Vaporstream®

Electric Humidifier

Installation, Operation, and Maintenance Manual

DRISTEEM®

The humidification experts

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

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⚠ WARNING

Attention installer

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

DRI-STEEM Technical Support: 800-328-4447

Read all warnings and instructions

Read this manual before performing service or maintenance procedures on any part of the system. Failure to follow all warnings and instructions could produce the hazardous situations described, resulting in property damage, personal injury, or death.

Failure to follow the instructions in this manual can cause moisture to accumulate, which can cause bacteria and mold growth or dripping water into building spaces. Dripping water can cause property damage; bacteria and mold growth can cause illness.

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Hot surfaces and hot water

This steam humidification system has extremely hot surfaces. Water in 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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WARNING

Disconnect electrical power

Disconnect electrical power before installing supply wiring or performing service or maintenance procedures on any part of the humidification system. Failure to disconnect electrical power could result in fire, electrical shock, and other hazardous conditions. These hazardous conditions could cause property damage, personal injury, or death.

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

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

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Electric shock hazard

If the humidifier starts up responding to a call for humidity during maintenance, severe bodily injury or death from electric shock could occur. To prevent such start-up, follow the procedure below before performing service or maintenance procedures on this humidifier (after the tank has cooled down and drained):

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

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CAUTION

Hot discharge water

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

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 DRI-STEEM 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.

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ATTENTION INSTALLER

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

DRI-STEEM® Technical Support

800-328-4447

Where to find more information

Our web site:

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

- Catalogs
  - – Vaporstream
  - – Ultra-sorb®
- Installation, Operation, and Maintenance manuals (IOM)
  - – Ultra-sorb
  - – Vapor-logic4 controller (includes humidifier operation and troubleshooting)
- *DRI-STEEM Humidification System Design Guide* (includes steam loss tables and general humidification information)

Dri-calc®:

Dri-calc, 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 Dri-calc is the quickest way to view our literature, or we will be happy to mail literature to you.

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Keypad/display and troubleshooting

The *Vapor-logic4 Installation and Operation Manual,* which was shipped with your humidifier, is a comprehensive operation manual. Refer to it for information about using the keypad/display and Web interface, and for troubleshooting information.

Download DRI-STEEM literature

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

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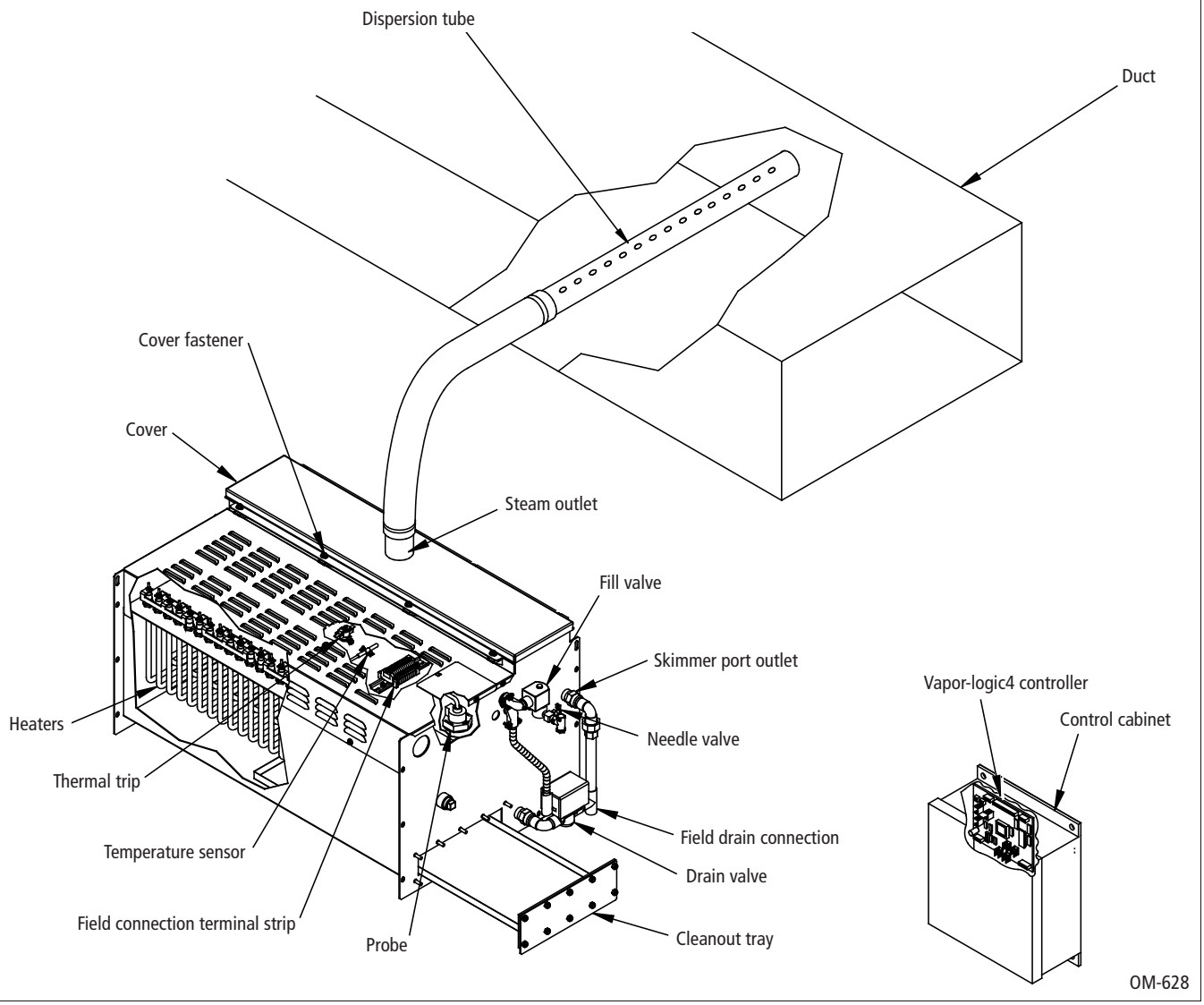
Vaporstream VLC with tap/softened water

Figure 2-1:
Vaporstream system example, tap/softened water

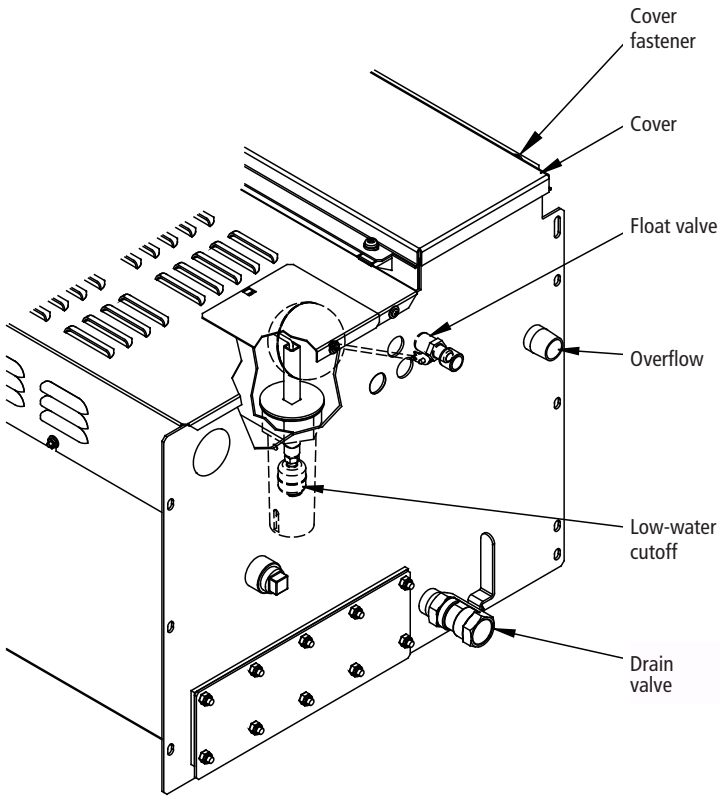


Tap/softened water

Vaporstream humidifiers with tap/softened water (shown above) use electricity to heat tap or softened fill water into steam for humidification. A conductivity probe monitors the water level; therefore, water conductivity must be at least 30 µS/cm for proper operation. Vaporstream with tap/softened water will not operate with DI/RO water. For DI/RO water, use Vaporstream with the DI/RO water option.

Vaporstream VLC with DI/RO water option

Figure 3-1:
Vaporstream humidifier, DI/RO water option



DI/RO water option

Vaporstream humidifiers with DI/RO water systems (systems using deionized water or water that has been treated using reverse osmosis) use electricity to heat DI/RO fill water into steam for humidification. Water level is controlled with a float valve and low water cutoff switch. Float valves are compatible with DI/RO water only.

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

Water type conversion

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

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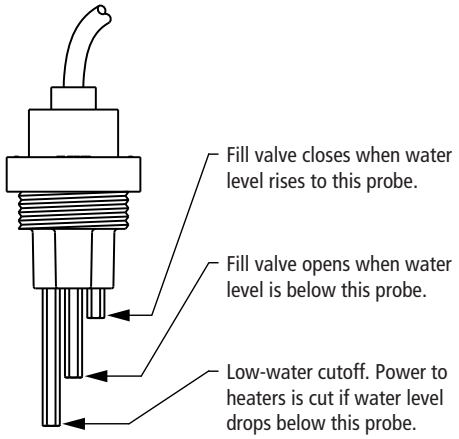
See Pages 22 and 23 for detailed installation drawings.

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

Figure 3-2:
Water level control for tap/softened water humidifier



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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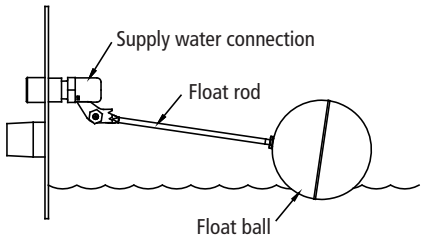
Figure 3-3:
Water level control for DI/RO water option humidifier



Humidifiers using DI/RO water control water levels using a float valve and low-water cutoff switch.

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Specifications

Table 4-1:
Vaporstream VLC capacities and electrical specifications, tap/softened water and DI/RO water

VLC model (kW-stages)	Maximum steam capacity †		Heaters		Current draw (amps)											kW
					Single-phase						Three-phase***					
	lbs/hr	kg/h	Qty.	Stages**	120V	208V*	240V*	277V*	480V*	600V*	208V*	240V*	277V*	480V*	600V*	
2-1	5.7	2.6	1	1	16.7	9.6	8.3	7.2	4.2	3.3	—	—	—	—	—	2
3-1	8.6	3.9	1	1	25.0	14.4	12.5	10.8	6.3	5.0	—	—	—	—	—	3
4-1	11.4	5.2	1	1	33.3	19.2	16.7	14.4	8.3	6.7	—	—	—	—	—	4
5-1	15.2	6.9	1	1	44.4	25.6	22.2	19.2	11.1	8.9	—	—	—	—	—	5.33
6-1	17.1	7.8	3	1	—	28.8	25.0	21.7	12.5	10.0	16.7	14.4	12.5	7.2	5.8	6
9-1	25.7	11.7	3	1	—	43.3	37.5	32.5	18.8	15.0	25.0	21.7	18.8	10.8	8.7	9
12-1	34.2	15.5	3	1	—	—	—	43.3	25.0	20.0	33.3	28.9	25.0	14.4	11.5	12
16-1	45.6	20.7	3	1	—	—	—	—	33.3	26.7	44.4	38.5	33.3	19.2	15.4	16
21-1	59.9	27.2	3	1	—	—	—	—	43.8	35.0	—	—	43.8	25.3	20.2	21
25-1	71.3	32.3	3	1	—	—	—	—	—	41.7	—	—	—	30.1	24.1	25
12-2	34.2	15.5	6	2	—	57.7	50.0	43.3	25.0	20.0	33.3	28.9	25.0	14.4	11.5	12
18-2	51.3	23.3	6	2	—	86.5	75.0	65.0	37.5	30.0	50.0	43.3	37.5	21.7	17.3	18
24-2	68.4	31.0	6	2	—	—	—	86.6	50.0	40.0	66.6	57.7	50.0	28.9	23.1	24
32-2	91.2	41.4	6	2	—	—	—	—	66.7	53.3	88.8	77.0	66.7	38.5	30.8	32
42-2	119.7	54.3	6	2	—	—	—	—	87.5	70.0	—	—	87.5	50.5	40.4	42
50-2	142.5	64.6	6	2	—	—	—	—	—	83.3	—	—	—	60.1	48.1	50
18-3	51.3	23.3	9	3	—	86.5	75.0	65.0	37.5	30.0	50.0	43.3	37.5	21.7	17.3	18
27-3	77.0	34.9	9	3	—	129.8	112.5	97.5	56.3	45.0	74.9	65.0	56.3	32.5	26.0	27
36-3	102.6	46.5	9	3	—	—	—	130.0	75.0	60.0	99.9	86.6	75.0	43.3	34.6	36
48-3	136.8	62.1	9	3	—	—	—	—	100.0	80.0	133.2	115.5	100.0	57.7	46.2	48
63-3	179.6	81.5	9	3	—	—	—	—	131.3	105.0	—	—	131.3	75.8	60.6	63
75-3	213.8	97.0	9	3	—	—	—	—	—	125.0	—	—	—	90.2	72.2	75
24-4	68.4	31.0	12	4	—	115.4	100.0	86.6	50.0	40.0	66.6	57.7	50.0	28.9	23.1	24
36-4	102.6	46.5	12	4	—	173.1	150.0	130.0	75.0	60.0	99.9	86.6	75.0	43.3	34.6	36
48-4	136.8	62.1	12	4	—	—	—	173.3	100.0	80.0	133.2	115.5	100.0	57.7	46.2	48
64-4	182.4	82.7	12	4	—	—	—	—	133.3	106.7	177.6	154.0	133.4	77.0	61.6	64
84-4	239.4	108.6	12	4	—	—	—	—	175.0	140.0	—	—	175.1	101.0	80.8	84
100-4	285.0	129.3	12	4	—	—	—	—	—	166.7	—	—	—	120.3	96.2	100

* If using an optional SDU or Area-type fan unit for dispersion, run a neutral line with 208V/240V/single-phase and 208V/three-phase power supply lines to provide a 120V circuit for the fan. With all other power supply voltages (other than 120V), provide a separate 120V circuit for the fan, or order from DRI-STEEM a transformer installed in the control cabinet.

** Heater stage identifies the number of contactors.

*** Three-phase power supply connection. All heater loads are wired Delta.

† Total humidifier load = load to meet design conditions + load to compensate for steam loss from the dispersion assembly and interconnecting piping. If total humidifier load is more than the humidifier's maximum capacity, design conditions will not be met. For steam loss data see the *DRI-STEEM Design Guide* available for downloading and printing at www.dristeem.com

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Dimensions

Table 5-1:
Standard control cabinet dimensions and weights

Cabinet size	Cabinet dimensions		Shipping weight*	
	inches	mm	lbs	kg
S	16 h x 14 w x 6 d	406 h x 356 w x 152 d	32	15
M	20 h x 20 w x 7 d	508 h x 508 w x 178 d	55	25
L	24 h x 24 d x 7 d	610 h x 610 w x 178 d	73	33
XL	30 h x 24 w x 9 d	762 h x 610 w x 229 d	91	41
XXL	36 h x 30 w x 9 d	914 h x 762 w x 229 d	136	62

* Weight does not include humidifier.

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Figure 5-1:
Vaporstream VLC dimensions, tap/softened water and DI/RO water

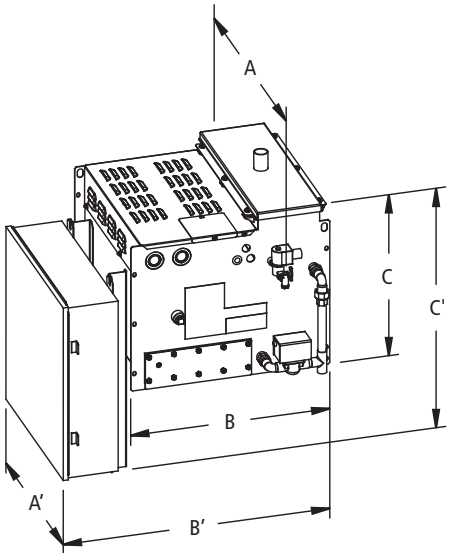

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Table 5-2:
Vaporstream VLC dimensions, tap/softened water and DI/RO water

VLC model (kW - stages)	Without mounted control cabinet					
	A (length)		B (width)		C (height)	
	inches	mm	inches	mm	inches	mm
2-1, 3-1, 4-1, 5-1	12.52	318	26.00	660	18.88	480
6-1, 9-1, 12-1, 16-1, 21-1, 25-1	17.85	453	22.00	559	18.88	480
12-2, 18-2, 24-2, 32-2, 42-2, 50-2	25.35	644	22.00	559	18.88	480
18-3, 27-3, 36-3, 48-3, 63-3, 75-3	32.85	834	22.00	559	18.88	480
24-4, 36-4, 48-4, 64-4, 84-4, 100-4	40.35	1025	22.00	559	18.88	480

VLC model (kW - stages)	With mounted control cabinet option						
	Max. control cabinet size	A' (length 2)		B' (width 2)		C' (height 2)	
		inches	mm	inches	mm	inches	mm
2-1, 3-1, 4-1, 5-1	M	14.75	375	34.00	864	30.31	770
6-1, 9-1, 12-1, 16-1, 21-1, 25-1	M	25.00	635	30.00	762	30.31	770
12-2, 18-2, 24-2, 32-2, 42-2, 50-2	L	29.00	737	30.00	762	34.11	866
18-3, 27-3, 36-3, 48-3, 63-3, 75-3	XXL	32.85	834	32.00	813	46.11	1171
24-4, 36-4, 48-4, 64-4, 84-4, 100-4	XXL	40.35	1025	32.00	813	46.11	1171

Notes:
- For all Vaporstream models with optional insulation, add 1" (25 mm) to dimensions A, C, and C'.
- Dimensions are largest possible for these models. Actual dimensions may be smaller.

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Weights and cabinet sizes

Table 6-1:
Vaporstream VLC weights and control cabinet sizes, tap/softened water and DI/RO water

VLC model (kW-stages)	Shipping weight		Operating weight †		Control cabinet size* (M, L, XL, XXL)										
					Single-phase power						Three-phase power				
	lbs	kg	lbs	kg	120V	208V	240V	277V	480V	600V	208V	240V	277V	480V	600V
2-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
3-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
4-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
5-1	35	16	79	36	M	M	M	M	M	M	—	—	—	—	—
6-1	57	26	157	71	—	M	M	M	M	M	M	M	M	M	M
9-1	57	26	157	71	—	M	M	M	M	M	M	M	M	M	M
12-1	57	26	157	71	—	—	—	M	M	M	M	M	M	M	M
16-1	57	26	157	71	—	—	—	—	M	M	M	M	M	M	M
21-1	57	26	157	71	—	—	—	—	M	M	—	—	M	M	M
25-1	57	26	157	71	—	—	—	—	—	M	—	—	—	M	M
12-2	79	36	237	108	—	L	L	L	L	L	L	L	L	L	L
18-2	79	36	237	108	—	L	L	L	L	L	L	L	L	L	L
24-2	79	36	237	108	—	—	—	L	L	L	L	L	L	L	L
32-2	79	36	237	108	—	—	—	—	L	L	L	L	L	L	L
42-2	79	36	237	108	—	—	—	—	L	L	—	—	L	L	L
50-2	79	36	237	108	—	—	—	—	—	L	—	—	—	L	L
18-3	110	50	326	148	—	L	L	L	L	L	L	L	L	L	L
27-3	110	50	326	148	—	XL	L	L	L	L	L	L	L	L	L
36-3	110	50	326	148	—	—	—	XL	L	L	L	L	L	L	L
48-3	110	50	326	148	—	—	—	—	L	XXL	XL	L	L	L	L
63-3	110	50	326	148	—	—	—	—	XL	XXL	—	—	L	L	L
75-3	110	50	326	148	—	—	—	—	—	XXL	—	—	—	L	XXL
24-4	153	70	427	194	—	L	L	L	L	L	L	L	L	L	L
36-4	153	70	427	194	—	XL	XL	XL	L	L	L	L	L	L	L
48-4	153	70	427	194	—	—	—	XL	L	L	XL	L	L	L	L
64-4	153	70	427	194	—	—	—	—	XL	XXL	XL	XL	XL	L	L
84-4	153	70	427	194	—	—	—	—	XL	XXL	—	—	XL	L	L
100-4	153	70	427	194	—	—	—	—	—	XXL	—	—	—	L	XXL

* Control cabinet sizes in this table are for the largest required cabinet for each model. Depending on Vaporstream options chosen you may receive a smaller cabinet than the one shown in this table. Contact DRI-STEEM if you need more detailed information about control cabinet sizes. See control cabinet dimensions in Table 5-1.

† Operating weight does not include control cabinet. See control cabinet weights in Table 5-1.

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Selecting a location

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

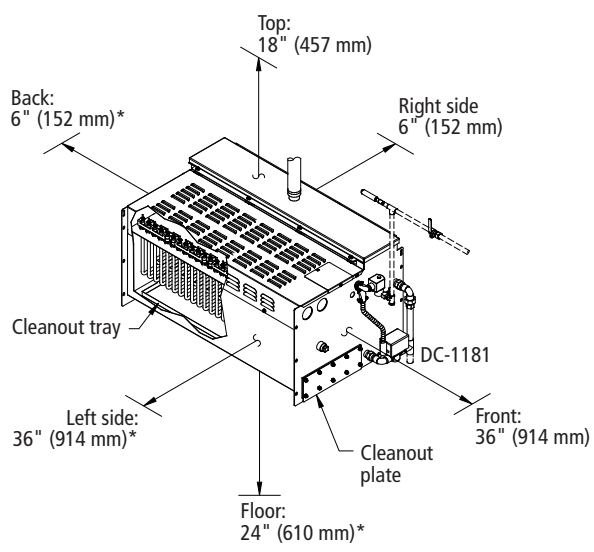
- Easy access for maintenance
- Maximum ambient temperature for the control cabinet is 104 °F (40 °C).
- Noises inherent to operation:
  - Fill cycles (tap/softened water humidifier)
    See *Fill noise in tap/softened water humidifier* on Page 26.
  - Control cabinet: cycling contactors
- Clearance recommendations — primarily top, left side, and front (see Figure 7-1).
- Convenient location to dispersion system for routing of vapor hose, tubing, or pipe (see *Dispersion* section of this manual).
- Electrical connections: Power, control, and safety circuits
- Plumbing connections: Supply water, drain piping, and condensate return piping (see the piping section of this manual)
- Water seal requirements (see *Piping* section of this manual)
- Avoid locations above critical equipment or processes.
- Avoid locations close to sources of electromagnetic emissions, such as power distribution transformers and high horsepower motors controlled by variable frequency drives.

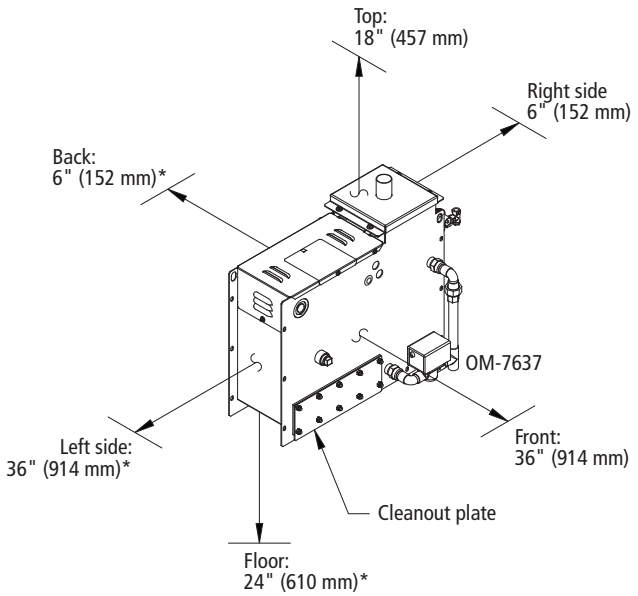
Important:

Installation must comply with governing codes.

See *Dispersion*, beginning on page 34, for dispersion assembly placement guidelines.

Figure 7-1:
Vaporstream clearance recommendations





* When the control cabinet is mounted on the Vaporstream, provide 36" (914 mm) clearance from the front of the control cabinet and 6" (152 mm) from the bottom of the cabinet to the floor.

Mounting

⚠ WARNING

Mounting hazard

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

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To ensure that the water level control system works properly, the tank must be mounted level from side to side and front to back.

The mounting methods described in this manual 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 approvals.

Table 8-1:
Mounting options by model

Mounting method	Models			
	2-1, 3-1, 4-1, 5-1		All other models	
	Standard	Optional	Standard	Optional
Trapeze	X		X	
Support legs				X
Wall brackets	X			X
Weather cover		X		X
Outdoor Enclosure		X		X

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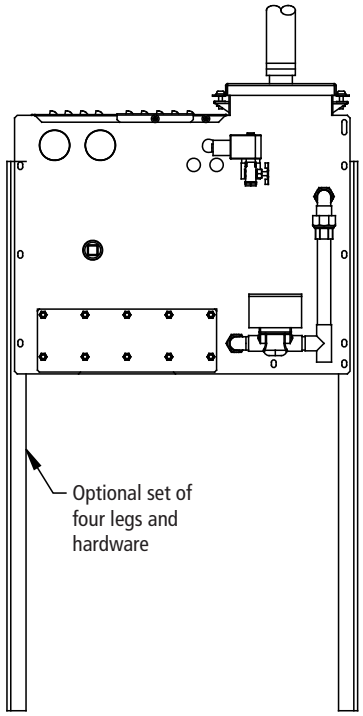
Mounting

Support legs

Support legs are not available for single-heater models (2-1, 3-1, 4-1, and 5-1). These models must be mounted with a trapeze (Page 10) or an Outdoor Enclosure (Pages 14 through 21).

Use enclosed bolts, nuts, and washers to fasten legs to tank. Shim or adjust so the tank sets level side to side and front to back. Verify level after the tank is filled and is at operating weight.

Figure 9-1:
Support legs



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Mounting

Overhead installation

Do not install water piping and humidifiers above expensive apparatus or equipment. A broken water pipe, leaking valve gland, condensation or other water leaks can occur causing serious damage and costly repairs to the equipment below.

If this type of installation cannot be avoided, install a drip pan constructed of galvanized sheet metal under the humidifier to catch potential water drips (see Figure 10-1).

Pipe the overflow from the Vaporstream directly to a floor drain — do not drain the Vaporstream into the drip pan. Terminate the drip pan and the Vaporstream overflow drains above an open floor drain.

Trapeze hanger

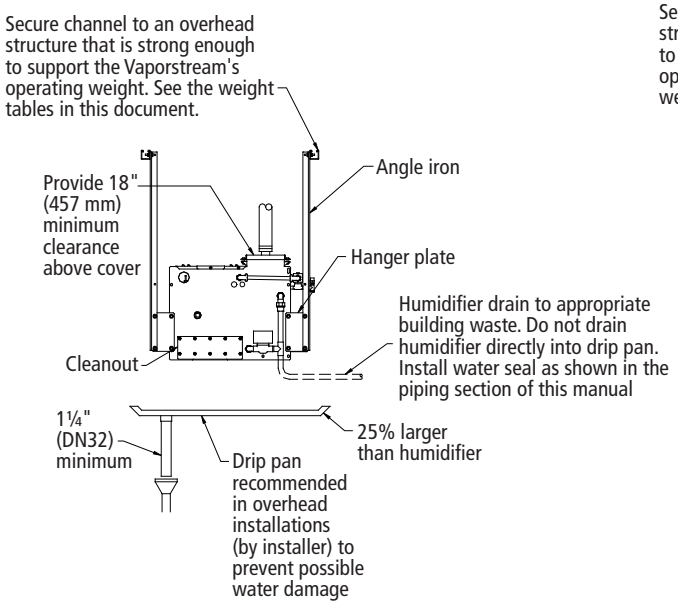
For overhead installations, install a drip pan to prevent possible water damage (see Figure 10-1).

Secure trapeze hanger to an overhead structure that is strong enough to support the operating weight of the Vaporstream humidifier and field installed piping, plus the weight of the control cabinet if it is mounted on the humidifier.

Adjust the mounting so that the tank sets level side to side and front to back. Verify level after the tank is filled and is at operating weight.

Figure 10-1:
Trapeze hanger

Vaporstream Models 2-1 through 5-1



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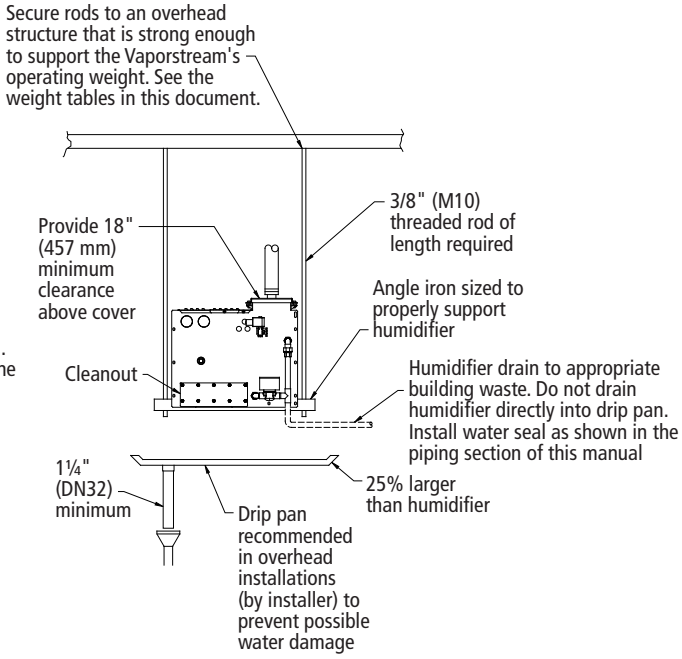
Vaporstream Models 6-1 through 100-4



VLC-OM-005

Mounting

Wall brackets

DRI-STEEM recommends using 3/8" (M10) fasteners.

- Wood stud wall, recommended mounting — two horizontal 2 × 4s (100 mm × 50 mm timbers) with center line spaced at dimension shown in Table 11-1.
  - Three-heater models: lag bolt (coach screw) both horizontal 2 × 4s (100 mm × 50 mm timbers) to two vertical studs (16" [404 mm] on center)
  - Six-heater and nine-heater models: lag bolt (coach screw) to three studs
  - 12-heater models: lag bolt (coach screw) to four studs

  Lag bolt (coach screw) wall brackets to the horizontal 2 × 4s (100 mm × 50 mm timbers). Locate the wall brackets so they are flush to the front and back flanges of the tank.
- Metal stud wall — follow the same 2 × 4 wood stud (100 mm × 50 mm timber) wall guidelines, but provide a second set of 2 × 4s (100 mm × 50 mm timbers) on the backside of the wall. Run a bolt with a washer through the face 2 × 4 (100 mm × 50 mm timber), the metal stud, and the backside 2 × 4 (100 mm × 50 mm timber) with washer and nut to connect the 2 × 4s (100 mm × 50 mm timbers). DRI-STEEM does not recommend mounting the nine-heater and 12-heater models on a metal stud wall — use support legs.
- Concrete or block walls — use concrete anchors (expansion bolts) rated for the operating weight of the Vaporstream humidifier. Locate the wall brackets so they are flush to the front and back flanges of the tank.

Shim or adjust mounting so the tank sets level from side to side and front to back. Verify level after the tank is filled and is at operating weight.

Figure 11-1:
Wall brackets

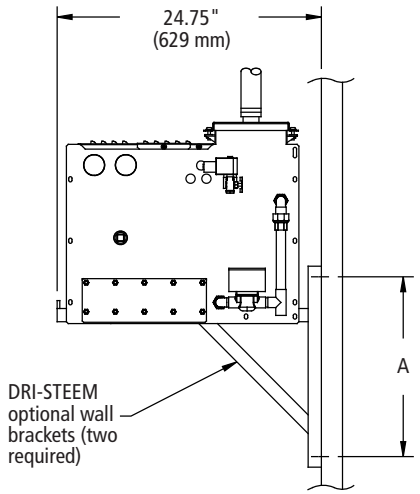


Table 11-1:
Wall brackets Dimension A
(center to center of mounting holes)

Vaporstream model	inches	mm
One-heater models: 2-1, 3-1, 4-1, 5-1	17	432
Three-heater models: 6-1, 9-1, 12-1, 16-1, 21-1, 25-1	17	432
Six-heater models: 12-2, 18-2, 24-2, 32-2, 42-2, 50-2	17	432
Nine-heater models*: 18-3, 27-3, 36-3, 48-3, 63-3, 75-3	28	711
Twelve-heater models*: 24-4, 36-4, 48-4, 64-4, 84-4, 100-4	34	864

* Wall bracket installation on metal stud walls is not recommended for nine-heater and twelve-heater models

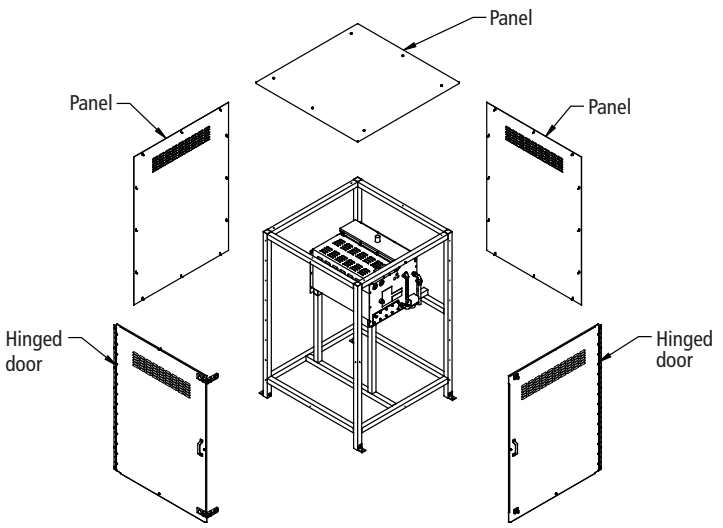
mc_022310_1345

Weather cover

The optional Vaporstream weather cover is water-resistant and designed to protect the humidifier from rain and sun. The 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.

mc_020110_1255

Figure 12-1:
Weather cover exploded view



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.

Table 12-1:
Weather cover weights

Weather cover size	Weight*	
	lbs	kg
1-heater	390	177
3-heater	395	179
6-heater	430	195
9-heater	465	211
12-heater	500	227
* Weight does not include humidifier or control cabinet.		

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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 vapor hose in outdoor applications — the effects of ultraviolet rays will prematurely age the vapor hose.
- Installer required to 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 so the steam supply can be disconnected easily for removal of the weather cover to gain access to the Vaporstream for service and maintenance.

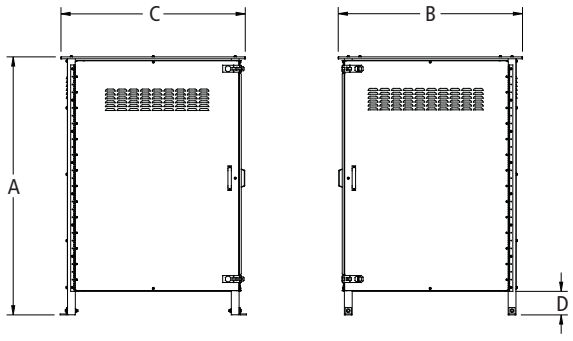
Annual weather cover maintenance requirements

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

mc_022510_1235

Weather cover

Figure 13-1:
Weather cover dimensions



OM-7434

Table 13-1:
Weather cover dimensions

Letter	Description	1-heater and 3-heater covers		6-heater cover		9-heater cover		12-heater cover	
		inches	mm	inches	mm	inches	mm	inches	mm
A	Height	66	1676	66	1676	66	1676	66	1676
B	Length	44	1118	44	1118	44	1118	44	1118
C	Width	35	889	39	991	44	1118	50	1270
D	Distance from bottom	6	152	6	152	6	152	6	152

mc_022310_1645

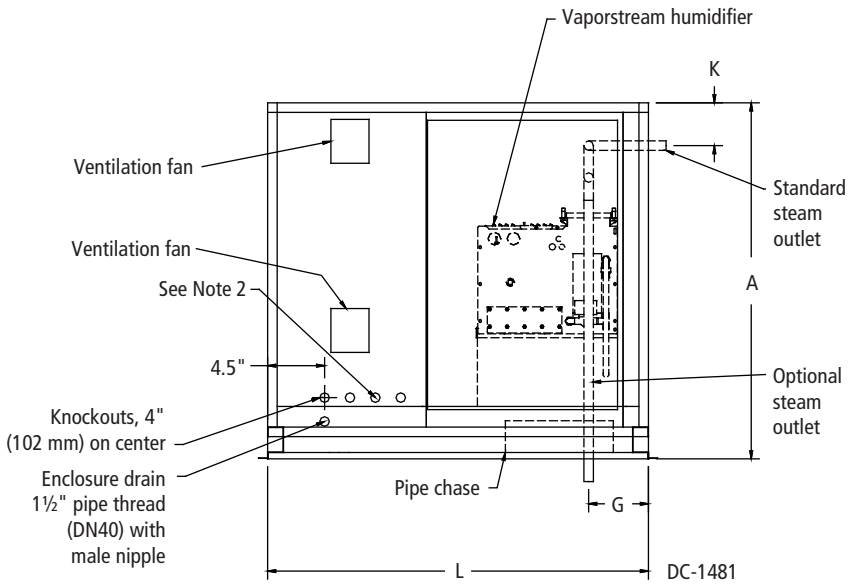
Note:

Weather Covers are only available in the United States and Canada.

The Vaporstream Outdoor Enclosure is weather tight with access doors and supplemental heating and cooling. See Pages 14 through 21.

Outdoor Enclosure

Figure 14-1:
Vaporstream Outdoor Enclosure with standard or optional steam outlet, elevation view



mc_030410_1500

Notes:

1. The Outdoor Enclosure has two available steam distribution configurations:

   The standard configuration has a steam outlet at the back 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.

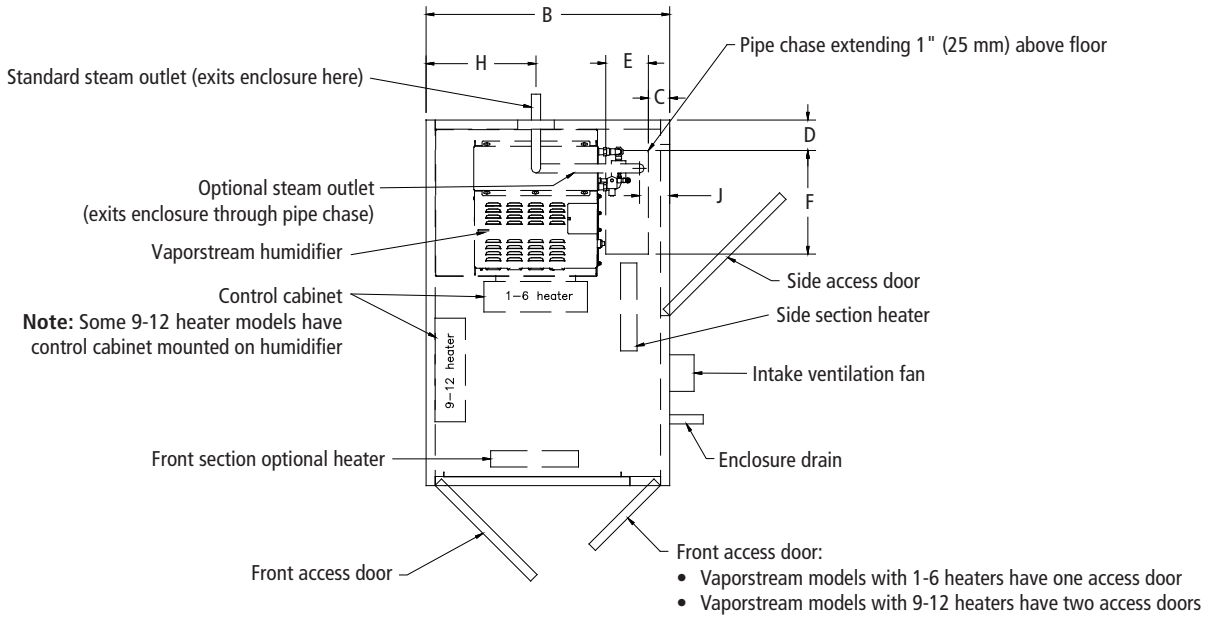
2. There are four knockouts located on the right and left side of the enclosure. Knockout sizes are 1½" (hole dia. 50 mm) for Vaporstream models with 1-6 heaters and 2" (hole dia. 63.5 mm) for Vaporstream models with 9-12 heaters. Run the electrical power into the enclosure at these knockouts.

3. All piping from the Vaporstream unit to the steam outlet is stainless steel pipe. Depending on the application, interconnecting piping from the steam outlet to the dispersion assembly can be tubing, pipe or DRI-STEEM vapor hose. See the *Dispersion* section of this document for more information about connecting to the dispersion assembly.

4. A separate 15 amp, 120 VAC service must be brought to the Outdoor Enclosure to power the enclosure heaters and fans.

Outdoor Enclosure

Figure 15-1:
Vaporstream Outdoor Enclosure, top view



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DC-1482

Table 15-1:
Vaporstream Outdoor Enclosure dimensions*

Item	Description	Vaporstream models			
		with 1-6 heaters		with 9-12 heaters	
		inches	mm	inches	mm
A	Enclosure height	56.00	1422	56.00	1422
B	Enclosure width	40.00	1016	54.00	1372
C	Pipe chase position	2.50	67	2.50	67
D		2.50	64	2.50	64
E	Pipe chase size	8.00	203	8.00	203
F		19.50	495	19.50	495
G	Steam pipe position	13.50	343	13.50	343
H		22.00	559	29.50	899
J		7.00	178	7.00	178
K		8.25	210	9.25	235
L	Length	60.00	1524	64.00	1626

* See drawings above and on facing page.

mc_030410_1520

Outdoor Enclosure

Table 16-1:
Vaporstream Outdoor Enclosure weights

Vaporstream model	Number of heaters	Outdoor Enclosure shipping weight*		Outdoor Enclosure operating weight*	
		lbs	kg	lbs	kg
2-1, 3-1, 4-1, 5-1	1	485	220	530	240
6-1, 9-1, 12-1, 16-1, 21-1, 25-1	3	515	234	620	281
12-2, 18-2, 24-2, 32-2, 42-2, 50-2	6	535	243	690	313
18-3, 27-3, 36-3, 48-3, 63-3, 75-3	9	860	390	1090	494
24-4, 36-4, 48-4, 64-4, 84-4, 100-4	12	910	413	1190	540
* Includes humidifier					

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Specifications

- See Table 4-1 for humidifier capacities and input requirements.
- Add 15 full load amps (120 VAC) when using an Outdoor Enclosure with a heater package.
- Add 2 full load amps (120 VAC) when using an Outdoor Enclosure without a heater package.

Table 16-2:
Vaporstream Outdoor Enclosure connection sizes

Description	All Vaporstream models
Water makeup (fill)	¼" pipe thread (DN8)
Drain	¾" (DN20)
Condensate return	¾" pipe thread (DN20)

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Outdoor Enclosure

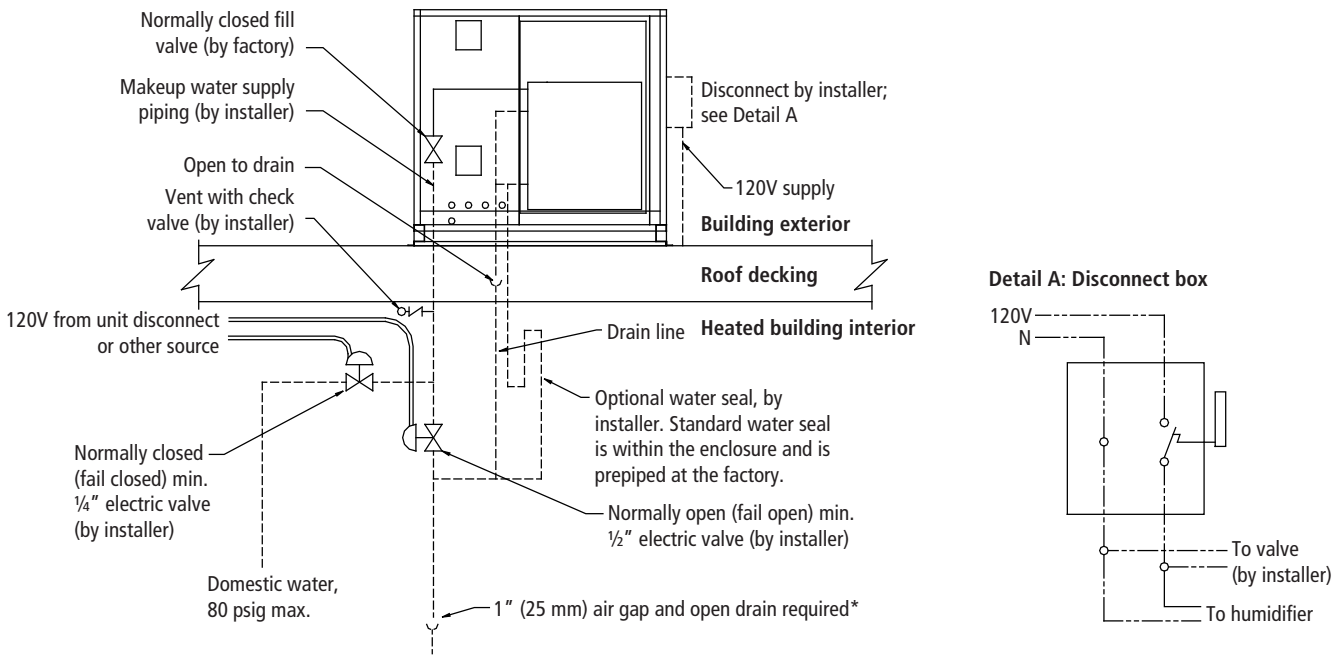
The Outdoor Enclosure option is used when DRI-STEEM humidifiers are installed outdoors. The following information is not intended to supersede any requirements of federal, state or local codes having jurisdiction; prior to installing the unit, consult authorities having jurisdiction.

Operating temperatures

DRI-STEEM humidifiers housed in an Outdoor Enclosure operate properly from -40 °F to 122 °F (-40 °C to 50 °C).

Insulate supply water piping to avoid dripping from condensation. To ensure that water will not remain in the fill line and freeze if there is a loss of power, field-install additional valves in a conditioned space upstream of the fill valve. These valves should be powered on the same circuit as the humidifier such that if the power goes off, water will drain out of the fill line to prevent freezing. See Figure 17-1.

Figure 17-1:
Optional installation method for water supply piping



* Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensate may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.

OM-954

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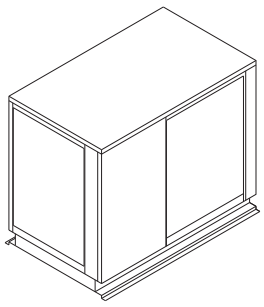
Outdoor Enclosure

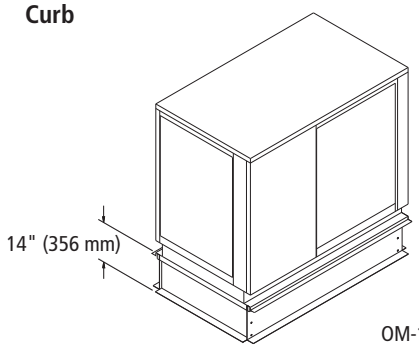
Figure 18-1:
Outdoor Enclosure mounting options

Flush



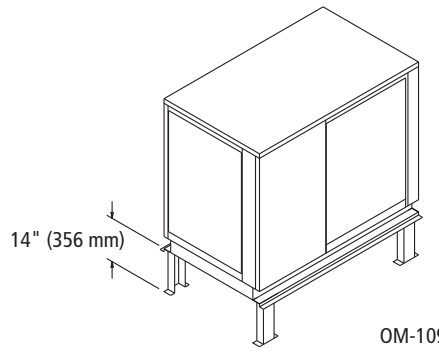
DC-1110

Curb



OM-1095

Legs
(Vaporstream models with 1-6 heaters only)



OM-1096

Mounting

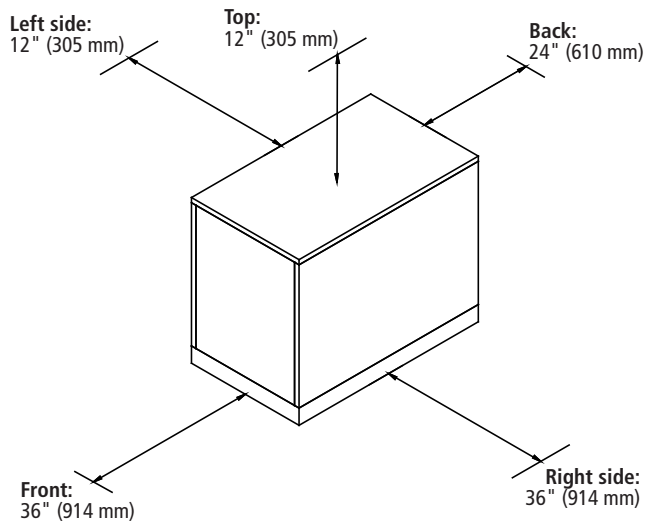
- Outdoor Enclosure must be level and located so there is enough clearance for opening access doors.
- Verify that position of support legs, pad, or curb properly support unit, and support structure dimensions coincide with unit dimensions.
- Locate unit so air intakes are not too close to exhaust fan outlets, gasoline storage, or other contaminants that could cause dangerous situations. Using and storing gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance 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. Locate Outdoor Enclosure so prevailing winds do not blow into air intakes.
- Remove all shipping brackets and other packaging prior to installing Outdoor Enclosure.
- During transit, unloading, and setting of unit, bolts and nuts may have become loosened. Check that all nuts are tightened.
- 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

- 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 Outdoor Enclosure dimensions in Table 15-1.
- 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.

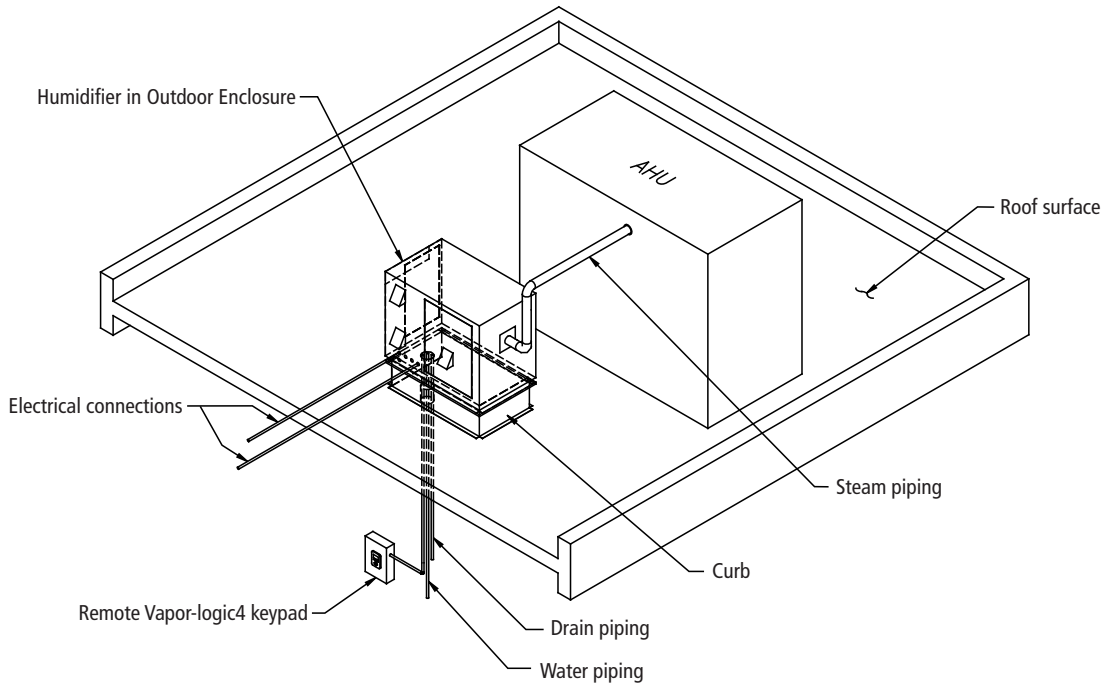
Figure 19-1:
Outdoor Enclosure clearances



Outdoor Enclosure

- 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.
- 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.

Figure 20-1:
Typical rooftop installation overview



Outdoor Enclosure

- 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" × ½" 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.
- Four symmetrically shaped stand legs (optional) are include all necessary hardware for elevating Outdoor Enclosure 14" (356 mm) from ground. Stand legs should be securely mounted to grade by installing contractor. To prevent outdoor environment from penetrating enclosure, close-off provisions must be made between stand legs.
- All piping from humidifier to steam outlet is stainless steel pipe. Depending on application, interconnecting piping from steam outlet to dispersion assembly can be tubing, pipe or DRI-STEEM vapor hose.

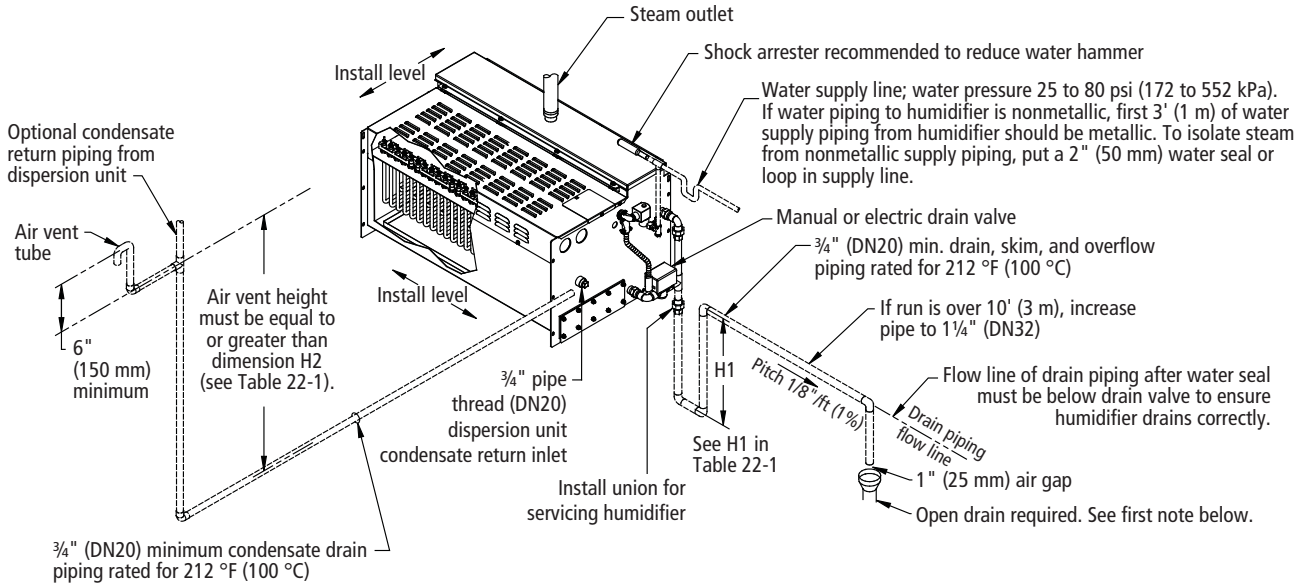
Operation

When power is applied to Outdoor Enclosure:

- If ambient temperature in Outdoor Enclosure is below 50 °F (10 °C), the strip heaters will power up. Humidifier is not allowed to operate unless temperature inside enclosure is at least 35 °F (2 °C). Strip heaters power down when temperature in Outdoor Enclosure reaches 50 °F (10 °C). Humidifier's aquastat feature allow's humidifier to continue operating until it reaches a factory default tank temperature of 70 °F (21 °C). This temperature can be field-reset up to 180 °F (82 °C).
- If temperature in enclosure is at or above 85 °F (30 °C) but less than 150 °F (66 °C), two ventilation fans turn on to cool the electronic components.
- If temperature in enclosure is 150 °F (66 °C) or higher, a high limit switch powers down humidifier, and the ventilation fans continue to run. When enclosure temperature falls below 130 °F (54 °C), humidifier automatically resumes normal operation.
- If there is a power loss to Outdoor Enclosure, normally-open (fail-open) drain valve drains humidifier.

Piping:
Overview, tap/softened water

Figure 22-1:
Field piping overview, Vaporstream VLC with tap/softened water



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

mc_022310_1255 VLC-OM-010

Figure 22-2:
Piping, Vaporstream VLC with tap/softened water, Models 2-1 through 5-1

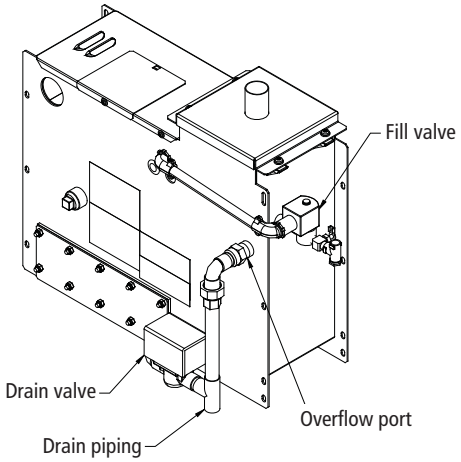


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Table 22-1:
Heights required to overcome Vaporstream internal pressure (H1, H2)

Unit output			Water seal height (H1)		Air vent height (H2)	
kW	lbs/hr	kg/h	inches	mm	inches	mm
≤ 48	≤ 138	≤ 62	12	305	22.5	572
49-64	139–183	63–83	15	381	27.5	699
> 64	> 183	> 83	18	457	30.5	775

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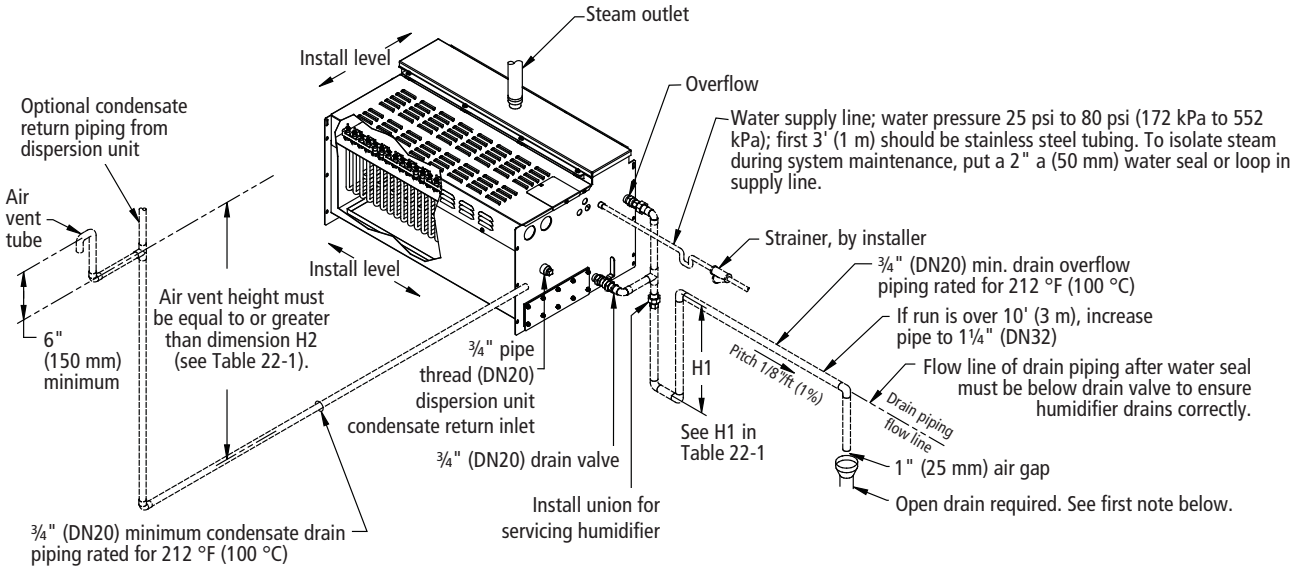
Piping:
Overview, DI/RO water option

Figure 23-1:
Field piping overview, Vaporstream VLC with DI/RO water option

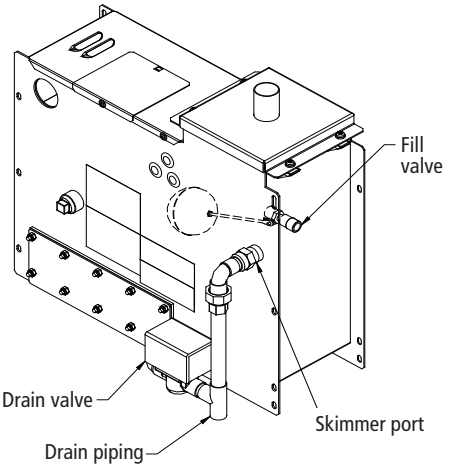


Notes:

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

mc_022310_1300 VLC-OM-011

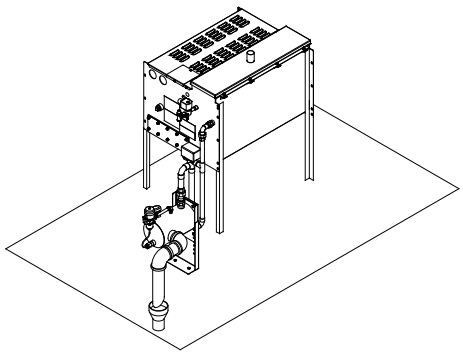
Figure 23-2:
Piping, Vaporstream VLC with DI/RO water, Models 2-1 through 5-1



mc_030210_1802 OM-4004

Piping: Drain

Figure 24-1: Drane-kooler™ water tempering device



DRI-STEEM's Drane-kooler, shown mounted to a Vaporstream humidifier, tempers discharged water temperature. For other Drane-kooler mounting options or for more information, contact DRI-STEEM or view the Drane-kooler product data sheet in the literature section at www.dristeem.com

OM-956

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

Minimum drain pipe size is ¾" (DN20) inside diameter. If the length of the drain piping exceeds 10' (3 m), increase the pipe size to 1¼" (DN32) pipe.

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

An open drain with a 1" (25 mm) air gap between the drain piping and the drain is required. Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces may occur.

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).

To allow normal operation and prevent steam from escaping through the drain line, the installer must provide a water seal of sufficient height to contain the pressure developed in the humidifier system. See Table 22-1 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.

If the proximity of a drain requires the humidifier drain and skim water to be lifted by a pump, DRI-STEEM offers a condensate pump option (see Figure 25-1). 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

Tap/softened water

The drain connection to a tap/softened water humidifier is a ¾" (DN20) sweat (soldered) fitting. The installer should place a union directly after the factory drain fitting, provide a water seal of height H1 (from Table 22-1), and pipe. To mount the humidifier closer to the floor, see Figure 25-2. The installer needs to rework the factory piping that connects the drain valve to the skim/overflow fitting, cut out the elbow, and repipe per the diagram.

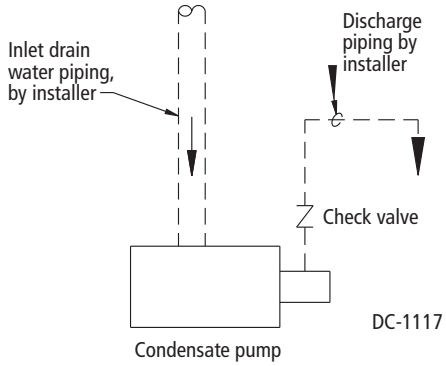
DI/RO water option

DI/RO systems have a ¾" pipe thread (DN20) fitting on the drain valve and on the overflow fitting. Prior to dumping into a drain, the installer needs to connect the drain and overflow, provide a water seal of height H1 (from Table 22-1), and pipe. To mount the humidifier closer to the floor, see Figure 25-2.

Alternate water seal and drain valve piping

Typically, the water seal height dictates the minimum dimension the bottom of the humidifier can be above the floor. The alternate water seal reduces the water seal piping below the humidifier up to 8" (203 mm), allowing the tank to sit closer to the floor.

Figure 25-1:
Lifting drain water



Note:
Use a condensate pump rated for your application. Pumps are rated by fluid temperature, head (pressure), and flow (gpm). Contact your local DRI-STEEM representative for pump selection.

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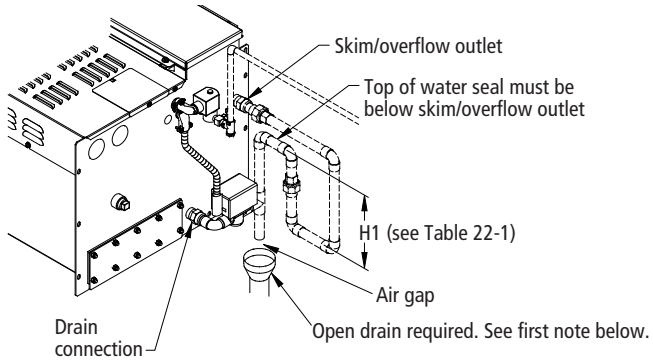
Figure 25-2:
Alternate water seal and drain valve piping



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.
- Use this piping configuration when water seal must be elevated above flow line of drain connection, such as when the humidifier is mounted near the floor.
- Dashed lines indicate provided by installer

mc_030210_1801 VLC-OM-012

Piping: Water supply

Note:

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

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 DRI-STEEM 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.

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Vaporstream humidifiers have a 1" (25 mm) internal air gap to prevent back siphoning into a potable water system. 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 supply piping

The water supply assembly for a tap/softened water Vaporstream humidifier includes a strainer, needle valve, and fill solenoid. The pipe connection is a 1/4" pipe thread (DN8), except for Vaporstream humidifiers in Europe, which have a 3/8" pipe thread (DN10) connection.

When using nonmetallic tubing for supply water, it must be rated for 212 °F (100 °C) minimum continuous operating temperature. DRI-STEEM recommends installing 3' (914 mm) of non-insulated metallic pipe directly off the humidifier (between the humidifier and the nonmetallic tubing).

If using nonmetallic supply water tubing, DRI-STEEM recommends making a 2" (50 mm) water seal or loop in the supply line to isolate steam from the nonmetallic tubing. See Figure 22-1.

The minimum water conductivity for tap/softened water Vaporstream humidifiers is 30 µS/cm.

Fill noise in tap/softened water humidifier

The primary component of the water supply assembly is the solenoid valve; therefore, noise can be expected during fill cycles.

If water hammer occurs when the fill solenoid closes, the best solution is to install a shock arrester. The noise might be diminished by reducing the supply water pressure (minimum 25 psi [172 kPa]) or using flexible tubing rated for 212 °F (100 °C) minimum continuous operating temperature.

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.

Piping: Water supply

DI/RO water supply piping

The DI/RO-water Vaporstream humidifier controls water level with a float valve. The pipe connection is a 1/4" pipe thread (DN8), except for Vaporstream humidifiers in Europe, which have a 3/8" pipe thread (DN10) connection.

With the end-of-season drain option, a solenoid valve is added on the inlet of the float valve. The end-of-season feature shuts off the fill water supply and drains the tank when there is no demand for humidity for 72 hours. (This length of time is a default setting and is user-adjustable. See the *Vapor-logic4 Installation and Operation Manual* for more information.)

When using nonmetallic tubing for supply water, it must be rated for 212 °F (100 °C) minimum continuous operating temperature. DRI-STEEM recommends installing 3' (914 mm) of non-insulated stainless steel pipe directly off the humidifier (between the humidifier and the nonmetallic tubing).

If using nonmetallic supply water tubing, DRI-STEEM recommends making a 2" (50 mm) water seal or loop in the supply line to isolate steam from the nonmetallic tubing. See Figure 23-1.

DRI-STEEM 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.

⚠ WARNING

Fire hazard

Do not supply a DI/RO-water Vaporstream humidifier with tap water. Particulates from tap supply water will accumulate on and clog the low water cutoff switch in the float valve assembly, causing a critical safety circuit to fail. This can cause a dry tank fire and severe personal injury or death.

Wiring

⚠ 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 or remove heater terminal or subpanel access panels 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 DRI-STEEM warranty.

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 DRI-STEEM warranty. Review information and diagrams before proceeding.

Wiring diagram overview

- Ladder style wiring diagrams (located inside the control cabinet door) show power, control, and humidifier to control cabinet interconnection requirements.
- Heater connection diagrams (located under the humidifier terminal cover) show bussing and wire connections to heaters.
- External connections diagrams (located inside the control cabinet door) show connection points to the microprocessor-based controller and wire terminals for 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 Vaporstream 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.

Verify electrical current characteristics — voltage, phase and amp draw — and capacity requirements against those listed on the name plate.

Service disconnect

A service disconnect must be installed per NEC requirements and/or governing codes.

- For single stage units, the fuse block and fuses are omitted in the control cabinet; therefore, the installer MUST provide a FUSED disconnect.
- Multiple stage units require a service disconnect (provided by the installer).

For European models, locate the disconnect per IEC 60364. Refer to the detailed drawing of the disconnect location on Page 30 of this document.

Wiring

Control cabinet

The length of wire from the control cabinet to the humidifier must not exceed 50' (15 m).

The left side of the control cabinet is the control circuit side, and the right side is the power circuit side. Place conduit connection holes in the control cabinet so that the control and power wire routing is limited to their respective sides of the control cabinet.

Control wiring and power wiring must be run in dedicated or separated earthed metal conduit, cable trays, or trunking.

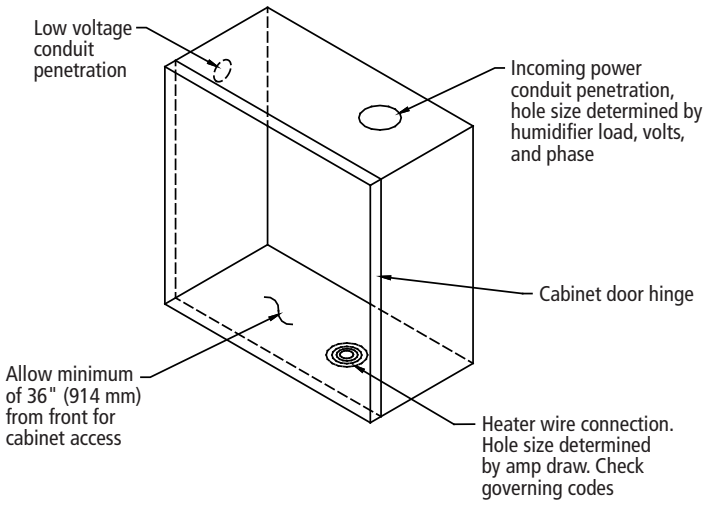
The control cabinet should be mounted in a location convenient for service with a minimum of 36" (914 mm) clearance in front of the door.

The installer is responsible for making electrical connections at the power block, contactors, and heater lugs. Torque requirements for power block lugs are identified on the side of the power block.

Electrical connection torque requirements

- Contactor screw connection torque: 16 inch-lbs (1.8 Nm)
- Heater lug torque depends on wire size:
  - 6-gauge (10 mm^2) wire 35 inch-lbs (4.0 Nm)
  - 8-gauge (6 mm^2) wire 25 inch-lbs (2.8 Nm)
  - 10 to 14-gauge (< 6 mm^2) 20 inch-lbs (2.2 Nm)

Figure 29-1:
Control cabinet penetrations



Wiring

Table 30-1:
European wiring requirements

230 volt single phase			400 volt three phase		
Amps	Wire size mm²	Ground wire size mm²	Amps	Wire size mm²	Ground wire size mm²
0 - 18	2.5	2.5	0 - 15.7	2.5	2.5
18.1 - 24	4	4	15.8 - 21	4	4
24.1 - 30.7	6	6	21.1 - 27	6	6
30.8 - 42.7	10	10	27.1 - 37.5	10	10
42.8 - 57	16	16	37.6 - 51	16	16
57.1 - 75.7	25	16	51.1 - 66.7	25	16
75.8 - 93.7	35	16	66.8 - 82.5	35	16
93.8 - 113.2	50	25	82.6 - 100.5	50	25
113.3 - 144	70	35	100.6 - 128.2	70	35
144.1 - 174	95	50	128.3 - 155.2	95	50
174.1 - 201.7	120	70	155.3 - 179.2	120	70

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Table 30-2:
European breaker requirements

I max. A	Breaker size
0 - 8.0	10
8.1 - 10.4	13
10.5 - 12.8	16
12.9 - 16	20
16.1 - 20	25
20.1 - 25.6	32
25.7 - 32	40
32.1 - 40	50
40.1 - 50.4	63
50.5 - 64	80
64.1 - 80	100
80.1 - 100	125
100.1 - 128	160
128.1 - 160	200

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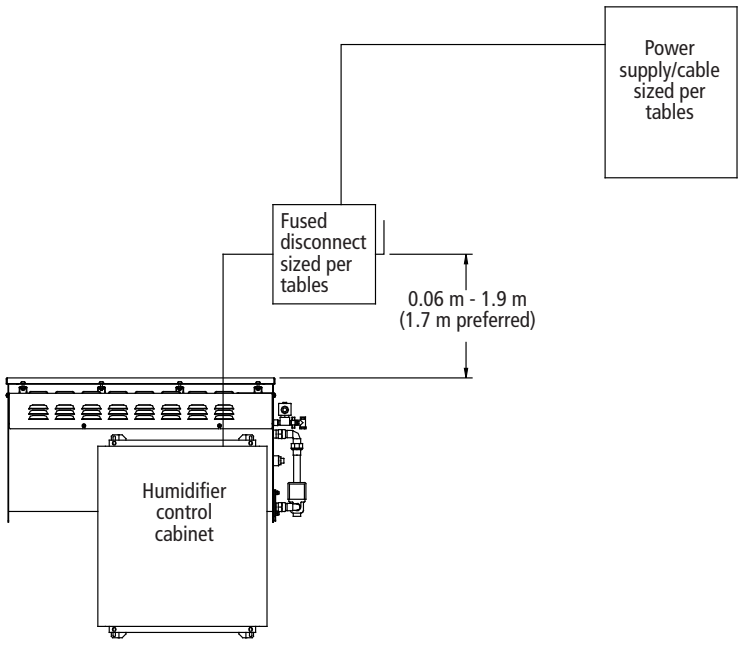
Figure 30-1:
European disconnect location requirements



Note:
See tables on this page.

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Wiring

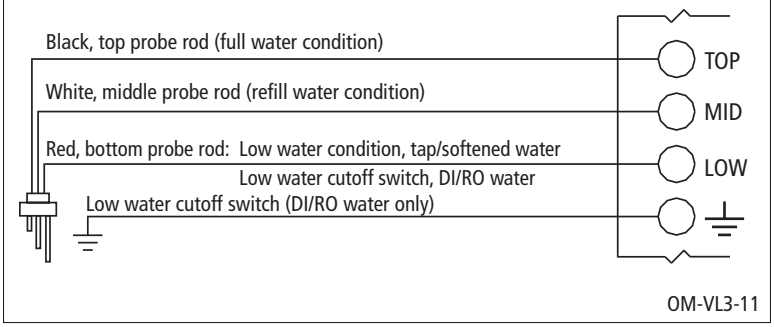
Preventing electrical noise

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

Most electrical noise problems can be prevented by using proper wiring practices and techniques to prevent coupling or inducing of electrical interference into control circuits. The following wiring practices should minimize interaction of noise and controls:

- Connect humidifier and control cabinet to a code approved earth ground.
- Separate the line voltage wiring from low voltage control circuit wiring when routing electrical wiring inside the control cabinet.
- Use separate electrical conduits for line and low voltage wiring to the humidifier.
- Do not use chassis or safety grounds as current-carrying commons. A safety ground should never be used as a conductor or neutral to return circuit current.
- When wiring external electrical connections to humidistats, humidity and temperature transmitters, or control signal input connections from a building control system, use 18-gauge minimum (1 mm^2) plenum-rated twisted pair wire with cable shielding (screening) and drain wire for grounding.
- Return all shielded (screened) cable connections to the control cabinet for grounding. **Do not ground shield at the device end.**

Figure 31-1:
Water level control wiring for Vapor-logic4



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⚠ WARNING

Excessive moisture hazard

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

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Important: Do not use shielded (screened) cable for water level control devices.

Wiring

Important:

Installing the keypad/display

If the keypad/display has been shipped loose, mount it in a convenient location for easy access, but not inside the control cabinet. Mount the keypad/display using a field-supplied network phone wall plate. To mount, slide the keypad/display onto the tabs on the phone plate.

Note that the keypad/display requires an ambient temperature range of 32 °F to 122 °F (0 °C to 50 °C) to operate properly. Exceeding these limits results in a poor reading or no reading.

Control wiring

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

- Humidistat, room/duct transmitter, and temperature transmitter wiring must be minimum 18-gauge (1 mm^2) plenum rated, shielded (screened), twisted pair wire with a bare drain wire for grounding.
- Airflow proving switch wiring must be minimum 18-gauge (1 mm^2) stranded wire run in conduit. The airflow proving switch can be wired using minimum 18-gauge (1 mm^2) 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, thermal trip, humidifier cover interlock, 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 mm^2) 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 mm^2) 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 (mm^2) 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 the same AWG (mm) as the largest heater wire or sized per NEC or IEC 60364 requirements.

Humidistat and transmitter placement

Humidistat and transmitter locations are critical

Humidistat and humidity transmitter locations have a significant impact on humidifier performance. DRI-STEEM recommends that you do not interchange duct and room humidity devices. Room humidity devices are calibrated with zero or little airflow; whereas duct humidity devices require air passing across them. See the following recommendations and the locations in Figure 33-1.

A Ideal humidistat or humidity transmitter location. Placement here ensures the best uniform mix of dry and moist air with stable temperature control.

B Acceptable, but the room environment can affect controllability such as when the humidistat or transmitter is too close to air grilles, registers, or heat radiation from room lighting.

C Acceptable, because this location provides a uniform mixture of dry and moist air. If there is a time lag between humidity generation and sensing, extend the sampling time.

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

E Not acceptable, because these locations may not represent actual overall conditions in the space.

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

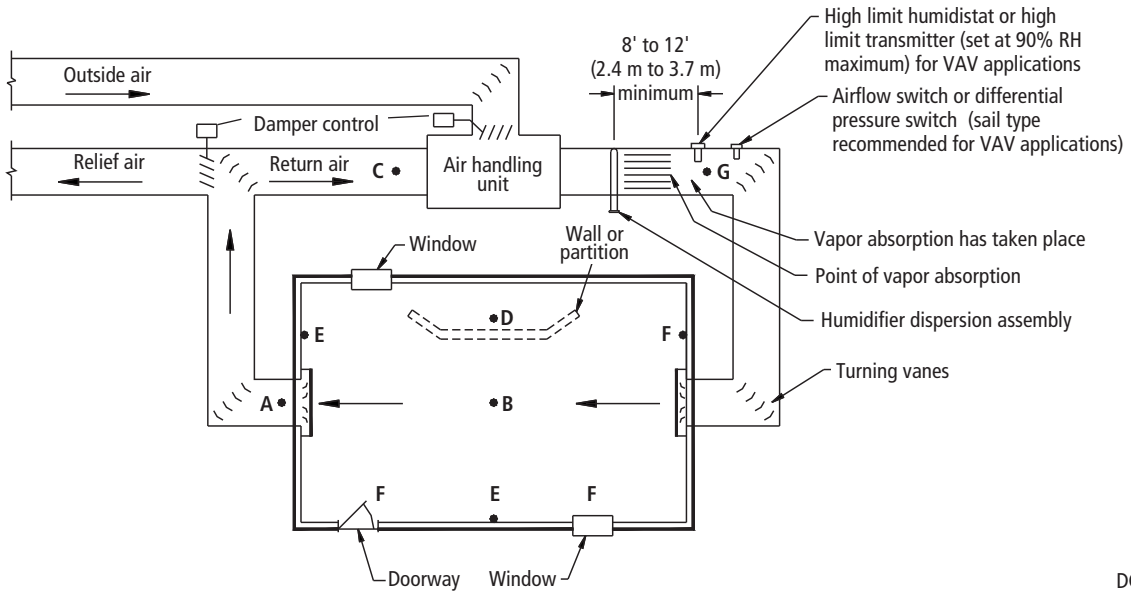
G Best sensing location for a high limit humidistat or humidity transmitter and airflow proving switch.

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 33-1:
Recommended humidistat and transmitter locations



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Dispersion: Selecting the dispersion assembly location

⚠ WARNING

Hot surface and steam hazard

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

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Important:

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

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

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

- For each dispersion device, DRI-STEEM documents distances required for non-wetting to occur. For more information about absorption non-wetting distances, see the non-wetting tables in this humidifier's product catalog, available for viewing, printing or ordering at www.dristeem.com.
- In general, the dispersion assembly is best placed where the air can absorb the moisture being added without causing condensation at or after the unit. This normally will be after the heating coil or where the air temperature is highest.
- Place the dispersion assembly such that absorption will occur
  - before the intake of a high efficiency filter, because the filter can remove the visible moisture and become waterlogged;
  - before coming in contact with any metal surface;
  - before fire or smoke detection devices;
  - before a split in the duct; otherwise, the dispersion assembly can direct more moisture into one duct than the other.
- When draining dispersion condensate to an open drain, provide a 1" (25 mm) air gap between the condensate drain piping and the drain. Locate the gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces.

mc_060210_0838

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 tubing/piping with an inside diameter smaller than the humidifier steam outlet. See note at right.

- See maximum steam carrying capacities in Table 36-1.
- If the humidifier must be located higher than the dispersion assembly, use the recommended installation shown in Figure 40-1.

Connecting to humidifier with steam hose

- Support steam hose to prevent sags, or low spots, and to maintain a minimum pitch of 2"/ft (15%) back to the humidifier.
- Use DRI-STEEM steam hose. Other manufacturers of steam hose may use unacceptable release agents or material mixes that can affect humidifier system performance adversely. Using hose from alternative manufacturers increases the possibility of tank foaming and accelerated aging. Foaming causes condensate discharge at the dispersion assembly.
- Do not use steam hose in outdoor applications.
- Do not insulate steam hose. Insulation causes accelerated heat aging, causing the steam hose to become hard and susceptible to failure due to cracks.
- For single tube applications, see hose kit sizes in Table 41-1.

Connecting to humidifier with tubing or pipe

- See Table 42-2 for interconnecting tubing and pipe pitch requirements for single tube and multiple tube applications. See Table 47-1 for interconnecting tubing and pipe pitch requirements for Rapid-sorb applications.
- Support interconnecting piping between the humidifier steam outlet and the dispersion system with pipe hangers. Failure to properly support the entire steam piping weight may cause damage to the humidifier tank and void the warranty.
- Steam supply adapters are available from DRI-STEEM. These adapters convert a tubing outlet on the humidifier to threaded pipe, allowing a pipe connection.
- 90° elbows are not recommended; use two 45° elbows, 1' (0.3 m) apart.
- Thin wall tubing heats up faster and causes less start-up loss than heavy wall pipe.
- Insulating hard pipe reduces the loss in output caused by condensation.
- When using hard pipe, take care to remove ALL traces of lubricants used to thread the pipe. This will minimize the possibility of tank foaming. Denatured alcohol or mineral spirits work best for removing lubricant.

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Important:

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

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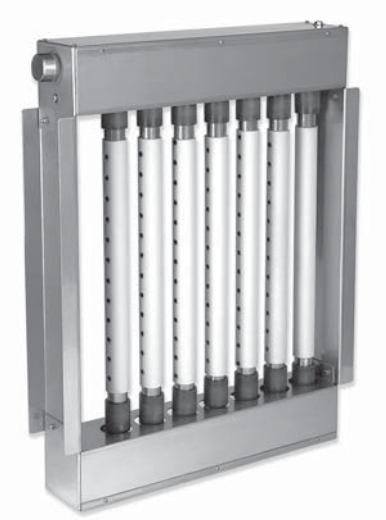
Figure 35-1:
Ultra-sorb with the High-efficiency Tube option



High-efficiency Tube option

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

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Dispersion: Interconnecting piping requirements

Table 36-1:
Maximum steam carrying capacity and length of interconnecting vapor hose, tubing, and pipe*

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

* Based on total maximum pressure drop in hose, tubing, or pipe of 5" wc (1244 Pa)
** Maximum recommended length for vapor hose is 10' (3 m). Longer distances can cause kinking or low spots.
*** To minimize loss of capacity and efficiency, insulate tubing and pipe.
† Developed length equals measured length plus 50% of measured length to account for pipe fittings.
†† Requires flange connection.
††† When using vapor hose, use DRI-STEEM vapor 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 vapor hose for outdoor applications.

Dispersion: Steam outlet connections

Figure 37-1:
Vapor hose connection

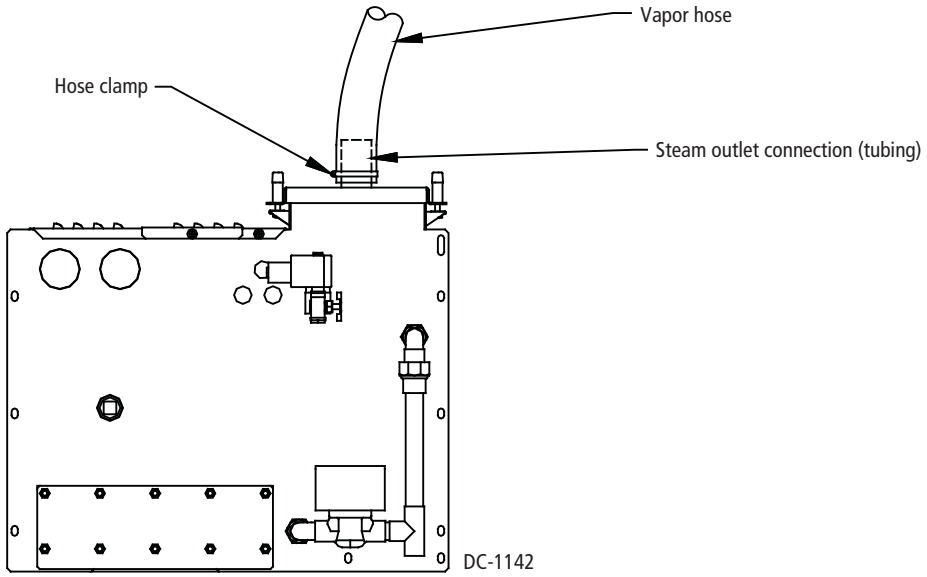

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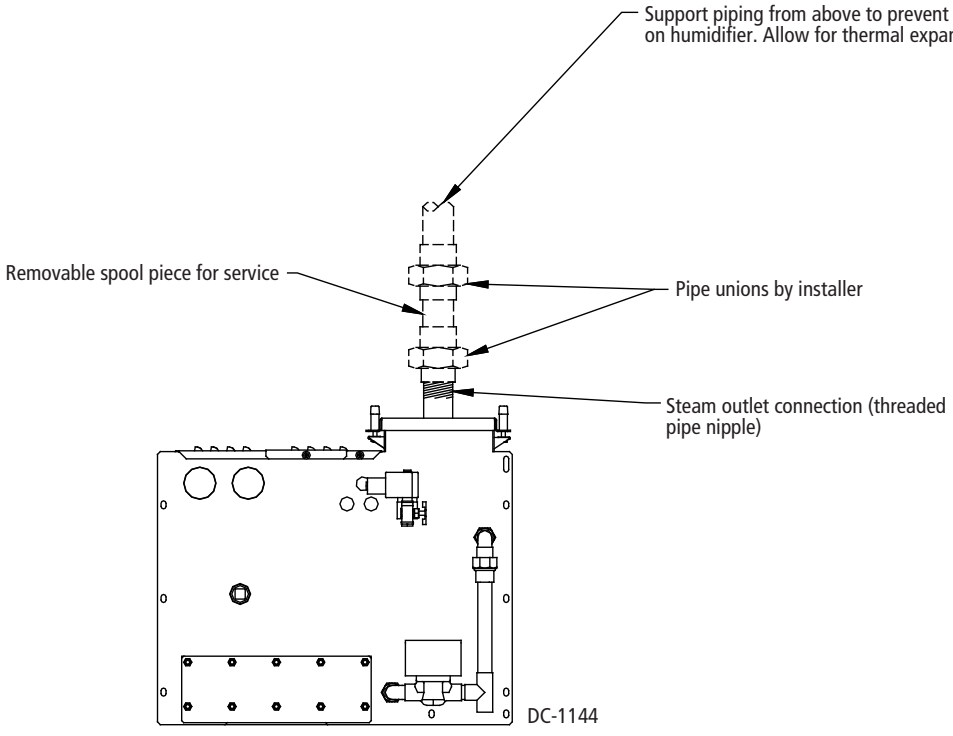
Figure 37-2:
Threaded pipe nipple connection



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Dispersion: Steam outlet connections

Figure 38-1:
Tubing or hard pipe connection using hose cuff with clamps

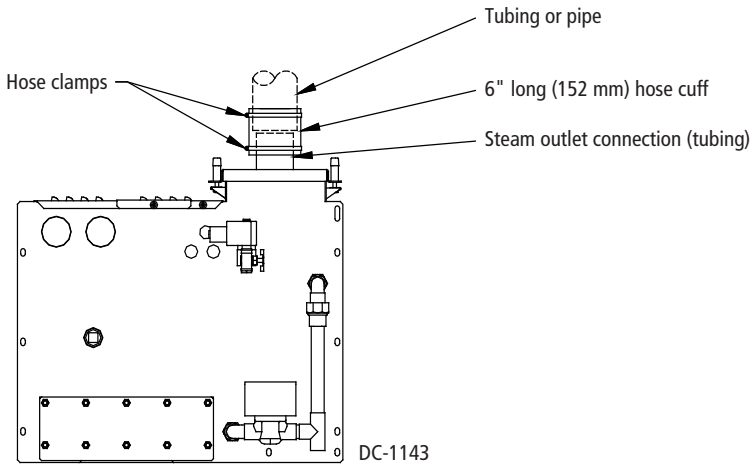

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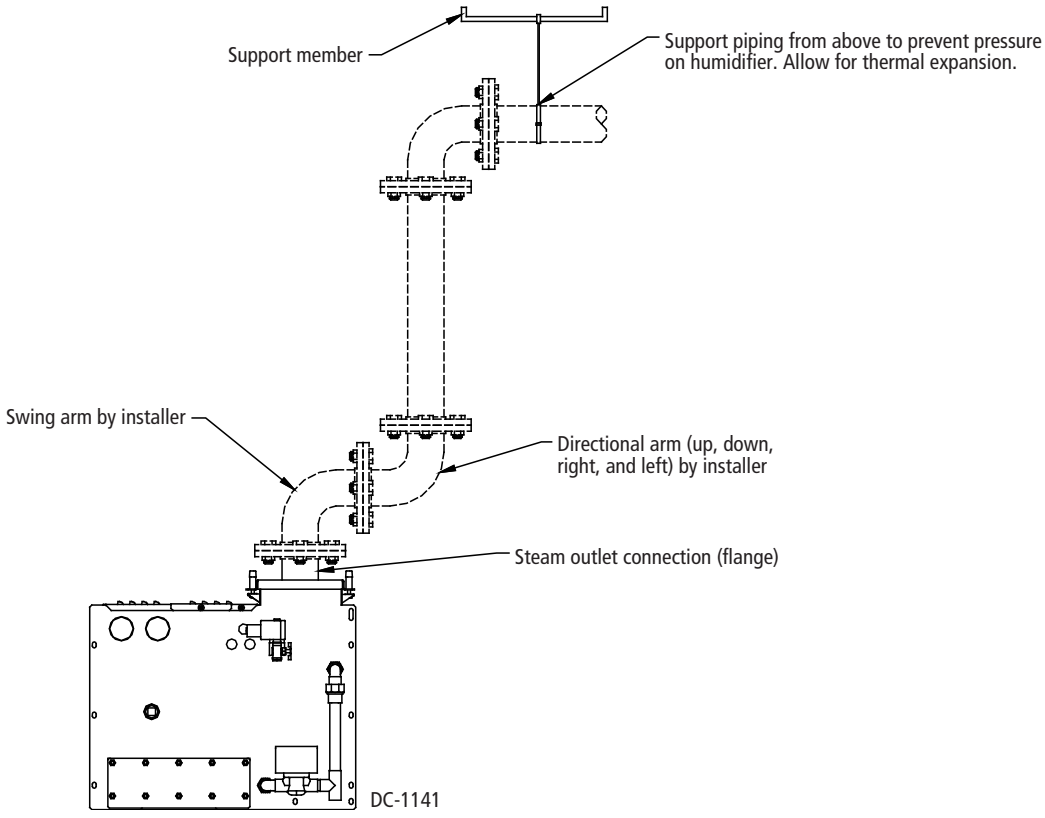
Figure 38-2:
Flange connection



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Dispersion: Drip tee installation

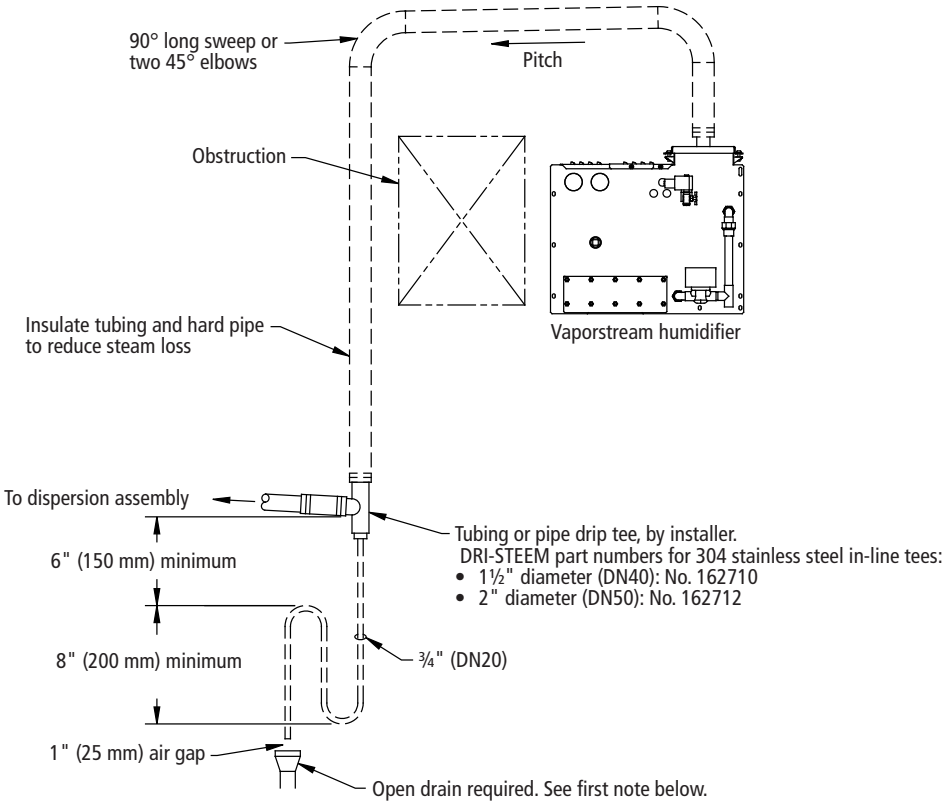
Install a drip tee as shown in Figure 40-1 when:

- Humidifier is mounted higher than the dispersion assembly,
- Interconnecting hose or piping must go over an obstruction, or
- Interconnecting piping runs are long.

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

Dispersion:
Drip tee installation

Figure 40-1:
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 vapor 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 41-1 for single tube applications.
- Orient dispersion tube(s) so that tubelets (steam orifices) point up.
- See Table 42-2 for dispersion tube pitch requirements.
- When mounting the humidifier above the level of the dispersion tube(s), see drip tee installation in Figure 40-1.

Condensate drain piping

- Minimum diameter (ID) for draining from one or two dispersion tubes: ¾" (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.

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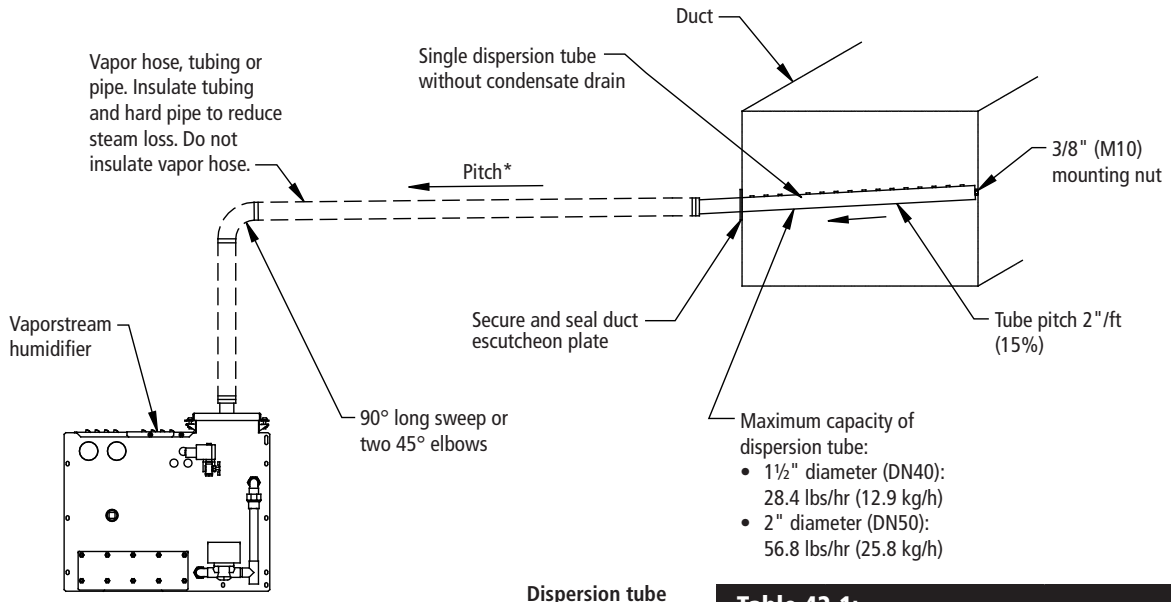
Table 41-1: Hose kit sizing by capacity

Maximum tube capacity		Hose kit (vapor hose, dispersion tube, and hardware)
lbs/hr	kg/h	
28.4	13	1½" (DN40) without drain
56.8	25.8	1½" (DN40) with drain
		2" (DN50) without drain
85.2	38.6	2" (DN50) with drain
> 85.2	>38.6	These models require multiple tube assemblies and cannot use a single hose kit.

Dispersion:
Single tube and multiple tube

Figure 42-1:
Single tube dispersion without condensate drain



Dashed lines indicate provided by installer

* Pitch vapor hose, tubing or pipe toward humidifier:
– 2"/ft (15%) when using vapor hose
– 1/8"/ft (1%) when using tubing or pipe

Dispersion tube escutcheon plate

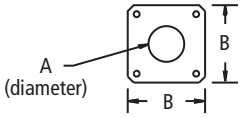


Table 42-1:
Dispersion tube escutcheon plate dimensions

	for 1½" tube		for 2" tube	
	inches	mm	inches	mm
A	1.51	38	2.03	52
B	3.25	83	5.00	127

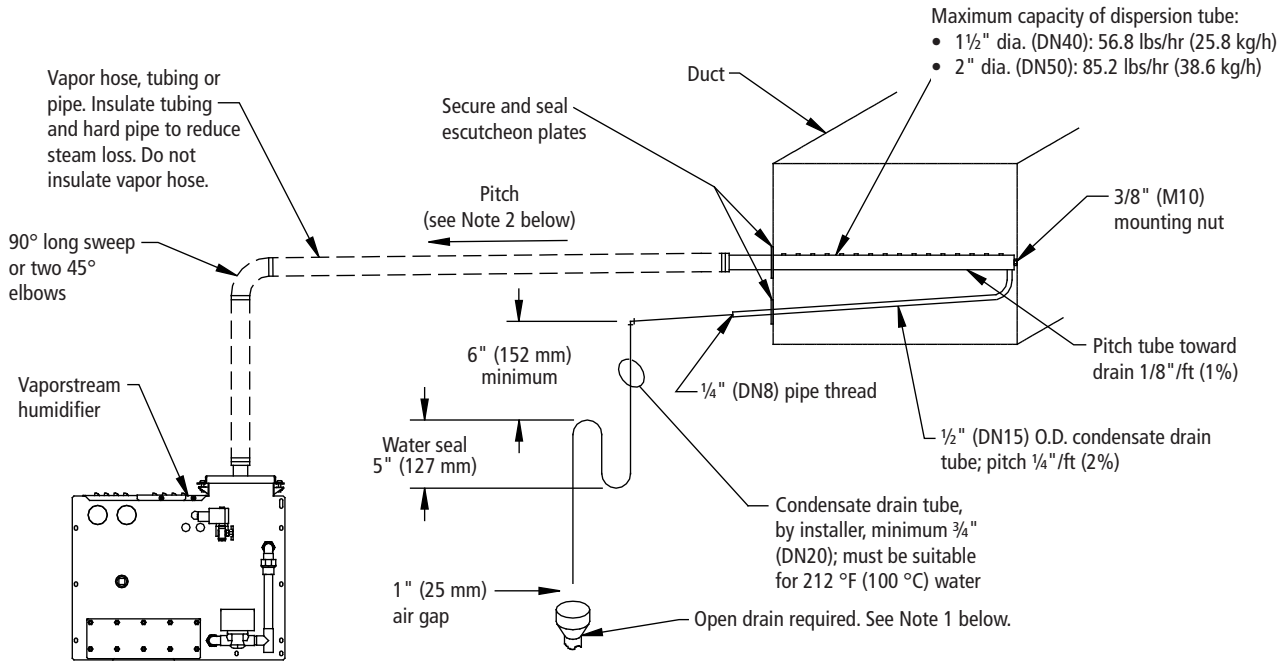
Table 42-2:
Pitch of dispersion tube(s) and interconnecting piping for Single-tube or multiple-tube evaporative dispersion units*

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	Vapor hose	1½" (DN40)	2"/ft (15%) toward humidifier	2"/ft (15%) toward humidifier	No drain
		2" (DN50)			
	Tubing or pipe	1½" (DN40)	1/8"/ft (1%) toward humidifier		
		2" (DN50)			
With drain	Vapor hose	1½" (DN40)	2"/ft (15%) toward humidifier	1/8"/ft (1%) toward condensate drain	¼"/ft (2%) toward floor drain or toward humidifier if humidifier is below dispersion unit
		2" (DN50)			
	Tubing or pipe	1½" (DN40)	½"/ft (5%) toward humidifier		
		2" (DN50)	¼"/ft (2%) toward humidifier		

* When piping over an obstruction, see the drip tee installation illustration on Page 40.

Dispersion:
Single tube and multiple tube

Figure 43-1:
Single tube dispersion with condensate wasted to floor drain



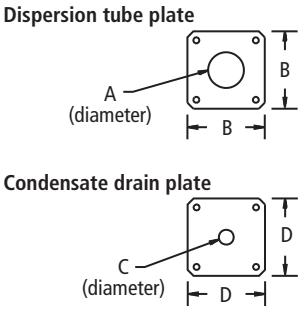
Notes:
1 Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam, or condensing on nearby surfaces my occur. Refer to governing codes for drain pipe size and maximum discharge water temperature.
2 Pitch vapor hose, tubing or pipe toward humidifier:
– 2"/ft (15%) when using vapor hose
– ½"/ft (5%) when using 1½" tubing or pipe
– ¼"/ft (2%) when using 2" tubing or pipe
3 Dashed lines indicate provided by installer

DC-1046a

Table 43-1:
Dispersion tube and condensate drain escutcheon plate dimensions

	for 1½" tube		for 2" tube	
	inches	mm	inches	mm
A	1.51	38	2.03	52
B	3.25	83	5.00	127
C	0.75	19	0.75	19
D	3.25	83	3.25	83

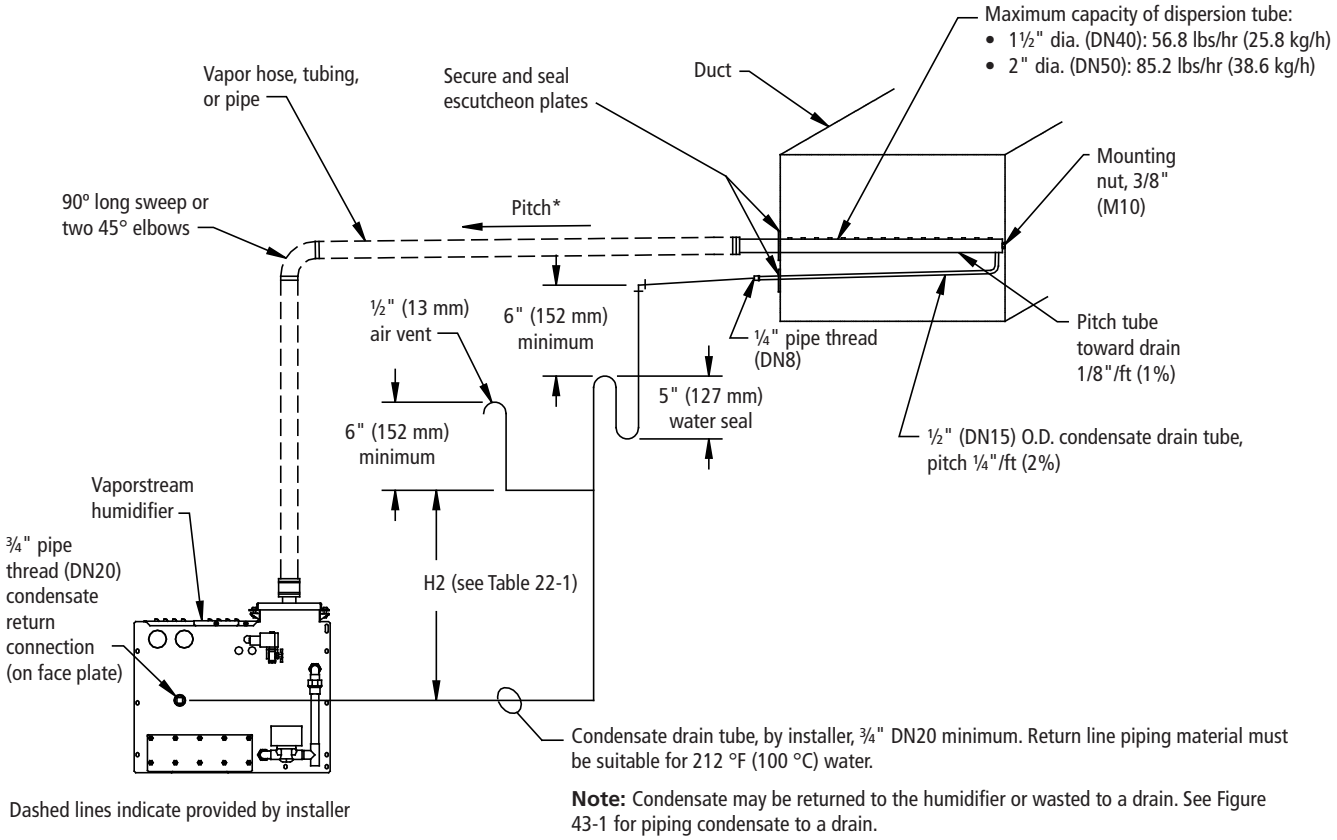
Figure 43-2:
Dispersion tube and condensate drain escutcheon plates



OM-351c

Dispersion:
Single tube and multiple tube

Figure 44-1:
Single tube with condensate returned to humidifier



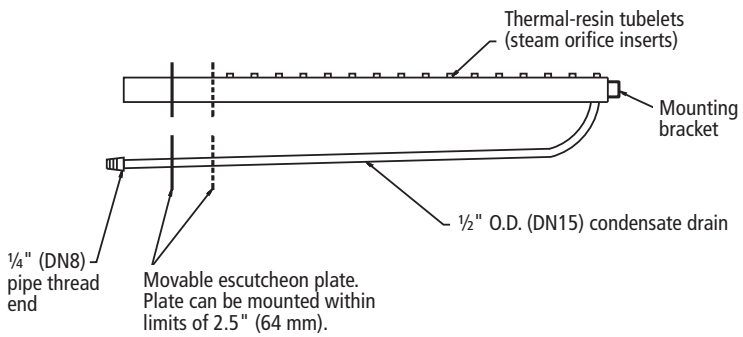
Note: Condensate may be returned to the humidifier or wasted to a drain. See Figure 43-1 for piping condensate to a drain.

Dashed lines indicate provided by installer

* Pitch vapor hose, tubing or pipe toward humidifier:
– 2"/ft (15%) when using vapor hose
– ½"/ft (5%) when using 1½" tubing or pipe
– ¼"/ft (2%) when using 2" tubing or pipe

DC-1046b

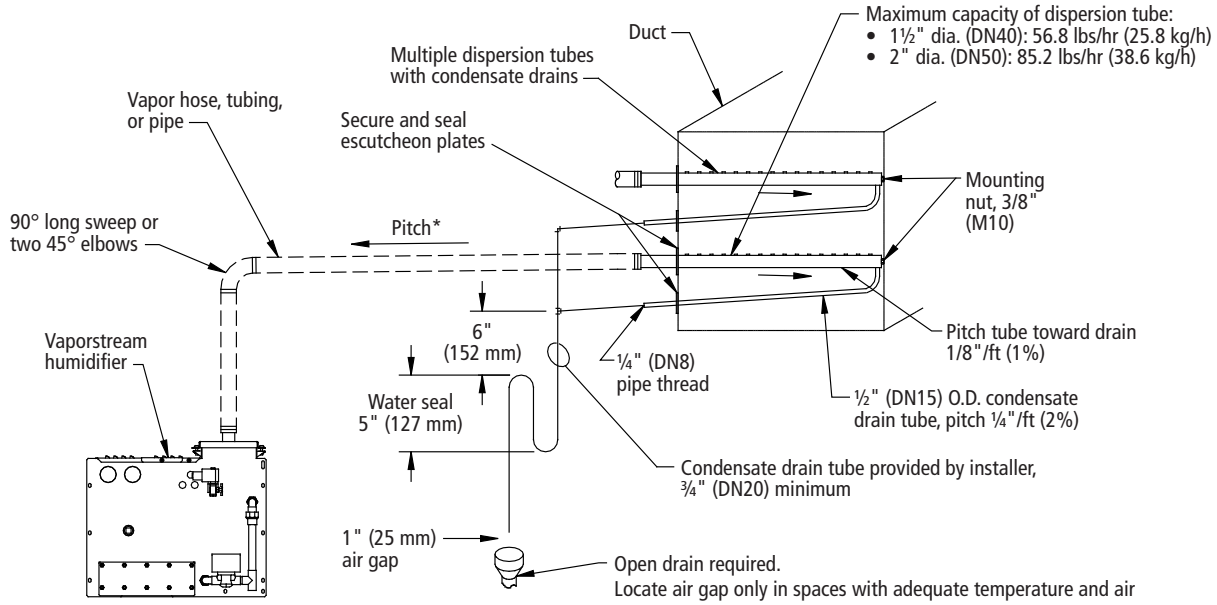
Figure 44-2:
Single tube dispersion with condensate drain



OM-351b

Dispersion:
Single tube and multiple tube

Figure 45-1:
Multiple tube with condensate wasted to floor drain



Dashed lines indicate provided by installer

* Pitch vapor hose, tubing or pipe toward humidifier:
– 2"/ft (15%) when using vapor hose
– ½"/ft (5%) when using 1½" tubing or pipe
– ¼"/ft (2%) when using 2" tubing or pipe

DC-1048a

Dispersion: Rapid-sorb

CAUTION

Operate Rapid-sorb within rated steam capacity

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

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

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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 47-1). The size, quantity, and location of penetrations are determined by the dimensions and configuration of the Rapid-sorb assembly you received.

mc_060210_0937

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

- Unpack shipment and verify receipt of all Rapid-sorb components with packing list. Report any shortages to DRI-STEEM immediately. The components typically include the following:
  - Multiple dispersion tubes
  - Header
  - ¾" × 2" (19 mm × 51 mm) L-bracket

    Note: Dispersion tubes, header, and L-bracket are each tagged with the customer requested identification number.
  - A single duct escutcheon plate the size of the header
  - Slip couplings or hose cuffs and clamps
  - Accessories such as duct plates, slip couplings, or hose cuffs
  - Bolts and washers for mounting the dispersion tubes to the bracket
- L-bracket mounting holes (see note at left):
  - L-bracket 50" (1270 mm) long or shorter has a mounting hole 4" (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 Dri-calc Installation Guides library or contact your representative/distributor or DRI-STEEM for installation instructions for air handler or vertical airflow applications.

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Dispersion: Rapid-sorb

Pitch requirements

- For Rapid-sorb with the header outside a horizontal-airflow duct, consider the following:
  - 1½" (DN40) dispersion tubes: Use a fastener of sufficient length to accommodate the 1/8"/ft (1%) pitch requirements toward the ¾" pipe thread (DN20) header drain fitting.
  - 2" (DN50) dispersion tubes: The bracket can be mounted flush to the ductwork. The 1/8"/ft (1%) pitch typically can be accomplished in the length of the hose cuffs used to connect the tubes to the header.
- See Table 47-1 and the drawings on the following pages for pitch requirements.

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Table 47-2:
Rapid-sorb dispersion tube capacities

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

mc_060210_0935

Table 47-3:
Rapid-sorb header capacities

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

mc_060210_0936

Table 47-1:
Pitch of interconnecting piping, dispersion tubes, and headers for Rapid-sorb evaporative dispersion units

Airflow	Type of interconnecting piping	Diameter of interconnecting piping	Pitch of interconnecting piping	Pitch of dispersion tubes	Pitch of header
Horizontal	Steam hose	1½" (DN40), 2" (DN50)	2"/ft (15%) toward Rapid-sorb	Vertically plumb	1/8"/ft (1%) toward condensate drain
	Tubing or pipe	1½" (DN40), 2" (DN50), 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 or pipe	1½" (DN40), 2" (DN50), 3" (DN80), 4" (DN100), 5" (DN125), 6" (DN150)	1/8"/ft (1%) toward Rapid-sorb		

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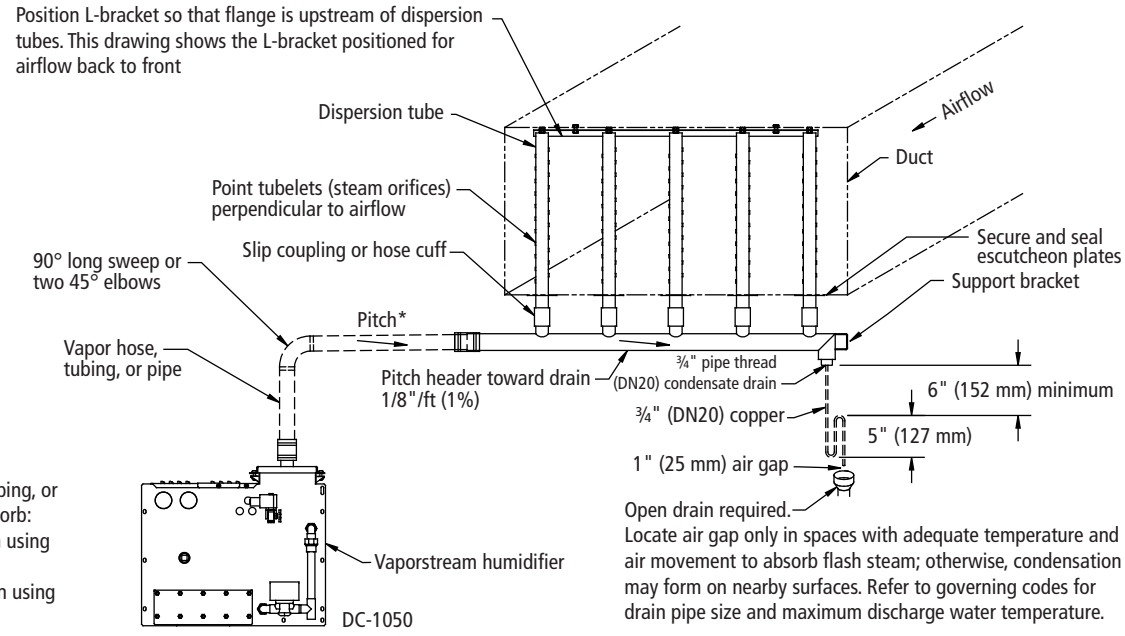
Dispersion: Rapid-sorb

Figure 48-1:
Rapid-sorb in a horizontal airflow with header outside duct



Header outside of duct, horizontal airflow

1. Mark and cut holes in the ductwork for the dispersion tubes. Use the L-bracket as a template to mark the holes on the duct floor.
2. Temporarily, loosely suspend or support the header below the final location. Vertical balance point of the dispersion tube length dictates where the header should be suspended or temporarily supported.
3. Mount the dispersion tubes to the header with the slip coupling or hose cuff (provided).
   - When installing slip couplings for 1½" (DN40) dispersion tubes, take care not to shear the O-rings.
   - Set the slip coupling on the header stub or dispersion tube so the O-ring is resting on the face of the tubing.
   - Rotate the slip coupling as you push it onto the tubing.
   - The O-rings are lubricated at the factory. If additional lubrication is necessary, DO NOT use a petroleum-based lubricant.

Dispersion: Rapid-sorb

4. Position the flange of the L-bracket so it is upstream of the tubes when the assembly is raised and fastened into position. Fasten the L-bracket to the end of the dispersion tubes with the provided bolt, lock washer, and flat washer.
5. Before tightening the L-bracket bolts to the dispersion tubes:
   - For 1½" (DN40) dispersion tubes:
     - Dispersion tube will rotate in slip coupling. Verify that dispersion tube orifices are directed perpendicular to airflow.
     - Dispersion tube and slip coupling must be fully engaged on header stub for O-rings to provide a seal.
   - For 2" (DN50) dispersion tubes:
     Before securing hose cuff in place with hose clamps on dispersion tube and the header stub, verify that dispersion tube orifices are directed perpendicular to airflow.
6. Slide the assembly up until the L-bracket aligns with the mounting holes in the duct.
   - For 1½" (DN40) dispersion tubes:
     - Header pitch is duplicated in the L-bracket.
     - Dispersion tube and slip coupling must be fully engaged on header stub for O-rings to provide a seal.
     - High end of L-bracket can be fastened tight to duct or air handler.
     - Fastener on low end of L-bracket must be long enough to compensate for pitch. Use a nut on both sides of L-bracket and duct or air handler for stability.
   - For 2" (DN50) dispersion tubes:
     - Fasten bracket to top of duct and use hose cuffs to compensate for header pitch.
     - Before securing hose cuffs with hose clamps on dispersion tube and header stub, verify that header pitch, 1/8"/ft (1%) toward drain, is maintained.
7. Permanently secure both ends of header, and verify that header pitch, 1/8"/ft (1%) toward drain, is maintained.
8. Verify that all fasteners are secure:
   - L-bracket to duct
   - Dispersion tubes to L-bracket
   - Hose clamps on 2" (DN50) tubes
9. Secure and seal the dispersion tube escutcheon plate and condensate drain tube escutcheon plate around the respective tubes, if applicable.

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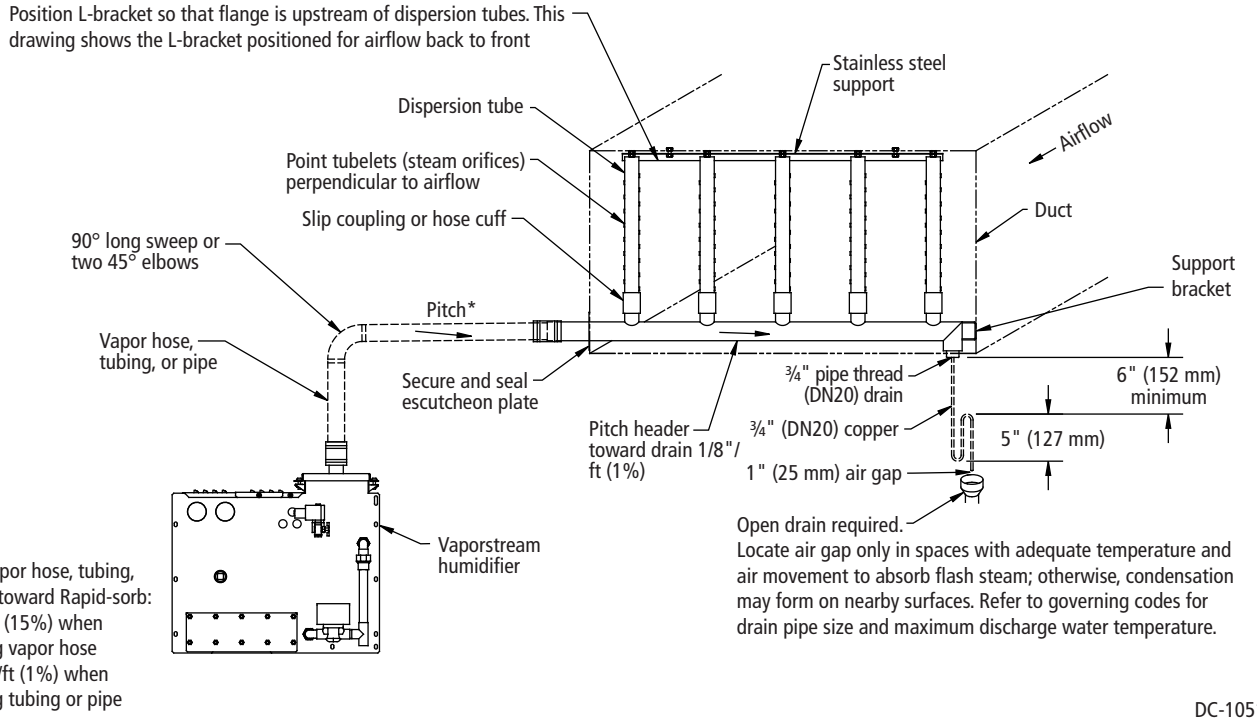
Note:

See Page 52 for steam supply and condensate drain line connection instructions.

Dispersion: Rapid-sorb

Figure 50-1:
Rapid-sorb in a horizontal airflow with header inside the duct



Header inside of duct, horizontal airflow

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

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

Dispersion: Rapid-sorb

4. Mount the dispersion tubes on the header with the slip couplings or hose cuffs:
   - When installing slip couplings for 1½" (DN40) dispersion tubes, take care not to shear O-rings.
   - Set slip coupling on header stub or dispersion tube so O-ring is resting on face of tubing.
   - Rotate slip coupling while pushing it onto the tubing.
   - O-rings are lubricated at factory. If additional lubrication is necessary, DO NOT use petroleum-based lubricant.
5. Allow the dispersion tubes to rest against the bottom of the duct.
6. Position the flange of the L-bracket so it is upstream of the tubes when the assembly is rotated into position. Fasten the L-bracket to the end of the dispersion tubes with the provided bolt, lock washer, and flat washer.
7. Rotate the assembly up until the L-bracket aligns with the mounting holes in the duct or air handler.
   - For 1½" (DN40) dispersion tubes:
     - Header pitch is duplicated in the L-bracket.
     - Dispersion tube and slip coupling must be fully engaged on header stub for O-rings to provide a seal.
     - High end of L-bracket can be fastened tight to duct or air handler.
     - Fastener on low end of L-bracket must be long enough to compensate for pitch. Use a nut on both sides of L-bracket and duct or air handler for stability.
   - 2" (DN50) dispersion tubes
     - Fasten bracket to top of duct and use hose cuffs to compensate for header pitch.
     - Before securing hose cuffs with hose clamps on dispersion tube and header stub, verify that dispersion tube orifices are directed perpendicular to airflow.
8. Verify that all fasteners are secure:
   - L-bracket to duct
   - Dispersion tubes to L-bracket
   - Hose clamps on 2" (DN50) tubes
   - Header support bracket fastener
9. Secure and seal the header escutcheon plate around the header.

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Note:

See Page 52 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 provided. Typically, the multiple steam supply connector attaches to the Rapid-sorb header supply end with hose cuff and clamps:

1. Route the necessary number of steam supplies from the 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 ¾" I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.

The condensate drain line must be piped as shown in Figures 48-1 and 50-1. 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.

mc_060210_1300-NA

Dispersion: SDU-I and SDU-E

Choosing a location for SDU-I and SDU-E

- When used with a Vaporstream, the SDU can be located a minimum of 18" (457 mm) above a Vaporstream humidifier, or remotely from the humidifier (see interconnecting piping requirements in Table 36-1 for maximum distance).
- Allow 6" (152 mm) clearance on each side of SDU.

Mounting SDU-I and SDU-E

SDU-I and SDU-E units can be mounted on a wall remotely from the Vaporstream humidifier.

- Installation must comply with governing codes.
- See interconnecting piping requirements in Table 36-1, and the drip tee installation instructions on Page 40.
- Provide at least 6" (150 mm) clearance on each side of the SDU.
- Field wiring is required to connect the SDU fan and airflow proving switch terminals to the humidifier electrical panel terminals. Refer to the external connections diagram in the package shipped with the unit.
- For wall mounting, use the mounting template on the box for correct placement. Two 3/8" lag bolts (M10 × 50 mm coach screws) are provided with each fan unit.
- When mounting on a stud wall (studs 16" [406 mm] on center), locate studs and position lag bolts (coach screws) in place so that each of the two lag bolts (coach screws) centers on a stud. Mark hole locations and predrill ¼" (6 mm) diameter pilot holes for a 3/8" × 2" lag bolt (M10 × 50 mm coach screw).
- For hollow block or poured concrete wall mounting, position template in place and mark the holes. Drill appropriate pilot hole for two 3/8" (M10) toggle bolts or two 3/8" (M10) machine bolt lead anchors (expansion bolts). Secure SDU frame in place.
- To provide power to the SDU, run a neutral line with 208V/240V/single-phase and 208V/three-phase power supply lines to provide a 120V circuit for the fan. With all other power supply voltages (other than 120V), provide a separate 120V circuit for the fan, or order from DRI-STEEM a transformer installed in the control cabinet.
- The fan and airflow proving switch terminals are labeled in the humidifier and in the SDU. Minimum wire size for field wiring is 18-gauge (1.5 mm2) stranded wire.

SDU-I: Instant, internal absorption

SDU-I (Space Distribution Unit Internal Absorption) disperses humidity with no visible vapor trail or wetness, making it ideal for use in finished spaces. The SDU-I fan mixes room air and steam to ensure complete absorption before discharge as humidified air.

Important: For visible vapor to be absorbed completely within the SDU-I unit before being discharged as humidified air, room air must be 45% RH or less. Trying to maintain greater than 45% RH will cause visible vapor and potential for moisture collection on the discharge grille.

SDU-E: Higher capacity

SDU-E (Space Distribution Unit External Absorption) is designed for higher capacity dispersion. SDU-E requires an installed condensate drain line and water seal, provided by installer.

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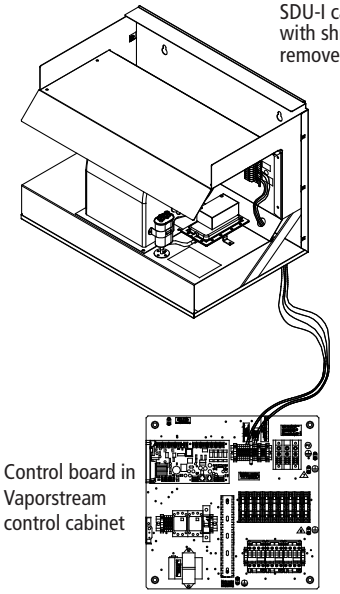
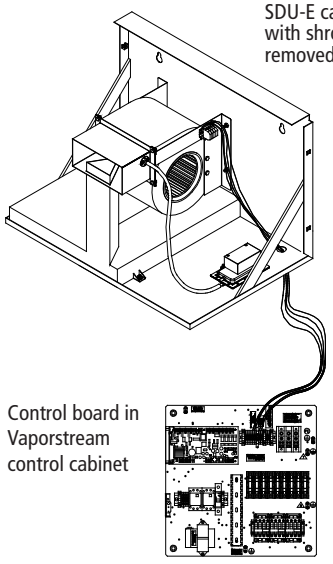
Dispersion: SDU-I and SDU-E

Figure 54-3: SDU-I field wiring



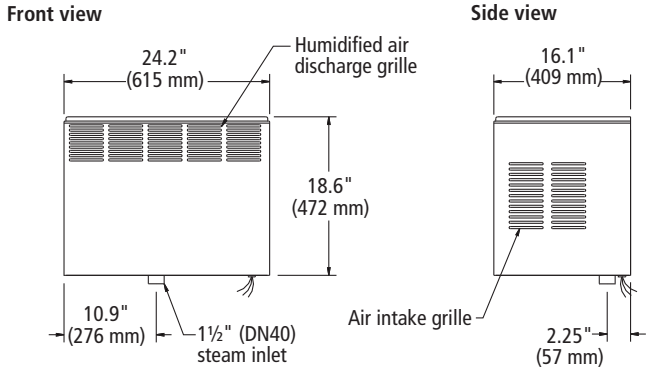
VLC-OM-032

Figure 54-4: SDU-E field wiring



VLC-OM-024

Figure 54-1: SDU-I mechanical detail



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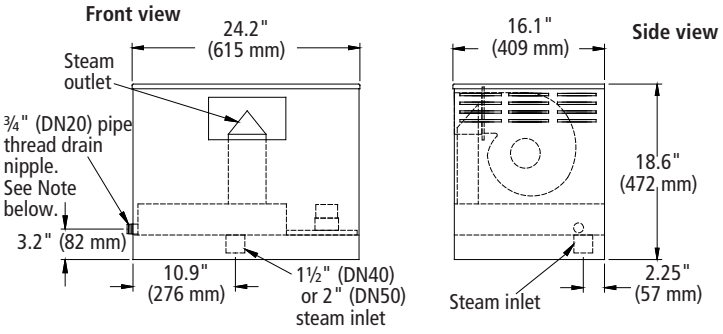
DC-1076

Figure 54-2: SDU-E mechanical detail



Note: SDU-E requires a condensate drain line and water seal, provided by installer. See Figure 55-2.

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DC-1078

Table 54-1: SDU specifications

SDU model	Maximum capacity		Shipping weight		Amps at 120V (50/60 Hz)	Horse-power	cfm	m^3/s	dB*
	lbs/hr	kg/h	lbs	kg					
SDU-I	30	13.6	68	31	3.20	1/5	760	0.36	58
SDU-E	102	46.3	61	28	2.07	1/8	545	0.26	64

* Measurement taken 6.5' (2 m) in front of SDU cabinet.

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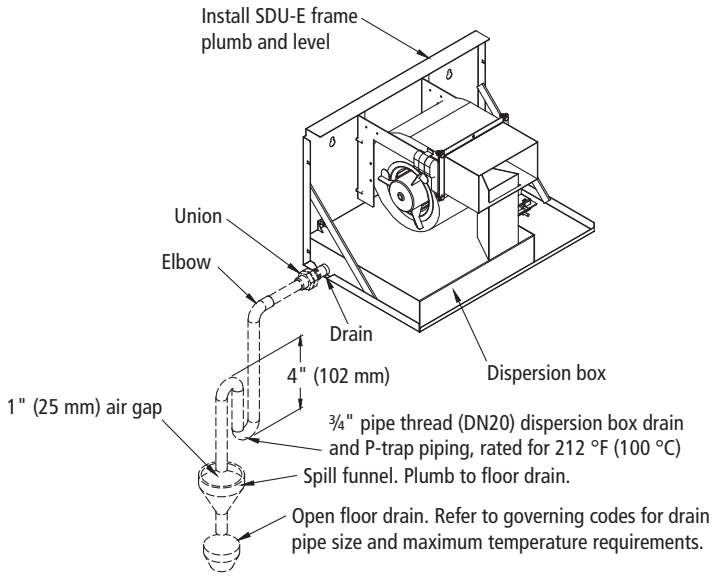
Dispersion: SDU-E

Mounting SDU-E

- The SDU-E unit requires an installed condensate drain line and water seal (provided by installer). See Figure 55-1 and instructions at right.
- Spread dimensions greater than 3' (1 m) may require additional clearance (see Table 56-1).

Figure 55-1: SDU-E drain line piping



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SDU-E condensate drain connection

1. Piping must be minimum ¾" I.D. (DN20) and rated for 212 °F (100 °C) minimum continuous operating temperature.
2. Drain line must be piped as shown in Figure 55-2. Provide a 6" (152 mm) drop prior to a 4" (102 mm) water seal to ensure condensate drainage from the SDU-E, and to keep steam from blowing out of the drain line.
3. 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 degree 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.
4. All drain lines must be installed and sized according to governing codes.
5. The drain line should have a union installed directly on the dispersion box ¾" nipple to accommodate future removal of the SDU-E shroud.
6. A drain line and water seal must be connected to the SDU-E fan unit dispersion box ¾" nipple. **If the condensate is not drained from the dispersion box, standing water will accumulate. See Warning below.**
7. The dispersion box is constructed with a pitch toward the drain; however, the SDU-E frame must be installed plumb and level for the dispersion box to drain properly.

mc_052610_1720

⚠ WARNING

Hazards of standing water in SDU-E

If standing water is allowed to accumulate in the dispersion box, it can:

- Cause bacteria and mold growth, which can cause illness.
- Affect SDU-E fan unit performance.
- Cause 212 °F (100 °C) water to discharge from the SDU-E fan unit, which can cause severe personal injury.

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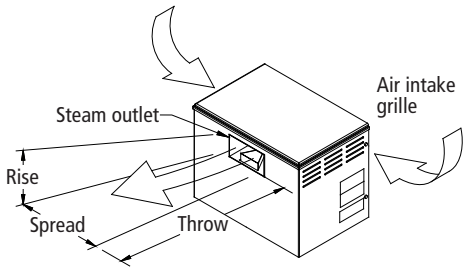
Dispersion: SDU-E

Figure 56-1:
SDU-E rise, spread, and throw



mc_042710_1435 DC-1027

SDU-E rise, spread, and throw

As steam is discharged from the SDU-E, it quickly cools and turns to a visible fog that is lighter than air. As this fog is carried away from the SDU-E by the airstream, it tends to rise toward the ceiling. If this fog contacts solid surfaces (columns, beams, ceiling, pipes, etc.) before it disappears, it could collect and drip as water. The greater the space relative humidity, the more the fog will rise, throw and spread.

Table 56-1 lists the minimum rise, throw and spread non-wetting distances for SDU-E at 40%, 50% and 60% RH in the space. Surfaces cooler than ambient temperature, or objects located within this minimum dimension, can cause condensation and dripping. To avoid steam impingement on surrounding areas, observe the minimum non-wetting distances in Table 56-1.

The SDU-E contains a blower (120 V, single-phase, 60 Hz) and an airflow proving switch (field-wired to the humidifier electrical panel). A wiring diagram of the SDU-E is included with the unit.

On a call for humidity, the humidifier begins producing steam, and the start relay energizes the SDU-E blower. When the call for humidity is satisfied, the Vapor-logic4 controller keeps the blower running to disperse residual moisture using a time delay.

mc_042710_1255

Table 56-1:
SDU-E minimum nonwetting distances

kW	Maximum steam capacity		40% RH @ 70 °F (21 °C)						50% RH @ 70 °F (21 °C)						60% RH @ 70 °F (21 °C)					
			Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
	lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
2	6	2.7	1.0	0.3	1.0	0.3	5.0	1.5	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
4	12	5.4	1.0	0.3	1.0	0.3	5.0	1.5	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
6	18	8.2	1.0	0.3	1.0	0.3	5.0	1.5	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
8	24	10.9	1.0	0.3	1.0	0.3	5.5	1.7	1.5	0.5	1.5	0.5	6.5	2.0	2.5	0.8	2.5	0.8	7.5	2.3
10	30	13.6	1.5	0.5	1.5	0.5	6.0	1.8	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	8.0	2.5
12	36	16.3	1.5	0.5	1.5	0.5	6.0	1.8	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	8.0	2.5
14	42	19.1	2.0	0.6	2.0	0.6	7.0	2.1	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	9.0	2.7
16	48	21.8	2.0	0.6	2.0	0.6	7.0	2.1	2.0	0.6	2.0	0.6	7.0	2.1	3.0	1.0	3.0	1.0	9.0	2.7
21	63	28.6	2.0	0.6	2.0	0.6	7.5	2.3	2.5	0.8	2.5	0.8	10.0	3.0	3.0	1.0	3.0	1.0	12.0	3.7
25	75	34.0	2.0	0.6	2.0	0.6	8.0	2.5	2.5	0.8	2.5	0.8	10.5	3.2	3.5	1.1	3.5	1.1	12.5	3.8
30	90	40.9	2.0	0.6	2.0	0.6	8.0	2.5	2.5	0.8	2.5	0.8	10.5	3.2	3.5	1.1	3.5	1.1	12.5	3.8
34	102	46.3	2.0	0.6	2.0	0.6	8.0	2.5	2.5	0.8	2.5	0.8	10.5	3.2	3.5	1.1	3.5	1.1	12.5	3.8

Notes:
- Surfaces or objects directly in the path of vapor discharge may cause condensation and dripping.
- To avoid steam impingement on surrounding areas, observe the minimum nonwetting dimensions in this table.
- Rise: The minimum nonwetting height above the steam outlet of the SDU-E.
- Spread: The minimum nonwetting width from the steam outlet of the SDU-E.
- Throw: The minimum nonwetting horizontal distance from the steam outlet of the SDU-E.

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Dispersion: Area-type fan

Table 58-1 lists the Area-type steam minimum rise, spread, and throw nonwetting dimensions. Surfaces or objects located within this minimum dimension can cause condensation and dripping.

The greater the space relative humidity, the higher and farther the discharged steam will carry and rise in the space until becoming absorbed.

The Area-type fan and brackets are shipped separately and field-installed on the humidifier. After mounting the fan, terminate the wires as specified on the wiring diagram.

To provide power to the Area-type fan, run a neutral line with 208V/240V/single-phase and 208V/three-phase power supply lines to provide a 120V circuit for the fan. With all other power supply voltages (other than 120V), provide a separate 120V circuit for the fan, or order from DRI-STEEM a transformer installed in the control cabinet.

Dispersion: Area-type fan

Table 58-1:
Area-type (evaporative steam) minimum non-wetting distances*

Maximum steam capacity		60 °F (16 °C)																	
		30% RH						40% RH						50% RH					
		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
50	20	1.0	0.3	2.0	0.6	6.0	1.8	1.0	0.3	2.0	0.6	6.0	1.8	1.0	0.3	2.5	0.8	6.0	1.8
75	34	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	4.0	1.2	8.0	2.4
100	45	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	5.0	1.5	10.0	3.1
150	68	6.0	1.8	5.0	1.5	12.0	3.7	6.0	1.8	5.0	1.5	12.0	3.7	6.0	1.8	5.0	1.5	12.0	3.7
200	90	7.0	2.1	7.0	2.1	13.0	4.0	8.0	2.4	7.0	2.1	14.0	4.3	8.0	2.4	7.0	2.1	14.0	4.3
225	102	7.0	2.1	7.0	2.1	13.0	4.0	8.0	2.4	7.0	2.1	14.0	4.3	8.0	2.4	7.0	2.1	14.0	4.3
250	110	8.0	2.4	8.0	2.4	15.0	4.6	9.0	2.7	9.0	2.7	16.0	4.9	9.0	2.7	9.0	2.7	16.0	4.9
285	130	9.0	2.7	9.0	2.7	17.0	5.2	10.0	3.1	10.0	3.1	18.0	5.5	10.0	3.1	10.0	3.1	18.0	5.5
300	136	9.0	2.7	9.0	2.7	17.0	5.2	10.0	3.1	10.0	3.1	18.0	5.5	10.0	3.1	10.0	3.1	18.0	5.5
Maximum steam capacity		**70 °F (16 °C)**																	
		30% RH						**40% RH**						**50% RH**					
		Rise		**Spread**		**Throw**		**Rise**		**Spread**		**Throw**		**Rise**		**Spread**		**Throw**	
lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
50	20	1.0	0.3	1.5	0.5	4.0	1.2	1.0	0.3	2.0	0.6	4.0	1.2	1.0	0.3	2.0	0.6	4.0	1.2
75	34	2.0	0.6	2.0	0.6	6.0	1.8	2.0	0.6	2.5	0.8	6.0	1.8	2.0	0.6	2.5	0.8	6.0	1.8
100	45	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4	3.0	0.9	3.0	0.9	8.0	2.4
150	68	4.0	1.2	4.0	1.2	10.0	3.1	4.0	1.2	4.0	1.2	11.0	3.4	4.0	1.2	4.0	1.2	11.0	3.4
200	90	5.0	1.5	5.0	1.5	11.0	3.4	5.0	1.5	5.0	1.5	12.0	3.7	5.0	1.5	5.0	1.5	12.0	3.7
225	102	5.0	1.5	5.0	1.5	11.0	3.4	5.0	1.5	5.0	1.5	12.0	3.7	5.0	1.5	5.0	1.5	12.0	3.7
250	110	6.0	1.8	6.0	1.8	12.0	3.7	6.0	1.8	6.0	1.8	13.0	4.0	6.0	1.8	6.0	1.8	14.0	4.3
285	130	7.0	2.1	7.0	2.1	14.0	4.3	7.0	2.1	7.0	2.1	15.0	4.6	7.0	2.1	7.0	2.1	16.0	4.9
300	136	7.0	2.1	7.0	2.1	14.0	4.3	7.0	2.1	7.0	2.1	15.0	4.6	7.0	2.1	7.0	2.1	16.0	4.9

* With fan on high speed

Table 58-2:
Area-type electric fan specifications*

Motor	120 V, 50/60 Hz
Blade diameter	18" (457 mm)
Speeds	3
Control	Rotary switch
cfm (high speed)	3190
m^3/s (high speed)	1.51
rpm (high speed)	1500
Amps (high speed)	1.52

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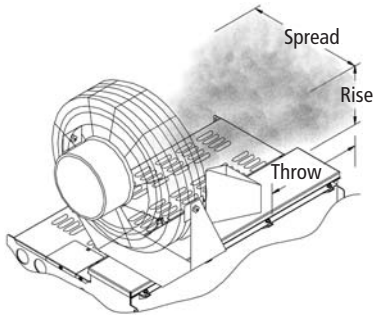
Figure 58-1:
Area-type rise, spread, throw



Spread: Minimum non-wetting width from the steam chute

Rise: Minimum non-wetting height above the steam chute

Throw: Minimum non-wetting horizontal distance from the steam chute

VLC-OM-020

Start-up procedure

After the system is installed and connected properly:

1. Verify that the Vaporstream humidifier, controls, piping, electrical connections, steam supply, and dispersion unit(s) are installed according to the following:
   - Installation instructions in this manual
   - *Vapor-logic4 Installation and Operation Manual*
     - Installation section
     - Pre-installation checklist
   - Ladder style wiring diagram (inside control cabinet)
   - External connections wiring diagram (inside control cabinet)
   - Heater connections wiring diagrams (inside heater terminal cover)
   - All governing codes
2. Verify that electrical connections in the control cabinet and at the humidifier are secure before applying power. See "Electrical connection torque requirements" on Page 29.
3. Make sure all electrical covers are in place and secure. See Warning at right.
4. Verify that the humidifier is mounted level and securely supported before filling with water. See operating weights in Table 6-1.
5. Verify that the humidifier is level front to back and side to side after it is full of water.
6. Read the "Operation" section of the *Vapor-logic4 Installation and Operation Manual.*

   Note: During start-up, do not leave the humidifier unattended.
7. Perform all applicable "Start-up checklist" items. See Page 60.
8. Monitor humidifier operation through multiple fill cycles. The humidifier operating status appears on the keypad/display.
9. 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-logic4 Installation and Operation Manual).*

   At start-up, DRI-STEEM recommends initially running the humidifier with the factory default setting for skim time. See "Maintenance," beginning on Page 61.

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CAUTION

Damage from dry startup

In the event the humidifier tank does not contain water and the heaters are energized, turn main power off. Operation of the heaters without water will cause damage to the humidifier. Before turning main power on, verify that all wiring has been completed per the wiring instructions in this manual and the unit wiring diagrams.

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⚠ WARNING

Electric shock hazard

Only qualified electrical personnel should perform start-up procedure.

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

Make sure that all electrical covers are in place and secure before turning on electrical power. These include the following:

- Heater terminal cover on tank
- Control cabinet door

The *Vapor-logic4 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

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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-logic4 controller's expected input signal. Input signals are listed in the Vapor-logic4 Setup menu. See “Installation Step 2: Setup” in the *Vapor-logic4 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-logic4 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.
- ☐ Make sure the tank has filled with water. See the “Damage from dry startup” Caution on Page 59.
- ☐ 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 heater outputs are activated.
- ☐ Check the amp draw of the heaters. Refer to the humidifier wiring diagram for the proper rating.
- ☐ If you experience difficulties, have the keypad/display information available along with the serial number and humidifier Model, and call DRI-STEEM Technical Support at 800-328-4447.

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Tap/softened water

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-logic4 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. DRI-STEEM recommends that the user observe and adjust the skim duration to achieve a balance between reducing mineral buildup and conserving heated water.

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⚠ WARNING

Electric shock hazard

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

When performing maintenance on the humidifier:

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

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⚠ WARNING

Hot 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 DRI-STEEM Drane-kooler™.

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Tap/softened water

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 DRI-STEEM 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.

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Troubleshooting

The *Vapor-logic4 Installation and Operation Manual,* which was shipped with your humidifier, is a comprehensive operation manual. Refer to it for troubleshooting information.

Cool down humidifier

Before performing any maintenance, allow the tank to cool down. 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.
- Verify that there is no call for humidity and that the aquastat set point (adjusted using the keypad/display Setup screens) is less than room temperature (default setting is 40 °F [4 °C]) so that the heaters do not energize while cooling down the tank.
- Models with a standard drain valve:
  - Manually open the drain valve by moving the valve lever located on the back of the drain valve to the manual open position. The fill valve eventually 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 optional drain valves:
  - For drain valves without the manual open lever, use the keypad to perform the cool down process.
  - Go to the control modes screen and select Manual Drain.
  - Allow approximately half the water to drain out of the tank.
  - In the Control Modes screen select Auto; the fill valve opens and the humidifier cools down.
  - When the fill valve closes, select Manual Drain in the Control Modes screen and let the tank drain dry. The humidifier should be cool enough to work on.
  - For more information about using the keypad, see the *Vapor-logic4 Installation and Operation Manual.*

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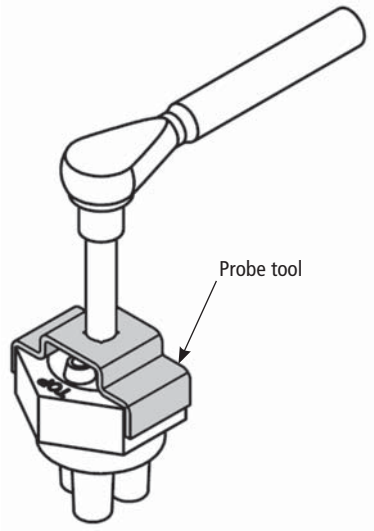
Tap/softened water

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.
   - Measure current draw of heaters and verify amp values per stage by comparing to the wiring diagram located inside the control cabinet. This identifies any burned out heaters. Only qualified electrical personnel should perform this task.
2. **Seasonally** (or as required, depending on water quality)
   - Cleaning the tank
     - Remove cleanout plate; slide the cleanout tray out, and dispose of any loose scale that has collected in the tray.
     - Remove any additional scale that has accumulated on the bottom of the humidifier tank. This should be done before the scale buildup reaches the bottom of the heaters.
     - 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
     - The probe assembly is located under the heater terminal cover. Access the probe assembly through the probe cover located on the end of the heater terminal cover.
     - Disconnect the probe plug and cable assembly and unscrew the probe rod assembly from the humidifier probe housing using the probe tool (see Figure 63-1).
     - Inspect the probe housing and clean, ensuring that all the housing passageways are clear. Remove the housing from the holding bracket by removing the humidifier cover and sliding the housing horizontally toward the open end of the bracket.
     - The scale should flake off easily from the probe assembly rods.
     - The bottom 3/8" (10 mm) of each rod is the sensing portion; clean these areas 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.
     - Apply silicon sealant to the probe gasket, and reassemble the probe assembly using the probe tool (see Figure 63-1).

Figure 63-1: 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 DRI-STEEM representative (Part no. 185101).

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Tap/softened water

Humidifier De-scaling Solution

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

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

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- 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.
  - 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 maintenance requirements are complete:
  - Slide the cleanout tray back into the tank.
  - Hook the tab on the backside of the cleanout plate over the edge of the cleanout tray and slide the cleanout plate over the tank studs.
  - Torque the cleanout plate nuts to 25 to 35 in-lb (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 and doors.
  - 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:
     - Heaters
     - Probe rods
     - Skimmer port and water seal
     - Humidifier tank
   - After cleaning, the humidifier should remain empty until humidification is required.

DI/RO water option

Recommendations for DI/RO water humidifiers

- Verify regularly that water processing equipment is operating correctly. The presence of chlorides in improperly processed DI water can cause pitting and failure of the tank and its components. Your DRI-STEEM warranty does not cover damage caused by chloride corrosion.
- Vaporstream humidifiers with DI/RO water option:
  - Do not require regular cleaning, although regular inspections are advised.
  - Do not require skimming or draining and flushing to remove precipitated minerals; however, all DI/RO humidifiers should be drained at the end of a humidification season either by manually opening the drain valve or by programming the humidifier to automatically drain at end-of-season (electric fill and drain valve required).

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.
- Verify that there is no call for humidity and that the aquastat set point (adjusted using the keypad/display Set Up screens) is less than room temperature (default setting is 40 °F [4 °C]) so that the heaters do not energize while cooling down the tank.
- For 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.
- For models with end-of-season drain option:
  - Use the keypad/display to perform the cool down process.
  - 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.
  - For more information about using the keypad/display, see the *Vapor-logic4 Installation and Operation Manual*.

⚠ WARNING

Electric shock hazard

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

When performing maintenance on the humidifier:

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

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⚠ WARNING

Hot 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 DRI-STEEM Drane-kooler™.

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DI/RO water option

Note:

When replacing the cleanout plate, tighten nuts to a torque measurement of 40 in-lb (4.5 N-m).

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 cutoff switch
   - Measure current draw of heaters and verify amp values per stage by comparing to the wiring diagram located inside the control cabinet. This identifies any burned out heaters. Only qualified electrical personnel should perform this task.
   - 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 DI/RO-water Vaporstream, no cleaning or flushing of the humidifier should be necessary.
2. **Off-season maintenance**
   - Perform a complete inspection of the following:
     - Heaters
     - Float valve
     - Low water cutoff switch
     - Humidifier tank and gaskets
   - After inspection, the humidifier should remain empty until humidification is required.

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 61.

⚠ WARNING

Electric shock hazard

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

When performing maintenance on the humidifier:

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

mc_031110_0444

Table 67-1: 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.

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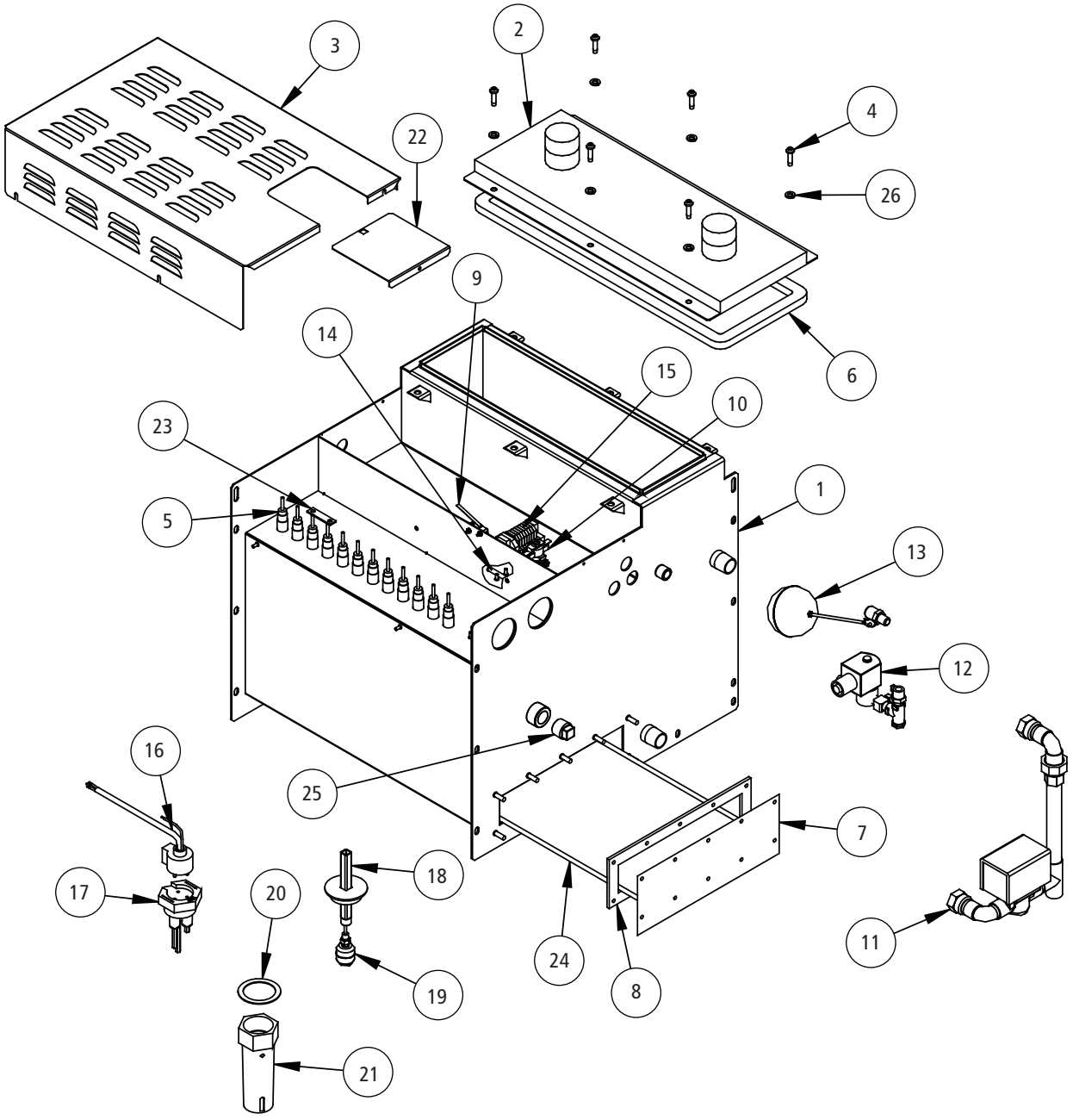
Humidifier

Figure 68-1:
Vaporstream tank replacement parts



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

VLC-OM-033

Humidifier

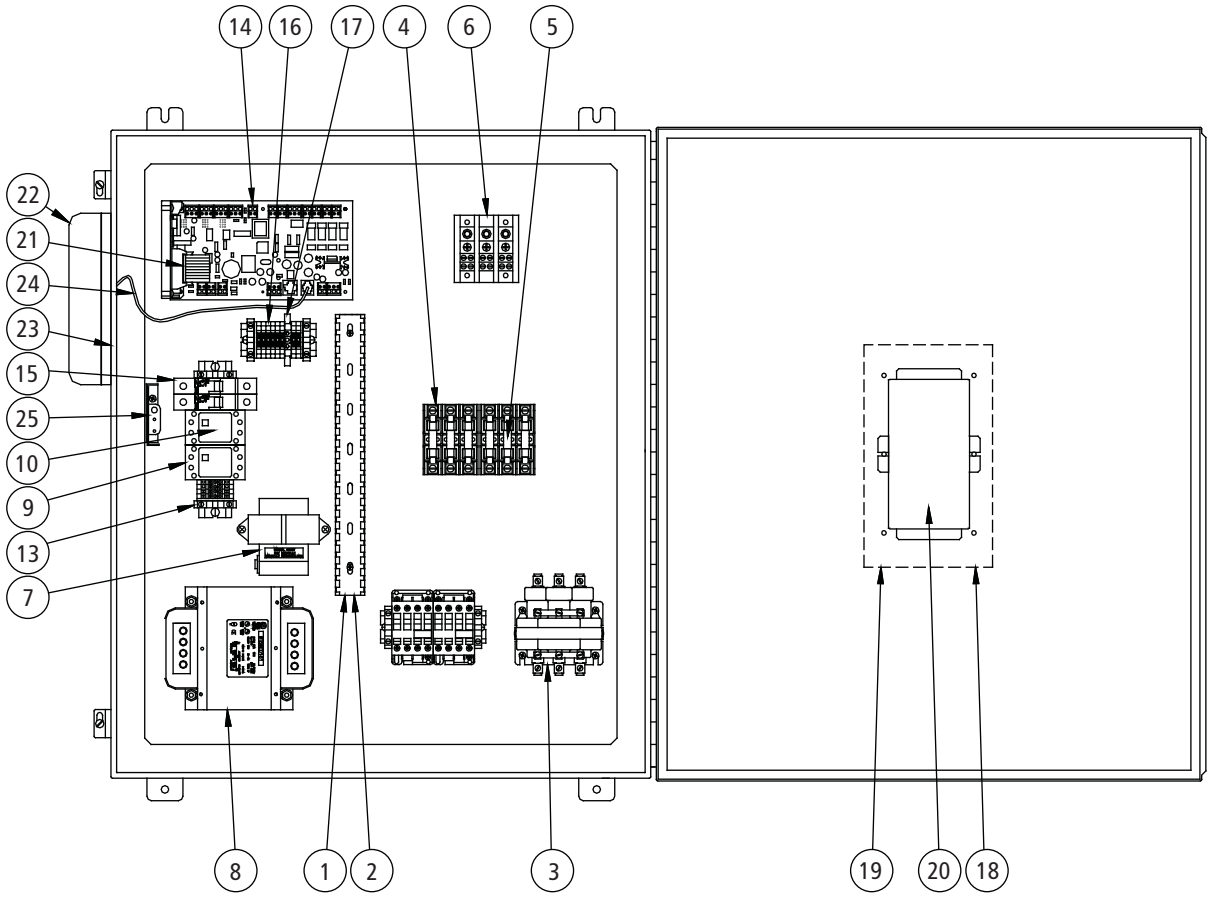
Table 69-1:
Tank replacement parts list

No.	Description	Models used	Part no.
1	Tank	All	*
2	Cover	All	*
3	Cover, heater louvered	All	167745- *
4	Pan-head mach. screw, ¼ - 20 x 1"	All	700300-013
5	Heater	All	409600- *
6	Gasket, cover	All	160691- *
7	Cleanout plate	All	165472
8	Gasket, cleanout plate	All	308225
9	Switch, door interlock	All	408475
10	Thermal cut-out	All	409560-001
11	Drain valve assembly	All	*
12	Fill valve assembly	Vaporstream with tap/softened water	*
13	Float valve assembly	Vaporstream with DI/RO water	*
14	Temperature sensor	All	405760-002
15	DIN rail mounted terminals	All	*
16	Probe plug assembly	Vaporstream with tap/softened water	406050-101
17	Probe assembly	Vaporstream with tap/softened water	406303-011
18	Low water tube	Vaporstream with DI/RO water	167790
19	Low water cut-out switch	Vaporstream with DI/RO water	408420-002
20	Gasket, probe	All	309750-004
21	Probe housing	All	308500
22	Probe cover	All	167746
23	Buss bar	All	*
24	Cleanout tray	6, 9, and 12 heater Vaporstream with tap/softened water	167770- *
25	Plug, ¾" NPT	All	250192-075
26	Washer, ¼" standard lock	All	700300-005

* Specify humidifier model and serial number when ordering.

Control cabinet

Figure 70-1:
Control cabinet replacement parts



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

VLC-OM-035

Control cabinet

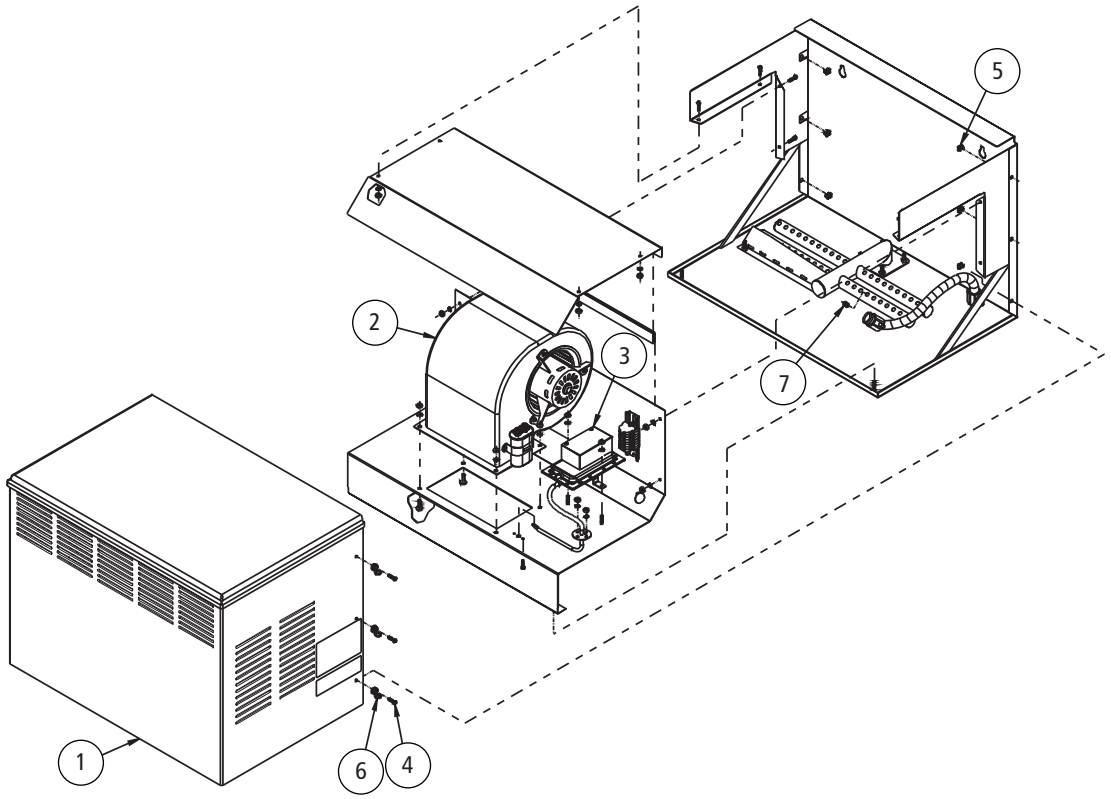
Table 71-1:
Control cabinet replacement parts

No.	Description	Models that use this part	Part no.
1	Wire channel, 1" x 1"	All	408999-001
2	Wire channel, cover	All	408999-002
3	Contactor	Standard	407001- *
4	Fuse holder	Model and voltage dependent	*
5	Fuse	Model and voltage dependent	*
6	Power block	Model and voltage dependent	*
7	Transformer, 24 V	All	*
8	Transformer, 120 V	Optional SDU or Area-type fan dispersion	*
9	Relay socket	SDU or Area-type	407900-011
10	Relay, 24V DPDT	SDU or Area-type	407900-016
11	Relay socket (3PDT)	All	407900-021
12	Relay, 24V (3PDT)	All	407900-017
13	Terminal end bracket	All	408252-006
14	Board, Vapor-logic4 main microprocessor	All	408495-001
15	Circuit breaker, single pole	Optional SDU or Area-type fan dispersion	406775- *
16	20 amp DIN rail terminal	All	408252-001
17	Terminal ground	All	408252-010
18	SSR	SSR control	*
19	Gasket, SSR	SSR control	*
20	Cover, SSR	SSR control	165545
21	Ribbon cable	Multiple stage	408490-016
22	Board, Vapor-logic4 keypad/ display	All	408495-002
23	Vapor-logic4 jack with plate	Mounted keypad/display	408490-017
24	Cable assembly, Vapor-logic4 keypad/display	All	408490- *
25	Door interlock, electric switch	Door interlock option	408470

* Specify humidifier model and serial number when ordering.

SDU-I

Figure 72-1:
SDU-I replacement parts



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OM-1504

Table 72-1:
SDU-I replacement parts

No.	Description	Qty.	Part number
1	Shroud	1	330001-002
2	Blower, SDU external assembly	1	*
3	Switch, airflow	1	406190
4	Screw, 8-32 × 1½" PHMS Phillips	6	700170-007
5	Nut retainer, 8-32	6	409593-001
6	Cap, black	6	409593-002
7	Tubelet, 0.375" × 0.375" molded	44	310280-006

* This is an assembly of multiple parts.

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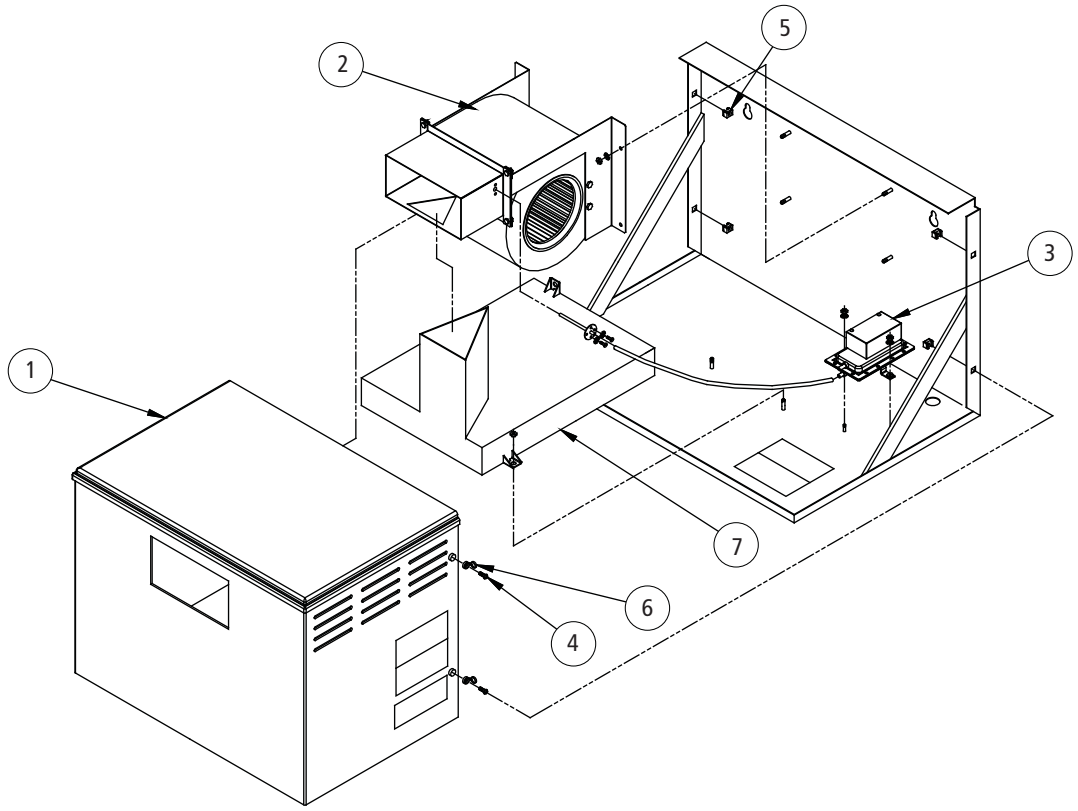
SDU-E

Figure 73-1:
SDU-E replacement parts



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OM-1503

Table 73-1:
SDU-E replacement parts

No.	Description	Qty.	Part number
1	Shroud	1	330002-001
2	Blower, SDU external assembly	1	*
3	Switch, airflow	1	406190
4	Screw, 8-32 × 1½" PHMS Phillips	4	700170-007
5	Nut retainer, 8-32	4	409593-001
6	Cap, black	4	409593-002
7	Dispersion chamber for SDU with 1½" outlet	1	160445-003
	Dispersion chamber for SDU with 2" outlet	1	160445-004

* This is an assembly of multiple parts.

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Outdoor Enclosure

Figure 74-1:
Outdoor Enclosure replacement parts

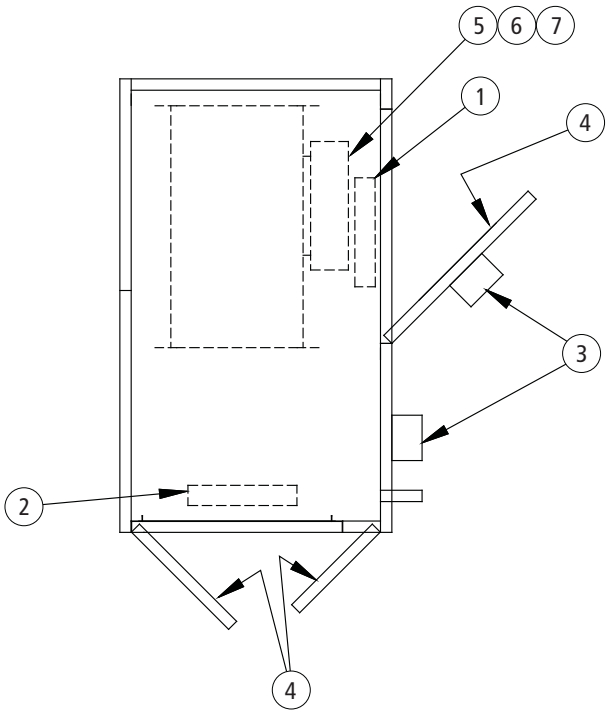

Table 74-1:
Outdoor Enclosure replacement parts

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, low limit	405800-066
7	Stat, heater	405800-066
8	Stat, fan	405800-067

* Specify quantity in feet

Expect quality from the industry leader

For more than 45 years, DRI-STEEM has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of the Vaporstream humidifier, which features cleanable, stainless steel construction. DRI-STEEM 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 production information visit our Web site:
www.dristeem.com

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Continuous product improvement is a policy of DRI-STEEM Corporation; therefore, product features and specifications are subject to change without notice.

Form No. VLC-IOM-0311
Part No. 890000-801 Rev F

Two-year Limited Warranty

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

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

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

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

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

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