	Kit, Cylinder, XT-10, 480 V, 1 phase	194601-002
	Kit, Cylinder, XT-10, 600 V, 1 phase	194601-003
	Kit, Cylinder, XT-10, 208/240 V, 3 phase	194601-004
	Kit, Cylinder, XT-10, 400 V, 3 phase	194601-005
	Kit, Cylinder, XT-10, 480 V, 3 phase	194601-006
	Kit, Cylinder, XT-10, 600 V, 3 phase	194601-007
	Kit, Cylinder, XT-20, 208-277 V, 1 phase	194601-008
	Kit, Cylinder, XT-20, 480 V, 1 phase	194601-009
	Kit, Cylinder, XT-20, 600 V, 1 phase	194601-010
	Kit, Cylinder, XT-20, 208-277 V, 3 phase	194601-011
	Kit, Cylinder, XT-20, 400 V, 3 phase	194601-012
	Kit, Cylinder, XT-20, 480 V, 3 phase	194601-013
	Kit, Cylinder, XT-20, 600 V, 3 phase	194601-014
	Kit, Cylinder, XT-30, 208/240 V, 3 phase	194601-015
	Kit, Cylinder, XT-30, 400 V, 3 phase	194601-016
	Kit, Cylinder, XT-30, 480 V, 3 phase	194601-017
	Kit, Cylinder, XT-30, 600 V, 3 phase	194601-018
	Kit, Cylinder, XT-50, 208/240 V, 3 phase	194601-019
	Kit, Cylinder, XT-50 ,400 V, 3 phase	194601-020
	Kit, Cylinder, XT-50, 480/600 V, 3 phase	194601-022
	Kit, Cylinder, XT-75, 400 V, 3 phase	194601-023
	Kit, Cylinder, XT-75, 480/600 V, 3 phase	194601-025
	Kit, Cylinder, XT-100, 400 V, 3 phase	194601-026
	Kit, Cylinder, XT-100, 480/600 V, 3 phase	194601-028
11	Strainer, cylinder	531006
12	Drain valve assembly (see parts in Figure 52-1)	194610-001
13	Fill valve assembly XT-5/10	194622-001
	Fill valve assembly XT-20/30/50	194622-002
	Fill valve assembly XT-75/100/150/200	194622-003
14	Fill cup extension kit (see parts in Figure 11-1)	194605-100
15	Clip, quarter-turn fastener	700458-003
16	Relay socket	407900-019
17	Relay, DPDT, Finder	407900-016

Replacement parts: XT humidifier models 150 and 200

Figure 56-1:
XT humidifier models 150 and 200 replacement parts



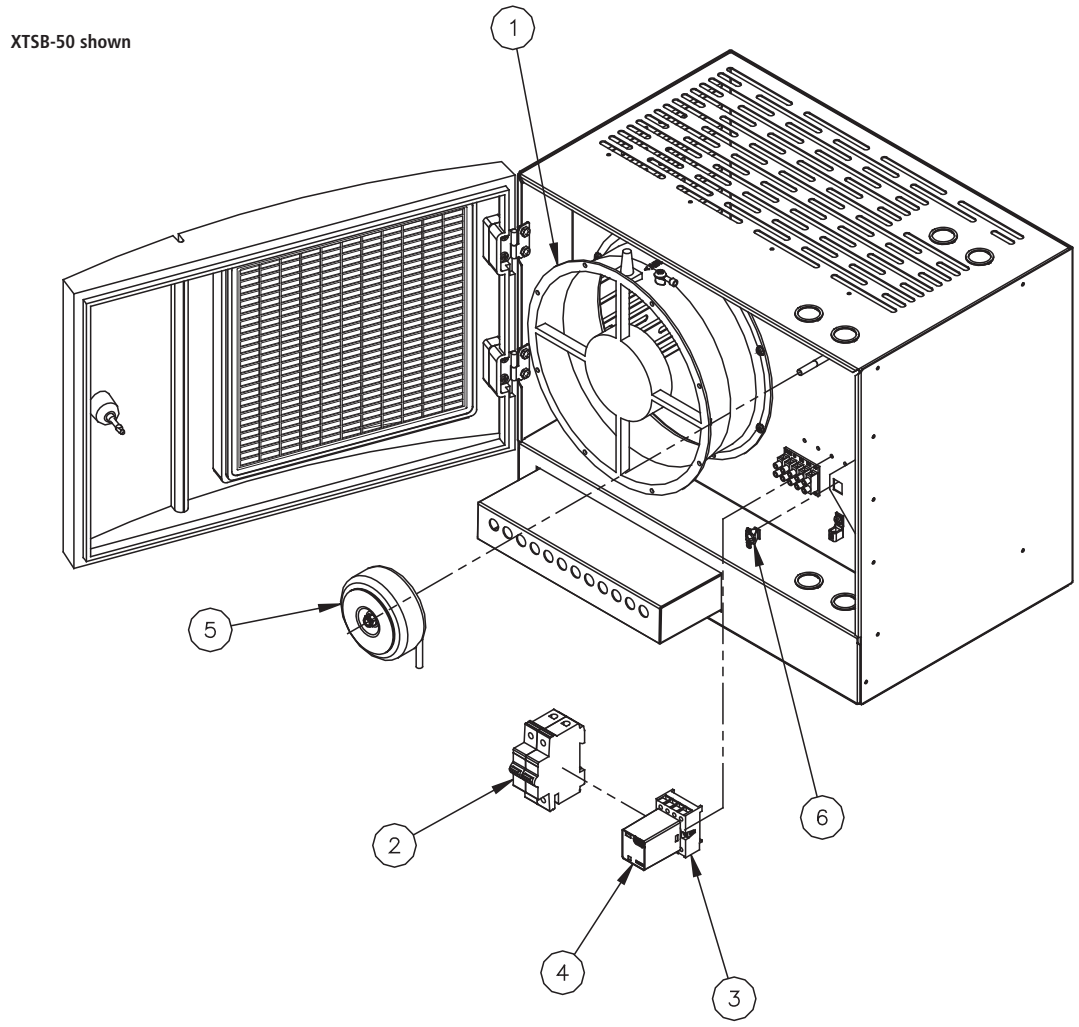
Replacement parts: XT humidifier models 150 and 20

Table 57-1: XT humidifier models 150 and 200 replacement parts

Item	Description	Part No.
1	Switch, door interlock	530010-002
2	Transformer, 208/240/480 to 24 VAC	408965-001
	Transformer, 600 to 24 VAC	408986
	Transformer, 230/400 to 24 VAC	408985
3	Contactor - 24 VAC - 35 A	407010-001
	Contactor - 24 VAC - 55 A	407010-002
4	Plug, max. water level sensor	530010-105
5	Board, current sensing, 400/480 V	530013-002
	Board, current sensing, 600 V	530013-003
6	Vapor-logic4 display board	408495-004
7	Vapor-logic main board	408495-001
8	Electrode wiring kit (plugs with wires: 1 red, 1 black, 1 white)	194625-001
9	Breaker, 1 pole, 0.5 A, 277/480 V, D curve	406775-010
10	Kit, Cylinder, XT-75, 400 V, 3 phase (order 2 for XT-150)	194601-023
	Kit, Cylinder, XT-75, 480/600 V, 3 phase (order 2 for XT-150)	194601-025
	Kit, Cylinder, XT-100, 400 V, 3 phase (order 2 for XT-200)	194601-026
	Kit, Cylinder, XT-100, 480/600 V, 3 phase (order 2 for XT-200)	194601-028
11	Strainer, cylinder	531006
12	Drain valve assembly (see parts in Figure 52-1)	194610-001
13	Fill valve assembly XT-75/100/150/200	194622-003
14	Fill cup extension kit (see parts in Figure 11-1)	194605-100
15	Clip, quarter-turn fastener	700458-003
16	Relay socket	407900-019
17	Relay, DPDT Finder	407900-016
18	Breaker, 40 A	406776-040
	Breaker, 50 A	406776-050
	Breaker, 63 A	406776-063

Replacement parts: Steam blowers XTSB-20 and XTSB-50

Figure 58-1:
XTSB-20 and XTSB-50 replacement parts



Replacement parts: Steam blowers XTSB-20 and XTSB-50

Table 59-1: XTSB-20 and XTSB-50 replacement parts

Item	Description	Part No.
1	Fan (XTSB-20)	407109-001
	Fan (XTSB-50)	306376
2	Breaker, 0.5A, 480V	406775-010
3	Finder relay socket	407900-019
4	Finder relay	407900-016
5	Transformer, XTSB-20, 208/240/277V	408963-001
	Transformer, XTSB-20, 480V	408963-002
	Transformer, XTSB-20, 600V	408963-003
	Transformer, XTSB-50, 208/240/277V	408963-011
	Transformer, XTSB-50, 480V	408963-012
	Transformer, XTSB-50, 600V	408963-013
	Transformer, XTSB-20/50, 230/400V	408963-014
6	Clip, quarter-turn fastener	700458-003

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 humidifier. DRI-STEEM leads the industry with a Two-year Limited Warranty and optional extended warranty.

For more information

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For the most recent production information visit our web site:
www.dristeem.com

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Intertek

Form No. XT-IOM-1210
Part No. 890000-140 Rev D

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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