

READ AND SAVE THESE INSTRUCTIONS



STS®

Steam-to-Steam Humidifier

Installation, Operation,
and Maintenance Manual

Warnings and cautions

WARNING

Indicates a hazardous situation that could result in death or serious injury if instructions are not followed.

CAUTION

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

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.

DriSteem® 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 tank, 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.



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Warnings and cautions

 WARNING	
 	<p>Disconnect electrical power</p> <p>Disconnect electrical power before installing supply wiring or performing service or maintenance procedures on any part of the humidification system. Failure to disconnect electrical power could result in fire, electrical shock, and other hazardous conditions. These hazardous conditions could cause property damage, personal injury, or death.</p> <p>Contact with energized circuits can cause property damage, severe personal injury, or death as a result of electrical shock or fire. Do not open control cabinet door or remove subpanel access panels until electrical power is disconnected.</p> <p>Follow the shutdown procedure below before performing service or maintenance procedures on any part of the system.</p>
  	<p>Shutdown procedure</p> <p>To prevent serious injury, follow this shutdown procedure before performing service or maintenance procedures on this humidifier, after the tank has cooled down and drained.</p> <ol style="list-style-type: none">1. Follow the “Cool down humidifier” instructions on Page 50 (tap/softened water STS) or Page 53 (STS with RO/DI water option) to put the humidifier at a safe temperature for service.2. Use the Vapor-logic® keypad/display to change control mode to Standby.3. Place all power disconnects in OFF position and lock in OFF position.4. Close the field-installed manual water supply shut-off valve.5. Close the manual shut-off valve on the inlet steam supply.

CAUTION	
<p>Hot discharge water</p> <p>Discharge water can be as hot as 212 °F (100 °C) and can damage the drain plumbing.</p> <p>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.</p> <p>If the humidifier is not equipped with a water tempering device, allow the tank to cool before opening the drain valve.</p>	
<p>Excessive supply water pressure</p> <p>Supply water pressure greater than 80 psi (550 kPa) can cause the humidifier to overflow.</p>	

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Attention installer

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

Where to find more information

Our web site:

The following documents are available on our web site: www.dristeem.com

- Catalogs
 - STS
 - Ultra-sorb®
- Installation, Operation, and Maintenance manuals (IOM)
 - Ultra-sorb Models LV and LH
 - Ultra-sorb Model XV
 - Vapor-logic controller (includes humidifier operation and troubleshooting)
- *DriSteem Humidification System Design Guide* (includes steam loss tables and general humidification information)

DriCalc®:

DriCalc, our software for humidification system sizing and selection, can be ordered at our web site. Also in Dri-calc:

- Library of installation guides
- Dispersion and sensor placement in ducts and air handlers
- Vertical airflows

Call us at 800-328-4447

Obtaining documents from our web site or from DriCalc is the quickest way to view our literature, or we will be happy to mail literature to you.

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Product overview

STS (steam-to-steam) humidifiers use pressurized boiler steam to heat clean fill water into chemical-free steam for humidification. See Figure 3-1.

STS humidifiers are designed for use with tap/softened water and are available with an option for RO/DI water (water that has been treated using reverse osmosis, or deionized water).

TAP/SOFTENED WATER

A conductivity probe (Figure 3-2) monitors the water level in the tap/softened water STS humidifier; therefore, water conductivity must be at least 30 µS/cm for proper operation. A tap/softened water STS humidifier will not operate with RO/DI water. For RO/DI water, use STS with the RO/DI water option.

RO/DI WATER OPTION

STS humidifiers with the RO/DI water option control water level with a float valve (Figure 3-3). Float valves are compatible with RO/DI water only.

Humidifiers with the RO/DI water option are virtually maintenance free and require little or no downtime.

WATER TYPE CONVERSION

STS tap/softened water humidifiers can be converted in the field for use with RO/DI water, and STS RO/DI water humidifiers can be converted in the field for use with tap/softened water. Contact your DriSteem representative or distributor for parts and instructions.

Supply water guidelines

Supply water quality is an important component of humidifier reliability and maintenance.

Examples:

- Corrosive water can decrease the service life of the humidifier.
- Excessive water hardness can increase the humidifier maintenance requirements.

To maximize humidifier service life and minimize humidifier maintenance, DriSteem has established guidelines for supply water. See Table 2-1.

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Table 2-1: DriSteem supply water guidelines	
Chlorides*	
RO or DI water	< 5 ppm
Softened water	< 25 ppm
Tap water	< 50 ppm
* Damage caused by chloride corrosion is not covered by your DriSteem warranty.	
Total hardness	
Tap water	< 500 ppm
pH	
RO, DI, or softened water	7 to 8
Tap water	6.5 to 8.5
Silica	< 15 ppm
You may wish to take action to mitigate potential negative effects to your humidifier. Supply water outside of these guidelines may void your DriSteem warranty. Please contact your DriSteem Representative or DriSteem Technical Support if you need advice.	

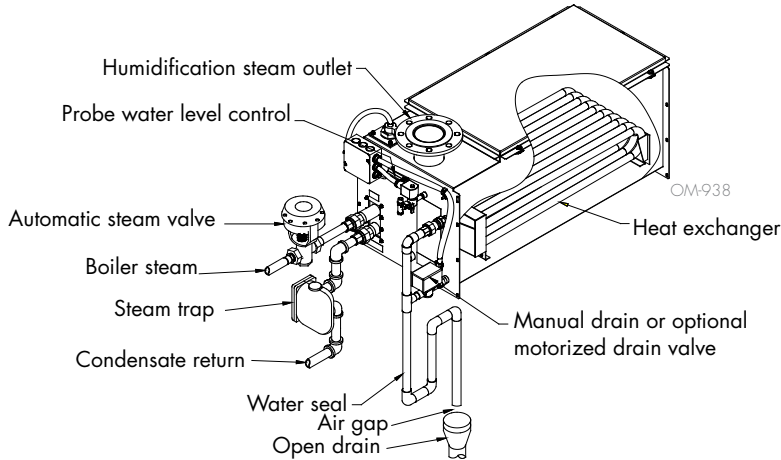
Product overview

FIGURE 3-1: STS HUMIDIFIERS

Notes:

- Drain piping material must be suitable for 212 °F (100 °C) water.
- See the piping drawings on Pages 22 through 25.

Tap/softened water STS humidifier



STS humidifier with the RO/DI water option

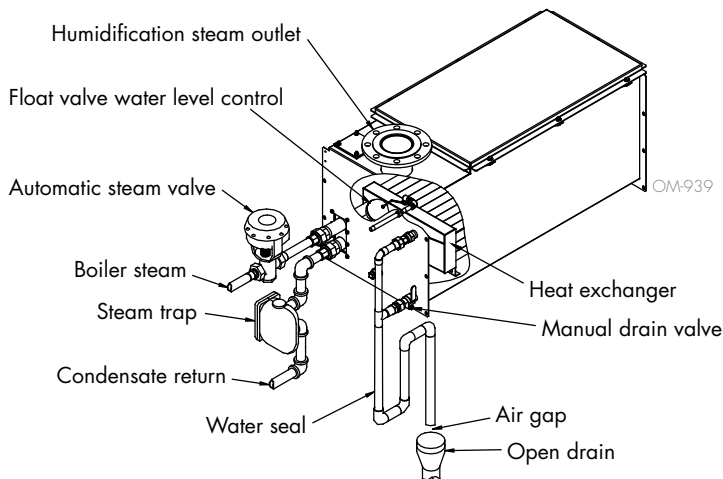
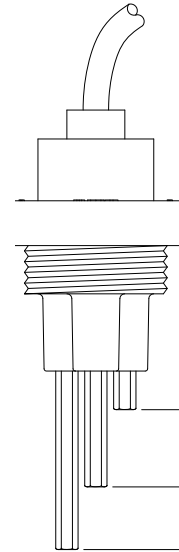


FIGURE 3-2: WATER LEVEL CONTROL FOR TAP/SOFTENED WATER HUMIDIFIER



Fill valve closes when water level rises to this probe.

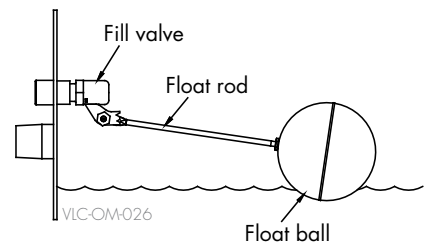
Fill valve opens when water level is below this probe.

Low-water cutoff. Pressurized steam to heat exchanger is cut if water level drops below this probe (if steam to STS heat exchanger is controlled by Vapor-logic).

Humidifiers using tap or softened water control water levels electronically using a three-rod probe. The controller responds with the above actions when the water level reaches each rod.

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FIGURE 3-3: WATER LEVEL CONTROL FOR RO/DI-WATER OPTION HUMIDIFIER

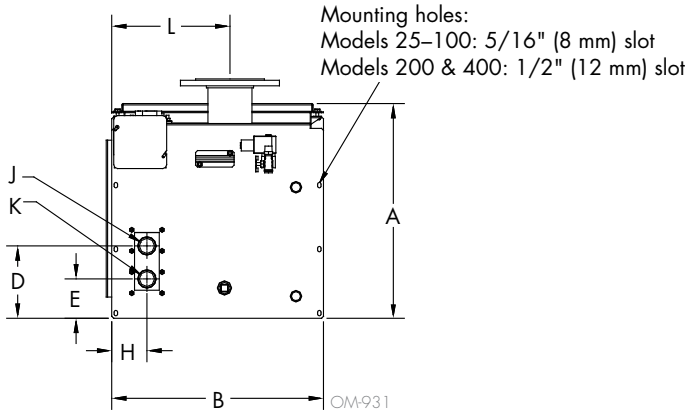


Humidifiers using RO/DI water control water level using a float valve. An optional low-water cutoff switch is available as a remote water indicator.

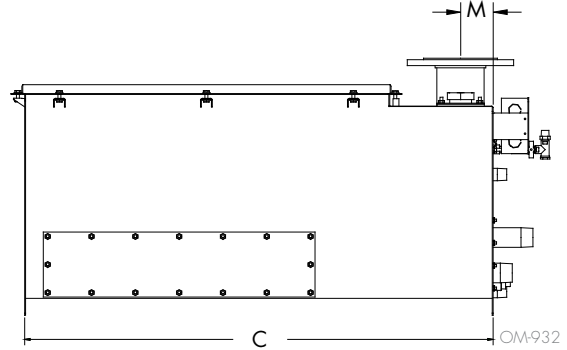
Dimensions

FIGURE 4-1: DIMENSIONS, STS MODELS 25, 50, 100, 200, AND 400 (WITH COPPER OR STAINLESS STEEL HEAT EXCHANGERS)

Front view



Side view

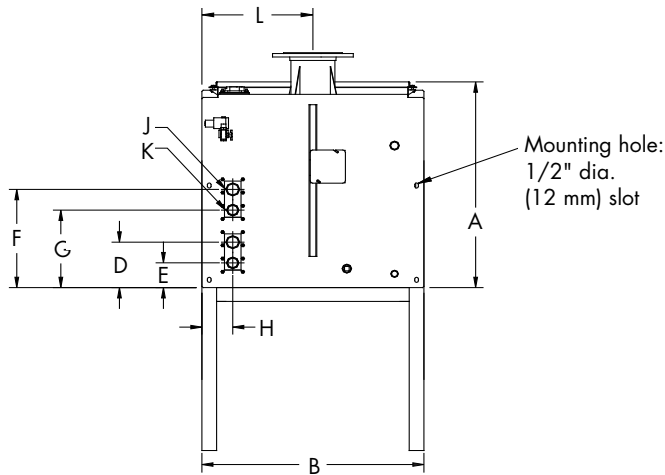


Notes:

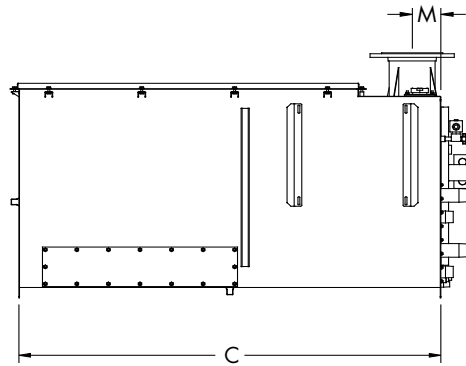
- Tap/softened water model shown
- See dimensions in Tables 5-1 and 5-2

FIGURE 4-2: DIMENSIONS, STS MODEL 800 (WITH COPPER OR STAINLESS STEEL HEAT EXCHANGERS)

Front view



Side view



Notes:

- Tap/softened water model shown
- See dimensions in Tables 5-1 and 5-2

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Dimensions

Table 5-1:
Dimensions, STS with copper heat exchangers

	Description See drawings in Figures 4-1 and 4-2	STS model*									
		25C		50C		100C		400C		800C	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A	Height**	19.50	495	19.50	495	19.50	495	19.50	495	29.75	756
B	Width	14.75	375	14.75	375	19.25	489	30.25	768	30.25	768
C	Length	23.65	600	39.65	1007	39.65	1007	55.15	1401	55.15	1401
D	Bottom to supply inlet of first heat exchanger	6.63	168	6.63	168	6.63	168	6.63	168	6.63	168
E	Bottom to return outlet of first heat exchanger	3.63	92	3.63	92	3.63	92	3.63	92	3.63	92
F	Bottom to supply inlet of second heat exchanger	—	—	—	—	—	—	—	—	14.28	363
G	Bottom to return outlet of second heat exchanger	—	—	—	—	—	—	—	—	11.24	285
H	Side to heat exchanger	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83
J	Pressurized steam supply inlet	3/4" pipe thread	DN20	1/4" pipe thread	DN32	1/4" pipe thread	DN32	1/2" pipe thread	DN40	1/2" pipe thread	DN40
K	Pressurized condensate return outlet	3/4" pipe thread	DN20	3/4" pipe thread	DN20	1/4" pipe thread	DN32	1/4" pipe thread	DN32	1/4" pipe thread	DN32
L	Side to steam outlet	6.25	159	8.63	219	9.63	245	13.00	330	13.00	330
M	Front to steam outlet	2.50	64	2.25	57	2.75	70	3.75	95	3.75	95

* C, S, and SNC in model numbers are explained in Table 6-1.
 ** Add 23.5" (597 mm) to overall height when STS is mounted on four support legs. Add 22.5" (572 mm) to overall height when STS is mounted on two H-legs.

Table 5-2:
Dimensions, STS with stainless steel heat exchangers

	Description See drawings in Figures 4-1 and 4-2	STS model*											
		25S		50S		100S		200S		400SNC		800SNC	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A	Height**	19.50	495	19.50	495	19.50	495	19.50	495	19.50	495	29.75	756
B	Width	14.75	375	14.75	375	19.25	489	30.25	768	30.25	768	30.25	768
C	Length	23.65	600	39.65	1007	39.65	1007	55.15	1401	55.15	1401	55.15	1401
D	Bottom to supply inlet of first heat exchanger	6.85	174	6.85	174	6.85	174	6.85	174	6.85	174	6.85	174
E	Bottom to return outlet of first heat exchanger	3.35	85	3.35	85	3.35	85	3.35	85	3.35	85	3.35	85
F	Bottom to supply inlet of second heat exchanger	—	—	—	—	—	—	—	—	—	—	14.5	368
G	Bottom to return outlet of second heat exchanger	—	—	—	—	—	—	—	—	—	—	11.0	279
H	Side to heat exchanger	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83
J	Pressurized steam supply inlet	3/4" pipe thread	DN20	1" pipe thread	DN25	1" pipe thread	DN25	1/2" pipe thread	DN40	1/2" pipe thread	DN40	1/2" pipe thread	DN40
K	Pressurized condensate return outlet	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20
L	Side to steam outlet	6.25	159	8.63	219	9.63	245	13.00	330	13.00	330	13.00	330
M	Front to steam outlet	2.50	64	2.25	57	2.75	70	3.75	95	3.75	95	3.75	95

* C, S, and SNC in model numbers are explained in Table 6-1.
 ** Add 23.5" (597 mm) to overall height when STS is mounted on four support legs. Add 22.5" (572 mm) to overall height when STS is mounted on two H-legs.

Capacities, electrical specifications, and weights

Table 6-1:
STS humidifier models and capacities with copper heat exchangers

STS models	Steam pressure at connection to STS steam valve (valve provided by DriSteem)							
	5 psi (34 kPa)		10 psi (69 kPa)		13 psi (90 kPa)		15 psi (103 kPa)	
	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h
25C	20	9	70	32	100	45	120	54
50C	50	23	150	68	200	91	240	109
100C	100	45	300	136	400	181	480	218
400C	300	136	580	263	720	327	790	358
800C	650	295	1275	578	1500	680	1600	726

Table 6-2:
STS humidifier models and capacities with stainless steel heat exchangers

STS models	Steam pressure at connection to STS steam valve (valve provided by DriSteem)							
	5 psi (34 kPa)		10 psi (69 kPa)		13 psi (90 kPa)		15 psi (103 kPa)	
	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h
25S	10	5	25	11	30	14	35	16
50S	30	14	55	25	75	34	80	36
100S	60	27	110	50	140	64	150	68
200S	150	68	290	132	360	163	390	177
400SNC	170	77	392	178	552	250	637	289
800SNC	212	96	825	374	1095	497	1223	555

For use with tap/softened or RO/DI water:

- STS models ending in C (copper heat exchangers with a nickel coating)
- STS models ending in S (stainless steel heat exchangers with a Teflon coating)

For use with RO/DI water option only:

STS models ending in SNC (stainless steel heat exchangers with no coating)

Table 6-3:
STS humidifier weights

STS model	Shipping weight		Operating weight*	
	lbs	kg	lbs	kg
25	95	43	175	79
50	125	57	336	152
100	139	63	350	159
200	245	111	850	386
400	320	145	950	431
800	410	186	1450	658

* Operating weight does not include weight of interconnecting piping provided by installer.

Table 6-4:
STS humidifier electrical specifications

North America	120 V single phase max 3 amps
Europe	230 V single phase max 3 amps

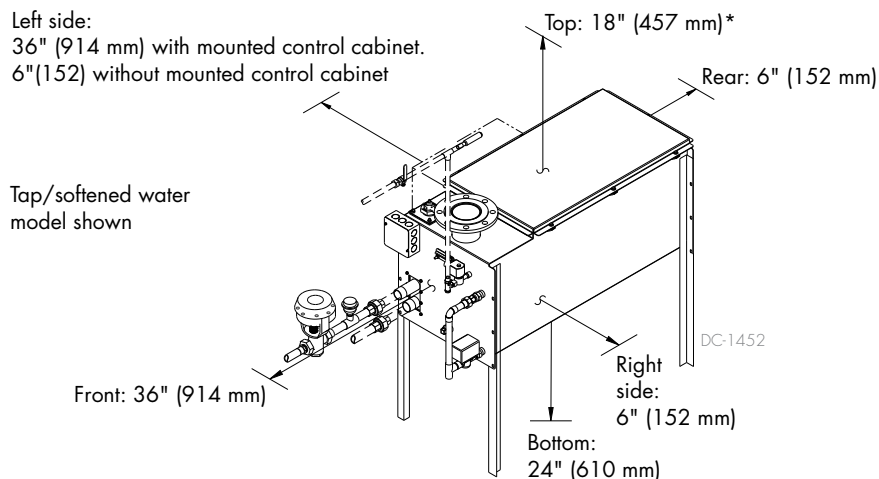
Selecting a location

When selecting the location of the humidifier, consider the following:

- Maximum ambient temperature for control cabinet is 104 °F (40 °C).
- Noises inherent to operation such as STS water fill cycles
- Easy access for maintenance
- Critical service and maintenance clearances around humidifier — primarily top, left side, and front (see Figure 7-1).
- Convenient location to dispersion system for routing of steam hose or tubing
- Electrical connections — power, control, and safety circuits
- Steam supply piping connections — inlet steam piping, condensate piping, and optional equipment (see Figure 26-1)
- Plumbing connections — supply water, drain piping, and condensate return piping
- Water seal requirements
- Avoid locations above critical equipment or processes to avoid damage to the equipment below in the event of a water leak.
- Avoid locations close to sources of electromagnetic emissions such as power distribution transformers and high horsepower motors controlled by variable frequency drives.

FIGURE 7-1: RECOMMENDED CLEARANCES

* Minimum access clearance of 18" (457 mm) recommended for periodic removal of top cover for access to tank.



Mounting methods

FIGURE 8-1: SUPPORT LEGS, STS MODELS 25, 50, AND 100 ONLY

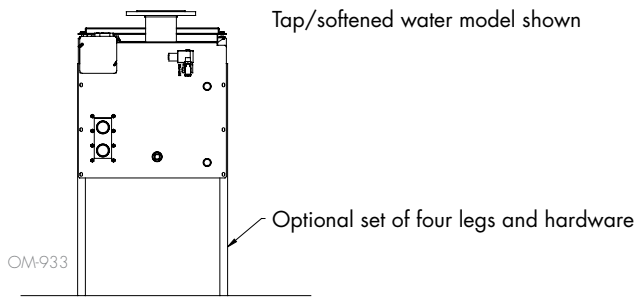


FIGURE 8-2: TRAPEZE HANGER, STS MODELS 25, 50, AND 100 ONLY

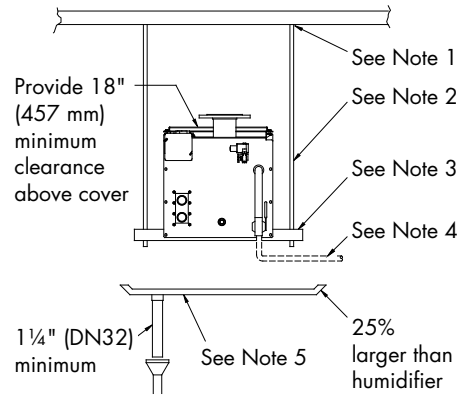
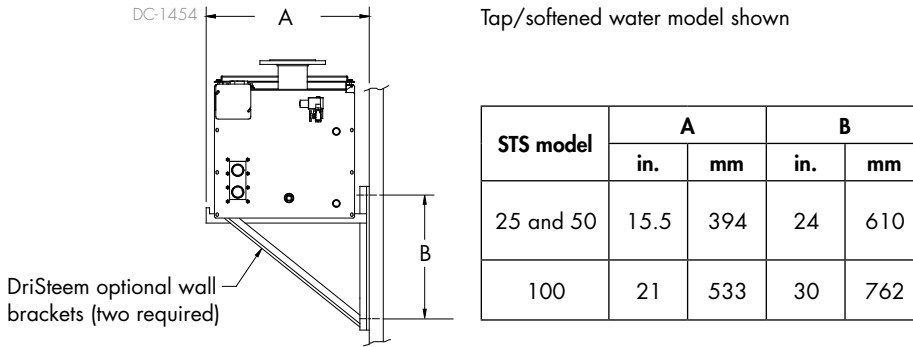


FIGURE 8-3: WALL BRACKETS, STS MODELS 25, 50, AND 100 ONLY



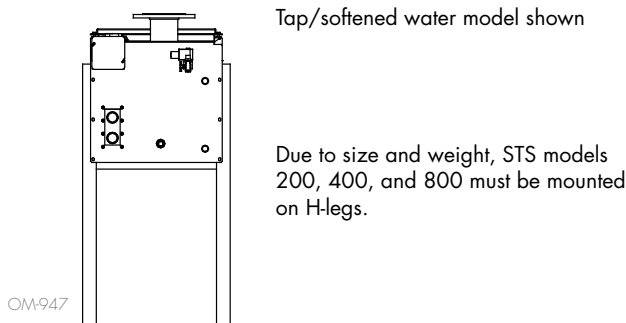
Tap/softened water model shown

Notes:

1. Secure rods to overhead construction.
2. 3/8" (M10) threaded rod of length required.
3. Angle or channel sized to properly support humidifier.
4. Humidifier drain to appropriate building waste. Do not drain humidifier directly into drip pan. Install water seal as shown on Pages 22 through 25.
5. Drip pan (by installer) recommended in overhead installations to prevent possible water damage to equipment below.

DC-1453

FIGURE 8-4: H-LEGS, STS MODELS 200, 400, AND 800 ONLY



Mounting the humidifier

The STS humidifier tank must be level from side to side and front to back. For all mounting methods, shim and adjust when mounting, and verify that tank is level after it is filled and at operating weight.

SUPPORT LEGS

See Figure 8-1. Use the enclosed bolts, nuts, and washers to fasten the legs to the tank.

WALL BRACKETS

See Figure 8-3. DriSteem does not recommend mounting STS model 200, 400, or 800 with wall brackets. DriSteem recommends using 3/8" (M10) fasteners.

- **Concrete or block wall:** Use concrete anchors (expansion bolts) rated for the operating weight of the STS humidifier. Position the wall brackets so they are flush with the front and back flanges of the tank.
- **Wood stud wall:** Mount two horizontal 2 x 4 boards (100 mm x 50 mm timbers) 16" (404 mm) on center:
 - STS 25: Lag bolt (coach screw) the 2 x 4s to two studs.
 - STS 50: Lag bolt the 2 x 4s to three studs.
 - STS 100: Lag bolt the 2 x 4s to four studs.

Lag bolt the wall brackets to the horizontal 2 x 4s. Position the wall brackets flush with front and back flanges of tank.
- **Metal stud wall:** Follow the wood stud wall guidelines above, but provide a second set of 2 x 4s (100 mm x 50 mm timbers) on the backside of the wall. Run bolts with washers through the face 2 x 4, through each metal stud, and through the backside 2 x 4. Fasten the bolts and the face and backside 2 x 4s to the wall with washers and nuts.

H-LEGS

See Figure 8-4. With the STS tank securely held in place above the floor, attach front and rear supports using the supplied 3/8" (M10) bolts, nuts, and washers. **Make sure the bottom of the tank is supported by the H-leg supports;** this can be accomplished by having the bolts slightly loose as the unit is lowered to the floor, then tighten them after the unit is place.

TRAPEZE HANGER

See Figure 8-2. Secure the threaded rods to an overhead structure strong enough to support the operating weight of the humidifier, field-installed piping, and (if mounted on the humidifier) control cabinet.

For overhead installations, install a drip pan to prevent possible damage to equipment below in the event of a water leak.

Important:

Installation must comply with local governing codes.

These mounting methods are the only options available to maintain compliance to the UL 998 standard. Alternate mounting methods will compromise the humidifier's CE, ETL, and C-ETL approval.

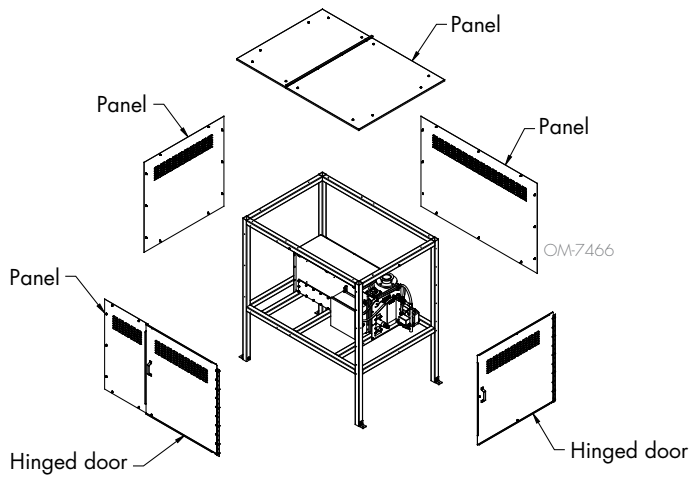
Support legs, trapeze hanger, and wall brackets are not available for STS models 200, 400, and 800.

Table 9-1:
STS mounting options

Mounting method	STS model	
	25, 50, 100	200, 400, 800
Trapeze hanger	standard	—
H-legs	—	standard
Support legs	optional	—
Wall brackets	optional	—

Weather cover

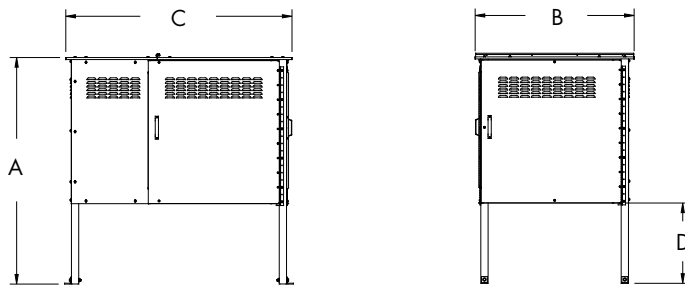
FIGURE 10-1: WEATHER COVER EXPLODED VIEW



**Table 10-1:
Weather cover weights**

Weather cover size	lbs	kg
STS 25 to 100	425	193
STS 200 to 800	550	250

FIGURE 10-2: WEATHER COVER DIMENSIONS



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**Table 10-2:
Weather cover dimensions**

Letter	Description	STS 25 to 100		STS 200 to 800	
		inches	mm	inches	mm
A	Height	62	1575	66	1676
B	Length	43.5	1105	53	1346
C	Width	62	1575	78.25	1988
D	Distance from bottom	22	559	22	559

Weather cover

The optional STS weather cover is water-resistant and designed to protect an STS humidifier from rain and sun. This weather cover has been tested and approved by ETL Testing Laboratories, Inc., and is listed to UL Standard 1995 and certified to CAN/CSA Standard C22.2 No. 236.

The weather cover is fully assembled at the DriSteem factory.

INSTALLATION NOTES

Open the hinged doors to make necessary connections to the humidifier. Refer to the installation section of this manual for all electrical, supply water, and drain connection requirements.

INSTALLATION ISSUES SPECIFIC TO WEATHER COVER APPLICATIONS

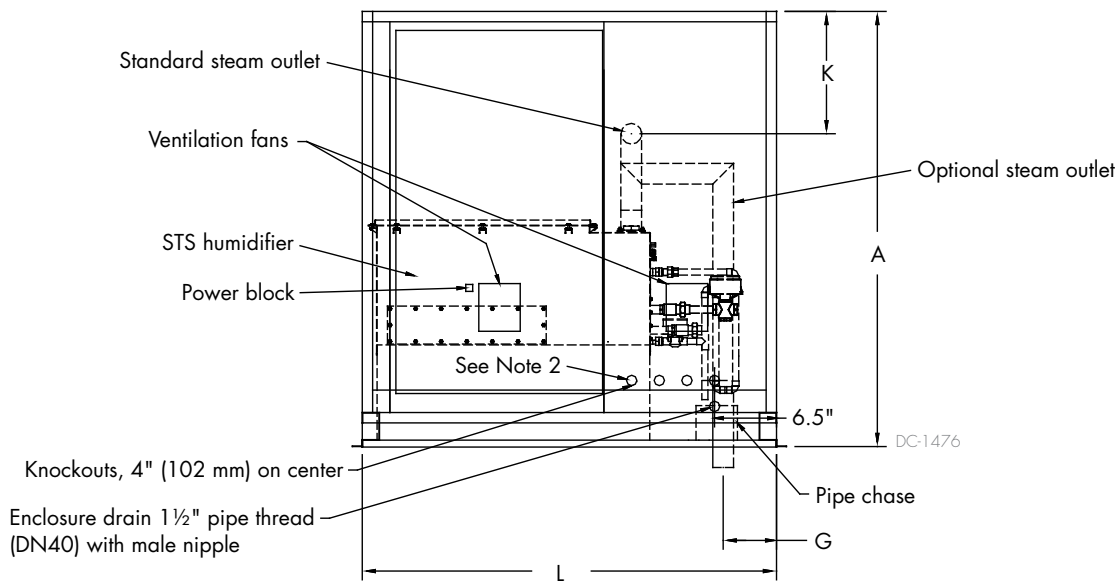
- Installation must comply with all governing codes.
- The bottom of the weather cover is open to accommodate piping and electrical connections.
- Electrical connections must be made with approved, outdoor-rated, watertight conduit.
- Freeze protection must be provided on all water piping.
- Steam supply must be insulated.
- Avoid using steam hose in outdoor applications — the effects of ultraviolet rays will prematurely age the steam hose.
- Installer must drill a hole in weather cover for steam piping. Seal after making steam connection to maintain weather protection.
- The steam outlet must be isolated with a union to allow easy disconnection of the steam supply. This allows easy removal of the weather cover to access the STS for service and maintenance.

ANNUAL WEATHER COVER MAINTENANCE REQUIREMENTS

- Check all fasteners and verify they are secure.
- Check for any sign of leakage — trace back to origin and repair.

Outdoor Enclosure

FIGURE 12-1: OUTDOOR ENCLOSURE WITH STANDARD OR OPTIONAL STEAM OUTLET, ELEVATION VIEW



Notes:

1. The Outdoor Enclosure has two available steam distribution configurations. The standard configuration has a steam outlet on the right side of the Outdoor Enclosure for connecting to steam dispersion unit piping. The optional internal steam distribution configuration routes steam within the Outdoor Enclosure and down through the enclosure pipe chase into a building.
2. There are four knockouts located on the right and left side of the enclosure. Knockout sizes are 1 1/2" (hole dia. 50 mm) for STS models 25-100, and 2" (hole dia. 63.5 mm) for STS models 200-800. Run the electrical power into the enclosure at these knockouts.
3. All piping from the STS unit to the steam outlet is stainless steel pipe. Depending on the application, tubing or DriSteam steam hose is recommended for interconnecting piping from steam outlet to dispersion assembly.
4. Install a riser trap in the branch line leading to the humidifier.
5. The preferred location for the STS steam control valve is inside the Outdoor Enclosure. If one of these valves must be located inside the building, it must be located within 6' (1.8 m) of the humidifier to reduce pressure drop.
6. See the dimensions in Table 13-1.

Description	STS model	
	25 – 100	200 – 800
Water makeup (fill)	1/4" pipe thread (DN8)	1/4" pipe thread (DN8)
Drain	3/4" (DN20)	1" (DN25)
Condensate return	3/4" pipe thread (DN20)	3/4" pipe thread (DN20)
Steam outlet	See Table 27-1.	

STS model	Shipping weight*		Operating weight*	
	lbs	kg	lbs	kg
25	600	272	680	308
50	625	284	840	381
100	640	290	860	390
200	1050	476	1650	748
400	1125	510	1750	794
800	1225	556	2250	1021

* Includes humidifier

Outdoor Enclosure

FIGURE 13-1: OUTDOOR ENCLOSURE, TOP VIEW

Valve access door:

- Models 25-100 have one access door
- Models 200-800 have two access doors

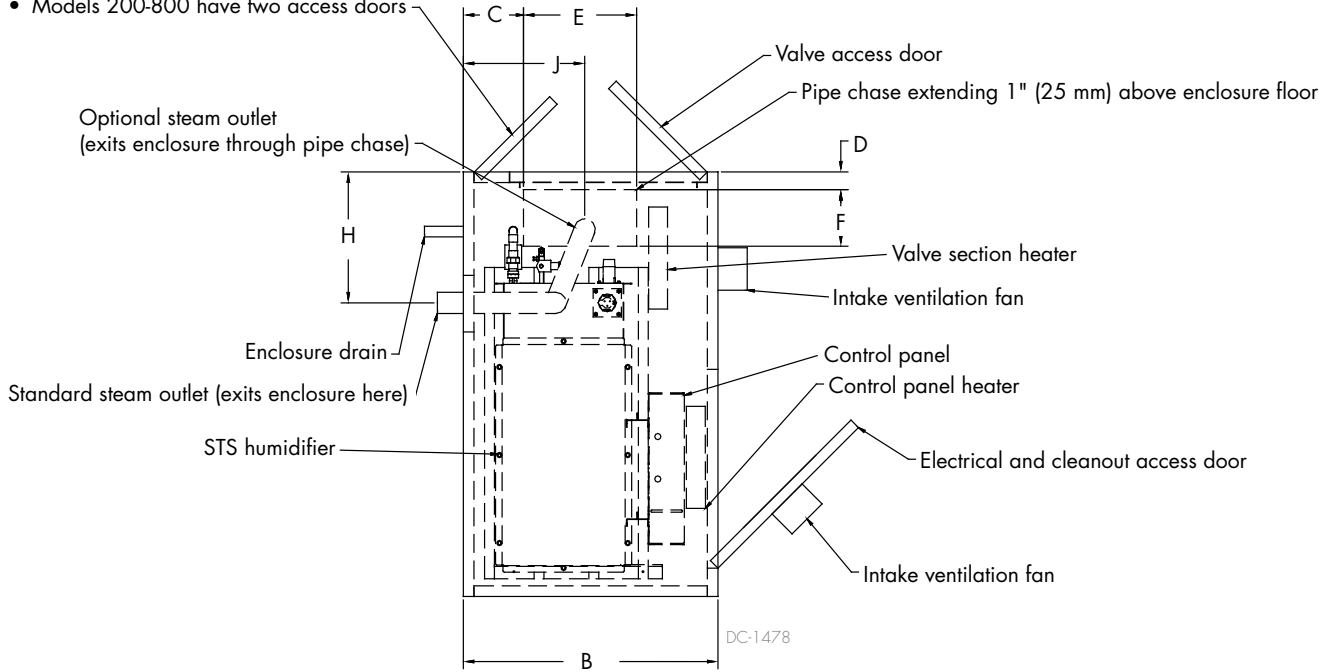


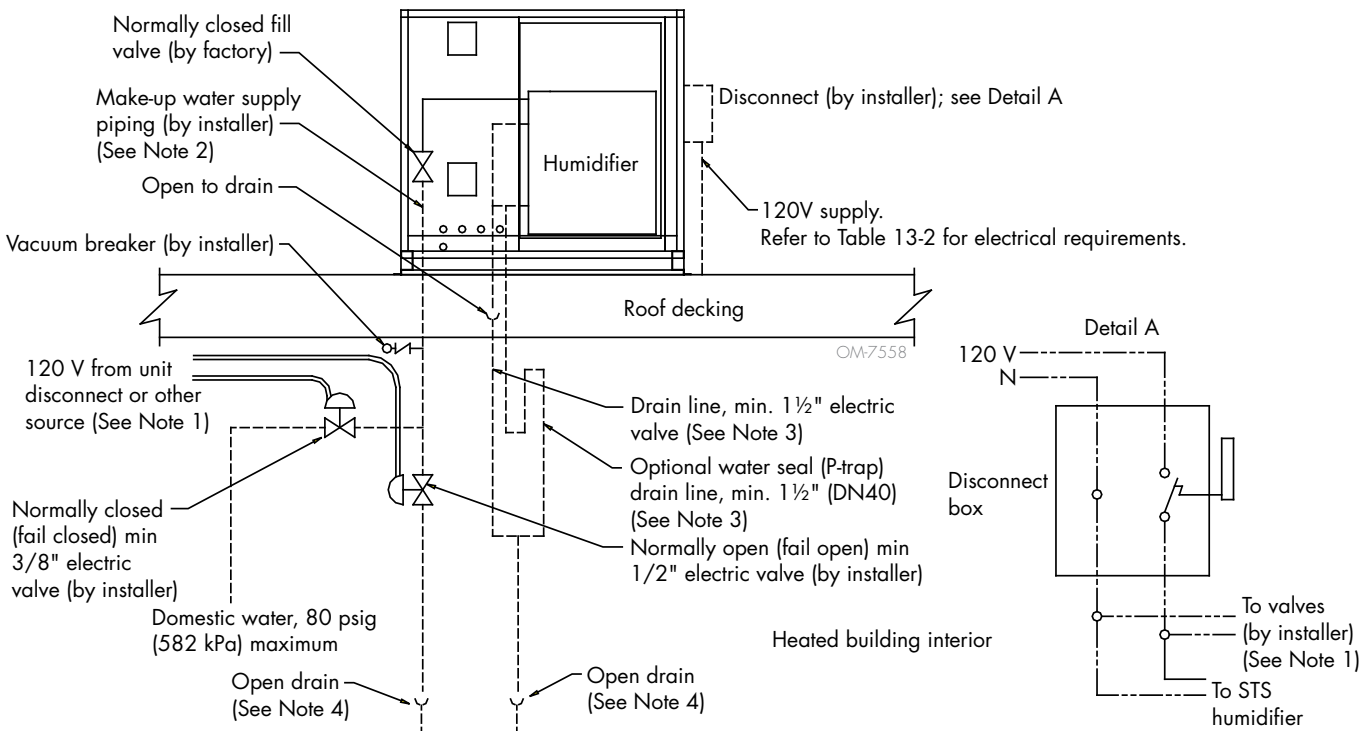
Table 13-1: Outdoor Enclosure dimensions*					
Item	Description	STS model			
		25-100		200-800	
		inches	mm	inches	mm
A	Enclosure height	56.00	1422	66.00	1676
B	Enclosure width	36.00	914	46.00	1168
C	Pipe chase position	4.50	114	4.50	114
D		2.00	57	3.50	89
E	Pipe chase size	20.00	508	32.00	312
F		8.00	203	10.00	254
G		6.00	152	8.50	216
H	Steam pipe position	18.63	473	22.00	559
J		14.50	368	20.50	521
K		12.25	311	11.00	279
L	Enclosure length	60.00	1524	78.00	1981

* See drawings in Figures 12-1 and 13-1.

Table 13-2: STS Outdoor Enclosure electrical specifications			
	Voltage	Current	Maximum disconnect
Outdoor Enclosure without heater package	120 Vac, 50/60 Hz	3.5 A	10 A
Outdoor Enclosure with heater package	120 Vac, 50/60 Hz	13.5 A	20 A

Outdoor Enclosure

FIGURE 14-1: OUTDOOR ENCLOSURE INSTALLATION DETAIL



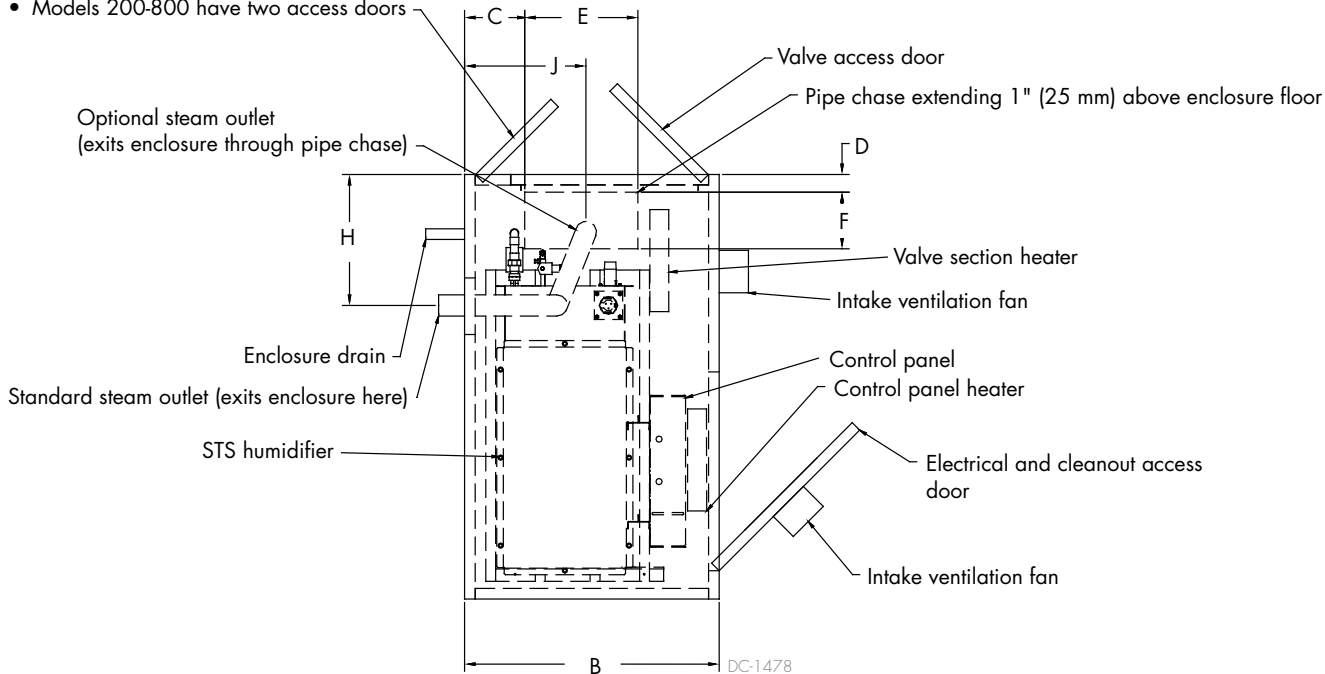
- Notes:
1. Insulate supply water piping to avoid dripping from condensation. To ensure that water does not remain in the fill line and freeze if there is a loss of power, DriSteem recommends field installing additional valves upstream of the fill valve in a conditioned space. Power these valves on the same circuit that supplies the STS (as shown above); if the power goes off, water drains out of the fill line to prevent freezing.
 2. Ensure that water lines are protected from freezing conditions.
 - Install heat tracing and insulation on fill piping inside the Outdoor Enclosure.
 - In extreme or critical applications in which the unlikely event of a water leak could cause severe damage, DriSteem recommends a thermostat with a remote sensor on the fill line to cut power to the STS and safety valves to stop fill water to the STS and drain the fill piping when the temperature is below freezing.
 3. DriSteem recommends copper or iron drain piping for Outdoor Enclosures. On a loss of power the tank water will drain, but not be cooled by the Drane-kooler because of the field supplied safety shut-off valves. If it is critical to keep the Drane-kooler functional in the case of a power loss, disconnect the Drane-kooler and relocate it down inside the conditioned space of the building. Pipe the supply water for the Drane-kooler before the safety shut-off valves.
 4. If copper or iron piping is used for both the fill and drain piping, these drains may be tied together. Locate 1" 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.

Outdoor Enclosure

FIGURE 15-1: STS OUTDOOR ENCLOSURE, TOP VIEW

Valve access door:

- Models 25-100 have one access door
- Models 200-800 have two access doors



MOUNTING

- Outdoor Enclosure must be level and positioned with enough clearance to open access doors.
- Verify that position of pad or curb properly supports Outdoor Enclosure, and that support structure dimensions coincide with unit dimensions.
- Locate unit so air intakes are not close to exhaust fan outlets, gasoline storage, or other contaminants that could potentially cause dangerous situations. Using or storing gasoline or other flammable vapors and liquids in open containers in vicinity of Outdoor Enclosure is hazardous.
- When located on roof, Outdoor Enclosure air intakes must be a minimum of 14" (356 mm) above roof to prevent intake of snow or splashed rain. Position Outdoor Enclosure so prevailing winds do not blow into air intakes.
- Remove all shipping brackets and other packaging prior to installing the unit.
- During transit, unloading, and setting of the unit, bolts and nuts may have become loosened. Check that all nuts are tightened.

Important note about STS Outdoor Enclosure installation

- Install a riser trap in the branch line leading to the humidifier.
- The preferred location for the STS steam control valve is inside the Outdoor Enclosure. If one of these valves must be located inside the building, it must be located within 6' (1.8 m) of the humidifier to reduce pressure drop.

Outdoor Enclosure

MOUNTING (CONTINUED)

- There are four knockouts on the right and left side of the enclosure. It is recommended that electrical power is run into enclosure at these knockouts.
- Outdoor Enclosure is designed for lifting by two methods:
 - Preferred method of lifting is by forklift. This is only possible if the forks extend across entire unit. Forks that do not extend across entire unit could cause tipping, resulting in unsafe conditions or damage to the unit.
 - Alternative method of lifting is through unit's channel base frame and/or special lifting lug hooks installed on the unit. Use a load spreader of sufficient width to ensure that lifting cables clear sides of unit. If such a spreader is not available, insert wood strips between cables and unit where necessary. All four lifting points must be used; they are marked "lift here" on the unit.

In both cases it must be lifted from the bottom base and kept level, and it must not tip, fall, or twist. If unit is severely twisted during handling, permanent damage could occur. It is installer's responsibility to verify handling equipment's capability to safely handle Outdoor Enclosure.

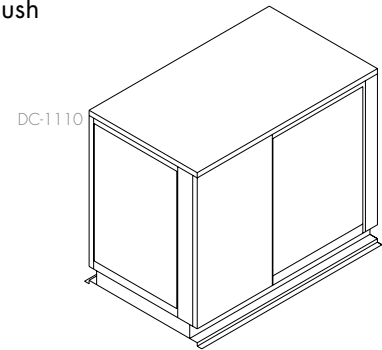
- Outdoor Enclosure has two available steam distribution configurations:
 - Standard configuration is a steam outlet on one side of enclosure for connecting to steam dispersion unit piping.
 - Optional internal configuration routes steam within Outdoor Enclosure and down through pipe chase into building.

See the drawings beginning on Page 12.

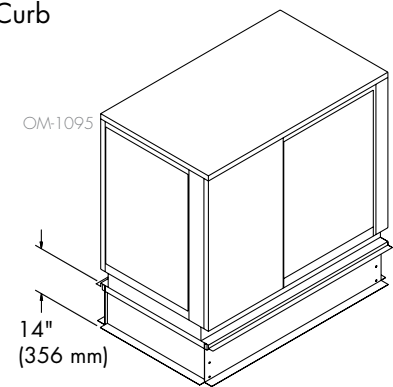
- Pipe chase is inside enclosure. Cover for pipe chase is provided to maintain proper pressure in enclosure if this opening is not utilized. However, it is recommended that this pipe chase be used for both supply water piping and drain piping, in which case pipe chase cover should be removed. Install insulation rated for 212 °F (100 °C) to completely fill area around pipes to maintain proper enclosure pressure.
- When enclosure is pad mounted or when pipe chase cannot be used, supply water and drain piping can be run through the knockouts — preferably on side opposite utility connections.
- When ordered with heater package, two thermostat-controlled strip heaters are provided to keep enclosure at constant minimum temperature: one heater is in control cabinet section, and one heater is in front section.
- Enclosure drain is provided. In case of water leak, water will drain from enclosure through this drain.

FIGURE 16-1: OUTDOOR ENCLOSURE MOUNTING OPTIONS

Flush



Curb



Outdoor Enclosure

MOUNTING (CONTINUED)

- Keypad/display with standard 5' (1.5 m) cable ships mounted to subpanel in Outdoor Enclosure. Keypad/display must not come in contact with strip heaters or block intake ventilation hood.
- If constant monitoring of unit is desired, or if unit is located in a severe climate, a remote-mount keypad/display should be installed. Additional cable lengths up to 500 feet (152 m) are available as an option for this mounting configuration.
- 16-gauge galvanized steel curbs (optional) are shipped unassembled for ease of transporting to roof; they include all hardware for bolt-together assembly, and all holes are matched before leaving factory. Curb must be a minimum of 14" (356 mm) high. One 2" x 1/2" closed-cell curb gasket with adhesive on one side is supplied with hardware. Gasket must be installed between top of curb and base surface of Outdoor Enclosure to prevent moisture from leaking into building from driving rain or melting snow. Installation drawing is included.
- All piping from humidifier to steam outlet is stainless steel pipe. Depending on the application, tubing or DriSteem steam hose is recommended for interconnecting piping from steam outlet to dispersion assembly.

STS OUTDOOR ENCLOSURE SEQUENCE OF OPERATION

- Power is applied to Outdoor Enclosure:
- If ambient temperature in enclosure is below 50 °F (10 °C), the strip heaters power up. Strip heaters remain on until enclosure reaches 50 °F (10 °C) to ensure that enclosure temperature does not drop below the freezing point.
- When there is no call for humidity, an aquastat maintains tank temperature at the factory default of 70 °F (21 °C). This temperature can be reset in the field to be from 40 to 180 °F (4 to 82 °C).
- When the ambient temperature in the enclosure reaches 85 °F (29 °C), two ventilation fans turn on to cool the electronic components. A high limit is also provided to power down the STS if the enclosure temperature reaches 150 °F (66 °C). In a high limit situation, the ventilation fans continue to run and once the enclosure temperature falls below 130 °F (54 °C), the STS automatically resumes normal operation.
- A normally open drain valve is provided on the STS Outdoor Enclosure to drain the tank in the event of a power loss.

FIGURE 17-1: TYPICAL ROOFTOP INSTALLATION OVERVIEW

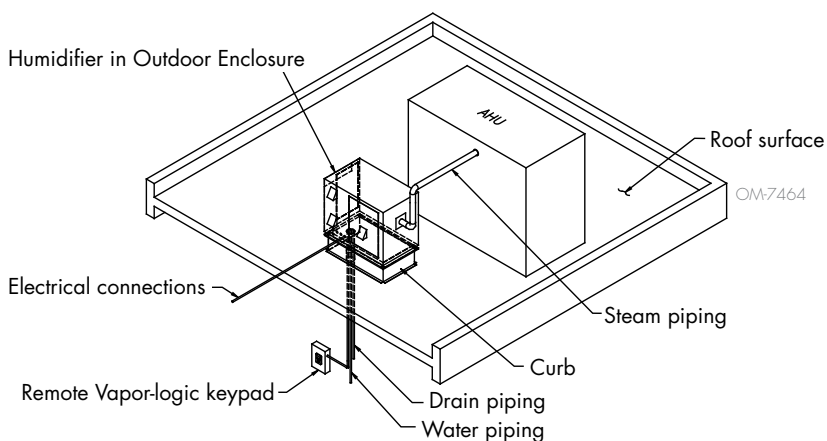
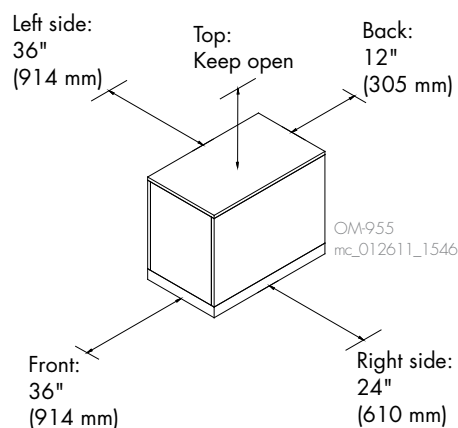


FIGURE 17-2: OUTDOOR ENCLOSURE CLEARANCES



Piping: Drain

The drain line piped from the humidifier must be run to an approved sanitary waste or suitable drain. If nonmetallic pipe or steam hose is used, it must be rated for 212 °F (100 °C) minimum continuous operating temperature.

See the detailed piping drawings on Pages 22 through 25.

Minimum drain pipe sizes:

STS models 25 through 100: 3/4" (DN20) outside diameter.

STS models 200 through 800: 1" (DN25) outside diameter.

If the length of the drain piping exceeds 10' (3 m), increase the pipe size. If combining multiple drain lines, ensure that proper common pipe sizing practices are used.

Do not locate the humidifier directly above a floor drain — skim and drain water dumped into the floor drain will cause flash steam. This steam will rise and saturate electrical components, adversely affecting component life and performance.

TEMPERING DRAIN WATER

Governing codes may require that the 212 °F (100 °C) drain and skim water from the humidifier be tempered before it is discharged into the building drain piping. The Drane-kooler® option will temper 6 gpm (22.7 L/m) of 212 °F (100 °C) water to 140 °F (60 °C).

WATER SEAL

To allow normal operation and prevent steam from escaping through the drain line, the installer must provide a water seal of a sufficient height to contain the pressure developed in the humidifier system. See Table 27-1 for water seal heights.

Drain piping after the water seal must be pitched a minimum of 1/8"/ft (1%) toward the drain. Governing codes may require more pitch.

CONDENSATE PUMP

If the proximity of a drain requires the humidifier drain and skim water to be lifted by a pump, DriSteem offers a condensate pump option. A check valve is required on the discharge of the pump. Electrical power for the pump is independent of the humidifier. Plug the pump into a wall outlet; an integral float switch turns the pump on and off.

Piping: Drain

STS with RO/DI water option and manual drain has a pipe thread fitting on the drain valve and on the skim/overflow fitting. Prior to dumping into a drain, the installer needs to connect the drain and skim/overflow, provide a water seal of height H1 (see Table 22-1), and pipe.

DRAIN CONNECTION

Note: This section applies to all tap/softened water STS models and all STS models with the RO/DI and auto drain options.

The installer should install a water seal of height H1 (see Table 22-1).

The drain connection provided is a ProBite™ quick connection. Connect as follows:

1. See Warning and Caution at right.
2. Cut drain line to length for insertion depth shown below for your ProBite connector size. Cut must be clean and smooth.
3. Ream and de-burr drain line before connecting to ProBite connection. Make sure drain line is clean, round, and free from damage.
4. Mark insertion depth on drain line according to table below for your ProBite connection size.
5. Push drain line into ProBite connection to insertion depth marked in Step 4.

WARNING

Do not insert fingers or any body part into ProBite connection openings

Insert only piping into ProBite connection. Inserting fingers or any body part could require emergency medical attention for removal.

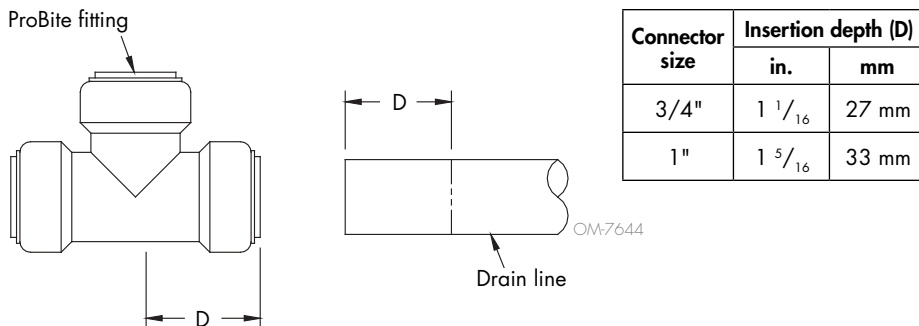
CAUTION

ProBite installation precautions

To avoid damage to the ProBite connection:

- In addition to DriSteem drain piping material requirements on the facing page, ProBite fittings are compatible only with copper, PEX, CPVC or stainless steel.
- Do not solder within 10" (250 mm) of the ProBite connection.
- Do not use heat or glue when installing the ProBite connection.

FIGURE 19-1: DRAIN CONNECTION (ALL MODELS EXCEPT STS WITH RO/DI WATER OPTION AND MANUAL DRAIN)



Piping: Fill

WATER SUPPLY PIPING

All STS humidifier models have a 1" (25 mm) internal air gap to prevent back siphoning into a potable water system. However, some governing codes may require additional protection such as a vacuum breaker or backflow preventer.

The supply water pressure range must be 25 to 80 psi (172 to 552 kPa).

TAP/SOFTENED WATER STS

Water supply assembly includes a strainer, needle valve, and fill solenoid — 1/4" pipe thread (DN8) connection. European models are provided with a 3/8" pipe thread (DN10) connection. Since the primary component of the water supply assembly is a solenoid valve, there may be noise issues that surface during a fill cycle.

During a fill cycle, the supply water drops the water temperature in the tank and may collapse the steam, which can cause a low rolling sound. To diminish this, adjust the needle valve to decrease the water fill rate and/or use hot supply water.

In cases where water hammer occurs when the fill solenoid closes, a shock arrester is recommended. Reducing the supply water pressure (minimum 25 psi [172 kPa]) or using flexible tubing (rated 212 °F [100 °C], minimum continuous operating temperature) may diminish the noise, but installing a shock arrester is the best solution.

The minimum water conductivity for the probe-type water level control system to work is 30 µS/cm.

Piping: Fill

STS WITH RO/DI WATER OPTION

A float valve controls the water supply — 1/4" pipe thread (DN8) connection. European models are provided with a 3/8" pipe thread (DN10) connection. For the end-of-season drain option, a solenoid valve is added on the inlet of the float valve. This option shuts off the fill water supply and drains the tank when there is no demand for humidity for 72 hours. (This is a default setting, which is adjustable. To modify this value, see the *Vapor-logic Installation and Operation Manual*.)

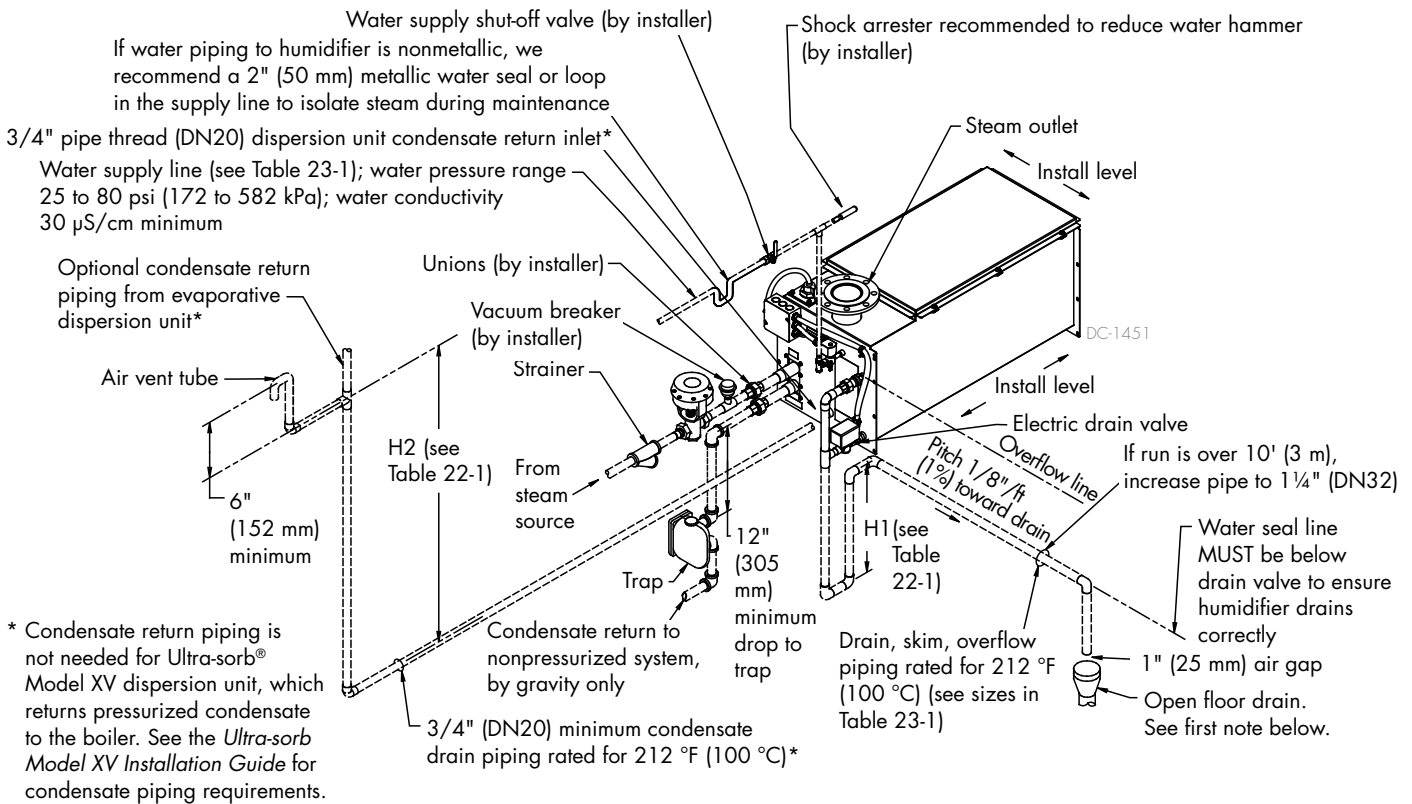
When using nonmetallic tubing for supply water, it must be rated for 212 °F (100 °C) minimum continuous operating temperature. DriSteem recommends installing a three-foot (914 mm) piece of noninsulated stainless steel pipe directly off the humidifier prior to connecting to the nonmetallic tubing. When using nonmetallic tubing, DriSteem recommends the installer place a 2" (50 mm) water seal/loop in the supply line to isolate steam during RO/DI water system maintenance.

DriSteem recommends installing a strainer in the water supply line to prevent clogging of the float valve orifice. A strainer is highly recommended when the humidifier has the end-of-season drain option. The strainer will prevent particulate from collecting at the solenoid valve seat.

If an STS humidifier with the RO/DI water option is supplied with tap water, the float valve assembly will become clogged and run without water.

Piping: Tap/softened water, one heat exchanger

FIGURE 22-1: FIELD PIPING OVERVIEW FOR TAP/SOFTENED WATER STS MODELS 25, 50, 100, 200, AND 400



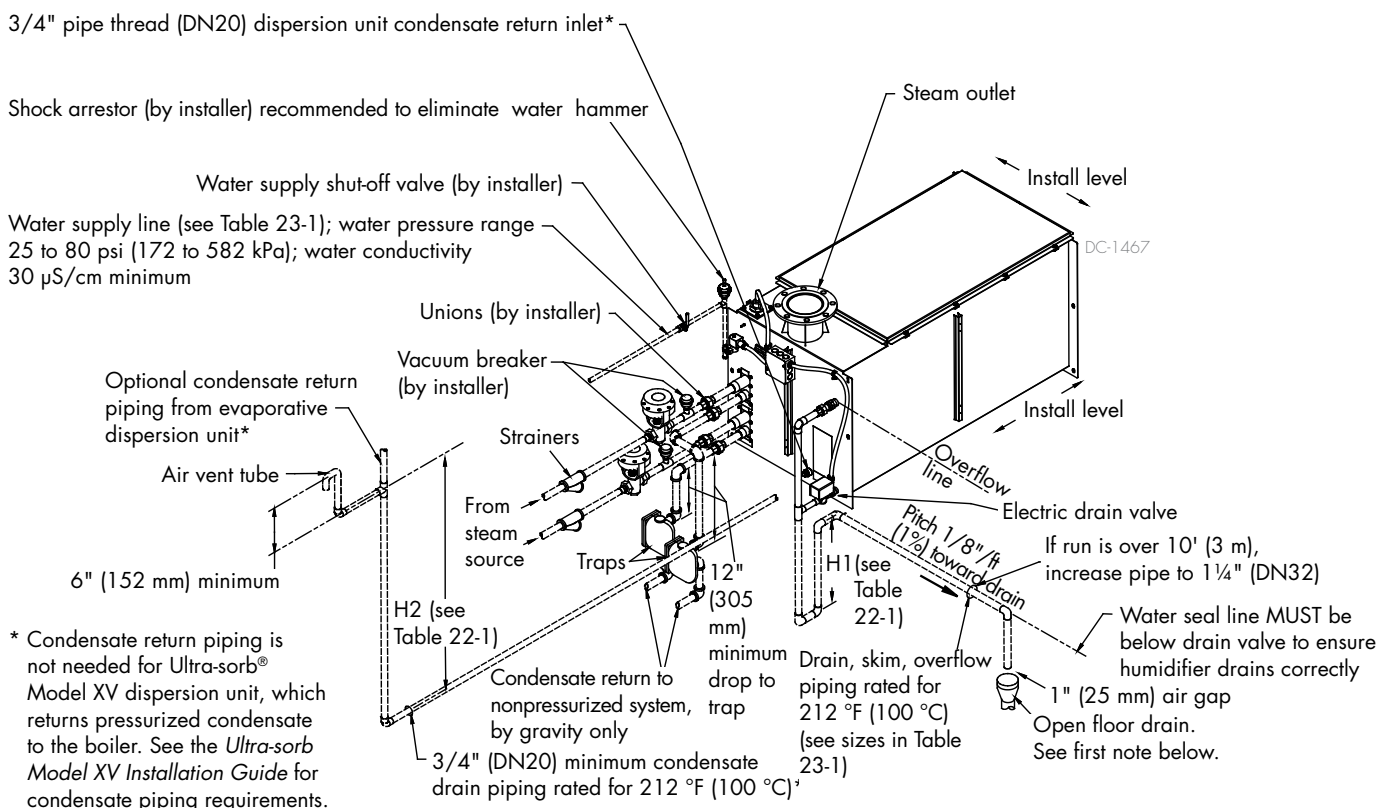
- Notes:
- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
 - Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
 - Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
 - Damage caused by chloride corrosion is not covered by your DriSteem warranty.
 - Dashed lines indicate provided by installer.

Table 22-1:
Heights required to overcome humidifier internal pressure (H1, H2)

Unit output		Water seal height (H1)		Air vent height (H2)			
		All STS models		STS models			
				25, 50, 100, 200, 400		800	
lbs/hr	kg/h	inches	mm	inches	mm	inches	mm
≤ 138	≤ 62	12	305	27	686	—	—
139-183	63-83	15	381	30	762	—	—
> 183	> 83	18	457	33	838	42.25	1073

Piping: Tap/softened water, two heat exchangers

FIGURE 23-1: FIELD PIPING OVERVIEW FOR TAP/SOFTENED WATER STS MODEL 800



Notes:

- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- 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.
- Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DriSteem warranty.
- Dashed lines indicate provided by installer.

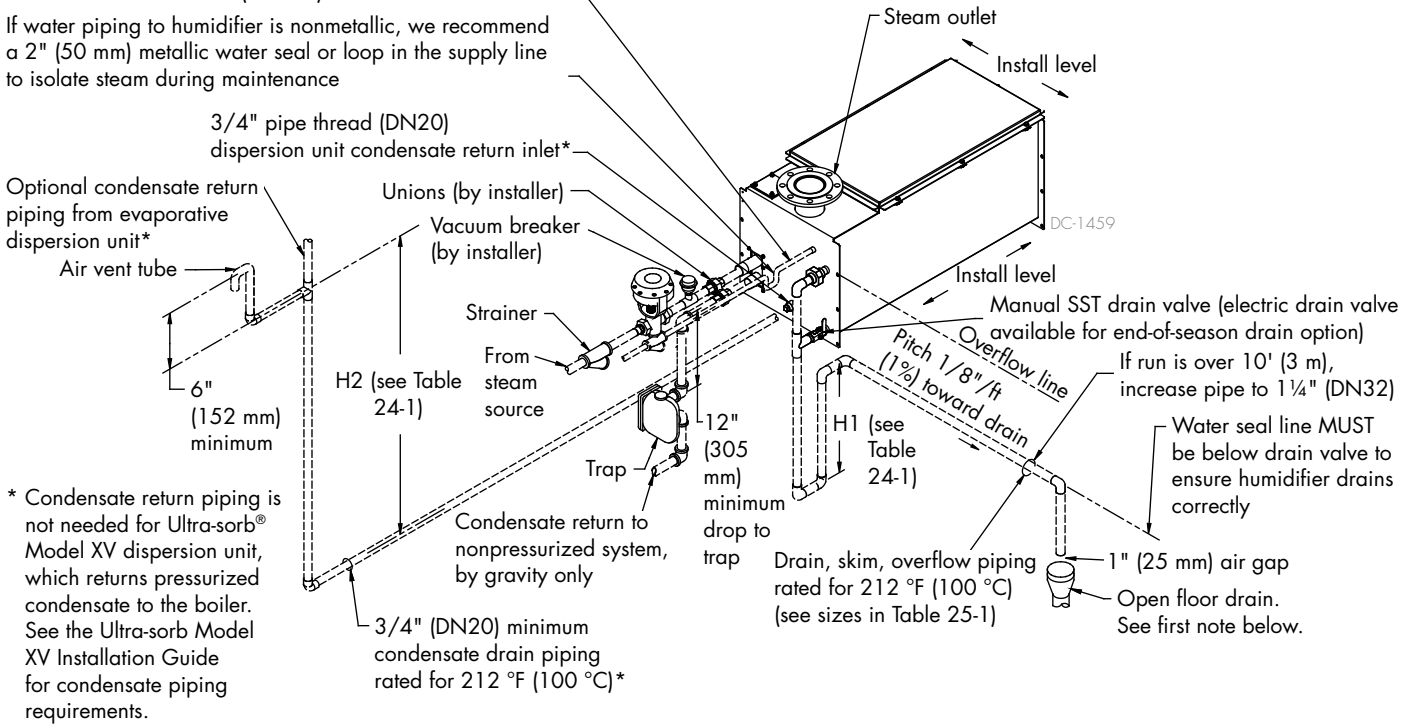
Table 23-1: STS connection sizes	
Description	Connection size
Water makeup (fill)	1/4" pipe thread (DN8), all STS models
Drain	3/4" (DN20) for STS models 25 through 100 1" (DN25) for STS models 200 through 800
Steam outlet	Varies with capacity and dispersion type; see Table 27-1
Condensate return	3/4" pipe thread (DN20)
Pressurized steam supply inlet and return outlet	See sizes in Tables 5-1 and 5-2.

Piping: RO/DI water option, one heat exchanger

FIGURE 24-1: FIELD PIPING OVERVIEW FOR STS MODELS 25, 50, 100, 200, AND 400 WITH RO/DI WATER OPTION

Water supply line (see Table 25-1); water pressure range 25 to 80 psi (172 to 582 kPa); first 3' (1 m) of supply line must be rated for 212 °F (100 °C)

If water piping to humidifier is nonmetallic, we recommend a 2" (50 mm) metallic water seal or loop in the supply line to isolate steam during maintenance



* Condensate return piping is not needed for Ultra-sorb® Model XV dispersion unit, which returns pressurized condensate to the boiler. See the Ultra-sorb Model XV Installation Guide for condensate piping requirements.

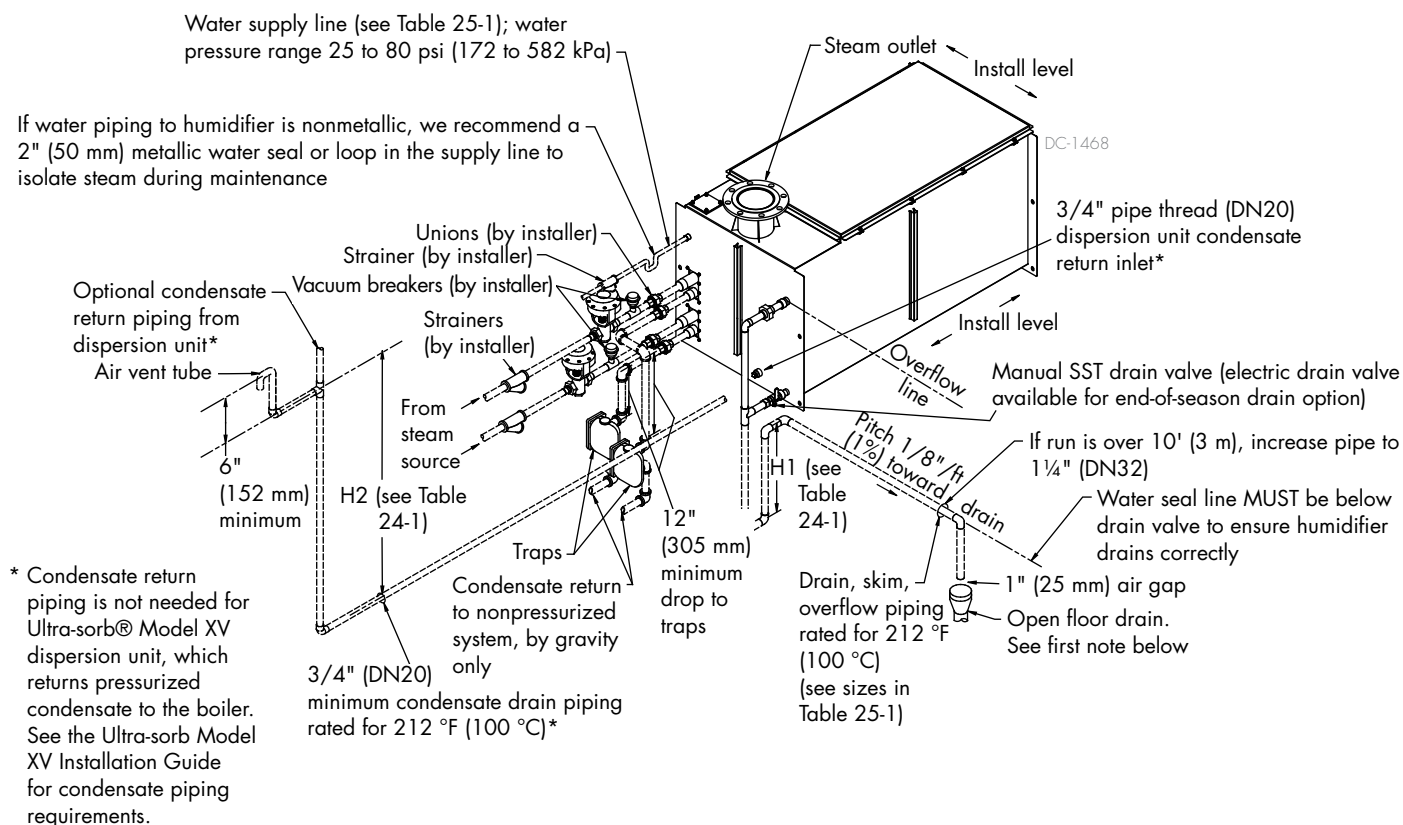
- Notes:
- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
 - Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
 - Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
 - Damage caused by chloride corrosion is not covered by your DriSteam warranty.
 - Dashed lines indicate provided by installer.

Table 24-1: Heights required to overcome humidifier internal pressure (H1, H2)

Unit output		Water seal height (H1)		Air vent height (H2)			
		All STS models		STS models			
				25, 50, 100, 200, 400		800	
lbs/hr	kg/h	inches	mm	inches	mm	inches	mm
≤ 138	≤ 62	12	305	27	686	—	—
139-183	63-83	15	381	30	762	—	—
> 183	> 83	18	457	33	838	42.25	1073

Piping: RO/DI water option, two heat exchangers

FIGURE 25-1: FIELD PIPING OVERVIEW FOR STS MODEL 800 WITH RO/DI WATER OPTION



Notes:

- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- 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.
- Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DriSteem warranty.
- Dashed lines indicate provided by installer.

Description	Connection size
Water makeup (fill)	1/4" pipe thread (DN8), all STS models
Drain	3/4" (DN20) for STS models 25 through 100 1" (DN25) for STS models 200 through 800
Steam outlet	Varies with capacity and dispersion type; see Table 27-1
Condensate return	3/4" pipe thread (DN20)
Pressurized steam supply inlet and return outlet	See sizes in Tables 5-1 and 5-2

Piping: Pressurized steam supply

The heat exchanger in the STS humidifier is designed for a maximum steam pressure of 15 psi (105 kPa). The steam valve, trap, and strainer are shipped loose for field installation.

Figure 26-1 shows piping from an overhead steam supply main with condensate returned to a vented gravity flow return system. Note the steam trap installed at the bottom of the branch feeding the steam valve of the STS. Failure to install this trap will cause water hammer, which could damage the STS heat exchanger.

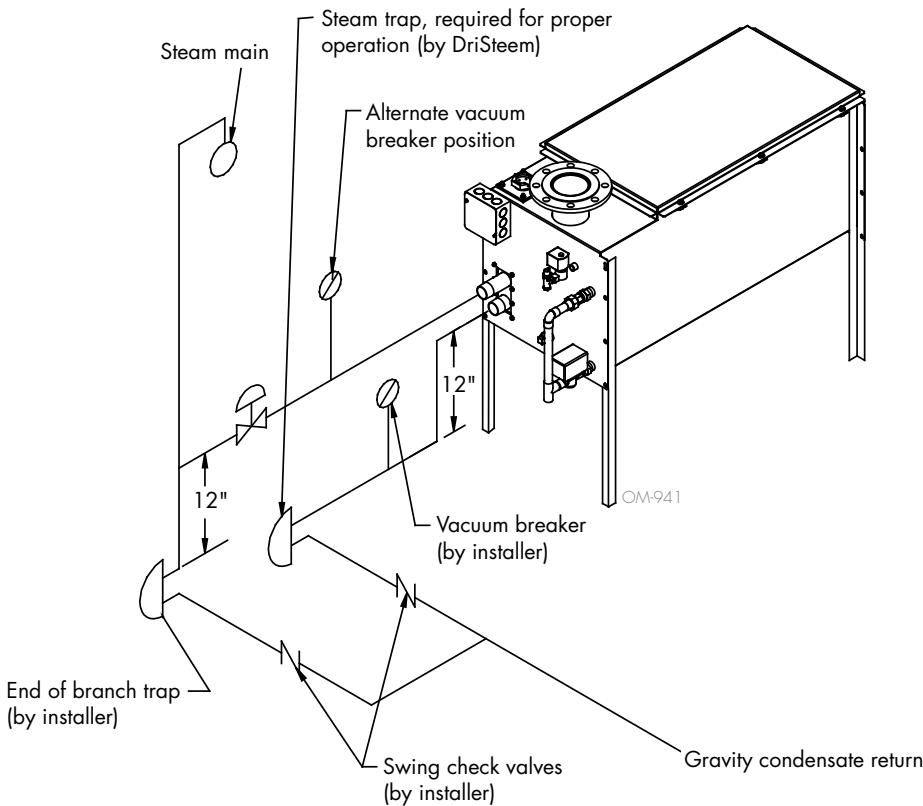
Vacuum breakers are necessary to ensure that condensate can drain from the heat exchanger when the steam valve closes.

Lifting condensate with pressurized steam is not recommended. Premature heat exchanger failure and erratic control can occur when using pressurized steam to lift condensate. A steam condensate pump is recommended when lifting condensate in a pressurized system.

Note:

For STS 800 models, to guarantee steam output capacities, a dedicated steam valve and steam trap is required for each heat exchanger.

FIGURE 26-1: STEAM SUPPLY PIPING TO STS HUMIDIFIER



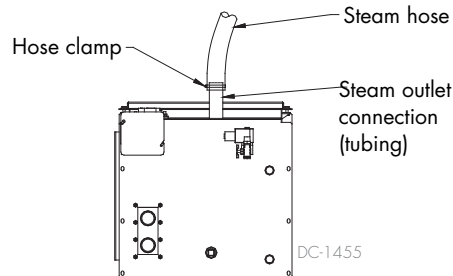
Piping: Humidification steam outlet

Table 27-1:
STS steam outlet sizes and types

STS model	Hose size		Flange size		
	2" (DN50)	3" (DN80)	4" (DN100)	5" (DN125)	6" (DN150)
25	X				
50	X	X			
100	X	X	X		
200		X	X	X	X
400		X	X	X	X
800			X	X	X

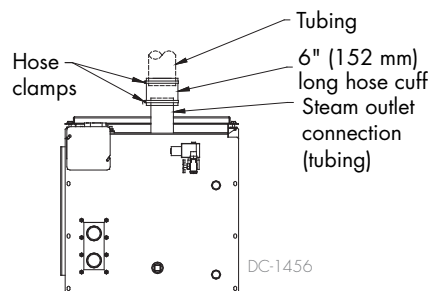
Note: For pipe thread steam outlet options, see DriCalc, DriSteem's free sizing and selection software, available at www.dristeem.com.

FIGURE 27-1: HOSE CONNECTION



Note: Tap/softened water model shown.

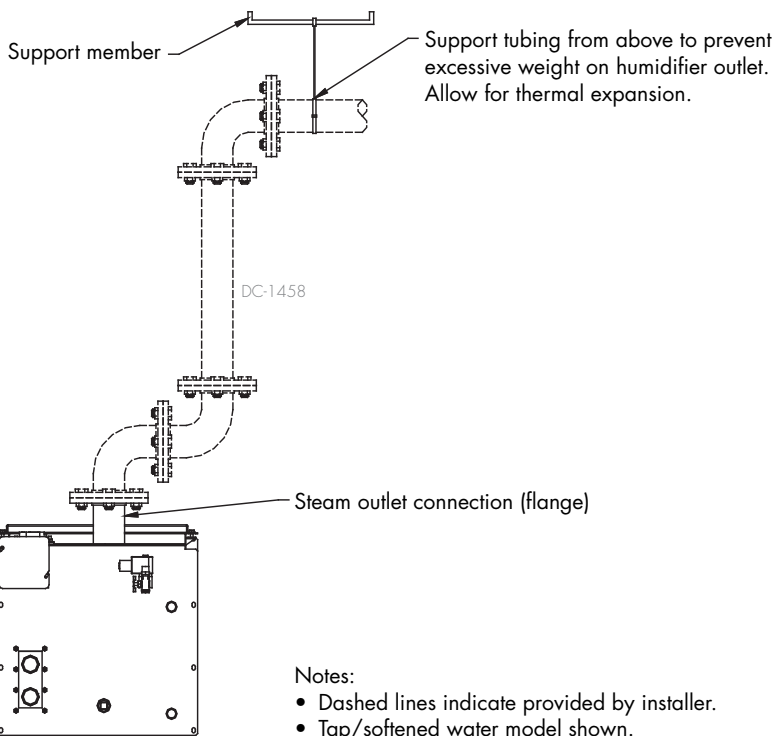
FIGURE 27-2: TUBING CONNECTION USING HOSE CUFF WITH CLAMPS



Notes:

- Dashed lines indicate provided by installer.
- Tap/softened water model shown.

FIGURE 27-3: FLANGE CONNECTION



Wiring

WIRING DIAGRAM LOCATIONS

- Ladder style wiring diagrams (located inside control cabinet door) show power, control, and humidifier-to-control-cabinet interconnection requirements.
- External connections diagrams (located inside control cabinet door) show connection points to the microprocessor-based controller and wire terminals for the following external safety and control devices: airflow proving switches, high limits, transmitters, or humidistats.

All wiring must be in accordance with all governing codes and with STS wiring diagrams.

ELECTRICAL INSTALLATION

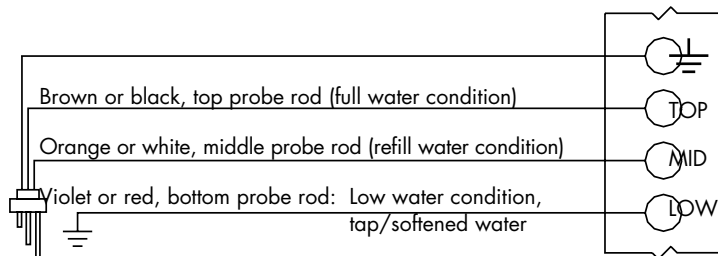
Wiring and branch circuit protection is provided by the installer per the National Electrical Code (NEC) or in Europe, IEC 60364. For power supply and machine ground connections, size the wire using the 75 °C wiring table, per the NEC (or IEC 60364). Then use copper conductors rated for a 105 °C environment. The wiring from the control cabinet to the humidifier must be rated for 105 °C.

All STS humidifiers have a 120V, single phase electrical supply for North America or 230V, single phase electrical supply for Europe. Verify current characteristics and capacity requirements against those listed on the name plate.

WIRING REQUIREMENTS

The length of wire from the control cabinet to the humidifier must not exceed 50' (15 m). Run control wiring in dedicated, earthed, metal conduit or cable trays or trunking that is separated from the building's power wiring.

FIGURE 28-1: WATER LEVEL CONTROL WIRING FOR VAPOR-LOGIC



⚠ WARNING

Electric shock hazard

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

Do not open control cabinet until electrical power is disconnected.

CAUTION

Damage from debris

When drilling penetrations in the control cabinet, protect all internal components from debris, and vacuum out the control cabinet when finished. Failure to comply with this directive can damage sensitive electronic components, cause erratic operation or failure, and void your DriSteem warranty.

Notes:

- See Outdoor Enclosure electrical specifications in Table 13-2.
- Damage caused by chloride corrosion is not covered by your DriSteem warranty.

Wiring

The control cabinet should be mounted in a location convenient for service with a minimum of 36" (914 mm) clearance in front of the door.

The installer is responsible for making electrical connections at the power terminals.

CONTROL WIRING

The following wiring methods for external low-voltage control wiring should minimize electrical noise problems:

- Humidistat, RH transmitter, and temperature transmitter wiring must be minimum 18-gauge (1 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.
- Airflow proving switch wiring must be minimum 18-gauge (1 mm²) stranded wire run in conduit. The airflow proving switch can be wired using minimum 18-gauge (1 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.
- The shield (screen) wire should be connected to the shield (screen) ground terminal/lug with a length less than 2" (51 mm). Do not ground the shield (screen) wire on the humidistat or transmitter end.
- Water level control device, fill valve, and drain valve wiring must be minimum 18-gauge stranded wire run in a separate conduit from power wires. **DO NOT USE SHIELDED (SCREENED) CABLE FOR WATER LEVEL CONTROL DEVICES.**
- The tank temperature sensor can be run with 18-gauge (1 mm²) stranded wire if the control cabinet is located within 10' (3 m) of the humidifier. For wire lengths of 10' to 50' (3 m to 15 m), use 18-gauge (1 mm²) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.

GROUNDING REQUIREMENTS

The approved earth ground must be made with solid metal-to-metal connections and must be a good conductor of radio frequency interference (RFI) to earth (multistranded conductors).

Ground wire should be the same AWG (mm²) size as the power wiring or sized per NEC requirements (in Europe, IEC 60364 requirements).

When the control cabinet is mounted remotely from the humidifier, a ground wire is necessary from the machine ground lug on the humidifier to the machine ground lug in the control cabinet. The bonding machine ground wire should be no less than 14-gauge AWG (mm²) or sized per NEC or IEC 60364 requirements.

Important: Failure to follow these wiring procedures can result in erratic operation or failure.

This product has been tested at the factory for proper operation. Product failures resulting from faulty handling, incorrect wiring, or shorting of wires together on external components are not covered under your DriSteem warranty. Review information and diagrams before proceeding.

Sensor placement

SENSOR LOCATION IS CRITICAL

Sensor location has a significant impact on humidifier performance. See the recommendations below and Figure 30-1.

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

Recommended humidity control (transmitter/humidistat) locations:

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

Recommended safety (airflow and high limit) sensor location:

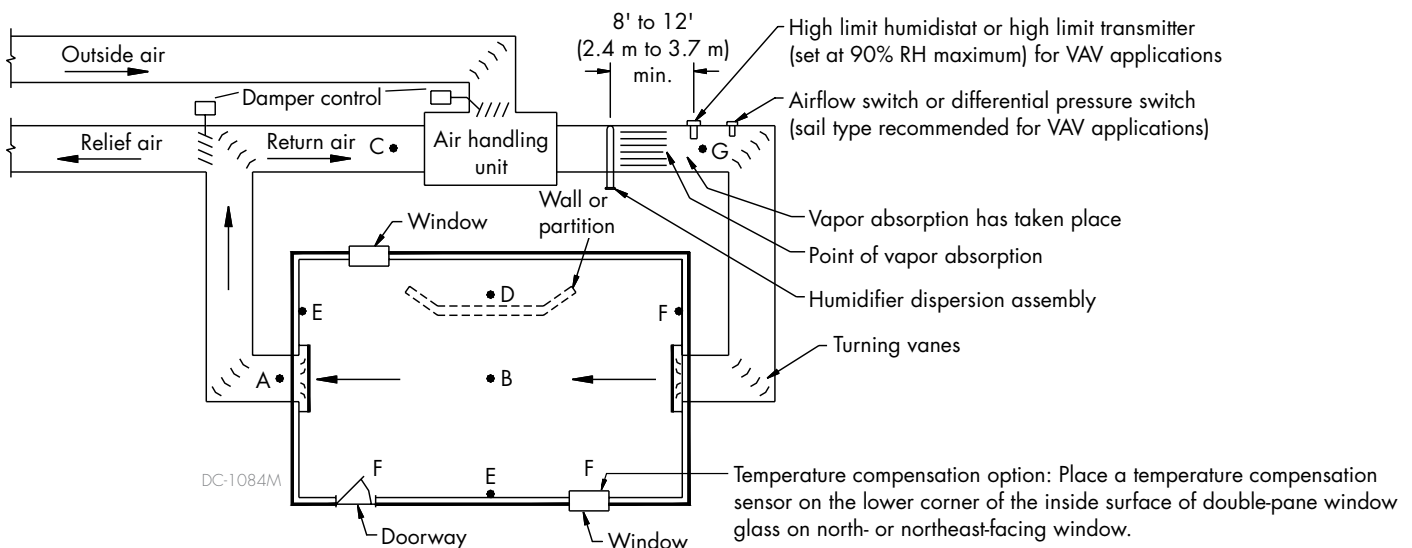
- G** Best sensing location for high limit humidistat or humidity sensor and airflow proving switch.

Other factors affecting humidity control

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

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

FIGURE 30-1: RECOMMENDED SENSOR LOCATIONS



Dispersion: Selecting the dispersion assembly location

DriSteem 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.

- Non-wetting distance is the dimension downstream from the leaving side of the steam dispersion assembly to the point where wetting will not occur, although wisps of steam may be present. This distance was calculated during humidification system design and is dependent on several application parameters. To determine your dispersion assembly's non-wetting distance, consult your system's design engineer or project documentation. Non-wetting distance can also be calculated using DriSteem's DriCalc sizing and selection software, available at www.dristeem.com. Note that your current design conditions may vary from conditions used for system design.
- 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.

OVERHEAD INSTALLATION

Water piping and humidifiers should not be installed above expensive equipment. A condensing or leaking water pipe or other accidental water spillage could cause serious damage to the equipment below.

When such an installation cannot be avoided, install a galvanized drip pan under the humidifier piping, valve, etc. to catch and drain away unintended water. See Figure 8-4.

It is advisable to terminate the drain above an open floor drain. The overflow from the STS should be piped separately to a floor drain. Do not drain the STS directly into the drip pan.

WARNING

Hot surface and steam hazard

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

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 dispersion tubes.

Dispersion: Interconnecting piping requirements

- The steam outlet on the humidifier is sized to the output of the humidifier. **DO NOT** use steam hose or interconnecting piping with an inside diameter smaller than the humidifier steam outlet.
- See maximum steam carrying capacities in Table 33-1.
- See the steam loss data in Table 33-2.
- See Table 36-2 for interconnecting tubing and pipe pitch requirements for single tube and multiple tube applications. See Table 41-1 for interconnecting tubing and pipe pitch requirements for Rapid-sorb applications.
- If the humidifier must be located higher than the dispersion assembly, use the recommended installation shown in Figure 34-1.
- For single tube applications, see capacities in Table 35-1.

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 dispersion tubes.

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%) back to the humidifier.
- Use DriSteem 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.

CONNECTING TO HUMIDIFIER WITH TUBING

- 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.
- 90° elbows are not recommended; use two 45° elbows, 1' (0.3 m) apart.
- Insulate tubing to reduce the loss in output caused by condensation.

Dispersion: Interconnecting piping requirements

Table 33-1:

Maximum steam carrying capacity and length of interconnecting steam hose or tubing

Steam hose ¹						Copper or stainless steel tubing					
Hose I.D.		Maximum capacity		Maximum length ²		Tubing size		Maximum capacity ³		Maximum developed length ⁴	
inches	DN	lbs/hr	kg/h	ft	m	inches	DN	lbs/hr	kg/h	ft	m
2	50	250	113	10	3	2	50	220	100	30	9
						3 ⁵	80 ⁵	450	204	80	24
						4 ⁵	100 ⁵	750	340	100	30
						5 ⁵	125 ⁵	1400	635	100	30
						6 ⁵	150 ⁵	2300	1043	100	30
1. When using steam hose, use DriSteam 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. 2. Maximum recommended length for steam hose is 10' (3 m). Longer distances can cause kinking or low spots.						3. Insulate tubing to minimize loss of capacity and efficiency. 4. Developed length of tubing equals measured length plus 50% of measured length, to account for fittings. Longer tubing lengths are possible at capacities lower than listed maximums. Consult factory. 5. Requires flange connection.					
Note: Capacities and lengths in this table are based on total maximum pressure drop in hose or tubing of 5" wc (1250 Pa).											

Table 33-2:

Steam loss of interconnecting steam hose or tubing

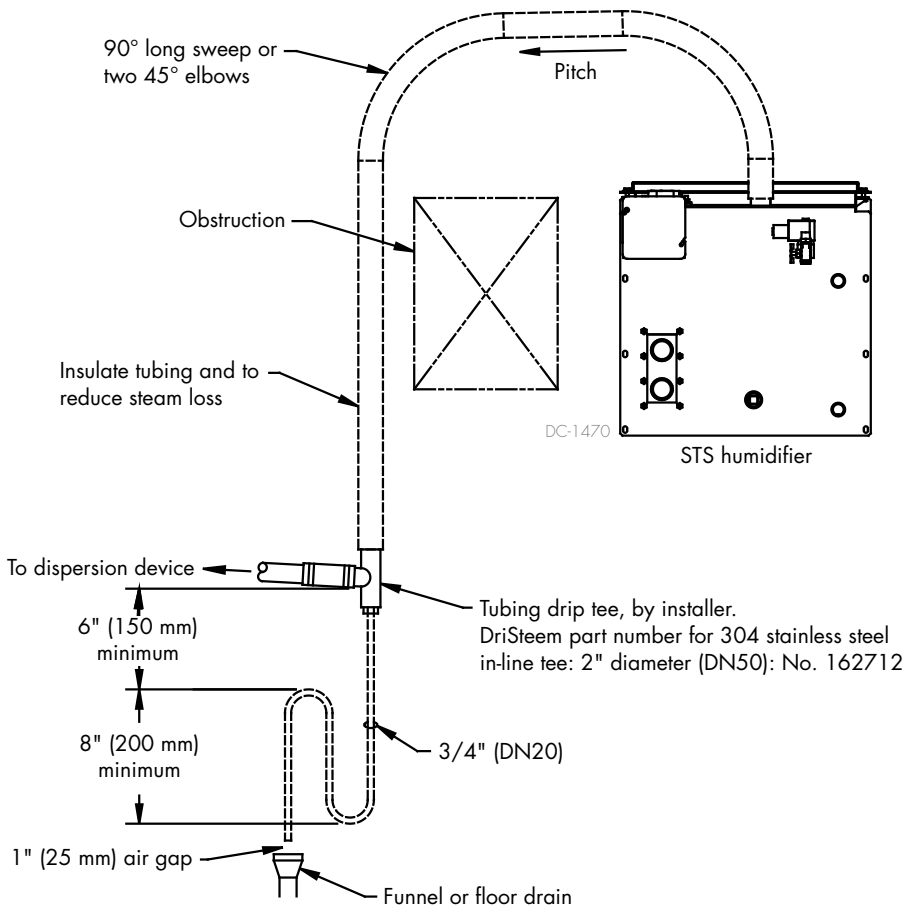
Description	Nominal hose or tubing size		Steam loss				Insulation thickness	
			Noninsulated		Insulated			
	inches	DN	lbs/hr/ft	kg/h/m	lbs/hr/ft	kg/h/m	inches	mm
Hose	1½	40	0.15	0.22	N/A	N/A	N/A	N/A
	2	50	0.20	0.30	N/A	N/A	N/A	N/A
Tubing	1½	40	0.11	0.16	0.020	0.030	2.0	50
	2	50	0.14	0.21	0.025	0.037	2.0	50
	3	80	0.20	0.30	0.030	0.045	2.5	64
	4	100	0.26	0.39	0.030	0.045	3.0	76
	5	125	0.31	0.46	0.035	0.052	3.0	76
	6	150	0.36	0.54	0.039	0.058	3.0	76
Note: Data based on an ambient air temperature of 80 °F (27 °C), fiberglass insulation, and copper tubing.								

Dispersion: Drip tee installation

Install a drip tee as shown below when the humidifier is mounted higher than the dispersion assembly, when interconnecting hose or tubing 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 34-1: DRIP TEE INSTALLATION (PIPING OVER AN OBSTRUCTION)



- 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.

Dispersion: Single tube and multiple tube

DISPERSION TUBE MOUNTING

- See the hose kit sizes in Table 35-1 for single tube applications.
- Orient dispersion tube(s) so that tubelets (steam orifices) point up.
- See Table 36-2 for dispersion tube pitch requirements.
- When mounting the humidifier above the level of the dispersion tube(s), see drip tee installation in Figure 34-1.

CONDENSATE DRAIN PIPING

- Minimum diameter (ID) for draining from one or two dispersion tubes: 3/4" (DN20)
- Minimum diameter (ID) for draining from three or more dispersion tubes: 1" (DN25)
- Condensate drain piping must be rated for 212 °F (100 °C) continuous operating temperature.
- Condensate drain line must be piped as shown in the figures on the following pages. 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.

Table 35-1:
Single dispersion tube capacities

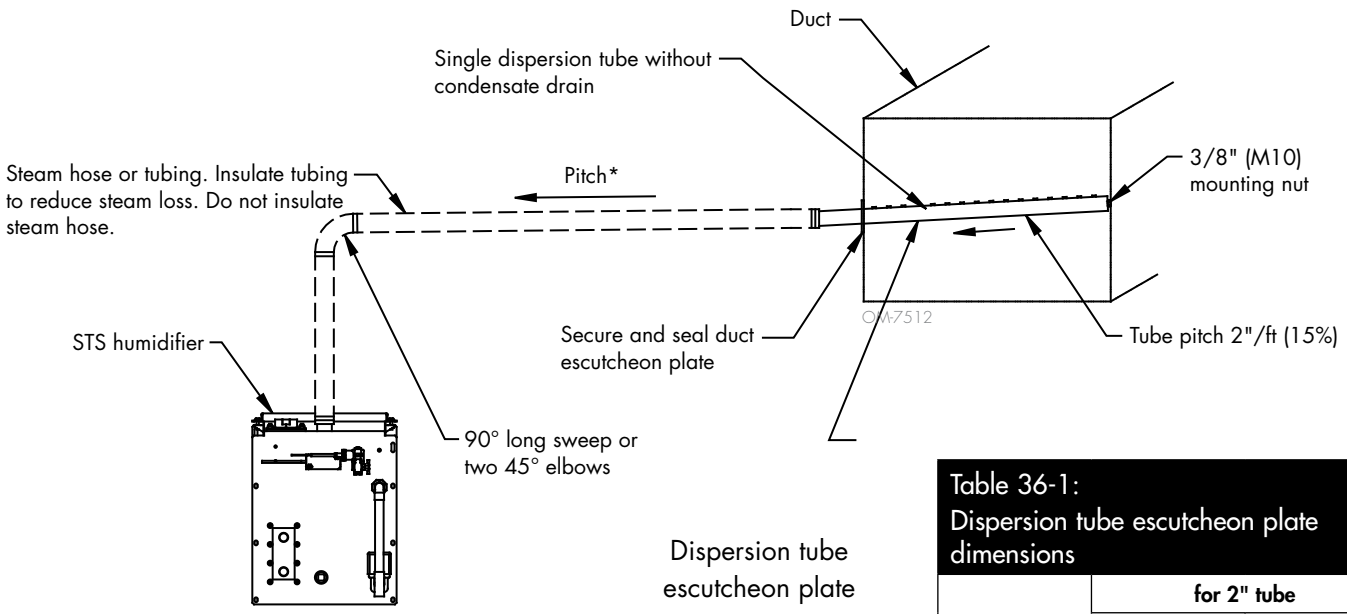
Tube size		Insulated (High-Efficiency Tubes)				Uninsulated			
		Without drain		With drain		Without drain		With drain	
inches	DN	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h
1½	40	29	13.2	65	29.5	28	12.7	62	28.2
2	50	65	29.5	97	44.1	62	28.2	93	42.3

Notes:

- Single dispersion tube available with face width between 6" (152 mm) up to 120" (3048 mm) in 1" (25 mm) increments.
- If face width is <19" (483 mm), tube capacity may be reduced. Consult DriSteem or see DriCalc for the correct capacity.
- Hose kits are available that include dispersion tube, 10 ft (3 m) of steam hose, and hardware

Dispersion: Single tube and multiple tube

FIGURE 36-1: SINGLE TUBE DISPERSION WITHOUT CONDENSATE DRAIN



Dashed lines indicate provided by installer
 * Pitch steam hose or tubing toward humidifier:
 - 2"/ft (15%) when using steam hose
 - 1/8"/ft (1%) when using tubing

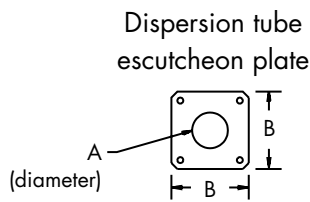


Table 36-1:
Dispersion tube escutcheon plate dimensions

	for 2" tube	
	inches	mm
A	2.03	52
B	5.00	127

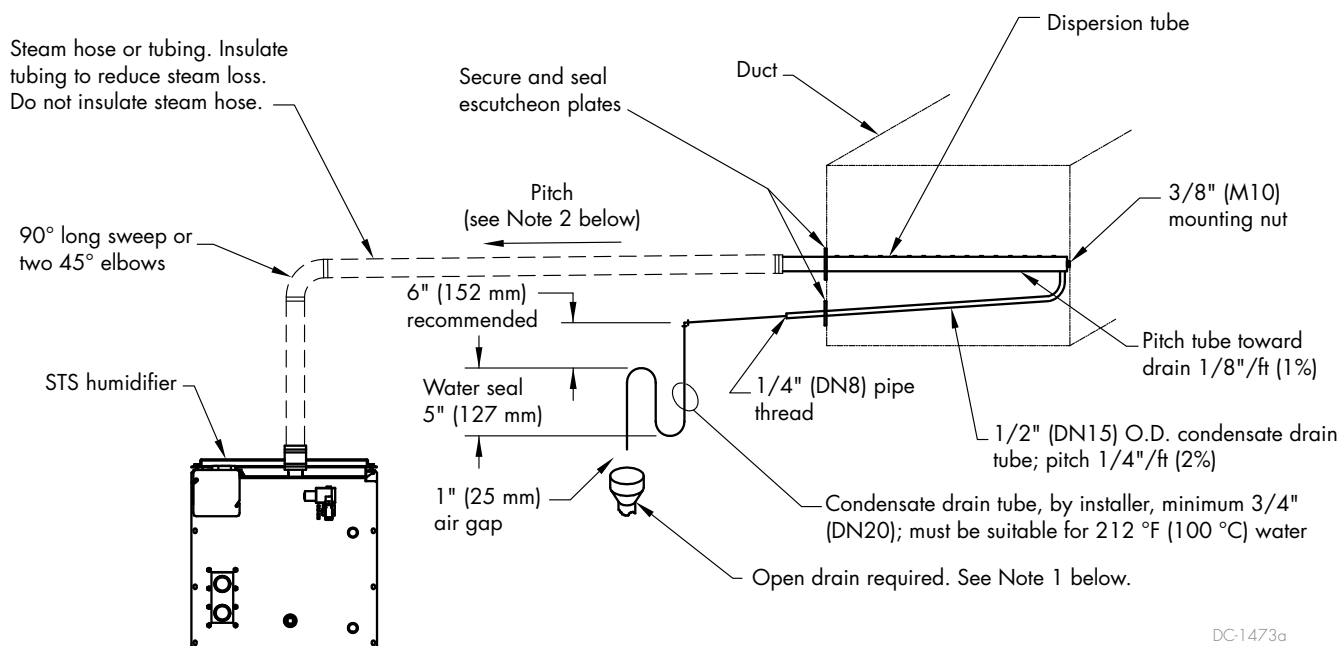
Table 36-2:
Pitch of dispersion tube(s) and interconnecting piping for Single tube or multiple tube evaporative dispersion units*

Condensate drain	Type of interconnecting piping	Diameter of dispersion tube and interconnecting piping	Pitch of interconnecting piping	Pitch of dispersion tube(s)	Pitch of condensate drain
Without drain	Steam hose	2" (DN50)	2"/ft (15%) toward humidifier	2"/ft (15%) toward humidifier	No drain
	Tubing	2" (DN50)	1/8"/ft (1%) toward humidifier		
With drain	Steam hose	2" (DN50)	2"/ft (15%) toward humidifier	1/8"/ft (1%) toward condensate drain	1/4"/ft (2%) toward floor drain or toward humidifier if humidifier is below dispersion unit
	Tubing	2" (DN50)	1/4"/ft (2%) toward humidifier		

* When piping over an obstruction, see the drip tee installation illustration on Page 38.

Dispersion: Single tube and multiple tube

FIGURE 37-1: SINGLE TUBE DISPERSION WITH CONDENSATE WASTED TO FLOOR DRAIN



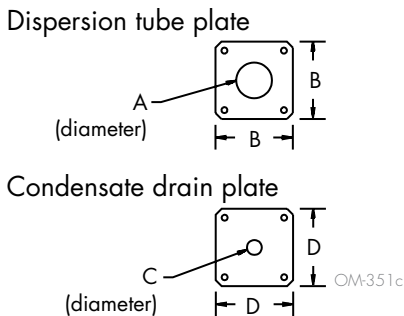
Notes:

1. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur. Refer to governing codes for drain pipe size and maximum discharge water temperature.
2. Pitch steam hose or tubing toward humidifier:
 - 2"/ft (15%) when using steam hose
 - 1/2"/ft (5%) when using 1 1/2" tubing
 - 1/4"/ft (2%) when using 2" tubing
3. Dashed lines indicate provided by installer

Table 37-1:
Dispersion tube and condensate drain escutcheon plate dimensions

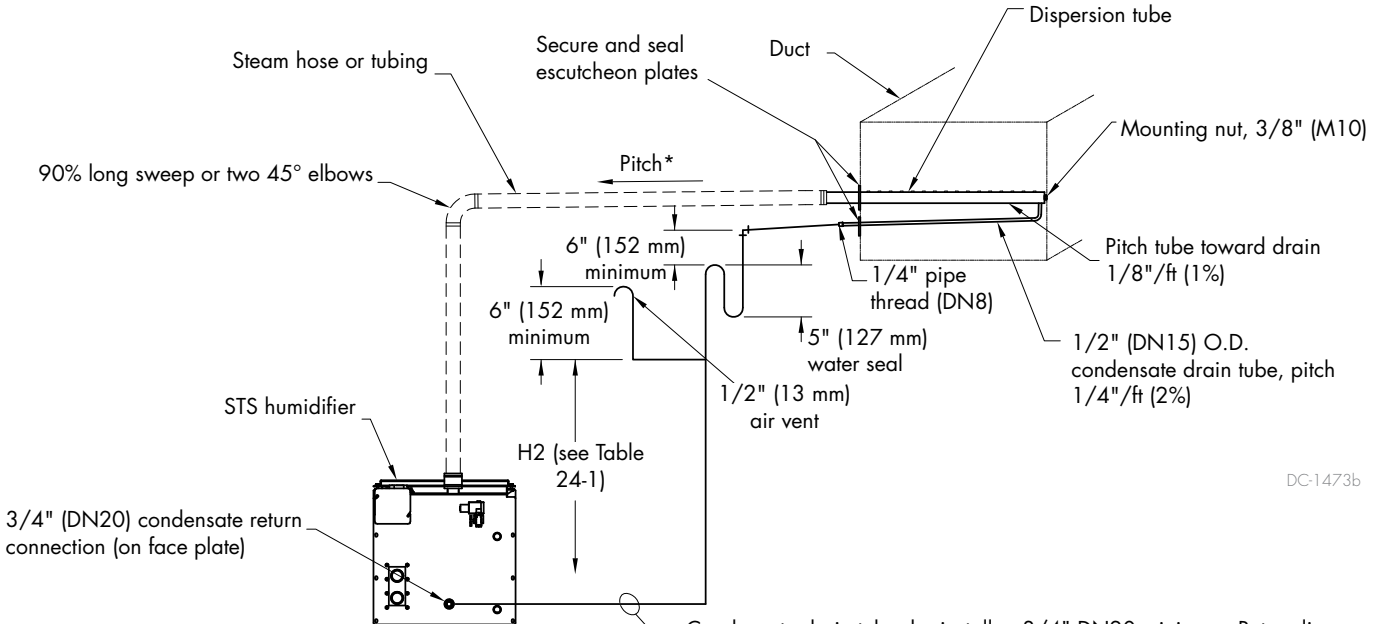
	inches	mm
A	2.03	52
B	5.00	127
C	0.75	19
D	3.25	83

FIGURE 37-1: DISPERSION TUBE AND CONDENSATE DRAIN ESCUTCHEON PLATES



Dispersion: Single tube and multiple tube

FIGURE 38-1: SINGLE TUBE WITH CONDENSATE RETURNED TO HUMIDIFIER

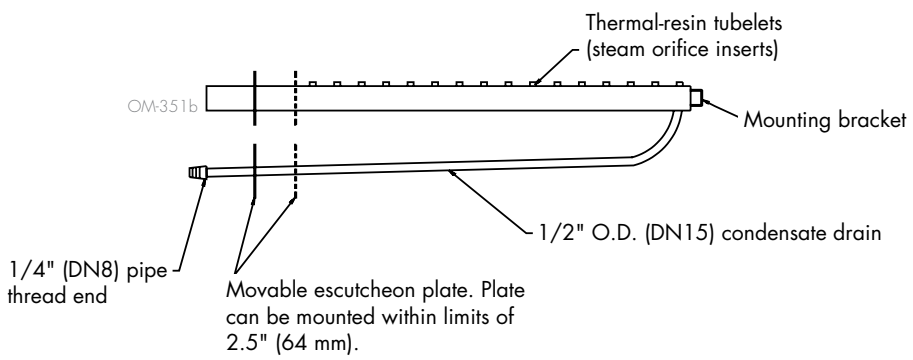


DC-1473b

Dashed lines indicate provided by installer
 * Pitch steam hose or tubing toward humidifier:
 - 2"/ft (15%) when using steam hose
 - 1/2"/ft (5%) when using 1 1/2" tubing
 - 1/4"/ft (2%) when using 2" tubing

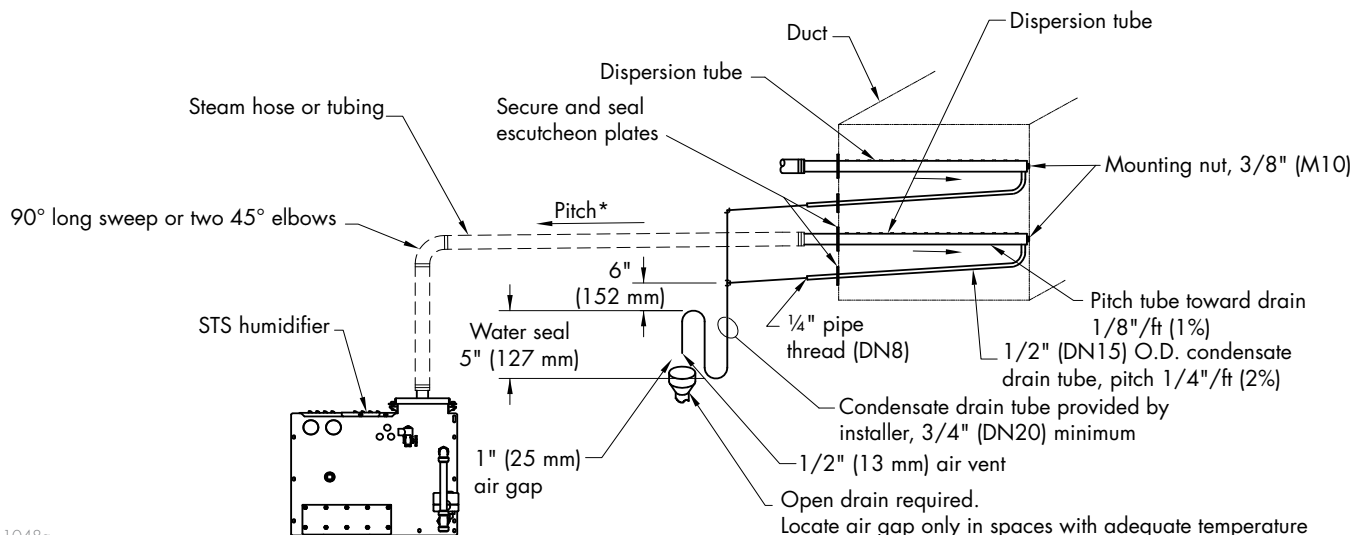
Condensate drain tube, by installer, 3/4" DN20 minimum. Return line piping material must be suitable for 212 °F (100 °C) water. Note: Condensate may be returned to the humidifier or wasted to a drain. See the previous page for piping condensate to a drain.

FIGURE 38-2: SINGLE TUBE DISPERSION WITH CONDENSATE DRAIN



Dispersion: Single tube and multiple tube

FIGURE 39-1: MULTIPLE TUBE WITH CONDENSATE WASTED TO FLOOR DRAIN



DC-1048a

- Dashed lines indicate provided by installer
- * Pitch steam hose or tubing toward humidifier:
 - 2"/ft (15%) when using steam hose
 - 1/2"/ft (5%) when using 1 1/2" tubing
 - 1/4"/ft (2%) when using 2" tubing

Open drain required.
 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.

Dispersion: Rapid-sorb

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 DriSteem immediately. The components typically include the following:
 - Multiple dispersion tubes
 - Header
 - 3/4" x 2" (19 mm x 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" (102 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 DriCalc Installation Guides library or contact your representative/distributor or DriSteem for installation instructions for air handler or vertical airflow applications.

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.

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 41-1). The size, quantity, and location of penetrations are determined by the dimensions and configuration of the Rapid-sorb assembly you received.

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 3/4" 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 41-3 and the drawings on the following pages for pitch requirements.

Table 41-1:

Rapid-sorb tube capacities*

Tube diameter		Insulated (High-Efficiency Tubes)		Uninsulated	
inches	DN	lbs/hr	kg/h	lbs/hr	kg/h
1½	40	43	19.5	40	18.2
2	50	80	36.4	77	35

* Capacities shown are for horizontal airflow. See DriCalc for vertical airflow capacities. If face height is <22" (559 mm), tube quantity per panel may need to increase to compensate for reduced capacity of short tubes. Consult DriSteem or see DriCalc for the correct calculation.

Table 41-2:

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

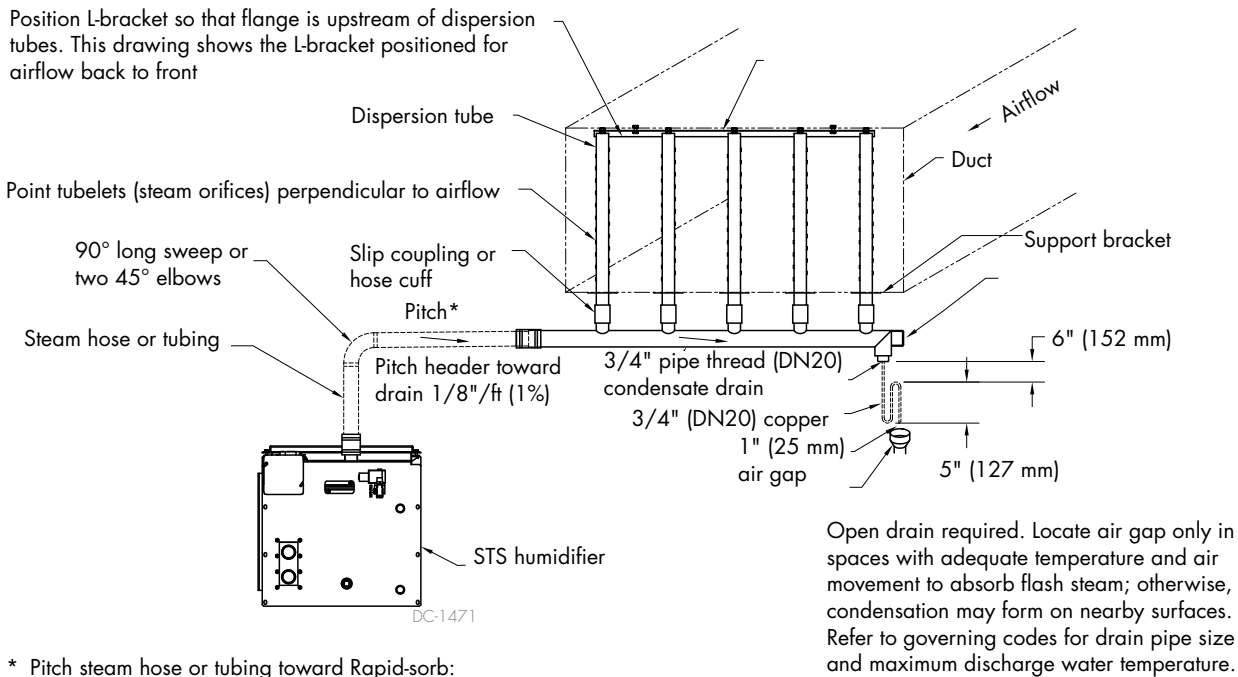
Table 41-3:

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	1½" (DN40), 2" (DN50), 3" (DN80), 4" (DN100), 5" (DN125), 6" (DN150)	1/8"/ft (1%) toward Rapid-sorb		
Vertical	Steam hose	1½" (DN40), 2" (DN50)	2"/ft (15%) toward Rapid-sorb	2"/ft toward header	1/8"/ft (1%) toward condensate drain
	Tubing	1½" (DN40), 2" (DN50), 3" (DN80), 4" (DN100), 5" (DN125), 6" (DN150)	1/8"/ft (1%) toward Rapid-sorb		

Dispersion: Rapid-sorb

FIGURE 42-1: RAPID-SORB INSTALLED IN A HORIZONTAL AIRFLOW WITH HEADER OUTSIDE THE DUCT



- * Pitch steam hose or tubing toward Rapid-sorb:
- 2"/ft (15%) when using steam hose
 - 1/8"/ft (1%) when using tubing

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 1 1/2" (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.
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.

Dispersion: Rapid-sorb

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:

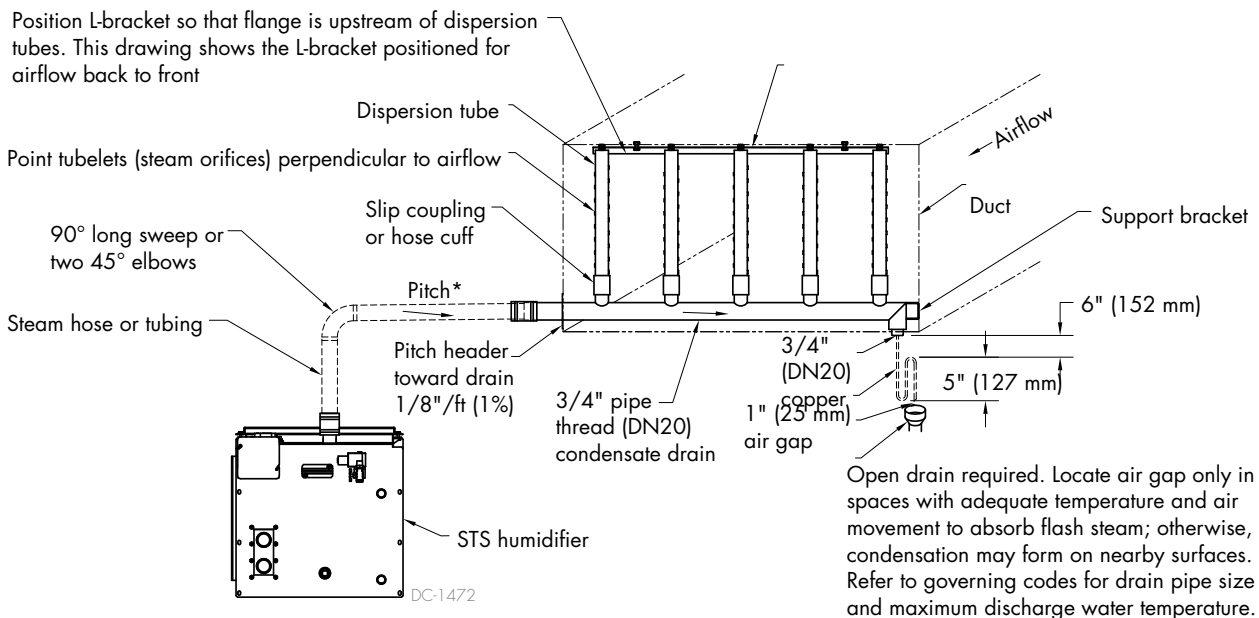
Before securing hose cuff in place with hose clamps on dispersion tube and the header stub, verify that dispersion tube orifices are directed perpendicular to airflow.
6. Slide the assembly up until the L-bracket aligns with the mounting holes in the duct.
 - For 1½" (DN40) dispersion tubes:
 - Header 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.

Note:

See Page 46 for steam supply and condensate drain line connection instructions.

Dispersion: Rapid-sorb

FIGURE 44-1: RAPID-SORB INSTALLED IN A HORIZONTAL AIRFLOW WITH HEADER INSIDE THE DUCT



- * Pitch steam hose or tubing toward Rapid-sorb:
- 2"/ft (15%) when using steam hose
 - 1/8"/ft (1%) when using tubing

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.
4. Mount the dispersion tubes on the header with the slip couplings or hose cuffs:
 - When installing slip couplings for 1 1/2" (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.

Dispersion: Rapid-sorb

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 1 ½" (DN40) dispersion tubes:
 - Header pitch is duplicated in the L-bracket.
 - Dispersion tube and slip coupling must be fully engaged on header stub for O-rings to provide a seal.
 - High end of L-bracket can be fastened tight to duct or air handler.
 - Fastener on low end of L-bracket must be long enough to compensate for pitch. Use a nut on both sides of L-bracket and duct or air handler for stability.
 - 2" (DN50) dispersion tubes
 - Fasten bracket to top of duct and use hose cuffs to compensate for header pitch.
 - Before securing hose cuffs with hose clamps on dispersion tube and header stub, verify that dispersion tube orifices are directed perpendicular to airflow.
8. Verify that all fasteners are secure:
 - L-bracket to duct
 - Dispersion tubes to L-bracket
 - Hose clamps on 2" (DN50) tubes
 - Header support bracket fastener
9. Secure and seal the header escutcheon plate around the header.

Note:

See Page 46 for steam supply and condensate drain line connection instructions.

Dispersion: Rapid-sorb

STEAM SUPPLY CONNECTIONS TO RAPID-SORB HEADER

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

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

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

CONDENSATE DRAIN CONNECTIONS TO RAPID-SORB HEADER

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

The condensate drain line must be piped as shown in Figures 42-1 and 44-1. 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

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

See also Figure 46-1.

FIGURE 46-1: 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.

Start-up procedure

After the system is installed and connected properly:

1. Verify that the STS humidifier, controls, piping, electrical connections, steam supply, and dispersion unit(s) are installed according to the following:
 - Installation instructions in this manual
 - *Vapor-logic Installation and Operation Manual*
 - Installation section
 - Pre-installation checklist
 - Ladder style wiring diagram (inside control cabinet)
 - External connections wiring diagram (inside control cabinet)
 - All governing codes
2. Verify that electrical connections in the control cabinet and at the humidifier are secure before applying power.
3. Verify that the humidifier is mounted level and securely supported before filling with water. See operating weights in Table 6-1.
4. Verify that the humidifier is level from front to back and side to side after it is full of water.
5. Read the “Operation” section of the *Vapor-logic Installation and Operation Manual*.

Note: During start-up, do not leave the humidifier unattended.
6. Perform all applicable “Start-up checklist” items. See Page 48.
7. Monitor humidifier operation through multiple fill cycles. The humidifier operating status appears on the keypad/display.
8. On tap/softened water units, water skims from the humidifier after every fill cycle. Adjust the amount of skim by increasing or decreasing the skim time (see the *Vapor-logic Installation and Operation Manual*).

At start-up, DriSteem recommends initially running the humidifier with the factory default setting for skim time. See “Maintenance,” beginning on Page 49.

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 control cabinet door is in place and secure before turning on electrical power.

The *Vapor-logic version 5 Installation and Operation Manual* is a comprehensive operation manual. Refer to it for information regarding the following features:

- Keypad/display setup and menu information
- Control input signals and functions
- Drain, flush, and skim features
- Safety features
- Alarm screens and fault messages

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

Start-up checklist

If an item in the Start-up checklist below does not apply to your system, skip to the next item and continue the process.

- Read this manual and all other information that was provided with your humidifier.
- Verify that all field wiring is done according to the instructions in this manual and in the humidifier wiring diagram.
- Confirm that the input signal is consistent with the Vapor-logic controller's expected input signal. Input signals are listed in the Vapor-logic Setup menu. See "Installation Step 2: Setup" in the *Vapor-logic Installation and Operation Manual*.
- Confirm that proper grounding and an approved earth ground are provided.
- Confirm that the keypad/display is mounted with its modular cable routed away from high-voltage circuits and connected to the Display connector on the Vapor-logic board.
- Turn on the water supply, and confirm that the drain valve is closed.
- Turn on power to the humidifier, and confirm the Main menu is displayed on the keypad/display. The display may take several seconds to appear as the controller powers up.
- Confirm in the Main Menu that the mode is "Auto" and that tank status is "Filling."
- When "Filling" appears in main menu, confirm that the tank is filling with water.
- In the Status screen, confirm that the Duct Airflow Switch is closed.
- In the Status screen, confirm that the high limit humidistat input is closed or the high limit transmitter is connected.
- With sufficient water in the tank, the airflow switch closed, the high limit closed, the safety interlock closed, and the humidifier getting a call for humidity, verify that the steam valve is activated.
- If you experience difficulties, have the keypad/display information available along with the serial number and humidifier Model, and call DriSteem Technical Support at 800-328-4447.

Water quality

The best way to determine how often your humidifier needs maintenance is to remove the tank cover and inspect it for mineral deposits after three months of duty. Hours of operation and duty cycle will determine your maintenance schedule, as will water quality.

WATER QUALITY AND MAINTENANCE

Maintenance requirements vary with water quality, because tap and softened water carry a variety of minerals and other materials in a mix that varies from location to location. Very hard (high mineral content) water requires more frequent cleaning and drain/flush cycles than water with low mineral content.

Softened water significantly reduces mineral accumulation inside the humidifier.

Note: Solids, like silica, are not removed in the softening process.

SKIM DURATION

Skim duration determines the quantity of water skimmed with each fill cycle and is field adjustable using the Vapor-logic keypad/display.

Skimming reduces the need for frequent humidifier cleaning. Each time the tank refills, it fills to a level just above the lip of the skim/overflow fitting. A portion of the fill water flows out of the skim/overflow fitting to the drain, which flushes minerals left by the previous evaporating cycle and skims away surface residue.

Both humidifier cleaning and heated water flowing to the drain are operational costs. DriSteem recommends that the user observe and adjust the skim duration to achieve a balance between reducing mineral buildup and conserving heated water.

WARNING

Hot surface and hot water hazard

Do not touch the tank or drain piping until the unit has had sufficient time to cool, or serious injury can occur.

Opening the drain valve when the tank is hot can discharge water with a temperature up to 212 °F (100 °C) into the plumbing system. This can cause damage to the plumbing system if the humidifier is not properly connected to a water tempering device such as a DriSteem Drane-cooler™.

Humidifier De-scaling Solution

Scale buildup on humidifier heat exchangers acts as an insulator, reducing humidifier performance while increasing energy costs. To keep humidifiers operating as efficiently as possible, remove scale with DriSteem's Humidifier De-scaling Solution, available for purchase from your DriSteem representative or distributor.

The De-scaling Solution cleans without risk of corroding humidifier tanks or welds. The De-scaling Solution also cleans surfaces unreachable by hand scraping.

DriSteem's Humidifier De-scaling Solution is the only approved cleaner/de-scaler for use with DriSteem humidifiers. Use of other cleaners/de-scalers may void your DriSteem warranty.

Tap/softened water

COOL DOWN HUMIDIFIER

Before performing any maintenance, allow the tank to cool down.

Note: Fresh make-up water is used to speed up cooling. Do not close the manual water supply before cooling down the humidifier; otherwise the tank could stay hot for several hours.

- Insulated and uninsulated tanks will have hot surfaces.
- Close the manual shut-off valve on the inlet steam supply.
- Models with a standard drain valve and Vapor-logic controller:
 - For drain valves without the manual open lever, use the keypad to perform the cool down process. Refer to the *Vapor-logic Installation and Operation Manual*.
 - Select Manual Drain in the control modes screen.
 - Allow approximately half the water to drain out of the tank.
 - Select Auto in the control modes screen; the fill valve opens and the humidifier cools down.
 - When the fill valve closes, select Manual Drain in the control modes screen and allow the tank to drain dry. The humidifier should be cool enough to work on.

CAUTION

Hot discharge water

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

To prevent such damage from humidifiers without water tempering, allow the tank to cool before draining.

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

Excessive supply water pressure

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

Troubleshooting

The *Vapor-logic Installation and Operation Manual*, which was shipped with your humidifier, is a comprehensive operation manual. Refer to it for troubleshooting information.

Tap/softened water

INSPECTION AND MAINTENANCE

1. **Annually** (also recommended when maintenance is performed)
 - All safety devices in the control circuit should be cycled on and off to verify they are functioning. These include:
 - High limit switch
 - Airflow proving switch
 - Low water level probe. Pull out probe plug; fill valve should energize.
 - Inspect tank and gaskets for leaks.
2. **Seasonally** (or as required, depending on water quality)
 - Cleaning the tank
 - Remove cleanout plate and dispose any loose scale that has collected in the bottom of the tank. This should be done before the scale buildup reaches the bottom of the heat exchanger.
 - Inspect the area inside the tank in front of the drain valve fitting, and thoroughly clean all scale and mineral buildup from that area.
 - Cleaning the probes
 - Disconnect the probe plug and cable assembly (located on top of the tank), and unscrew the probe rod assembly from the humidifier probe housing using the probe tool (see Figure 51-1).
 - Inspect the probe housing and clean, ensuring that all housing passageways are clear. To detach the housing from the tank, remove the four bolts that attach it to the tank. Then lift the housing up out of the tank.
 - The scale should flake off easily from the probe assembly rods.
 - The bottom 3/8" (10 mm) is the sensing portion of each probe rod; it should be brushed clean with a wire brush, abrasive pad, or steel wool.
 - Inspect the composite plastic probe rod assembly for any signs of cracking, roughness, or deterioration. If found, replace probe assembly.
 - Reassemble the probe rod assembly, and torque as indicated in Figure 51-1.

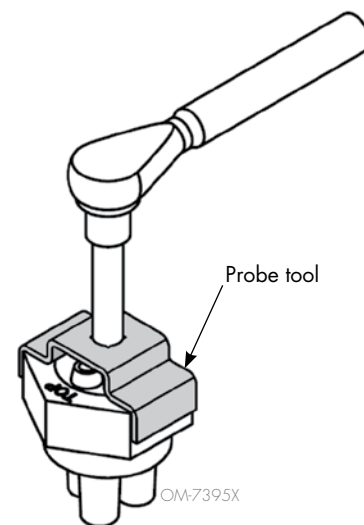
WARNING

Shutdown procedure

To prevent serious injury, follow this shutdown procedure before performing service or maintenance procedures on this humidifier (after the tank has cooled down and drained):

1. Use Vapor-logic keypad/display to change control mode to Standby.
2. Place all power disconnects in OFF position and lock in OFF position.
3. Close the field-installed manual water supply shut-off valve.
4. Close the manual shut-off valve on the inlet steam supply.

FIGURE 51-1: PROBE TOOL



Remove and install probe assembly with supplied probe tool. Attach a 3/8" square drive to the probe tool.

When installing, torque probe assembly to 120 in-lbs (10 ft-lbs; 13.6 N-m). Probe tools can be ordered from your DriSteem representative (Part no. 185101).

Tap/softened water

- Cleaning the skim overflow port
 - Water should drain from the skimmer drain pipe after each fill cycle. This should be verified visually by a weekly inspection.
 - Loosen deposits in and around the skimmer overflow port with a long tool such as a screwdriver.
 - Water should drain from the skimmer drain pipe after each fill cycle. This should be verified visually by a weekly inspection.
 - Loosen deposits in and around the skimmer/overflow port with a long tool such as a screwdriver.
 - If flow through the water seal/P-trap is diminished due to mineral accumulation:
 - Remove the water seal piping from the humidifier and flush out.
 - Replace the water seal with new piping if the minerals have hardened in the water seal.
 - Install a union at the base of the water seal to ease removal if water quality causes the water seal to become clogged often with scale.

When the seasonal maintenance requirements are complete:

- Re-install the cleanout plate, and torque the nuts to 25 to 35 in-lbs (2.8 to 4.0 N-m).
- Verify that the probe rod holder is secure and that the probe plug and cable assembly are plugged into the probe rod holder.
- Replace and secure all covers.
- Verify that the drain valve assembly is in the closed position.
- Turn on the water supply.
- Turn on the electrical power.
- Do not leave humidifier unattended. Allow the humidifier to cycle through multiple fill cycles and verify that the humidifier cover, cleanout plate, and probe holder gasket are not leaking.

3. Off-season maintenance

- Perform complete inspection and cleaning of the following:
 - Heat exchanger
 - Probe rods
 - Skimmer port and water seal
 - Humidifier tank
- After the humidification season, DriSteem recommends a complete inspection and cleaning of the heat exchanger, skimmer, and water chamber. After cleaning, the unit should remain empty until humidification is required.

RO/DI water option

Regularly verify that water processing equipment is operating correctly. The presence of chlorides in improperly processed RO/DI water eventually causes pitting and failure of the heat exchanger, tank, and components. Your DriSteam warranty does not cover damage caused by chloride corrosion.

STS humidifiers with the RO/DI water option do not require cleaning, but regular inspections are advised. There are no skimming, drain, or flush cycles.

COOL DOWN HUMIDIFIER

Before performing any maintenance, allow the tank to cool down.

Note: Fresh make-up water is used to speed up cooling. Do not close the manual water supply before cooling down the humidifier; otherwise the tank could stay hot for several hours.

- Insulated and uninsulated tanks will have hot surfaces.
- Close the manual shut-off valve on the inlet steam supply.
- Models with a standard drain valve:
 - Manually open the drain valve.
The float valve opens.
 - Let the fill water run until the tank is cooled; then shut off the field-installed manual supply water shut-off valve.
 - Let the tank drain; then manually close the drain valve.
- Models with end-of-season drain option:
 - Use the keypad to perform the cool down process. Refer to the *Vapor-logic Installation and Operation Manual*.
 - Select Manual Drain in the control modes screen.
 - Allow approximately half the water to drain out of the tank.
 - Select Auto in the control modes screen; the fill valve opens and the humidifier cools down.
 - When the fill valve closes, select Manual Drain in the control modes screen and allow the tank to drain completely dry. The humidifier should be cool enough to work on.

WARNING

Shutdown procedure

To prevent serious injury, follow this shutdown procedure before performing service or maintenance procedures on this humidifier (after the tank has cooled down and drained):

1. Use Vapor-logic keypad/display to change control mode to Standby.
2. Place all power disconnects in OFF position and lock in OFF position.
3. Close the field-installed manual water supply shut-off valve.
4. Close the manual shut-off valve on the inlet steam supply.

RO/DI water option

INSPECTION AND MAINTENANCE

1. **Annually** (also recommended when maintenance is performed)

- All safety devices in the control circuit should be cycled on and off to verify they are functioning. These include:
 - High limit switch
 - Airflow proving switch
- Inspect tank and gaskets for leaks.
- Verify that the float valve is closing off. If the float valve will not shut off, there may be particulate on the valve seat, or the stopper may be worn and need replacing.

As long as mineral-free water is used in the humidifier, no cleaning or flushing should be necessary.

2. **Off-season maintenance**

- Perform a complete inspection of the following:
 - Heat exchanger
 - Float valve
 - Humidifier tank and gaskets
- After inspection, the humidifier should remain empty until humidification is required.
- After the humidification season, DriSteem recommends a complete inspection and cleaning of the heat exchanger, skimmer, and water chamber. After cleaning, the unit should remain empty until humidification is required.

On units with Teflon coated heat exchangers, do not use a sharp object when cleaning. Cuts or scratches on the heat exchanger will impair its ability to shed scale during operation and could cause the Teflon to separate from the metal surface.

Outdoor enclosure

Access to the humidifier side cleanout plate is through the Outdoor Enclosure electrical service door.

- Clean vent screens annually.
- Check for proper operation of strip heaters and ventilation fans annually.
- Refer to instructions for complete humidifier maintenance, beginning on Page 49.

Table 55-1:
Outdoor Enclosure troubleshooting guide

Symptom	Possible cause	Recommended action
Fans not operating	No power	Check for power to Outdoor Enclosure.
	Loose connections	Reconnect wiring or tighten.
	Broken fan	Replace fan.
Heaters not operating	No power	Check for power to Outdoor Enclosure.
	Loose connections	Reconnect wiring or tighten.
	Broken heater	Replace heater.
Doors not sealing	Loose handles	Adjust handle.
	Bad gasket	Replace gasket.

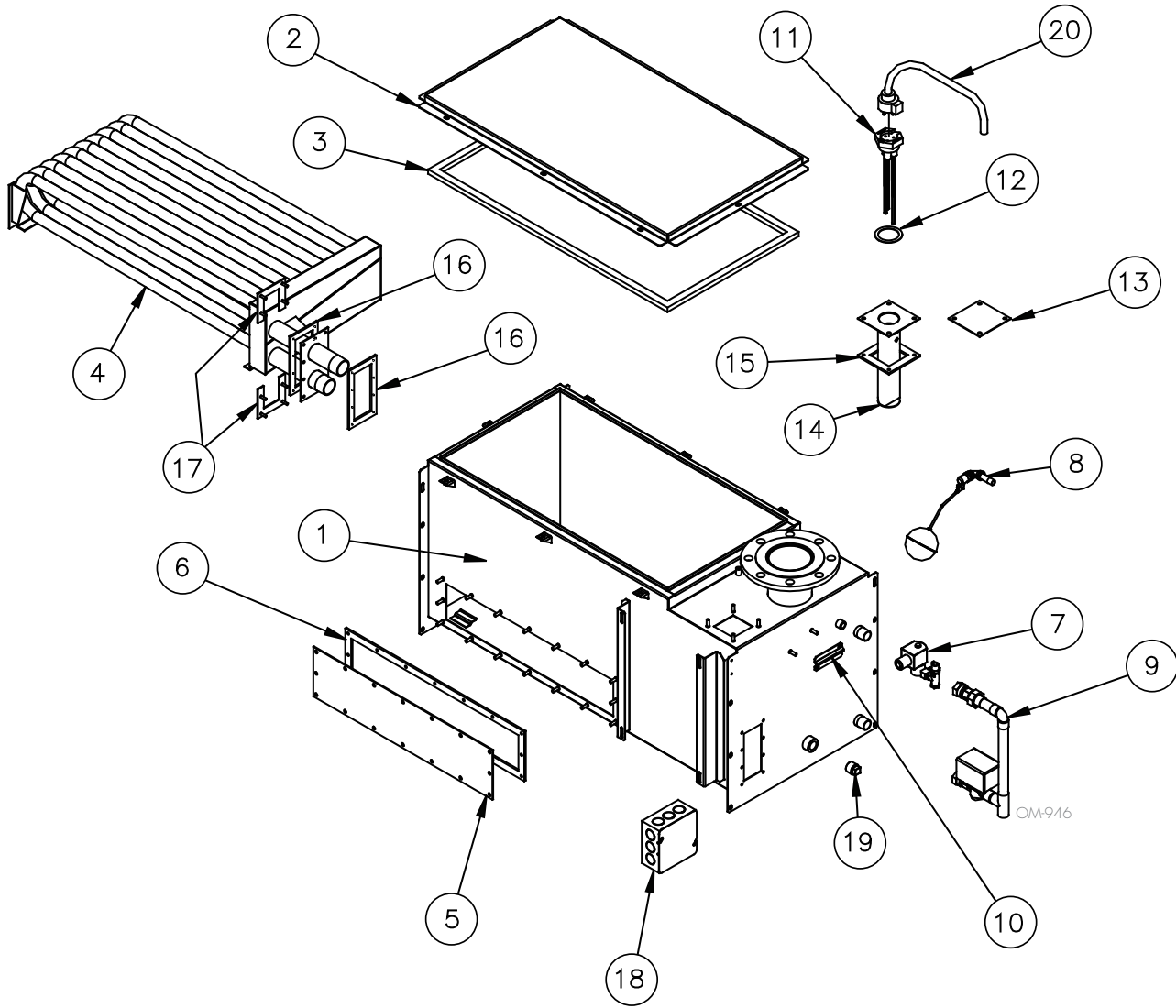
 **WARNING**

Electric shock and hot surfaces hazards
When performing maintenance on the humidifier:

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

Humidifier tank

FIGURE 56-1: TANK REPLACEMENT PARTS



Humidifier tank

Table 57-1:
Tank replacement parts

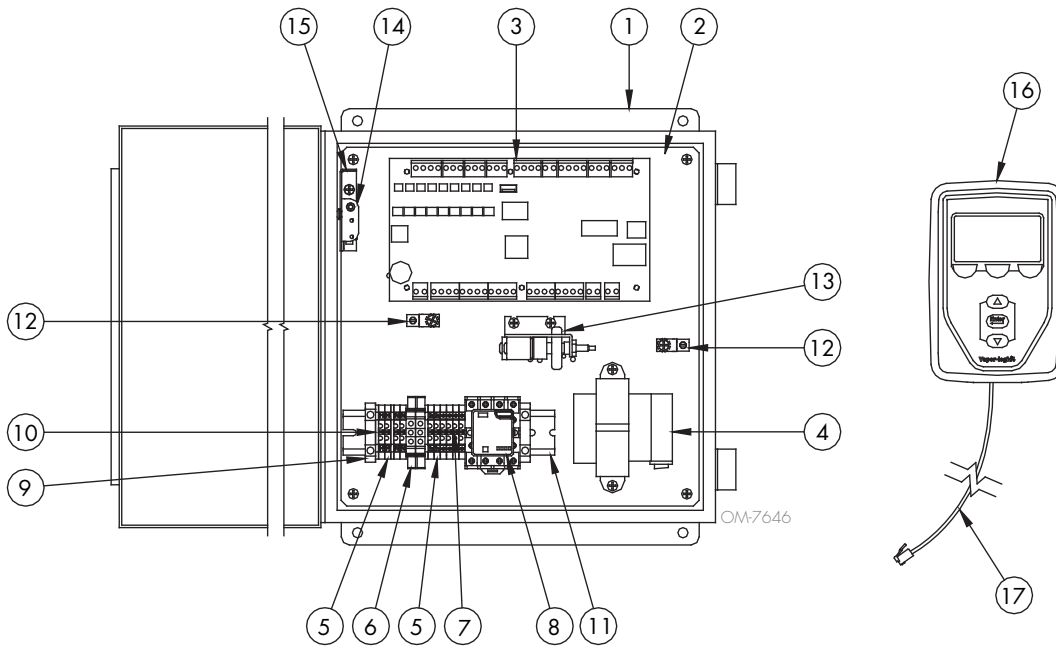
No.	Description	Part no.
1	Tank, STS	Consult factory
2	Cover, STS-25	165341-001
	Cover, STS-50	165341-002
	Cover, STS-100	165341-003
	Cover, STS-200/400/800	165341-004
3	Cover gasket, STS-25	160692-001
	Cover gasket, STS-50	160692-002
	Cover gasket, STS-100	160692-003
	Cover gasket, STS-200/400/800	160692-004
4	Heat exchanger, STS	Consult factory
5	Cleanout plate, STS-25	165481-001
	Cleanout plate, STS-50/100	165481-002
	Cleanout plate, STS-200/400/800	165481-003
6	Cleanout plate gasket, STS-25	308015
	Cleanout plate gasket, STS-50/100	308015
	Cleanout plate gasket, STS-800	308015
7	Fill assembly	Consult factory
8*	Float fill assembly, STS-25/50/100	505315
	Float fill assembly, STS-200/400	505305
	Float fill assembly, STS-800	505340
9	Drain assembly	Consult factory
10	Temperature sensor assembly	405760
11	Probe assembly, STS-25/50/100/200/400	406303-108
	Probe assembly, STS-800	406303-109
12	Probe gasket	309350-004
13*	Probe plate	120370-020
14	Probe weld	165301
15	Probe plate/weld gasket	308416-001
16	Heat exchanger gasket, STS	308220
17	Heat exchanger mounting plate	164581-001
18	Junction box	407134-005/006
19	Condensate return plug	250192-075
20	Probe plug	406050-004

Components may be in different location or orientation than shown in drawing on previous page.

* STS with RO/DI water option only

Control cabinet

FIGURE 58-1: CONTROL CABINET REPLACEMENT PARTS



Note: Components may be in different location or orientation than shown in drawing.

Table 58-1:
Control cabinet replacement parts*

No.	Description	Part no.
1	Control cabinet, 12 x 12	407100-003
2	Subpanel, STS	165720-002
3	Control board, Vapor-logic	183504-014
4	Transformer, 120V to 24V	408965-001
5	Terminal block	408252-001
6	Ground terminal	408252-010
7	Terminal jumper	408252-009
8	Relay, 24V 3PDT, Finder	407900-017
9	DIN-rail end cap	408252-006
10	Terminal spacer	408252-005
11	DIN-rail, 6.5" (165 mm)	167765-006
12	Ground lug	409250-003
13	P-E switch	408100
14	Interlock switch	408470
15	Interlock switch bracket	165614
16	Vapor-logic keypad/display with back	408495-010
17	Vapor-logic keypad cable, 5' (1.5 m)	408490-009

* Specify humidifier model and serial numbers when ordering.

Outdoor enclosure

FIGURE 59-1: OUTDOOR ENCLOSURE REPLACEMENT PARTS

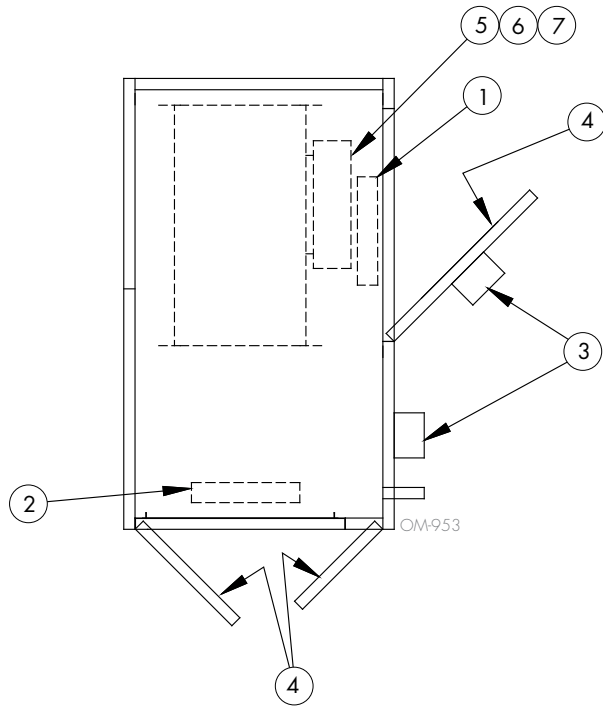


Table 59-1:
Outdoor Enclosure replacement parts

Number in drawing	Description	Part number
1	500W strip heater	405800-052
2	1100W strip heater	405800-053
3	Cooling fan	405800-068
4	Gasket, door or roof	308005-010*
5	Stat, high limit	405800-065
6	Stat, heater	405800-066
7	Stat, fan	405800-067

* Specify quantity in feet

Expect quality from the industry leader

For more than 45 years, DriSteem has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of the STS, which features cleanable, stainless steel construction. DriSteem also leads the industry with a Two-year Limited Warranty and optional extended warranty.

For more information

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For the most recent product information visit our Web site: www.drirsteem.com

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Form No. STS-IOM-EN-0221
Part No. 890000-501 Rev K

Two-year Limited Warranty

DRI-STEEM Corporation ("DriSteem") 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 DriSteem ships such product, whichever date is the earlier.

If any DriSteem product is found to be defective in material or workmanship during the applicable warranty period, DriSteem'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 DriSteem's election. DriSteem shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product. Excluded from the Limited Warranty are all consumable and wear and tear items such as cylinders, membranes, filters, or media replacements. These items are subject to usual wear and tear during usage.

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

DriSteem's Limited Warranty is made in lieu of, and DriSteem 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.

DriSteem 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 DriSteem has notice of the possibility of such damages.

By purchasing DriSteem'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 DriSteem 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. When a DriSteem humidifier is purchased with a DriSteem RO system, an extended twenty-four (24) month coverage is included.

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